Protected Areas - Not just for Biodiversity Conservation

The Contributions of Protected Areas to the Economic and Social Development in Bhutan, Costa Rica and Benin

Mary Luz Moreno Díaz
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Benin. Shea nuts *(Vitellaria paradoxa)* processing. Tchaourou-Toui-Kilibo (TTK) classified forest. Judicael Alladatin.

Bhutan. Farmers displaying their collection of caterpillar fungus *(Cordyceps sinensis)* at a Thimphu auction. Sonam Choden

Costa Rica. Tourist in one of the waterfalls in Rincón de la Vieja National Park. Carlos Mora.

Bhutan. Capped Langur *(Trachypithecus pileatus),* Trashiyangtse. Sonam Choden.

Costa Rica. Garrobo. *(Ctenosaura similis).* Palo Verde National Park. Fiorella Salas.

Benin. Elephants (*Loxodonta africana*) in Pendjari Biosphere Reserve. Anne Floquet.

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Preface

This book is part of the outcomes of the Project "Systematization and Analysis of the Contributions of the National Parks and Biological Reserves to the Economic and Social Development in Costa Rica, Benin and Bhutan".

Institutions taking part in the project were as follows: Costa Rica: the International Centre in Economic Policy for Sustainable Development (CINPE in Spanish), National University (UNA in Spanish). Bhutan: The Nature Conservation Division (NCD), Department of Forest, Ministry of Agriculture, Royal Government of Bhutan. Benin: Beninese Centre for the Environment and Socio-Economic Development (CEBEDES in French).

This project was executed under the Program of South-South Cooperation, financed by the Kingdom of the Netherlands and administrated by FUNDECOOPERACION with the support of national organizations. The project was developed from November 30th, 2008 to 2010 August 30th.

The main objective of the project was to systematize and analyze the socioeconomic contribution -decentralized and centralized - of the national parks and biological reserves to the economic and social development of Costa Rica, Bhutan and Benin and to develop recommendations for management policies of protected areas targeting the involved policymakers.

National parks and biological reserves play essential functions in the social, economic and environmental development of the three countries. Around these areas many economic activities are developed because of the presence of the parks and reserves and communities nearby develop strong economic, social and cultural ties. But such effects of the protected areas are overlooked. Benin and Bhutan had no systematic studies assessing the real social and economic benefits of protected areas to the country since their establishment. In Costa Rica, an innovative methodology had been developed by CINPE and INBIO in 2002 for such quantification; nevertheless it had only been applied in three of the 28 national parks and 8 biological reserves that exist in Costa Rica.

The project therefore aimed at validating the methodology and updating the figures for Costa Rica and at adapting this methodology to two very different countries such as Benin and Bhutan. Teams in the three countries started to work in November 2008. There was a constant collaboration between the teams over almost two years, in order to develop the activities simultaneously in the three countries. In spite of the differences not only in cultural aspects but also in geographical and climatic aspects, all the activities were developed successfully and the main objective of the project was accomplished.

Around 1500 people from Costa Rica, Benin, Bhutan and other countries participated directly and indirectly in the project. This people participated in activities like workshops, answering the surveys, giving interviews at the different stages of the project, validating results, among others. In each of the countries, results were presented and delivered to the direct beneficiaries, who are going to use this information in order to improve the management of Protected Areas.

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List of Acronyms

ABE: Agence Béninoise pour l'Environnement.

ABTO: Association of Bhutanese Tour Operators.

ACA-HN: Huetar North Conservation Area (Área de Conservación Huetar Norte).

ACA-T: Arenal-Tempisque Conservation Area (Área de Conservación Arenal Tempisque).

ACCVC: Central Volcanic Range Conservation Area (Área de Conservación Cordillera Volcánica Central).

ACG: Guanacaste Conservation Area (Área de Conservación Guanacaste).

ACLA-C: La Amistad-Caribe Conservation Area (Área de Conservación La Amistad – Caribe).

ACLA-P: La Amistad-Pacífico Conservation Area (Área de Conservación La Amistad - Pacífico).

ACMIC: Coco's Island Marine Conservation Area (Área de Conservación Marina Isla del Coco).

ACOPAC: Central Pacific Conservation Area (Área de Consevación Pacífico Central).

ACOSA: Osa Conservation Area (Área de Conservación Osa).

ACTO: Tortuguero Conservation Area (Área de Conservación Tortuguero).

AET: Average Expense per Tourism.

AOF: French speaking countries of West Africa.

ASADAS: Communal Associations administrators of Water and Sewerage Systems (Asociaciones Administradoras de Sistemas de Acueductos y Alcantarillados Comunales).

ASP: Wildlife Protected Areas **(**Áreas Silvestres Protegidas).

AVIGREF: Association Villageoise de Gestion des Réserves de Faune.

AyA: Costa Rican Institute of Water and Sewer (Instituto costarricense de Acueductos y Alcantarillados).

B&B: Bed and Breakfast.

BCCR: Central Bank of Costa Rica Rica (Banco Central de Costa Rica).

BLSS: Bhutan Living Standard Survey.

BR: Biological Reserve.

BTCL: Bhutan Tourism Corporation Limited.

BWS: Bumdeling Wildlife Sanctuary.

CA: Conservation Areas**.**

CAF: Certificate of Forest Payment.

CAFA: Certificate of Forest Payment in Advance.

CAFMA: Certificate of Forest Management (Certificado de Abono Forestal para Manejo de Bosque).

CATIE: Tropical Agronomical Education & Research Centre **(**Centro Agronómico Tropical de Investigación y Enseñanza).

CBD: Convention on Biological Diversity.

CBT: Community Based Tourism.

CCT: Tropical Science Center (Centro Científico Tropical).

CEBEDES: Centre Béninois pour l'Environnement et le Développement Economique et Social.

CEDARENA: Environmental Rights and Natural Resource Center (Centro de Derecho Ambiental y de los Recursos Naturales).

CENAGREF: Centre National de Gestion des Réserves de Faune (National Wildlife Management Centre).

CENATEL: Centre National de Télédétection (Remote sensing centre).

CGI: Corrugated Iron Roofing.

CGUA: Comite de gestion de l'unité d'aménagement.

CHPCA: Chhukha Hydro Power Corporation Limited.

CINPE: Centre on Economic Policies and Sustainable Development.

CITES: Convention on International Trade in Endangered Species of Fauna and Flora.

CNFL: National Power and Ligth Company (Compañía Nacional de Fuerza y Luz).

CNP: Corcovado National Park (Parque Nacional Corcovado).

CONAC: The National Conservation Areas Council (Consejo Nacional de Areas de Conservación).

CONAGEBIO: National Commission for Biodiversity Management (Comisión Nacional para la Gestión de la Biodiversidad de Costa Rica).

COOPEALFARO RUIZ: Alfaro Ruiz Cooperative (Cooperativa Alfaro Ruiz).

COOPELESCA: San Carlos' Rural Eletrification Cooperative (Cooperativa de Electrificación Rural de San Carlos).

COOPESANTOS: Santos Cooperative (Cooperativa de Santos).

CORAC: Regional Council of Conservation Areas (Consejos Regionales de las Áreas de Conservación).

CRUSA: Foundation for Cooperation (Fundación para la Cooperación).

CTD: Certificate of Tourist Development.

CST: Certification in Sustainable Tourism (Certificado para la Sostenibilidad Turística).

DGFRN: Direction Nationale des Forêts et Ressources Naturelles.

DGPC: Druk Green Power Corporation.

DGPCL: Druk Green Power Corporation Limited.

DK: Drake Bay (Bahía Drake).
DOF: Department of Forest.
DoFPS: Department of Forests and Park Services.
DPNP: Direction du Parc National de la Pendjari.
DSE: Sectorial Energy Directorate **(**Dirección Sectorial de Energía).
DzFO: Dzongkhag Forest Officers.
EARTH: School of Agriculture of the Wet Tropical Region (Escuela de Agricultura de la Región Tropical Húmeda).
ECOPAS: Projet Régional de Conservation de la Diversité Biologique dans les Aires Protegées.
EIA: Environment Impact Assessment.
ELAP: Latin School of Protected Areas **(**Escuela Latinoamericana de Áreas Protegidas).
ENCC: National Strategy of Climate Change (Estrategia Nacional de Cambio Climático).
ESP: Elementary Service Personnel.
FAO: Food and Agriculture Organization.
FCFA: Franc de la Communauté Financière Africaine (currency of the Financial African Community – XOF).
FEO: Forestry Extension Officers.
FMS: Forest Management Section.
FNCA: Forest and Nature Conservation Act.
FNCR: Forest and Nature Conservation Rules.
FONAFIFO: National Found for forest Financing (Fondo Nacional de Financiamiento Forestal).
FPN: National Parks Fund (Fondo de Parques Nacionales).
FPUD-DoF: Forest Protection and Utilization Division-Department of Forests
FR: Forestal Reserves.
FRDD: Forest Resource Development Section.
FYP: Five Year Plan.
GDP: Gross Domestic Product.
GEF: Global Environment Facility.
GHG: Green House Gases.
GLOF: Glacial Lake Outburst Flood.
GMP Average Expense per person (Gasto Promedio por Turista).
GNHC: Gross National Happiness Commission.
GTZ: German International Cooperation.
HDI: Human Development Index.

HWS: Human Wildlife Section.
ICBR: Isla del Caño Biological Reserve (Reserva Biologica Isla del Caño).
ICDP: Integrated Conservation Development Programs.
ICE: Electricity Costa Rican Institute (Instituto Costarricense de Electricidad).
ICT: Costa Rican Instituto of Tourism (Instituto Costarricense de Turismo).
ICTSD: International Centre for Trade and Sustainable Development.
INBio: Instituto Nacional de Biodiversidad (National Institute of Biodiversity).
INCAE: Central American Institute of Business Administration (Instituto Centroamericano de Administración de Empresas).
INCOPESCA: Costa Rican Intitute of Fishery and Agriculture **(**Instituto Costarricense de Pesca y Agricultura).
INEC: National Institute of Statistics and Census **(**Instituto Nacional de Estadísticas y Censos).
INSAE: Institut National de la Statistique et de l'Analyse Economique.
IPC: Consumer Price Index (Índice de precio del consumidor).
ITMS: Institute of Traditional Medicine Services.
IUCN: International Union for Conservation of Nature.
JASEC: Cartago**'**s Administrative Board of Electric Services (Junta Administradora de Servicios Eléctricos de Cartago).
JDNP : Jigme Dorji National Park.
JSWNP: Jigme Singye Wangchuck National Park.
KFW: Kreditanstalt für Wiederaufbau (Reconstruction Credit Institute).
KHP: Kurichu hydropower plant.
KWH: Kilowatts per hour (Kilowats por hora).
MAB: Man and Biosphere.
MAG: Ministry of Agriculture and Livestock (Ministerio de Agricultura y Ganadería).
MEHU: Ministry for Environment, Habitat and Urbanism.
MEPN: Ministry for Environment and Protection of Natural Resources.
MINAE: Ministry of Environment and Energy (Ministerio de Ambiente y Energía).
MINAET: Ministry of Energy, Environment and Telecommunications.
MIPYMES: Micro, Small and Medium Companies (Micro pequeña y mediana empresa).
MIRENEM: Ministry of Natural Resources, Energy and Mines **(**Ministerio de Recursos Naturales, Energía y Minas).
MoA: Ministry of Agriculture.
MoAF: Ministry of Agriculture and Forest.

MW: Mega Watt.
NBC: National Biodiversity Center.
NCD: National Conservation Division.
NEAP: National Environment Action Plan.
NEOTROPICA: Neotropica Foundation (Fundación Neotropica).
NGOs: Non-governmental Organization (Organización No-Gubernamental).
NP: National Park.
NPBR: National Parks and Biological Reserves.
NRDCL: Natural Resources Development Corporation Limited.
NSB: National Statistical Bureau.
NTFP: Non-Timber Forest Products.
NWFP: Non Wood Forest Product.
OET: Organization for Tropical Studies (Organización de Estudios Tropicales).
ONAB: National Wood Office (Office National de Bois).
ONF: National Forest Office.
PA: Protected Area.
PADAP: Development of Protected Areas.
PAMF: Projet d'aménagement des massifs forestiers (Forest management project).
PAs: Protected Areas.
PBF II : Projet Bois de Feu phase II (Fuelwood project, second phase).
PBR: Pendjari Biosphere Reserve.
PCGPN: Programme de Conservation et de Gestion des Parcs Nationaux.
PES: Payment for Environmental Services (Pago por Servicios Ambientales).
PGFTR: Forests and adjacent land Management project.
PGRN: Projet de Gestion des Ressources Naturelles.
PHCB: Population and Housing Censuses.
PJ: Jimenez' Port **(**Puerto Jiménez**)**.
PM: Management Plan.
PNE: Natural Heritage of the State **(**Patrimonio Natural del Estado**)**.
PNP: Parc National de la Pendjari.
PNUD: United Nations Development Programme (Programa de Naciones Unidas para el Desarrollo).
ProCGRN: Conservation and Management of Natural Resources Program.
PSA: Payment for Environmental Services (Pago por servicios ambientales).
PSC: Program for South-South Cooperation (Programa de Cooperación Sur-Sur).

PVNP: Palo Verde National Park (Parque Nacional Palo Verde).
PWS: Phibsoo Wildlife Sanctuary.
PZ: Protected Zones.
R&D: Research and Development.
RAMSAR: The Convention on Wetlands (Convención para el Manejo de Humedales).
RBIC: Caño Island Biological Reserve (Reserva Biologica Isla del Caño).
RDC: Research Development Research Centre.
REDPARQUES: Latin American Network of Technical Cooperation on National Parks, other protected areas and Wild Flora and Fauna (Red Latinoamericana de Cooperación Técnica en Parques Nacionales, otras Áreas Protegidas, Flora y Fauna Silvestres).
RFGD: Golfo Dulce Forest Reserve (Reserva Forestal Golfo Dulce).
RGOB: Royal Government of Bhutan.
RGPH Recensement Général de la Population et de l'Habitation.
RMA: Royal Monetary Authority of Bhutan.
RMNP: Royal Manas National Park.
RNR: Renewable Natural Resources.
RNRRC: Renewable Natural Resources Research Centre.
RVNP: Rincón de la Vieja National Park (Parque Nacional Rincón de la Vieja).
RWS: Rural Water Supply.
SAARC: South Asian Association for Regional Corporation.
SINAC: National System of Conservation Areas (Sistema Nacional de Áreas de Conservación).
SPN National Park Service (Servicio de Parques Nacionales)
SWOT: Strength, Weaknesses, Opportunities and Threats.
SWS: Sakteng Wildlife Sanctuary.
TCB: Tourism Council of Bhutan.
TCP: Average Exchange Rate (Tipo de Cambio Promedio).
TDF: Tourism Development Fund.
THPA: Tala HydroPower Authority.
TL: Truck Load.
TNC: The Nature Conservancy.
TNP: Thrumshingla National Park.
TSNR: Toorsa Strict Nature Reserve.
TTK: Tchaourou Toui Kilibo.
U-AVIGREF: Union of the Association Villageoise de Gestion des Ressources de Faune (Fauna Management Village Association).

UCI: University of the International Cooperation (Universidad para la Cooperación Internacional).
UICN: International Union for Conservation of Nature (Unión Internacional para la Conservación de la Naturaleza).
UNA: National University of Costa Rica (Universidad Nacional).
UN/GEF: United Nations/Global Environment Facility.
UNCCD: United Nations Convention on Combating Desertification.
UNCED: United Nations Conference on Environment and Development.
UNDP: United Nations Development Program.
UNEP: United Nations Environment Program.
UNESCO: United Nations Educational, Scientific and Cultural Organization.
UNFCCC: United Nations Framework Convention on Climate Change.
USA: United States of America.
UWICE: Ugyen Wangchuck Institute for Conservation and Environment.
VA: Value added.
WAPOK: Transnational protected areas W-Arly-Pendjari-Otti-Mandouri-Kéran.
WCD: Wildlife Conservation Division.
WCP: Wangchuck Centennial Park.
WHO: World Health Organization.
WMD: Watershed Management Division.
WNP: W National Park.
WPA: Wild Protected Areas.
WWF: World Wildlife Fund.
ZCP: Zone cynegetique (Game Hunting Area).
ZOC: Zone d'occupation controllée (zone under controlled use).

Assessing contributions of National parks, Biological Reserves, Biosphere Reserves and Community forests to economic and social development in Bhutan, Costa Rica and Benin: an introduction

Roch L. Mongbo

This book is about actual economic and social benefits derived from protected natural ecosystems. National parks and biological reserves appear now as taken for granted and the worldwide apparent consensus on the need for parks, bio-reserves and other protected areas make it unlikely that anyone dares to voice contest as to their utility. Nevertheless, protected areas remain, or are to a large extent considered as economic and financial burden to societies as to the opportunity costs of not converting forests into alternative economic and social use, and, most importantly, for the actual financial and political costs of the institutional and operational mechanisms needed to contain and prevent various attempts to conversion. The burden is even felt much heavier when one takes into consideration all the competing claims on these resources in contexts of scarcity and endemic poverty. In fact, devoting more effort to conservation may mean having fewer resources to address other pressing needs, such as improving education, health, or infrastructure (Pagiola et al. 2004), while 'the benefits provided by natural ecosystems are both widely recognized but poorly understood' (Daily, 1997), and therefore invaluable, making of nature conservation more of a fashion matter than of any real societal awareness of the values of preserved natural ecosystems.

As noticed by some authors (see Pagiola et al. 2004) 'what is increasingly clear is that natural ecosystems are under enormous pressure around the world from the growing demands placed on them by human economies. Growth in human populations and prosperity translates into increased conversion of natural ecosystems to agricultural, industrial, or residential use, but also into increased demand for ecosystem inputs, such as fresh water, fiber, and soil fertility, as well as increased pressure on the capacity of natural ecosystems to assimilate our waste, including air and water pollution as well as solid waste. In short, we are asking more and more from natural ecosystems even as we reduce their capacity to meet our needs.' Similar contradictory claims are put on biodiversity.

Attempts to provide public policy making processes on the conservation of natural ecosystems with hard data have raised questions as 'how valuable are the goods and services provided by natural ecosystems and what are these goods and services in the first place?'

The main framework adopted in this respect is the Total Economic Value (TEV) approach (see Pagiola et al. 2004) to record ***(1) the use values*** namely the direct use values (that refers to ecosystem goods and services that are used directly by human beings); the

indirect use values (derived from ecosystem services that provide benefits outside the ecosystem itself. Examples include the natural water filtration function of wetlands, which often benefits people far downstream, the storm protection function of coastal mangrove forests, which benefits coastal properties and infrastructure, and carbon sequestration, which benefits the entire global community by abating climate change) and the option values related to future potential uses; and ***(2) the non-use values,*** the pleasure of being aware of the existence of the resource, not attached to any use of it (for example Pearce and Warford, 1993).

The methods and techniques used in the Total Economic Value approach to estimate actual and hypothetical economic values of natural ecosystems and the goods and services they provide include among others, the revealed preference methods and the stated preference methods (see Pagiola et al. 2004: 11 for details). This framework has been widely applied in various contexts and dadaptations (see Lescuyer, 2000 as a case of African topical forests), and also as reviewed by Pagiola et al. 2004, (Hufschmidt et al., 1983; Pearce and Markandya, 1989; Braden and Kolstad, 1991; Pearce, 1993; Dixon et al., 1994; Johansson, 1994; Willis and Corkindale, 1995; Seroa da Motta. 1998, 2001; Garrod and Willis, 1999; Freeman, 2003; etc.).

Our basic assumption in this book is that a systematic valuation of all the actual tangible economic and social benefits derived by local and national communities from protected areas will shed substantial light on the societal importance of these ecosystems and allow informed public debate as to their conservation. Hence, we are rather concerned with tangible economic and social benefits derived from preserved natural ecosystems at local communities but also regional and national levels, here and now. In this respect, we present in this book a systematic record and analysis of the contributions of the national parks, biological reserves and community forests to the economic and social development in Costa Rica, Benin and Bhutan. The challenge for us is to feed public debates and national policy making processes in nature conservation with concrete data on the actual roles played by these parks, biosphere reserves and community forests in economic and social processes locally, regionally and nationally. In addition to taking stock of the economic benefits and social networks induced by these ecosystems, the book gives a critical attention to the actual distribution of these benefits at different levels and among the stakeholders, questioning therefore their actual and potential contribution to social justice and local economic development.

As far as methodology is concerned, the same basic approach was used, that consisted of computing all added values generated from the protected areas from local to national levels as part of the Gross Domestic Product, as well as analyzing the social networks entailed. This methodology was previously elaborated and tested for two years in Costa Rica. For the present application, each country team adapted the methodology to its particular national context.

In Costa Rica, the local and national development of economic activities emerging from each national park up to the national level, supported the idea of using cluster analysis as a conceptual framework to organize data collection and analysis. A cluster is a geographical concentration of enterprises operating in the same sector. This conceptual framework emerged from the industrial sector and found some applications in the agricultural food industries, whereby the activity clusters development initiated at a local level around a particular industry can expand all the way to induce a regional and national development (Hirschman, 1963). The actual web of economic activities that emerge around the national parks in Costa Rica from the parks up to regional and national levels, together with the social development that follows are to a large extent close to the industrial cluster picture. Therefore, the research team made a systematic inventory of the cluster units emerging from around the investigated national parks and trace the benefits of these activities upward to regional and national levels.

In Bhutan, people living their everyday life within and in harmony with nature is at the heart of conservation culture and policies. Riparian communities' livelihoods and spiritual wellbeing are strongly connected to neighboring ecosystems. Tourists visits are under the monitoring of state bodies, within a limit to avoid too high pressure. Here then, the actual market value of the goods and services derived from the forests are of less importance than actual satisfaction and wellbeing the riparian and national communities derived from them. Therefore, the methodology was not just about recording added values along a market chains, but also estimating the market values of the actual goods and services riparian and national communities derive from the parks in their everyday lives.

In Benin, the three protected areas investigated showed in various ways some proximity with one or the other states presented here of Costa Rica and Bhutan. Around the national parks and the classified state forests, there is the emergence of value chains on specific goods and services, that connect local community stakeholders to regional and national, even international actors and commodity chains, as in the cases of tourism and fish value chains from the Pendjari Park up to neighboring countries as Burkina Faso and Nigeria. On the other hand, the community forests are central to riparian communities' livelihoods (as in Bhutan) while at the same time the bedrock of numerous value chains involving local, regional and even national stakeholders. Because of the high number of different products and services more or less connected to each other, the value chain conceptual framework was found more applicable to this particular context of still lose cluster development. The systematic recording of the economic and social benefits of the protected areas to local and national communities was based on this specific features.

This approach allowed us to assess the benefits from protected ecosystems in these three particular countries under the same methodological framework while taking into account each country's specific nature and dynamics. The particular project context of this research allowed each country team to visit the two others in order to have a direct experience of

nature conservation culture, policies and practices there. Also, the three teams gathered in Bhutan to exchange and discuss their findings and analysis. Hence, all the authors of this book were able to present and discuss their findings in their own country, bearing in mind the specificities and learning from the two other countries. The account given here of the outcomes of this endeavor therefore goes beyond a simple compilation of three country case studies and is organized into four parts:

The first part provides the reader with a historical perspective as well as the present state of wildlife conservation and management in Bhutan, Costa Rica and Benin, which at the outset gives the picture of the common patterns and particular specificities at presence. The clear message from this part is that the current face of wildlife conservation culture, policies and practices in each of the three countries are historically constructed, grounded on the specific nature, geography, livelihoods and political environment.

In Bhutan, it is of common ground knowledge that Bhutanese have been living in harmony with nature for centuries. Individual households as well as local communities, royal and religious institutions and modern state administration are full part of this history. The chapter one devoted in this part to the Bhutan case present the major historical development in nature management, with some emphasis on its present status and management schemes.

In Costa Rica, the history of national park is the one of making the best and shared use of nature in a context of liberal democratic society. The environmental organizational structure combines public and private interests from local to national levels. The actual stakes shared by these actors in the Costa Rican nature economy operate as a strong support to the conservation policies and strategies of the ecosystems concerned.

In Benin to some extent, the historical development of ecosystems conservation bridges the Bhutanese and Costa Rican cases. Some community ecosystems were not, until recently, under state environmental administration, while their geographical location did not allow any early or hard incorporation in the market economy (which is the case of the Hlanzoun forest investigated in this project). In those cases, the riparian communities has been living in harmony with nature for centuries (as in Bhutan), and still maintain this to some extent. For the other types of protected areas, they were considered until recently as the symbols of the colonial arbitrary power and domination over areas and ecosystem considered as belonging to the communities. To the views of these communities, the post independence national state proceeded with the same colonial arbitrary power. While the successive state bureaucracies has presented ecosystem conservation as in the interest of and ***For the People***, the latter has experienced it as ***Against the People***. The participatory approaches launched early nineties have tried to reverse this feeling and started a policy of nature conservation ***With the People***, allowing the emergence and development of some private business around ecosystems goods and services, closer to the Costa Rican model.

The historical perspective of wildlife conservation in the three countries also shows the various financial arrangements in place for meeting conservation expenses and is very instructive as to their potential for sustainability.

The second part of the book is fully devoted to the conceptual and methodological frameworks of the research. The first chapter of this part, chapter 4, presents the cluster analytical framework for an investigation in the development induced by national parks and biological reserves. A methodological matrix is designed for a systematic collection of needed information that was derived from the previous Costa Rican pilot experience. The three other chapters in this part present the process through which each country team went to adapt the matrix to its particular context. In all three countries, the national account of the economic contributions of protected areas to gross domestic product is done, using the matrix frame. Then, the methodology chapters present the procedure used in each country context for the selection of case studies, the data collection and analysis, and their validation on the national scenes.

The third part of the book (chapters 8, 9 and 10) presents the results of the investigations in each country, taking the reader to the heart of the contributions of the existence of national parks, biological reserves and other protected areas in Bhutan, Costa Rica and Benin. The estimation of the contributions is done at national and case studies levels.

In Bhutan, the cases selected are (1) Bumdeling Wildlife Sanctuary (BWS), (2) Jigme Dorji National Park (JDNP), and (3) Jigme Singye Wangchuck National Park (JSWNP).

In Costa Rica, the case studies parks are (1) Corcovado National Park (CNP) and Isla del Caño Biological Reserve (ICBR), (2) Rincón de la Vieja National Park and (3) Palo Verde National Park.

In Benin, cases selected include (1) Pendjari Biosphere Reserve, (2) Tchaourou-Toui-Kilibo gazetted Forest (TTK) and (3) Hlanzoun Community Protected Area.

The last part of the book elaborates policy recommendations on protected areas and their contributions to economic and social development, as they flow from the findings and analysis. Policy recommendations are presented per country. In each country, recommendations address national conservation policy as well as each of the three individual protected areas investigated in the studies.

In Bhutan, people live within protected areas with the rights of making a living out of resources. Recommendations aim at designing a implementing a more collaborative management integrating conservation with sustainable rural livelihood in such a way that an increase of the benefits does not cause resource degradation.

In Benin and despite the enforcement of unitary legislation, the actual styles of protected areas management depends on areas historical background. A more systematic policy

should encourage benefits from conservation, with activities that preserve resource sustainability while protecting local people's rights on resources.

In Costa Rica, recommendations aim at enhancing benefits at local level for local communities and their small enterprises. They also encourages co-management through agreements between protected areas and local stakeholders on conservation issues.

The concluding chapter provides a crosscutting reading of the whole findings, analysis and discussions conducted within this project. In all cases, it appeared that environmental services from protected areas are not sufficiently paid for, neither nationally, nor internationally.

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PART I

Wildlife Conservation Areas and Management in Bhutan, Costa Rica and Benin: A Historical Perspective

Bhutan, Costa Rica and Benin. Could one imagine more different contexts for a comparative study on protected areas than a coastal West African, a land locked Himalayan and a Mesoamerican mountainous emergent country. In spite of these differences, this chapter shows in setting the scene of the investigations that there are many common issues shared by the three countries and that these issues all make the assessment of the economic benefits generated by a protected area particularly relevant for scientists, civil society and decision makers. Lessons also can be learnt from the different strategies each country has developed over time in order to put and keep areas under conservation.

Bhutan, 671,000 inhabitants on 38 thousands km², most of them rural and depending on natural resources for their livelihoods, has the largest part of its country under protection. This can be seen as the result of a strong political will and long term vision. Protected areas are not only very large, they are also interconnected. Protected areas are under the responsibility of a division within one Ministry. Such large parts of the country being put under a protection regime, protection had to cope with people living in these areas. In Bhutan local communities live within National Parks and have not been resettled outside. In order to reduce the pressure put on natural resources, the concept of Integrated Conservation and Development Program (ICDP) has been developed as an important tool in the management of protected areas. ICDPs recognize that biodiversity conservation in protected areas should integrate socio-economic needs of the local communities through participatory approaches and that measures have to be taken so that the resource used by local communities in the park area can be reduced or regulated.

Costa-Rica, in spite of its 4.5 million inhabitants on 51,100 km² reversed the trend of deforestation and destruction of wild habitats over the last decades in putting increasing parts of the country under protection, using a range of diverse forms of protected areas according to context. The whole country is now divided in 11 conservation areas. Inside each Conservation Area, different categories of Wildlife Protected Areas (WPA) can be found, such as National Parks, Biological Reserves, National Monuments, Wildlife Refuges, Forest Reserves, Protected Zones, and Wetlands so that 26% of the country area is under conservation. Small farmers were subsidized in an efficient way in order to keep part of their land under forest. Concerning National Parks and Biological Reserves, people are located outside the areas. Efficient conservation efforts made Costa Rican National Parks very famous and they attract millions of visitors. Protected areas are managed in a decentralized way and according to participatory management plans under the responsibility of a unique division in charge in the Conservation Areas. In spite of these successes, the costs of the maintenance of protected areas remain an issue.

Benin, now 7 million inhabitants on 126,000 km², inherited a large area of fauna reserves and gazetted forests designed in colonial times. 20% of the land area is therefore under protected areas. With a mainly rural population in bad needs of farming, grazing lands and fuel wood for their livelihoods, protected areas have to cope with their adjacent popula-

tion. Two types of protected areas in fauna rich savannahs and in forests developed two different traditions over time but are now facing similar questions. Efforts are currently to develop a coordinated approach for both types of protected areas in which all projects would have to be inserted with a unified set of administrative and financial procedures. In spite of stakeholders' participation, natural resources are put under threat and win-win solutions for conservation and income generation are not always easy to find out. But support of the local people is a must because they overtake much of the maintenance and control work which is to a large extent directly funded by users (hunters, loggers, etc.).

A more detailed description of the management in Bhutan, Costa Rica and Benin is presented in chapters 1, 2 and 3 respectively.

Chapter 1

Bhutan: Living in Harmony with Nature for Centuries

Sonam Choden

1. Introduction

One of the smallest countries in Asia is Bhutan, which is located in the Eastern Himalayas It is bordered by the Tibetan Plateau of China to the north and by India to the south, east and west, as shown in Figure 1.1. The country has an area of 38,394 km^2 with a maximum east-west dimension of 300 km and north-south dimension of 170 km (National Statistic Bureau [NSB], 2009b). Bhutan is also known as "Druk Yul" meaning "Land of the Thunder Dragon". The country has good forest cover with 72.5 percent (Ministry of Agriculture [MoA], 2002), and the Constitution of Bhutan 2008 mandates forest cover to be maintained at 60 percent for all times to come (Royal Government of Bhutan [RGoB], 2008).

Figure 1.1 Bhutan. Location map.

Source: http://www.bootan.com/bhutan/maps/btmap.shtml

The population of Bhutan was estimated to be 671,083 in 2008 and 683,407 in 2009 based on the projections of Population and Housing Censes (PHCB) conducted in 2005. In 2009 males made up 52 percent of that population and females constituted 48 percent. Thirty point nine percent of the population lived in urban areas while 69.1 percent of the

population lived in rural areas with agriculture being the main source of livelihood. The overall life expectancy was 66.3 years; female life expectancy was 66.9 years and male life expectancy 65.7 years (Population and Housing Census of Bhutan [PHCB], 2005). The average household family size was 5.0 (NSB, 2007).

Dzongkha is the national language and Buddhism the state religion. Bhutan was a Monarchy until 2007 and became the Democratic Constitutional Monarchy in 2008 with the first elected government headed by the Prime Minister. Ngultrum is the national currency which is pegged to the Indian rupee. The main exports are electricity, cement, agricultural products and handicrafts. The main sources of foreign exchange come from the hydropower and tourism sectors.

The country has extreme variation in elevation from 200 m in the south to over 7000 m in the north. Based on altitude, Bhutan is divided into three main ecological zones: the alpine zone (above 4000 m of altitude), the temperate zone (between 1000 and 4000 m of altitude) and the subtropical zone (between 200 and 1000 m of altitude). The highest peak, Jhomolhari, is in the west and reaches 7314 meters above sea level. There are nineteen other peaks which exceed 7000 meters. In the north, the snowcapped Great Himalayan Range reaches heights of over 7500 meters above sea level extending along the Bhutan-China border. The northern region consists of a range of glaciated mountain peaks with an arctic climate at the highest elevations. This range comprises the sources for Bhutan's major hydropower producing rivers (NSB, 2009a).

2. *Conservation Significance*

The conservation significance of Bhutan is largely due to its unique location in the Eastern Himalayas. Such location has blessed the country with rich biological resources that are representative of the three climatic/ecological zones. Bhutan is considered a global biodiversity hotspot, and three of the Global 200 Eco-regions classified by WWF can be found in the country. Bhutan has some of the largest and most pristine temperate forests in the entire Himalayan region (National Conservation Division [NCD], 2004).

Bhutan has very high levels of biological diversity at the ecosystem, species and genetic levels. Very few countries in the world match Bhutan's biological diversity, and fewer still have taken such strong steps to conserve their biodiversity. Bhutan ranks in the top ten percent of countries with the highest species density in the world, and it has the highest fraction of land in protected areas and the highest proportion of forest cover of any Asian country. The country is still among one of those few countries in the world that has 72.5 percent of forest cover (MoA, 2002) and over 51 percent of land under protected areas and biological corridor networks (MoA, 2009a).

Despite the small size, Bhutan has recorded over 7000 species of vascular plants including 46 species of rhododendrons and 423 species of orchids. As shown in Table 1.1, it is home to 200 species of mammals, 770 species of birds, 64 species of reptiles and 50 species of fish. About 800-900 species of butterflies are expected to be found in the country.

Table 1.1 Bhutan. Biological diversity.

Type	**No. of Species**
Plants	Over 7000
Rhododendrons	46
Orchids	423
Mammals	200
Birds	770
Reptiles	64
Fish	50
Butterflies	800-900

Sources: Gurung, 2006; MoA, 2009; NCD, 2003, 2004; Wangyal & Tenzin, 2009

Bhutan is the centerpiece of the Manas-Bhutan-Namdapha Complex, a Level I Tiger Conservation Unit rated by WWF as a priority tiger conservation landscape. Bhutan is also the only region in the world where Royal Bengal tigers have been sighted above 4000 meters and where tiger and snow leopard habitats overlap.

Bhutan is also important globally for bird conservation; according to the Birdlife International Classification, it has five key bird habitat regions. These include Sino-Himalayan mountain forests, Indo-Burmese forests, Indo-Gangetic grasslands, South Asian arid habitats and the Tibetan Plateau. Bhutan is home to many endangered and threatened species in the world: the Golden langur, which is found only in Bhutan and a few pockets in Assam, India; the Bhutan takin; the snow leopard, the rufous-necked hornbill; the white-bellied heron; wintering populations of black-necked cranes; and several other species (NCD, 2004).

In order to conserve and protect the rich biological resources of the country, the Royal Government of Bhutan has given high importance to conservation. Environmental conservation is one of the four pillars of "Gross National Happiness," a unique development philosophy promulgated by His Majesty the Fourth King of Bhutan. The guiding philosophy of Gross National Happiness places environmental conservation at the core of development along with spiritual and material development.

Article 5 of the Constitution of Bhutan mandates the Government to ensure a minimum forest cover of 60 percent for all times to come in order to conserve the country's natural resources and prevent degradation of fragile mountain ecosystems (RGoB, 2008). Such a balanced approach towards conservation and development has helped Bhutan keep intact its pristine environment up to this century. Bhutan has been awarded "Champion of the Earth Award 2005" by the United Nations for protecting the rich biodiversity. It has also received the 2006 J. Paul Getty Conservation Leadership Award from the WWF, USA for unprecedented conservation leadership and commitment towards conservation of the environment.

3. Conservation History

Conservation is not a new concept for Bhutan. The people of Bhutan have lived in harmony with nature for centuries. This is clear from the following statement made by His Majesty the Fourth King of Bhutan:

> *Throughout the centuries, the Bhutanese have treasured their natural environment and have looked upon it as the source of all life. This traditional reverence for nature has delivered us into the twentieth century with our environment still richly intact. We wish to continue living in harmony with nature and to pass on this rich heritage to our future generations. (RGoB, 1996)*

The Department of Forestry, the first government department to be established, was established in 1952 to oversee forestry activities. The office was based in Samtse, southern Bhutan and moved to Thimphu in 1973. The formalization of the principle of conservation against exploitation began with the enactment of the Bhutan Forest Act in 1969. The Act brought all forest resources under state control to curb exploitation and rationalize use of forest resources on a sustainable basis. It highlighted the importance placed by the government towards conservation of forest resources (NCD 2004).

In 1974 the national forest policy was formulated, which further consolidated the conservation importance put in place by the 1969 Forest Act. The policy aimed at ensuring conservation of the environment against economic exploitation and stipulated that 60 percent forest cover must be maintained for all times to come. In 1976 two wildlife circles known as northern wildlife circle and southern wildlife circle were established in Thimphu and Samtse, respectively, to oversee wildlife conservation in the country. These were later merged in 1990 to create the Nature Conservation Section, which was upgraded to a Division in 1992 (Department of Forest [DoF], 2002; NCD 2004).

The national system of protected areas was declared in 1983; it was mostly confined to the northern and southern part of the country. The Bhutan Trust Fund for Environmental Conservation was established in 1991 under the Royal Charter to sustain conservation programs in the country, especially in the protected areas. After the establishment of the

Nature Conservation Division in 1992, the protected areas system was revised in 1993 to make it more representative of all the important ecosystems found in the country. This resulted in the creation of four national parks, four wildlife sanctuaries and one strict nature reserve. In 1995, the Forest and Nature Conservation Act (FNCA) was enacted repealing the 1969 Bhutan Forest Act to address the emerging conservation needs including community participation and the management of protected areas.

In 1995, Bhutan also ratified two international conventions related to the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC). In order to fulfill the CBD obligations, Bhutan produced the first Biodiversity Action Plan in 1998, and subsequent revisions were made in 2002 and 2009 to update the progress made and incorporate new conservation needs. The declaration of biological corridors was made in 1999 to connect all protected areas through a network of natural forest corridors that provide a larger landscape for the conservation of species.

The Forest and Nature Conservation Rules of Bhutan were passed in 2000, and subsequent revisions were made in 2003 and 2006. The rules were passed to facilitate the smooth implementation of provisions in the 1995 FNCA. Bhutan also acceded to the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) in 2003, for which the focal agency is the NCD. Bhutan also acceded to the United Nations Convention on Combating Desertification (UNCCD) the same year.

The document titled "Vision and strategy for the Nature Conservation Division" was developed in 2003 to guide NCD in the management of the country's protected areas and biological corridors. According to this document, the vision of the NCD is to "maintain ecological integrity embedded in a social, economic and cultural environment mainly through management of coherent and viable nature conservation areas," and the mission is the "conservation and management of the natural biodiversity, primarily in the protected areas and the biological corridors of the country, in harmony with people's values and aspirations" (NCD, 2003).

The Biodiversity Act of Bhutan was enacted in 2003 to provide legal provisions on rights, access, benefit sharing, protection, offenses and penalties related to biodiversity resources. The Tiger Action Plan was developed in 2005 for the long term conservation of tigers in Bhutan. The Bhutan Biological Corridors Rules were passed in 2007 as an addendum to the 2006 Forest and Nature Conservation Rules of Bhutan to provide a legal framework for the management of biological corridors in Bhutan.

Bhutan National Human Wildlife Conflicts Management Strategy was developed in 2008 to mitigate and reduce human-wildlife conflicts in Bhutan.

Currently, work on the drafting of a separate Protected Areas and Wildlife Bill of Bhutan is underway.

3.1 Protected areas in Bhutan: The historical context.

Like many other countries, Bhutan also began establishing protected areas in the 1960s. After several centuries of self-imposed isolation, the country opened its doors to the outside world. Its first protected area, the present Royal Manas National Park, was designated in 1966. The concept of a national system of protected areas was introduced in 1974 with the declaration of eight protected areas, but the distribution was confined only to northern and southern parts of the country. This was followed by another five protected areas in 1983. In the same year, three protected areas in the north were consolidated to form Jigme Dorji Wildlife Sanctuary covering the entire northern part of the country (NCD, 2004).

Based on the international reviews conducted by organizations such as the International Union for Conservation of Nature (IUCN) and the World Wildlife Fund (WWF), Bhutan's system of protected areas was not found to be representative of all the major ecosystems present in the country. The 1983 system of protected areas as such was revised in 1993 to form four national parks, four wildlife sanctuaries and one strict nature reserve. They were Jigme Dorji National Park, Royal Manas National Park, Black Mountains National Park (now known as Jigme Singye Wangchuck National Park), and Thrumshingla National Park, Bumdeling Wildlife Sanctuary, Sakteng Wildlife Sanctuary, Phibsoo Wildlife Sanctuary, Khaling Wildlife Sanctuary and Toorsa Strict Nature Reserve.

Out of these nine protected areas declared in 1993, four of them were selected as priority for conservation management based on their conservation significance as well as due to their limited financial and technical resources. They were Jigme Dorji National Park (JDNP), Jigme Singye Wangchuck National Park (JSWNP), Royal Manas National Park (RMNP) and Bumdeling Wildlife Sanctuary (BWS). Subsequently, Conservation Management Plans were developed for RMNP in 1995, JDNP in 1997, and JSWNP and BWS in 2001.

Based on the findings of nationwide tiger censes conducted from 1996 to 1998 and field assessments of forest areas between the protected areas, a network of biological corridors was declared to connect the protected areas. Biological corridors were declared as a "Gift to the Earth from the People of Bhutan." In the same year Thrumshingla National Park was also identified for management. The first Conservation Management Plan was developed in 2002 (NCD, 2004) and revised in 2009. This was followed by management of Sakteng Wildlife Sanctuary in 2003 and a Conservation Management Plan developed in 2008.

3.2 Bhutan's system of protected areas: Current status and management.

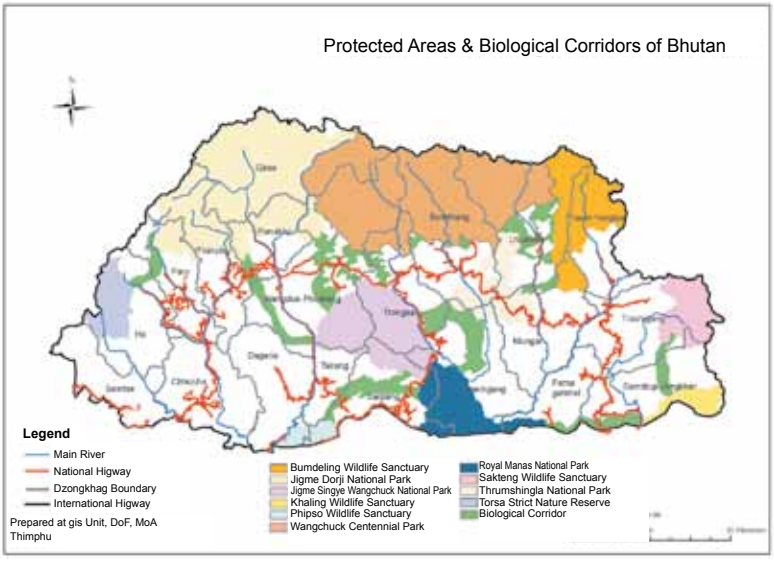
Until 2007, Bhutan had nine protected areas. But in 2008, the newest addition to Bhutan's network of protected areas was Wangchuck Centennial Park, the largest protected area in Bhutan, with an area of 4914 km^2. This new park holds special significance for

Bhutan since it was declared a tribute to the Monarchs of Bhutan for their unprecedented leadership towards conservation of Bhutan's environment. The new park was declared to celebrate three important events in 2008:

- 100 years of Monarchy in Bhutan;
- The coronation of His Majesty the Fifth King of Bhutan; and
- The introduction of the Democratic System of Governance in Bhutan.

With the declaration of the new park, Bhutan's protected area coverage stands at 42.71 percent of the total land area with five national parks, four wildlife sanctuaries and one strict nature reserve, as shown in Figure 1.2. An additional 8.61 percent of the area constitutes biological corridors connecting all the protected areas (MoA, 2009a). This network of protected areas and biological corridors also known as Bhutan Biological Conservation Complex (B2C2) complex represents one of the largest networks of protected areas set aside for conservation of wild biodiversity in Asia and elsewhere. In situ conservation of wild flora and fauna, ecosystems and unique cultural diversity along with sustainable use and management of natural resources are the main objectives behind the establishment of these protected areas. Out of ten protected areas, nine are currently under management, as shown in Table 1.2.

Figure 1.2 Bhutan. Map of protected areas and biological corridors.



Source: GIS Unit of DoFPS, 2009

The network of protected areas and biological corridors distributed throughout the country represents the rich biological resources found right from the subtropical zone in the south to the temperate zone in the center to the alpine zone in the north. They harbor critical ecosystems and unique flora and fauna diversity found in the country. These conservation areas are home to highly endangered species like the Royal Bengal tiger, Bhutan takin, snow leopard, golden langur, Asian elephant, Himalayan black bear, musk deer, red panda and endangered birds such as the black-necked crane, white-bellied heron, rufous-necked hornbill and several other species of wildlife and birds (NCD, 2003, 2004).

Table 1.2 Bhutan. Management status of protected areas.

Name of Protected Areas	**Area (km^2)**	**Ecosystem Representation**	**Districts**	**Management Status**
1. Toorsa Strict Nature Reserve	609.51	Temperate Forest	Ha and Samtse	Notified in 1993 and being managed by NCD since 2009.
2. Wangchuck Centennial Park	4,914.00	Glaciers, alpine water bodies, meadows and temperate forest. Habitat of snow leopard, tiger, Bhutan takin, Himalayan black bear, Tibetan wolf, alpine flowers, medicinal plants and *Cordyceps* (caterpillar fungus).	Gasa, Wangdiphodrang, Bumthang and Lhuentse	Declared in Dec. 2008 and managed since 2009. Provisional management plan developed in 2009. Park office to be established at Zabjethang; interim office in Bumthang town.
3. Jigme Dorji National Park	4,316.00	Alpine and temperate forest. Habitat for takin, snow leopard, blue sheep, Royal Bengal tiger and *Cordyceps*,	Gasa, Punakha, Thimphu, and Paro	Managed since 1995. First conservation management plan implemented from 1997-2002. Park head office located at Damji, Gasa. Management plan under revision.
4. Bumdeling Wildlife Sanctuary	1,520.61	Upland broadleaf forest. Winter roosting area of endangered black-necked cranes.	Trashiyangtse, Lhuentse and Mongar.	Managed since 1998 with head office in Trashiyangtse. First management plan implemented from 2001-2007. Plan under revision.
5. Jigme Singye Wangchuck National Park	1,730	Pristine upland broadleaf forest. Habitat for Royal Bengal tiger, clouded leopard and golden langur.	Zhemgang, Trongsa, Sarpang, Tsirang, and Wangduephodrang	Managed since 1995 and first conservation plan implemented from 2002-2008. Park office located at Tsangkha, Trongsa. Management plan under revision.
6. Thrumshingla National Park	905.05	Old growth fir forest and *Lobelia nubigena*, the only endemic plant species in the park. Prime habitat of red panda, tragopan, Monal pheasant and Royal Bengal tiger.	Bumthang, Lhuentse and Mongar	Managed since 1998 with head office at Ura, Bumthang. First management plan implemented from 2002-2007. Second plan developed in 2009.
7. Royal Manas National Park	1,057.00	Prime sub-tropical forests. Habitat for elephants, tigers, leopards and golden langur.	Zhemgang and Sarpang	Managed since 1995 with head office at Gelephu. First management plan implemented from 1995-2000 but suspended in the middle due to threats from Indian militants across the border. Plan under revision.

Name of Protected Areas	Area (km^2)	Ecosystem Representation	Districts	Management Status
8. Phibsoo Wildlife Sanctuary	268.93	Country's only natural sal forest habitat, and also the habitat of the spotted deer and elephants.	Sarpang	Partly managed since 2002 through Sarpang Forest Division. Fully managed since 2009. Plan under preparation.
9. Khaling Wildlife Sanctuary	334.73	Habitat of pygmy hog and elephants.	Samdrup Jongkhar	To be managed within 10th Five Year Plan (2008-2013).
10. Sakteng Wildlife Sanctuary	740.60	Pristine mixed coniferous forest. Twenty-eight species of rhododendrons found.	Trashigang	Managed since 2002. Conservation plan developed from 2009-2014. Park office located at Phongmey, Trashigang.
Biological Corridors	3305.72	Temperate and sub-tropical forest.	Haa, Paro, Thimphu, Punakha, Wangdue, Sarpang, Tsirang, Trongsa, Zhemgang, Bumthang, Mongar, Lhuentse, Trashigang, Samdrup Jongkhar	Partly managed by NCD through Biological Corridor Unit established in 2007. Strategic Plan prepared for JDNP-TSNR Corridor (2008-2013). Fifty percent to be managed within 10th Five Year Plan.

Source: DoF, 2002; MoA, 2009a

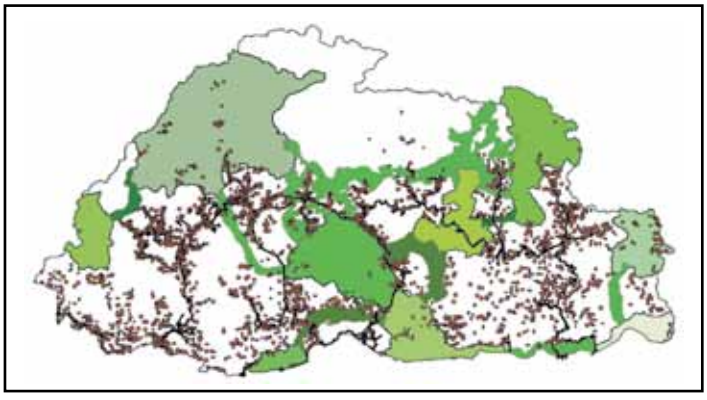
3.3 People and protected areas in Bhutan: The human footprint.

The protected areas in Bhutan are different and unique from those of other countries such as Costa Rica. This is because there are people living in and around these protected areas who have lived there since before the areas were established. Considering the rights of the local people, the Royal Government has taken a policy decision to allow the people who are legally settled within the protected areas to continue to live there and to use the natural resources in a sustainable manner within the legal framework provided by the 1995 Forest and Nature Conservation Act and the 2006 Forest and Nature Conservation Rules.

The estimated total number of households in Bhutan is 117,776 households (PHCB, 2005), of which an estimated 2070 households are inside the biological corridors and an equivalent number or more in the protected areas, as shown in Figure 1.3.This means almost 1.7 percent of all households are inside the biological corridors and protected areas, which puts pressure on the resources in these areas and corridors.

Thus, the task of managing protected areas in Bhutan is complex and challenging. It requires addressing both conservation and development issues related to local residents and dealing with different stakeholders.

Figure 1.3 Bhutan. Map of household distribution.



Source: PHCB, 2005, courtesy of N. Norbu

In order to reduce the pressure put on natural resources by local communities, the protected areas in Bhutan use the concept of Integrated Conservation and Development Program (ICDP) as an important tool in the management of protected areas. ICDPs recognize that biodiversity conservation in protected areas should integrate socio-economic needs of the local communities through participatory approaches. Therefore, they try to integrate biodiversity conservation interests into development planning. The basic aim of an ICDP is to "re-orient the development process at community, geog (block) and dzongkhag (district) levels in a way that resource use by local communities in the park area is reduced and/or can be regulated" (NCD, 2003).

Some of the activities initiated as part of ICDPs in the protected areas were:

1. Livestock intensification: Supply of improved breed, pasture and fodder development;
2. Crop intensification: Supply of seeds/seedlings, renovation of irrigation canal and electric fencing;
3. Community based natural resource management: Supply of CGI roofing material, cane and bamboo, NWFPs and community forestry;
4. Alternative energy: Supply of solar lights;
5. Community based tourism: Improvement of tourist facilities and services;
6. Education and awareness: Conduct workshops, meetings, campaigns, and publications; and
7. Rural scholarship: Support education for children from disadvantaged families.

3.4 Protected area administration and management.

The Department of Forests and Park Services under the Ministry of Agriculture and Forests has the overall mandate for conservation and sustainable management of forest resources including wildlife conservation and the management of protected areas. The Department is based in Thimphu, the capital city of Bhutan and is headed by a Director. The Director reports to the Secretary and Minister of the Ministry of Agriculture and Forests, who in turn report to the elected government headed by the Prime Minister.

There are currently six functional divisions under the Department that are headed by Chief Forest Officers responsible for providing policy and technical support to the field programs and offices. They are the Forest Protection and Utilization Division, the Forest Resources Development Division, the Wildlife Conservation Division previously known as the Nature Conservation Division, the Social Forestry Division, the Watershed Management Division, and the Nature Recreation and Ecotourism Division. Also, the Forest Information Management Section is headed by the unit in charge, and Figure 1.4 shows the Institutional Setup of the Department.

Moreover, the Ugyen Wangchuck Institute for Conservation and Environment (UWICE) is responsible for training human resources for the forestry sector. It was upgraded from the Bhutan Forestry Institute located in Thimphu, moved to Lamegongpa in Bumthang, and launched in 2008.The Institute is to serve as a centre for national and regional excellence in environmental and forestry education including developing knowledge based on stewardship and sustainable management of natural resources.

There are twelve territorial forest division offices and eight national parks/sanctuary offices that are headed by Chief Forest Officers, who implement field activities and report directly to the Department. In addition, there are 20 forestry sectors headed by Dzongkhag Forest Officers (DzFO) representing the 20 districts. They report technically to the Department through the District Administration and implement and coordinate field programs through RNR Forestry Extension Centers headed by a Forestry Extension Officer (FEO). Such centers are based in most of the 205 blocks along with agriculture and livestock extension centers. The FEOs report to the DzFOs.

Under the Department of Forests and Park Services, the Wildlife Conservation Division (WCD) is the focal agency for the management of the country's protected areas and biological corridors. As shown in Figure 1.5, the WCD has the following four sections and one unit:

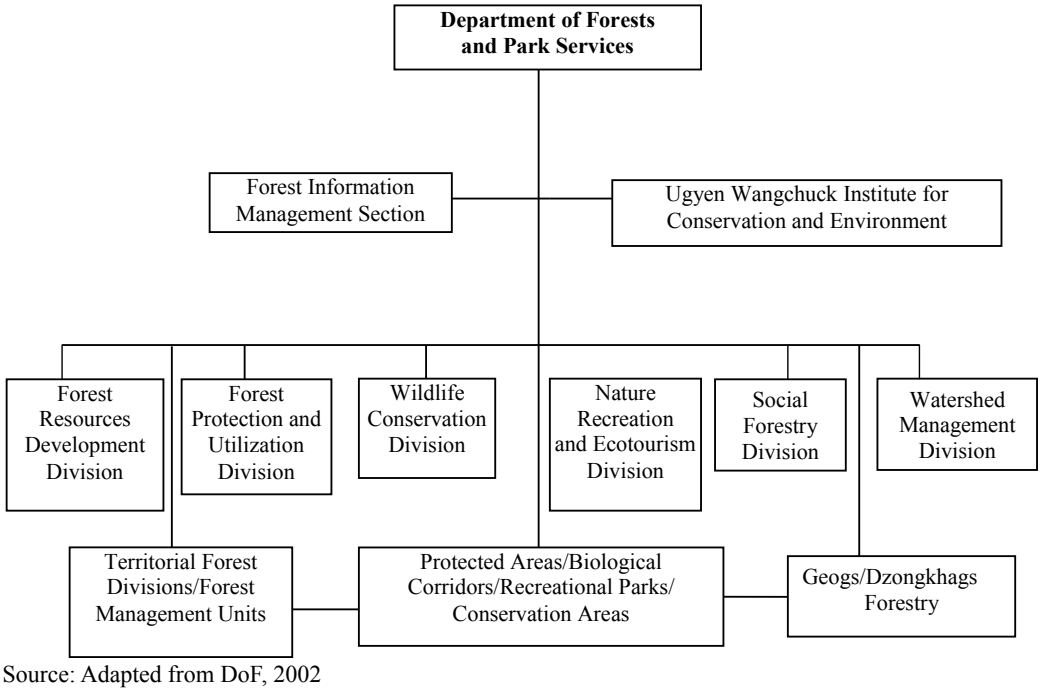
1. Biodiversity Inventory and Data Management Section,
2. Species Conservation and Monitoring Section,
3. Human Wildlife Conflicts Management Section,

4. International Conventions Section[1], and
5. Biological Corridors Unit.

All these sections are responsible for providing technical support to the field offices. The WCD is headed by the Chief Forest Officer and has 25 staff, including both technical and administrative staff but excluding Elementary Service Personnel (ESP).

At the field level each protected area has park head offices that are headed by Chief Forest Officers/park managers and Park Range offices headed by park rangers. The park offices also have four sections dealing with ICDP, species conservation, resource utilization and wildlife enforcement. The Park Range offices are further divided into park guard offices, which monitor activities in their particular area with support from Park Range and park head offices. All protected areas are funded by the government and donors.

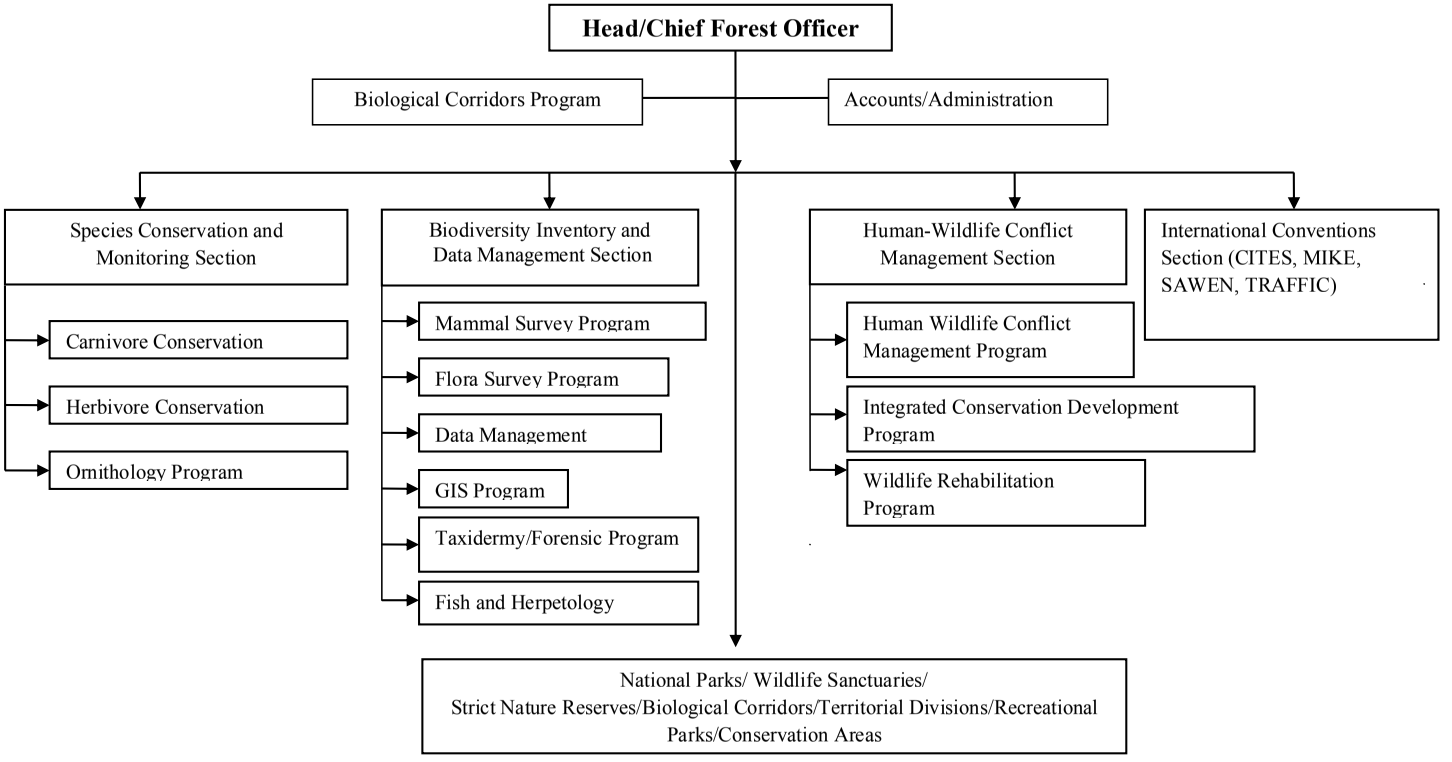
Figure 1.4 Bhutan. Institutional set-up of the Department of Forests and Park Services.



Source: Adapted from DoF, 2002

[1] The International Conventions Section is a new section created in the WCD after the recent re-arrangement of the functional Divisions under the Department.

Figure 1.5 Bhutan. Organogram of Wildlife Conservation Division.



Source: WCD, 2010

3.5 Conservation budget of protected areas.

The budgeting year followed for Bhutan is July to June annually. The Government, that is, the Ministry of Finance, allocates an annual budget to the Ministries/Agencies/Districts/ Blocks based on the approved budget outlay for the given Five Year Plan (FYP) periods. Currently Bhutan is in the 10th FYP period (2008-2013).

The total budget outlay for the 10th FYP is Nu 148.074 billion (Gross National Happiness Commission [GNHC], 2009); Nu 4021.509 million of it is for the Ministry of Agriculture and Forests (MoAF), also known as the Renewable Natural Resources (RNR) sector. Under the MoAF, the budget outlay for the Department of Forests and Park Services (DoFPS), also known as the forestry sector, is Nu 964.640 million (25% of the total MoAF budget outlay) in the 10th FYP (MoA, 2009c).

All protected areas in Bhutan are supported by the government and the donor projects channeled through the government. The government supports the overall administration and management costs of the protected areas while donors support specific activities and programs related to protected areas management. Both current and capital expenditures are funded by the government and donors. The annual budget for the six protected areas that were operational in 2008 is provided below in Table 1.3.

Table 1.3 Bhutan. Budget breakdown of protected areas. 2007-2008.

Budget/ Financial Year	**BWS**	**JDNP**	**JSWNP**	**TNP**	**RMNP**	**SWS**	**TOTAL**
2007-08 (RGoB)	8.38	9.20	7.66	7.85	14.33	7.86	
2007-08 (Project)	4.40	0.00	5.70	0.00	2.12	6.60	
TOTAL (Nu in millions)	12.77	9.20	13.36	7.85	16.45	14.46	74.09
TOTAL (US dollars in millions)	0.29	0.21	0.31	0.18	0.38	0.33	1.70

Source: Park Offices, 2009

3.6 *Human resources for the management of protected areas.*

The Ministry of Agriculture and Forests has a greater number of human resources when compared to other ministries and government agencies. The staff strength of the ministry in 2008 was 3197 staff with 1288 (40 %) staff belonging to the Department of Forests and Park Services' forestry sector (MoA, 2009c).

As of April 2010, the total number of human resources of the Department of Forests and Park Services was 1,331 staff, out of which 1,237 (93 %) are technical staff and 94 (7%) are administrative support staff. The total number of staff working in the Nature Conservation Division and the operational protected areas are 256 with 230 technical staff (90%) and 26 administrative staff (10%) (Human Resource Division [HRD], 2010). Nineteen percent of the total staff under the DoFPS work for the NCD and protected areas.

3.7 Threats and challenges.

Protected areas in Bhutan face many threats and challenges as a result of both the direct and indirect impacts from socio-economic activities in and around the protected areas. Some of the important threats and challenges facing protected areas are discussed below.

3.7.1 Over-exploitation and unsustainable use of natural resources.

Over-exploitation and unsustainable use of natural resources are two of the main threats facing protected areas. These resources include timber, especially for construction and roofing, handicrafts and furniture as well as non-timber resources such as medicinal and aromatic plants, mushrooms and other wild vegetables, cane and bamboo, plant barks and pulps for traditional paper and so forth.

The use of firewood as a source of energy is also quite significant in the protected areas. For example, the annual average firewood consumption per household in the three case study parks of the BWS, the JDNP and the JSWNP in 2008 was 129 head loads, 365 head loads and 476 head loads, respectively (Choden & Wangyal, 2010; Tashi, Lhaba & Choden, 2010; Dhendup, Wangchuk & Choden, 2010). According to the Department of Energy, firewood alone accounted for 57.7 % of the total primary energy supply in rural areas in 2005 (MoA, 2009d).

Unsustainable use of natural resources together with unsustainable harvesting practices and lack of sustainable harvesting measures are leading to over-exploitation and depletion of many of these important resources. Local extinctions are occurring in some places within the protected areas like the BWS due to over-exploitation of resources. Species such as the blue pine, which were once found in the Womenang area under the Dungzam range in the BWS, are no longer found. Similarly, the abundance of many other species, like daphne used for making traditional paper and wood burrs used for making wooden products, that were once available has been reduced drastically. Local enterprises based in Trashiyangtse and the BWS have to now get these raw materials from other districts in central and western parts of the country.

One of the issues with regard to unsustainable resource use is also the timber subsidy given to rural communities by the government; it gets misused and ends up being used for commercial purposes. The royalties charged for subsidized timber and other natural

resources are very negligible compared to the quantity of natural resources used from protected areas. This leads to over-exploitation and unsustainable use.

Moreover, illegal use of both timber and non-timber forest resources, due to lack of adequate human resources to monitor large and difficult areas in the protected areas, adds to the problem. There are also no clear policies on the conservation and use of natural resources from protected areas, which threatens the long term sustainability of these resources. With the enactment of a separate Protected Areas and Wildlife Bill of Bhutan, which is currently being drafted by the Wildlife Conservation Division, some of these policy gaps are expected to be addressed.

3.7.2 Land use change and conversion.

With only 8% arable land available for the agriculture on which the livelihoods of 69% of the rural population depends, there is increasing pressure on the forest land for both agriculture and development. The forest areas lost to the developmental activities, such as infrastructure, roads, transmission lines and agriculture (shifting cultivation) that take place in the protected areas, lead to habitat loss, fragmentation and degradation. More than 1300 hectares of forest land were cleared between 2001-2005 for infrastructure and agricultural production in the country. Roads and power transmission lines alone accounted for more than 70% of the forest land conversion (MoA, 2009d).

The lack of proper policies and guidelines on the developmental activities and lack of zoning in protected areas are some of the weaknesses that need to be addressed to undermine this threat.

3.7.3 Human-wildlife conflicts.

Human-wildlife conflicts in the form of crop damage and livestock depredation by wildlife are important conservation issues in the country today. With an increase in human population and developmental activities, there is more pressure on forest lands, which disturbs and reduces wildlife habitat, resulting in more conflicts. Crop damage by prey species, such as wild pigs, deer, monkeys, elephants and bears, and livestock depredation by carnivores, such as tigers, leopards, wild dogs and bears, inflict huge social costs on rural farmers annually. Such conflicts are threatening the livelihoods and quality of life of rural communities and leading to negative attitudes and retaliation against conflictive species.

According to the 2009 RNR Censes, at least 55.74 % of rural households are affected by crop damage with maize and paddy crops being the most damaged crops. Wild pig accounted for 63.34 percent of the damage caused to cereals. The most common livestock lost to wildlife were poultry (33%), cattle (32%), sheep (21%), yaks (7%) and horses (3%). The wildlife causing damages were jackals/foxes, leopards, wild dogs, tigers, bears and wolves (MoA, 2009, RNR Censes).

To address the rising conflicts, a comprehensive Bhutan National Human Wildlife Conflicts Management Strategy (available at http://www.moaf.gov.bt/moa/downloads/downloadFiles/MoADownload5lv1595os.pdf) was developed by the Nature Conservation Division in 2008. The strategy is under implementation by the NCD and other relevant agencies and stakeholders.

3.7.4 Poaching and wildlife trade.

The poaching of endangered wildlife, such as tigers, musk deer, Himalayan black bears and valuable caterpillar fungus *Cordyceps* as well as other protected species are occurring in the protected areas. These threats are both local and trans-boundary in nature due to the porous border, which threatens the long term viability of these species. The main threat to *Cordyceps* is the illegal collection by people from across the border in Tibet/China and also local collectors. Although park staff is involved in monitoring during the *Cordyceps* season, it becomes very challenging due to difficult terrain, limited staff and lack of appropriate arms and ammunition.

The lucrative international market for illegal wildlife/forest products, the porous international border both in the north with China and in the south with India, inadequate law enforcement personnel and lack of public awareness make it challenging to curb poaching. Moreover, the existing schedule of fines and penalties for wildlife poaching also needs to be reviewed, as does the list of totally protected species, based on national, regional and international criteria such as the IUCN and CITES (MoA, 2009d).

3.7.5 Forest fires.

Forest fires are another threat in the protected areas. Every year, especially during the dry season in early spring and during autumn and winters, forest fires occur in different parts of the country. In the protected areas, one of the main causes of forest fires is uncontrolled burning of pastures or tseri land.

During the last 10 years, a total of 526 forest fire incidents, affecting 70,000 hectares of forest, were recorded by the Social Forestry Division, Department of Forests and Park Services. Forest fires were more prevalent in the eastern part of the country, where fires are intentionally set for lemon grass oil production and grazing. Forest fires lead to forest degradation and ecosystem changes as well as landslides and soil erosion (MoA, 2009d).

3.7.6 Over-grazing.

Livestock rearing forms an important socio-economic activity for rural communities. Most of the livestock, such as cattle and yaks, is free ranging and grazes in both pastures and forests. Over-grazing, mostly by cattle and yaks in alpine pastures and forest areas, is a threat in the protected areas. With the increase in livestock population, there is more

pressure on pastureland in protected areas. The cattle herders harvest trees for fodder and set fires to create more pastures, causing a threat to biodiversity.

Over a long period of time, the over-grazing of pastures and forest along with the impacts of climate change and other factors cause natural disasters such as landslides, floods and soil erosion, which are becoming more frequent in protected areas like the BWS. Moreover, free ranging livestock are also the most predated by wildlife, leading to more human-wildlife conflicts. As of 2008, there were 310,071 cattle and 40,482 yaks in the country (MoA, 2009, RNR Censes).With only almost 4% of Bhutan being pastureland (MoA, 1995), which amounts to 1535.76 km^2, there are 228 cattle (including yaks) per square kilometer of pastureland. This puts lots of pressure on both pasture and forest areas.

3.7.7 Loss of biodiversity and climate change.

Aside from the threats and issues discussed earlier and at a broader and more general level, loss of biodiversity and climate change are also important issues Bhutan and the world at large are facing this century. Over-exploitation and unsustainable use of natural resources from protected areas could accelerate the loss of biodiversity, especially commercially valuable fungus, such as *Cordyceps*, and medicinal and aromatic plants as well as high value timber species. There are already local extinctions occurring in many protected areas like the BWS and the JSWNP. In Bhutan natural resources are provided almost free of cost to rural populations. In comparison to people from other countries where there are no government subsidies, the Bhutanese in general, do not value and appreciate the resources, which lead to their misuse and over-exploitation.

The threats related to impacts of climate change are already being felt in Bhutan and around the world by an increase in the intensity of the natural disasters taking place. One of the imminent threats related to climate change in Bhutan are Glacial Lake Outburst Floods (GLOF).The major impacts of the GLOFs in 1957, 1960 and 1994 were substantial damages to human properties and life. Bhutan has a total of 2,794 glacial lakes, most of which are found within protected areas. Of these, 562 lakes are associated with glaciers and 25 lakes are reportedly potentially dangerous for GLOFs (Department of Geology and Mines).The human induced threats in the protected areas could lead to more increased risks of GLOFs and other impacts of climate change. Thus, conservation and sustainable use of biodiversity in the protected areas are important for long term sustainability of natural resources and protection from natural disasters.

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Chapter 2

Costa Rica: Building a Democratic Environmental Organizational Structure

Mary Luz Moreno Díaz

1. Introduction

Costa Rica is located in Central America (see Figure 2.1). It is bordered to the north by Nicaragua, to the southeast by Panama, to the east by the Caribbean Sea and to the west by the Pacific Ocean. It has a continental territorial area of 51,100 km^2. If the exclusive economic zone (25,090.36 km^2 in the Caribbean Sea and 551,901.12 km^2 in the Pacific Ocean) is considered, the total area of the country is 628,091.48 km^2, which includes Coco's Island, located 535 km from the Cabo Blanco Nature Reserve on the southern part of the Nicoya Peninsula in Costa Rica's Pacific Ocean (SINAC, 2009).

Figure 2.1 Costa Rica. Location in America.

Source: http://www.monteverdeinfo.com/costa-rica-weather.htm

The approximate population in mid-2009 was 4,509,392 people (INEC, 2010), of which approximately 49% were women and 51% were men. The country has one of the highest Human Development Indexes (HDI)[1] in Latin America, holding the eighth position at that level and the 54th position at the worldwide level. The life expectancy at birth is about 78.5

[1] Indicator that measures the average progress of a country in terms of three measurable dimensions of human development: life expectancy, education and standard of living (measured by the real GDP per capita) (PNUD, 2009)

years, and the literacy rate of the adult population is about 94.9% (PNUD, 2009). In 2009, Costa Rica made an important achievement by decreasing infant mortality; the rate, 8.8 per thousand live births, was at its lowest to date (Estado de la Nación, 2010).

Costa Rica is a country that is well known for its conservation efforts; about 26% of its territory is protected areas. It is estimated that more than 500,000 species inhabit this small country, and they represent about 4% of all species on Earth (Guevara, 2005).

2. Main Historical Conservation Trends

In Costa Rica the protection of natural resources has consistently been addressed by policies. Conservation policies emerged during the early years of independent life (1828) when local governments were responsible for ensuring the conservation and reforestation of the mountains. Years later, when the legislation and the number of decrees were expanded in terms of environmental matters, local governments were asked to plant trees and ensure the water quality of rivers and headwaters. Also, the owners of grassland were asked to plant trees in their fences for firewood use (MINAE-SINAC, 1997). Subsequently, due to the expansion of coffee production, protection fell into oblivion and conservation efforts were mired in neglect. In 1942, Costa Rica participated in the Washington Convention on the Protection of Wildlife and Panoramic Beauties; this event marked positive influence on environmental legislation and the continuation of the protection of natural resources (MINAE-SINAC, 1997).

The establishment of Wildlife Protected Areas (*ASP's*) goes back to the year 1945 when a National Park was declared in southern Cartago (one of Costa Rica's seven administrative provinces) along the Inter-American Highway. This gave way to the formal establishment by law of the first two national parks in 1955. Both are located in the Central Volcanic Range Conservation Area. Turrialba Volcano National Park and Irazu Volcano National Park cover areas of 1,257 hectares and 2,012 hectares, respectively (Law # 1917 30-07-55 and Law # 1917 09-08-55). Subsequently, in 1963, the Cabo Blanco Absolute Nature Reserve was established (MINAE-SINAC, 2009).

Another important event happened in 1969 when Forest Law No. 4465 was published. It led to the creation of the Forestry Department with various departments, including that of the National Parks, later called the National Parks Directorate. The government took the time to lay the groundwork for the first protected areas, maintain control and protection over them and determine the various categories of Conservation Areas (MINAE-SINAC, 2009).

In the 1970's, the National Park Service (SPN) was established by Law No. 6084 as a Directorate of the Ministry of Agriculture and Livestock, which strengthens the process of establishment and consolidation of more *ASP's*. However, in 1988, due to administrative decisions and by Act No. 7152, the SNP becomes part of the Ministry of Natural Re-

sources, Energy and Mines (MIRENEM), in charge of the administration, protection and management system of ASP's in the country. During the period from 1969 to 1986, *ASP's* were established and consolidated in Costa Rica (MINAE-SINAC, 1997).

In 1986, with the first amendment to the former Forestry Law No. 4465, Certificates of Forest Payment (*CAF*s) were created. A CAF was awarded to those farmers who re-forested their properties, transferring the incentive from wealthier taxpayers to farmers. The government fixed a standard reforestation price per hectare. Years later, CAFs were granted under special conditions (CAFAs: Certificates of Forest Payment in Advance) to small farmers, representing a major conceptual change in reforestation incentives. First, the incentive was paid before reforestation took place so that small farmers had enough money to cover the costs of tree planting activities. Second, small farmers had to organize into associations to gain access to the incentive. The CAFAs helped improve farmer associations and made the incentives available to lower income forest owners. This system allowed for the reforestation of 23% of the country's planted area, which represented many farmers nationwide (De Camino et al., 1999).

However, in 1992, with the firm intention to encourage appropriate management of natural forest and ensure its sustainability by means of forestry techniques, the Certificate of Forest Management (*CAFMA*) was established (MINAE-SINAC, 1997). Later, experience and innovation processes, generated by these issues on the mechanisms and instruments mentioned above, laid the groundwork for the creation of what is known as Payment for Environmental Services[2] in Costa Rica, among other innovative tools for conservation and protection.

3. National System of Conservation Areas

The General Directorate of Forestry was part of the Ministry of Agriculture until 1987 when it was moved to the MIRENEM. The MIRENEM evolved into the MINAE in 1995. Also in 1995, the three directorates —Forestry, National Parks and Wildlife were consolidated into the National System of Conservation Area (SINAC). Once Forestry Law 7575 was approved, FONAFIFO, ONF and the Regional Environmental Councils were created and included in the National Forestry Administration (De Camino et al., 2000).

Article 22 of the Biodiversity Act enacts the creation of the National System of Conservation Areas (*SINAC*). It states that:

> *It will be a decentralized and participatory system of management and institutional coordination, bringing together responsibilities in matters of forest, wildlife, protected areas and the Ministry of Environment and Energy, with the aim*

[2] Through payment for environmental services, compensation is given to owners of forests and plantations for the environmental benefit that their conservation offers to the society in general.

> *of laying down policies, planning and executing processes aimed at achieving sustainability in the management of the natural resources of Costa Rica. (Asamblea Legislativa, 1998).*

The SINAC is composed of eleven regional administrative units, known as Conservation Areas. Ten of the Conservation Areas are continental and the eleventh corresponds to the Coco's Island National Park. According to Article 28 of the Biodiversity Law, a conservation area is:

> *A territorial unit of the country, administratively delimited, managed by the same strategy of development and administration duly co-ordinated with the rest of the public sector. In each one, private as well as national activities interrelate without discrediting the protected areas. The Conservation Areas will be in charge of the application of current laws in the area of natural resources, within their geographic demarcation. (Asamblea Legislativa, 1998).*

Inside each Conservation Area, different categories of ASP's can be found, such as National Parks, Biological Reserves, National Monuments, Wildlife Refuges, Forest Reserves, Protected Zones, and Wetlands. They generate not only ecological benefits, by being weather, atmosphere and ocean regulators, but also economic, social, cultural and educational benefits to the towns near the given *ASP*, through activities related to recreation, ecotourism, rural tourism, species protection and respect for nature. Established Conservation Areas are the following (see Figure 2.2):

1. Guanacaste Conservation Area (ACG in Spanish),
2. Arenal-Tempisque Conservation Area (ACA-T in Spanish),
3. Huetar North Conservation Area (ACA-HN in Spanish),
4. Tempisque Conservation Area (ACA-T in Spanish),
5. Central Volcanic Range Conservation Area (ACCVC in Spanish),
6. Tortuguero Conservation Area (ACTO in Spanish),
7. La Amistad Caribe Conservation Area (ACLA-C in Spanish),
8. La Amistad Pacifico Conservation Area (ACLA-P in Spanish),
9. OSA Conservation Area (ACOSA in Spanish),
10. Central Pacific Conservation Area (ACOPAC in Spanish), and
11. Coco's Island Marine Conservation Area (ACMIC in Spanish).

Figure 2.2 Costa Rica. Map of Conservation Areas.

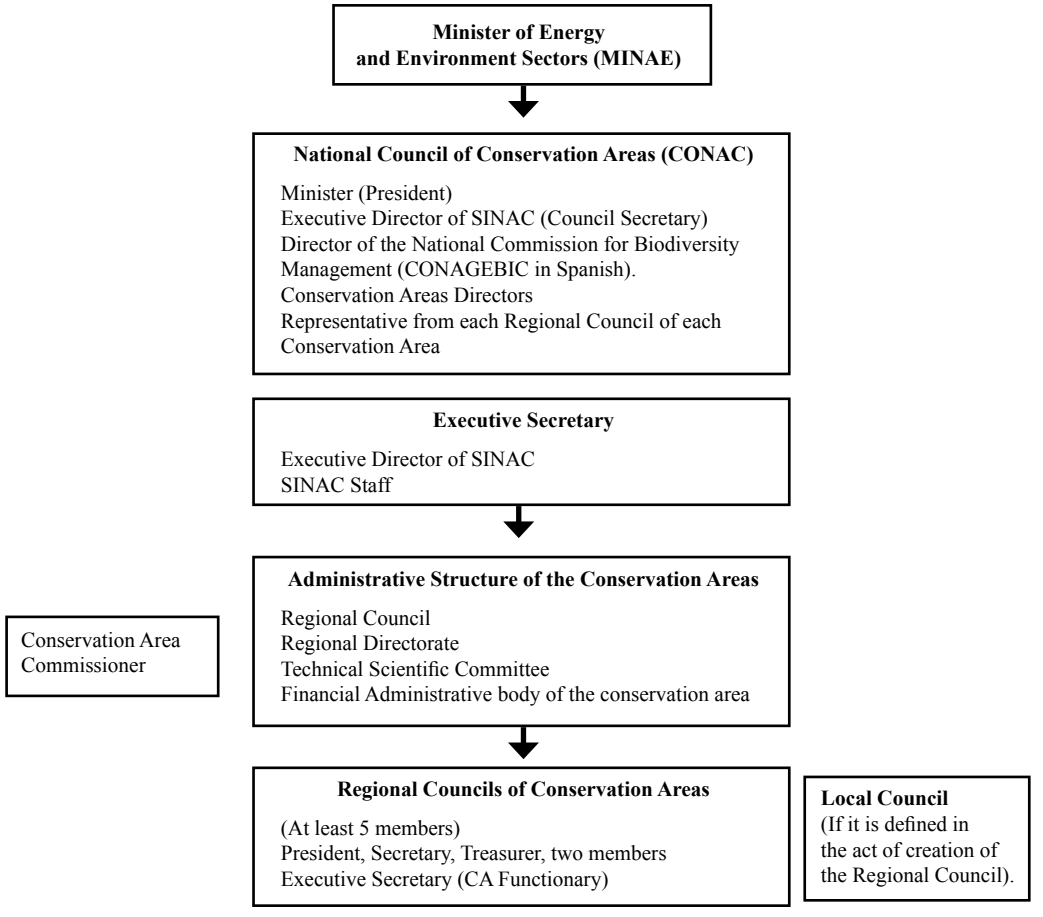
Source: http://www.sinac.go.cr/informacion.php

a. Internal administrative organization of SINAC.

SINAC's administrative organization was established in Biodiversity Law No. 7788, as shown in Figure 2.3. The National Conservation Areas Council (CONAC) is the highest institutional representation of SINAC, where officials and representatives of society share the right of decision making. It consists of:

- The Minister of Environment and Energy, who presides;
- The Executive Director of the System, who will act as secretary of the Council;
- The Executive Director of the National Committee Technical Office for the Management of Biodiversity (also created by Act No. 7788);
- Regional directors of each Conservation Area; and
- A representative from each Regional Council of Conservation Areas designated by the head of each Council. (Asamblea Legislativa, 1998)

Figure 2.3 Costa Rica. Administrative structure of SINAC.



Source: Translated from MINAE-SINAC, 2009

b. The functions of CONAC.

1. To define the execution of strategies and policies for the consolidation and development of SINAC and ensure they are executed.
2. To monitor and control the correct technical and administrative management of Conservation Areas.
3. To coordinate, together with the Commission, the elaboration and updating of the national strategy for the conservation and sustainable use of biodiversity, which should be done with full consultation of civil society and coordinated with the public sector, within the framework of each Conservation Area.

4. To define strategies and policies related to the consolidation and development of wildlife protected areas, as well as to supervise their management.
5. To approve the strategies, the structure of the administrative bodies of the wildlife protected areas, and the plans and annual budgets of the Conservation Areas.
6. To recommend the creation of new wildlife protected areas.
7. To carry out administrative and technical audits to monitor the proper management of Conservation Areas and their protected areas.
8. To establish guidelines and principles to organize coherent structures, administrative mechanisms and regulations in Conservation Areas.
9. To name the directors of the conservation areas, from a list submitted by the respective Regional Councils of Conservation Areas (CORAC).
10. To approve concession applications of non-essential services within the wildlife protected areas.
11. To develop other functions necessary to fulfill the objectives of this and other laws related to the functions of the System. (Asamblea Legislativa, 1998, Art. 25)

c. Executive Secretary.

It refers to the headquarters of SINAC, under the leadership of the General Executive Director of SINAC (who is the Executive Secretary of CONAC).

d. Administrative structure of the conservation areas.

The Conservation Areas are composed of the Regional Councils, the Regional Directorate, scientific and technical committees and governing financial bodies. Scientific and technical committees are made up of staff of working programs of each conservation area and other persons designated by the Regional Director. The financial bodies correspond to the administrative structures of the regional bureau.

e. Regional Councils of Conservation Areas (CORAC).

These are the highest decision-making bodies at the regional level. Their memberships, including the respective Regional Director and a minimum of five members representing different sectors in each conservation area, are decided by means of public meetings. Thus, they are elected by the Assembly of the organizations and institutions convened for that purpose. There must always be at least one municipal representative per council.

Their functions are: a-) To ensure the implementation of existing policies; b-) To ensure the integration of community needs into plans and activities of each conservation area; c-) To encourage participation of different sectors of each conservation area in the analysis of, discussion of and search for solutions to regional problems related to natural resources and environment; d-) To present to CONAC the proposal, in the form of a list, for the appointment of the respective Director of the CA; e-) To approve strategies, policies, guidelines, proposals, plans and budgets for each conservation area, including the proposal of the Regional Director and the scientific-technical committee; f-) To define specific issues for the management of protected areas and to submit them to CONAC for approval; g-) To recommend to CONAC the creation, modification or change of category of the corresponding wildlife protected areas; h-) To supervise the work of the Regional Director and of the Financial Administration Body; i-) To approve everything related to the concession of non-essential services within the corresponding wildlife protected areas (Asamblea Legislativa, 1998, Art. 30).

f. Local councils.

These may be created by decision of the respective CORAC in those areas where conservation is necessary due to its complexity. The establishment of such councils is defined in the same agreement of creation of the CORAC.

g. Performance and income in the conservation areas.

By 2008, there was a total of 168 Protected Areas, which covered a total of 26.58% of the national territory[3] (see Figure 2.4). The number of Costa Rican Protected Areas has experienced a 144% increase over the past 19 years (SINAC-MINAE, 2007). The category that continues to prevail over the others is that of national parks because they cover the largest geographical area (about 12% of the national territory) and continue to be the focus of national and international tourism. The recently created National Parks are the following: Cangreja National Park[4], the Quetzales National Park[5] and Diría National Park[6]. Two new Wildlife Refuges were created at the same time: Chenailles (private) and Saimiri (mixed). Table 2.1 summarizes the size and number of land areas declared until 2008.

[3] By 2007, the country had a total of 166 ASP's, and coverage in both land and territorial sea exceeded 1,800,000 hectares. This amounted to 26% of the land area and 17% of the sea surface.

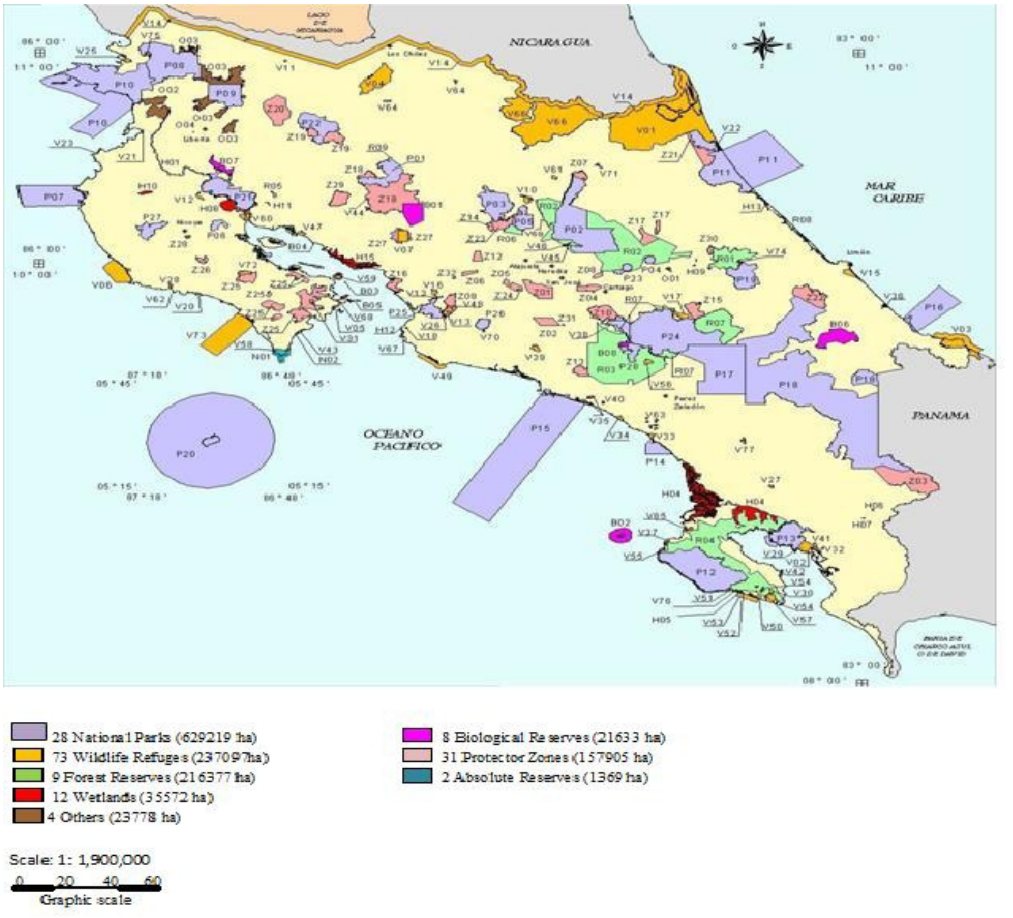
[4] At first it was established by Decree No. 17455-MAG 31-03-87 as a Protected Zone and in 2002 was declared a National Park.

[5] Created in 2006

[6] In 1991, it was established as a Protected Zone by executive order No. 20517, then in 1993 became a National Wildlife Refuge in 2004, and finally in 2004 became a National Park.

An important aspect for SINAC was the recognition received in 1997, the Coco's Island Marine Conservation Area by the UNESCO as one of humanity's World Heritage Sites. Another important fact is that our country has sites of international importance on a RAMSAR List, four of which were declared in the period between 1994 and 1998: Caribbean Northeast Wetland, Gandoca Manzanillo Wildlife Refuge, Sierpe Térraba Wetland and Coco's Island National Park (MINAE-SINAC, 1997).

Figure 2.4 Costa Rica. Wildlife Protected Areas. 2008.



Source: Translated from MINAE-SINAC, 200

Table 2.1 Costa Rica. Protected Areas. 2008.

CATEGORY	2006			2007			2008		
	Number	Terrestrial Extension (ha)	% National Territory	Number	Terrestrial Extension (ha)	% National Territory	Number	Terrestrial Extension (ha)	% National Territory
National Parks	27	625,531	12.27%	28	629,121	12.34%	28	629,219	12.34%
Biological Reserves	8	22,032	0.43%	8	22,036	0.43%	8	21,633	0.42%
Protected Zones	31	153,506	3.01%	31	157,680	3.09%	31	157,905	3.10%
Forest Reserves	9	221,239	4.34%	9	216,377	4.24%	9	216,377	4.24%
Wildlife Refuges (property of the state, private and mixed)	67	243,040	4.77%	71	236,865	4.64%	73	237,097	4.65%
Wetlands	13	66,388	1.30%	15	68,543	1.34%	13	68,543	1.34%
Absolute Reserves							2	1,369	0.03%
Others	5	7,843	0.15%	4	25,137	0.49%	7	23,778	0.47%
TOTAL	160	1,339,579	26.27%	166	1,355,759	26.58%	168	1,355,922	26.59%

Source: Own elaboration based on the information provided by MINAE-SINAC, 2008.
National Territory of 5,099,873 hectares

h. Management of protected areas.

For 2006, the number of staff designated to work directly in the wildlife protected areas was 500 officials. This figure increased by 87 officials for 2009. This includes rangers, cleaners, security guards, office workers, technicians, professionals and so forth. It is important to emphasize that until December 2007, 176 officials were registered for payment through the Fund of National Parks. As of January, 2008, this source of financing covered a total of 379 jobs since it assumed 203 jobs that were covered by different NGO's before (paid by the Foundation National Parks, Moore-Corcovado Foundation, Trusteeship ACG). This item is very significant since 35.36% of staff distinguished in the field now has work stability (MINAE-SINAC, 2010).

Table 2.2 shows the distribution of the staff per Conservation Area and category. In this regard, 317 officials occupy the *others* category, which include cleaners, security guards, office workers and others who work in the whole system. Osa Conservation Area has the greatest number (76), which also reflects a larger amount of personnel in comparison to the rest (104). On the other hand, the Central Pacific Conservation Area presents the lowest percentage in this category (1); however, the Marine Coco's Island has the lowest amount of personnel in relation to the rest of the areas (22).

Table 2.2 Costa Rica. Distribution of the staff located in the state ASP per CA*. 2009.

Conservation Area	Others **	Technicians	Professionals	Total
La Amistad Pacífico	20 (68.57%)	7 (20.00%)	4 (11.42 %)	31
Tortuguero	19 (57.58%)	10 (30.30 %)	4 (12.12 %)	33
Central Volcanic Range	54 (77.14%)	7 (10.00%)	9 (12.86 %)	70
Central Pacific	1 (1.56%))	49 (76.56%)	14 (21.88%)	64
La Amistad Caribe	8 (27.59%)	16 (55.17%)	5 (17.24 %)	29
Huetar Norte	10 (40.00 %)	4 (16.00 %)	11 (44.00 %)	25
Guanacaste	57 (60.00%)	11 (11.57 %)	27 (28.42 %)	95
Marine Cocos Island	18 (81.81%)	0 (%)	4 (18.18%)	22
Osa	76 (73.08%)	21 (20.19 %)	7 (6.73 %)	104
Tempisque	30 (56.60%)	10 (18.87 %)	13 (24.53 %)	53
Arenal - Tempisque	24 (39.35%)	24 (39.35 %)	13(21.30%)	61
TOTAL	317 (54.00%)	159 (27.09%)	111 (18.91 %)	587

*The data correspond to state official staff distinguished in the ASP.
**Others: cleaners, security guards, office workers and so forth.
Source: MINAE-SINAC, 2010

i. Resources for the conservation of protected wildlife areas.

According to the stipulations of the National Report about the System of Protected Wildlife, the following are sources of SINAC income:

1. Central Government,
2. Generation of own resources,
3. International cooperation, and
4. Private financial contributions of non-governmental organizations and foundations.

Different mechanisms are used in the management of such income: the Ordinary Budget of the Republic; the National Park Foundation in the form of fiscal stamps, admission fees to the ASP's and fees of services provided in such areas; the Forest Fund and the Wildlife Fund, collectively with the Special Funds; foundations; and allied organizations (MINAE-SINAC, 2007).

Table 2.3 details the actual incomes of SINAC for the period 2007-2009 both in colons and dollars. Actual incomes are all incomes received by SINAC and are subject to budget approval processes. That is, they are the total incomes previous to the budget process and approval of public funds by the competent authorities (MINAE- SINAC, 2010).

Table 2.3 Costa Rica. National System of Conservation Areas. Actual Total Income. 2007-2009

Sources of Income	2007		2008		2009	
	Colones	Dollars	Colones	Dollars	Colones	Dollars
Ordinary* Budget	6,937,443,849	13,341,152	9,224,361,787	17,404,285	12,334,520,314	21,715,912
National Parks Fund	5,601,134,868	10,771,343	8,533,332,344	16,100,469	10,025,882,116	17,651,370
Forest Fund	957,147,275	1,840,656	1,857,881,307	3,505,402	1,168,028,244	2,056,407
Wildlife Fund	225,602,604	433,848	391,592,035	738,846	327,341,608	576,311
TOTAL	13,721,328,596	26,386,999	20,007,167,474	37,749,001	23,855,772,282	42,000,000

Source: Own elaboration based on MINAE-SINAC, 2007, 2009, 2010
*The amount that is specified in the ordinary budget does not consider the money for the payment of the land that is also financed with this item.

The income from the ordinary budget finances the wages of SINAC officials. The funds created by special laws, that is, by the funds such as the ones from the National Park Forest Fund and the Wildlife Fund, complement the investment by the State through the ordinary budget of the Republic. According to the stipulations of the 2006 National Report on the

System of Wildlife Protected Areas, these funds are used to finance most of the operational items such as fuel, materials and supplies, equipment and traveling expenses.

The National Parks Fund (FPN) consists of tax income from the pro-parks fiscal stamp, goods and services, ticket fees, other income and financial income and transfers. The procedure of collecting incomes from the FPN is the responsibility of SINAC and different offices and institutions related to SINAC are responsible for doing so from some others (MINAE-SINAC, 2007).

Furthermore, the Forest Fund consists of: tax incomes (collection of forest tax); goods and services (sales of plaques and guides); financial incomes; asset sales; transfers (incomes coming from the national budget through transfer); surplus (all incomes accrued from previous years); and other incomes (MINAE-SINAC, 2007).

Meanwhile, the Wildlife Fund is composed of tax and non-tax incomes, operational income, taxes and rates, financial income, transfers and surplus. This fund is entrusted with the collection of the incomes from wildlife fiscal stamps, the import and export of flora and fauna, as well as those related to wildlife refuges with activities charging a ticket fee, the permits of use or research, and licenses for hunting and fishing. Tax income corresponds to the incomes from the wildlife fiscal stamps, operational incomes are those coming from the sale of hunting and fishing licenses, the fees and taxes are incomes from the wildlife refuges, and financial incomes are the interest earned on current accounts (MINAE-SINAC, 2007).

Finally, SINAC receives income from international projects of technical and financial cooperation to support the management of wildlife protected areas, which has also contributed greatly to their development (MINAE-UICN, 2006). Table 2.4 shows the income from this item for the period 2004-2009.

Table 2.4 Costa Rica. Budget of Cooperation. 2004-2009

Year	Amount assigned (in thousands of colones)	Amount assigned (in thousands of US$)
2004	1.,64,181	3,128
2005	1,958,695	3,917
2006	1,511,641	3,023
2007*	1,996,813	3,840
2008*	2,035,220	3,840
2009*	2,181,099	3,840

Source: MINAE-UICN, (2006); and MINAE-SINAC, 2010.
*Calculations made based on MINAE-SINAC, 2010, p.105
*Exchange rate used: in 2007, ¢520; in 2008, ¢530; and in 2009, ¢567.99

SINAC has subscribed 87 valid cooperation agreements with state institutions and private organizations (such as associations and national and international foundations). They are directly related to the management of the ASP's during the period 2006-2009 (MINAE-SINAC, 2010).

Some of the cooperation agreements have been subscribed with strategic members from SINAC, such as the National Institute of Biodiversity (INBio), State universities, associations, conservation foundations, public institutions and private entities. They contribute to the sustainable management of the ASP in order to consolidate and complement the actions that SINAC carries out. This strengthens SINAC action lines for the administration in charge of the ASP in aspects such as volunteering, protection and control of natural resources and biodiversity, environmental education, administration and management, and training and research.

In the period 2004-2009, the SINAC has executed 9 cooperation projects related to ASPs. Their lines of work are focused mainly on: management, conservation and consolidation of marine and terrestrial ASPs; integrated management of hydrographical basins, including the ASPs located in them: integrated management of the territory; strengthening of the tourist activity in ASPs; and reduction of negative impacts on ecosystems due to anthropogenic activity. The total contribution from the cooperation projects is an amount of US$11,404,423. On the other hand, the counterpart of SINAC and the co-financing for the implementation of these projects amounts to the sum of US$35,436,589. During this period, the approximate amount spent executing such projects was US$3,840,000; it was calculated based on the annual budget spending of each ASP (MINAE-SINAC, 2010).

4. Main Threats and Opportunities

The SINAC has successfully protected 26% of the Costa Rican territory under categories. It's important to highlight that 13% of such areas are in the National Park (NP) and Biological Reserve (BR) categories, and almost 88.55% of them belong to the State. The state policy and institutional guidelines were directed toward purchasing land to consolidate these areas because these two management categories are for the absolute protection with greater restrictions on use (MINAE-SINAC, 2010).

This policy has been very important for a lot of economic activities that depend on the existence of NPs and BRs in order to carry out their activities. Tourism activities, for example, are based on promoting and developing the beauty and biodiversity of the NPs and BRs. Millions of dollars are generated yearly for these activities, not only within the country, but outside of it (see Part 3 of this book). Despite this, the SINAC has serious problems in order to have the financial and human resources necessary for the proper protection of ASPs; however, it has made efforts to overcome this situation. Some of the constraints and opportunities to solve these problems are mentioned below.

a. Lack of budget to cover the basic needs of infrastructure in most of the ASPs.

Given the concern for ensuring financial stability in the long term, the SINAC established, at its foundation, an institutional process responsible for financing the System that seeks finding mechanisms to achieve sustainability. As part of the efforts along these lines, in 2003, the SINAC Formulation of Financial Strategy process began with technical and financial support from The Nature Conservancy (TNC). Other instruments that the SINAC is developing at the moment are ASP business plans (MINAE-SINAC, 2010).

Due to the national budget restrictions, and in spite of its efforts, the SINAC has serious problems incorporating new basic infrastructure and maintaining the existing ones in some of the ASPs.

According to REDPARQUES, 38% of financial resources allocated annually to the SINAC are invested in actions related to ASPs while the remaining 62% are spent on other matters, including the operation of the SINAC headquarters and regional offices (29%) and sub-offices (27%) (Induni, 2005). This kind of resource distribution has caused some of the ASPs to have very deteriorated basic infrastructure. Their bathrooms, shelters, ranger houses and administrative offices are in poor condition. One of the most recurrent complaints of tourists is precisely the conditions of the National Parks' facilities (Moreno et al., 2010).

One of the causes of this situation is the fact that the budget transferred to the majority of the National Parks is not big enough to cover the basic needs of these areas. It's important to clarify that not all the income generated by one NP in entrance fees is returned to this area in order to invest in it. For example, in Manuel Antonio National Park, about US$ 2,021,568 were generated in 2008. However, only US$ 392,156 (19.4%) of that was returned as budget, and it was spent on salaries and basic services and couldn't be invested in basic infrastructure or car maintenance (Cubillo, 2009). Another clarification that needs to be made is that all the money that is generated by all the national parks goes to a common fund and is distributed among all the ASPs. This policy allows the SINAC to manage all the ASPs even though some of them don't generate money for the system (such as biological reserves).

b. Ratio of rangers per unit of area to protect.

Due to the budget restriction in 2009, the SINAC had only 587 people, including rangers, office staff and others, to take care of 1.3 million hectares of ASPs; that is, each official had to take care of at least 2,300 ha. Because of this, the problems with logging of protected forests, hunting of animals at risk of extinction and invasion of ASPs are very common.

c. Lack of permanent economic resources to update management plans in many ASPs.

A Management Plan (MP) is a technical instrument that allows the successful management of a ASP; it contains all the measures that should be implemented to protect natural resources. For the structuring and establishment of a MP, a space for discussion and strategic approaches are generated in order to incorporate relevant participatory processes (MINAE-SINAC, 2010).

The economic cost of developing management plans for ASPs is one of the greatest obstacles to having a continuous system and, not only to creating the MP but also to updating it. In recent years, with the cooperation of environmental NGOs and other organizations, the SINAC has more MP; but, some of these areas are still without this important instrument (MINAE-SINAC, 2010).

Of the 168 Protected Areas, 88 (52%) have management plans in operation or under development. The distribution of these plans by management category is as follows: National Parks (75%), Wildlife Refuges (71%), other management categories (40%), Forest Reserves (33%), Biological Reserves (25%), Protected Zones (19%) and Wetlands (8%) (MINAE-SINAC, 2010).

d. Low interaction with local communities.

Although one of the most important developments in the methodology utilized for the elaboration of an MP in the country in the last decade has been the active participation of interested groups and individuals in the management of protected areas, some local communities don't feel the existence of the National Park is relevant for them. Such is the case of Palo Verde National Park, Rincon de la Vieja National Park, and others (Moreno, et al., 2010).

This is a threat because some local communities feel that they have the right to obtain direct benefits from the NP because they are public. This can be translated into illegal hunting and taking of protected resources. This kind of feeling and acting can be neutralized with educational campaigns and programs in order to improve the capacity of the small enterprises or families that live around the NP to take advantage of their activities in a way that does not imply destruction of the natural resources.

e. Other Threats

- *Forest fires.*

In Costa Rica, forest fires have an effect on biodiversity richness and quality of life. This has been a concern in the past fifteen years for those who have been responsible for protection, conservation and natural resource development. To address this situation,

the country has based its work on a National Strategy for Fire Management since 1997. It defines the general guidelines for establishing institutional programs that permanently address the problem of forest fires and fire use in agriculture activities (MIAE-SINAC, 2009).

Despite the efforts in the ENMF framework, between 1998 and 2009, there were 4,764.81 hectares affected by forest fires in ASPs.

Figure 2.5 Costa Rica PNPV. Forest fire.

Source: Chavarría, U. 2010

Figure 2.6 Costa Rica PNPV. Dead Turtles by forest fire.

Source: Chavarría, U. 2010

- *Poaching and illegal extraction.*

There are a number of laws in Costa Rica directly related to the management and protection of ASPs. Despite the existing legislation, there are problems with poaching, removal of plants, such as orchids, ferns, palms, mosses, and so forth, as well as the removal of animals used as pets, such as parakeets, parrots, turtles, iguanas, and others. In the northern region, there is significant hunting of alligators to use their skins. Likewise, there are problems with certain species of sea turtles that are hunted for meat consumption and use of their eggs. In marine areas there are serious problems with long-line and trawl fishing (MINAE-SINAC, 2010).

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Chapter 3

Benin: Developing Protected Areas For and With People

Anne Floquet

1. Introduction.

1.1 Struggle against Poverty.

Benin is a small country located on the West African coast. It is bordered to the west by Togo, to the east by Nigeria, and to the north by Niger and Burkina Faso. The country has an area of 114,763 km^2 with a north-south distance of 700 km and a breadth of 125 km along the coast and of 325 km at the widest section. It is composed of plateaus in the southern part and gently undulating landscapes with a few hills in the central and northern parts. It has an average altitude of 200 m and does not exceed 700 m.

Figure 3.1 Benin. Location Map.

Source: http://world.unomaha.edu/files/Image/benin_map.jpg

The population was 6,967,914 according to the general Population and Housing Census (RGPH) conducted in 2002 (INSAE, 2002), and it can be estimated at around 8 million inhabitants in 2010 with an urbanization rate of 45%. Demographic growth is still high

(around 3%) and is decreasing slowly. Population should further increase until 2050. Forty-six point eight percent of the population is under 15.

Large efforts have been made during the last decades in order to improve infrastructure and public services. Consequently, the Human Development Index[1] level was 0.305 in 1990 and is reaching 0.432 in 2009 (UNDP, 2010). Life expectancy was 55.8 years in 2002 and 62.5 in 2010. Economic growth never reached a level which would allow significantly reducing poverty incidence (35% of the population under poverty threshold). The economy is mainly relying on agriculture and transit trade. Agriculture still constitutes the main base of the livelihoods of 47% of the population and contributes to 32% of the GDP. Main exports used to be cotton fibers, but patterns are changing towards higher diversification of export products (cashew, shea nuts, pineapple, etc.). Benin belongs to the regional West African Economic and Monetary Union and shares a common currency with most of its francophone neighbors that is bound to the Euro. Many imported commodities land in Cotonou harbor and are transported towards landlocked Sahel countries. Important licit and illicit trade movements also concern Benin's giant neighbor, Nigeria.

Population settlement patterns result from many migrations across the continent over centuries and are nowadays built out of a large number of ethnic groups with different languages (around 50). The largest group is the Fon (39%). The language of the administration is French.

Figure 3.2 Benin. Communal Population Density. 2007.

Source: Sepulchre et al., 2008

[1] UNDP Human Development Index is a deprivation index based on the share of the population without access to education, primary health care and clean water, on the overall life expectancy and on the nutrition status.

The country is densely populated (58 inh./km²), especially in the southern part where population density is over 185 inh./km² even in rural areas. On the other hand, in the North, it ranges from 20 to 60 inh./km² in most cases (see Figure 3.2).

Benin gained its independence in 1960 after 6 decades of colonization. Since 1990, it is a multi-party democratic state. Since 2000, the State has undergone a profound decentralization process. Councils have been elected in 77 municipalities and given important responsibilities in basic service provision and local economic development promotion.

2. Forests and Biodiversity at Risk.

2.1 South-north vegetation gradient.

Benin is not a forest country. Benin and Togo receive less rainfall than their neighboring coastal countries, where tropical rainforests still can be found. This phenomenon, known as the Dahomey gap, is seen as a consequence of early deforestation in the densely populated South. Rainfalls hardly reach 1,300 mm per year. Three climatic zones can be distinguished in Benin (Adjanohoun et al, 1989); they coincide broadly with three main vegetation zones along a south-north gradient.

In the northern semi-arid soudanian zone, rainfall decreases northwards from 1,300 mm to less than 900 mm. Grass and park savannahs dominate the landscape. Forest can mainly be found as gallery along rivers and dry forests in areas protected from fire. If useful trees are protected, typical park savanna composed of shea and locust tree, baobab and Borassus palms replaces the initial vegetation. Fauna reserves are located in this region (Figure 3.1 & 3.2).

The mid-belt is a transition zone, where 1,200-1,300 mm of rainfall are distributed in one season with an intermediate dry spell. The climax vegetation consists in dry forests and woody savannahs. Forests are turned into grassland after clearing especially for planting yam (Figures 3.4 & 3.5) and, in many cases a fire climax prevents the reversal of abandoned grasslands to their initial state after farmland has been returned to fallow. Population density is lower in the central belt, and most of the forests left in Benin can be found in this area.

In the South, the coastal and sub littoral zone is characterized by 1,000-1,200 mm of rainfall distributed in two rainy seasons. The climax vegetation was composed of tropical semi-deciduous forests and of mangroves around the lagoons. The remains of forests, mangroves and swamp forests can still be found on a small scale. Most of the forest has been turned into bush land after farmland clearing. Bush fallow average duration gets shorter and shorter because of the high population density and is eventually replaced by grassland (Figures 3.6 & 3.7).

Figure 3.3 Benin. North Sudanian Zone: Dry forest in the Pendjari National Park.

Source: Floquet, A. 2010

Figure 3.4 Benin. Northern Sudanian Zone. Farmland with baobab and borassus palm.

Source: Floquet, A. 2010

Figure 3.5 Benin. Mid belt: Woody savanna in the Southern Zone: Remains of semi-deciduous forest within farmland.

Source: Floquet, A. 2010

Figure 3.6 Benin. Mild belt: Land clearing form yam fields.

Source: Floquet, A. 2010

Figure 3.7 Benin. Southern Zone: Remains of semi-deciduos forest within farmland

Source: Floquet, A. 2010

Figure 3.8. Benin. Southern Zone: Overused fields.

Source: Floquet, A. 2010

2.2 Deforestation as a general trend.

According to the last 2007 national forest inventory, 30% of the country's arable area is farmland (fields and fallow), and the rest is forest (16%), savannahs (52%) and perennial crops in pure stands (oil palms, teak, cashew and fruit trees [2%]) (Sepulchre et al., 2008). Farmland is expanding and farmers look for the most fertile soils, these being under forest. Woody formations are cleared into farmlands (at least 1,000 km² every year) and into pastures, while trees are logged for timber and charcoal. Deforestation is in progress at a high rate (forests cover: 78,000 km² in 1980; 69,000 km² in 1990; and 50,000 km² in 1997). In search of fertile soils and grazing lands, farmers and herd keepers are still moving from overexploited regions towards areas with remaining forests, putting them at acute risk. Consequences are losses of biodiversity, land erosion and siltation of rivers and lagoons. Forestry contribution to the GDP has been assessed at about 6.7% in 2009 (Bertrand & Agbahungba, 2009) while consequences of environmental degradation are assessed at about -3%.

In the nineties, decision makers in Benin became more and more aware of the global threats on the country's natural resources. In 1992, a national environmental plan was designed; it depicted alarming projections of the changes in natural resources by a status quo scenario. In 1994, Benin ratified the Convention on Biological Biodiversity and since that time, has been addressing the issue of conservation. In spite of these efforts, the state of the art depicted in 2002 by the National Plan for Biological Diversity Conservation was still alarming. The 2 preceding decades attest to this with: the clearing of 987,000 ha of forests in the classified domain, a regression of mangrove area by 15,000 ha in wetlands, a decrease in fauna density even in the national parks and an overall reduction in plantation efforts (MEHU, 2002). Despite these negative trends, the potential for biodiversity conservation is still significant in the country.

2.3 Actual standing of natural biodiversity.

In the North, untouched areas of dry forests and woody and grass savannahs can still be found in protected areas. They shelter a large range of mammals: bushbucks (*Tragelaphus scriptus)*; large antelopes, such as roan antelopes (*Hippotragus equinus*), hartebeests (*Alcephalus busephamus*) and Buffon kobs (*Kobus kob*); warthogs (*Phacochoerus africanus*); vervet monkeys; and so forth. Protected areas are even more famous because of their population of elephants (*Loxodonta africana*), buffalos (*Syncerus caffer*), hippos (*Hippopotamus amphibious)*, lions (*Panthera leo*), cheetahs (*Acinonyx jubatus*), hyaenas (*Crocuta crocuta, Hyaena hyaena*) and lycaons (*Lycaon pictus*). Crocodiles, other reptiles and numerous bird species can also be easily observed especially in floodplains. The most famous bird species are cranes (*Balearica pavonina*), marabous (*Leptoptilos* sp.), jabirus (*Ephippiorhynchus senegalensis)*, calaos (*Bucorvus abyssinicus*), bee-eaters during their seasonal migration from Europe to West Africa (*Merops apiaster*), and others. These spe-

cies would have disappeared without the protected areas because of the anthropogenic pressure.

In the South, wetlands are mainly located in the Oueme and Mono Valleys and coastal lagoons but can be found at the northern border in the Niger Valley as well. They shelter rare species of: mammals, such as sitatunga (*Tragelaphus spekei)*, otters (*Aonyx capensis* and *Lutra maculicollis)*, and hippos; and of reptiles, such as varans (*Varanus niloticus)* and dwarf crocodiles (*Osteolamus tetrapis)*. Many wading birds and a great number of migratory birds can also be observed in these areas. Near the coasts, fish, shellfishes, and mollusks spread in the brackish waters of the mangrove (*Rhizophora racemosa* and *Avicennia germinans)* remains. Manatees (*Trychetus senegalensis)* can still be found but are under great threat.

Remains of tropical semi-deciduous forests also allow for the survival of many species. The red-bellied monkey (*Cercopithecus erythrogaster*) is an endemic species emblematic of conservation efforts, but there are many other species under threat, such as the mona monkey (*Cercopithecus mona*), *Colobus* species, scaly anteaters (*Manis gigantean)*, and so forth. The fragmentation of their habitats, hunting habits and lack of consciousness of the risks of total extinction make their survival most problematic.

In the Mid-belt of the country, forests are best known for their tree species. *Isoberlinia doka, Isoberlinia tomentosa, Anogeissus leiocarpus, Pterocarpus erinaceus, Afzelia africana, Pseudocedrela kotschyi, Daniella oliveri, Khaya senegalensis, Triplochiton scleroxylon, Ceiba pentandra, Celtis* sp., and others are used for timber. *Vitellaria paradoxa* and *Parkia biglobosa* are protected in fields and constitute main elements of savannah park landscape around the forests. Forests also shelter many recently acknowledged: small mammals, among which endemic species are still being discovered by scientists; and non tree forest product species, such as mushrooms or medicinal plant species. Most of the remaining forests belong to the classified domain and are under State control; in some places, remains of forests and woody savannahs can also be found in the private domains and are under the control of local families, who allow family members and migrants to clear them for farming purposes or to use them as grazing lands. Up to now, classified forests have been mainly managed for their direct uses and not for their amenities nor for protecting their biodiversity. The lack of corridors between them also makes it more difficult for animals to survive.

A systematic inventory of the biodiversity was undertaken in the first years of the millennium by several research teams (see Sinsin & Olowabi, 2001 for a summary; Akoegnignon et al., 2006), but species may well go extinct before the inventory of the biodiversity will have been completed. According the the 4th report on the convention for biodiversity (MEPN, 2009), 40 fauna species are under protection but 3 are still under extinction threat and 2 in critical danger and the report recognizes that many species are not under monitoring.

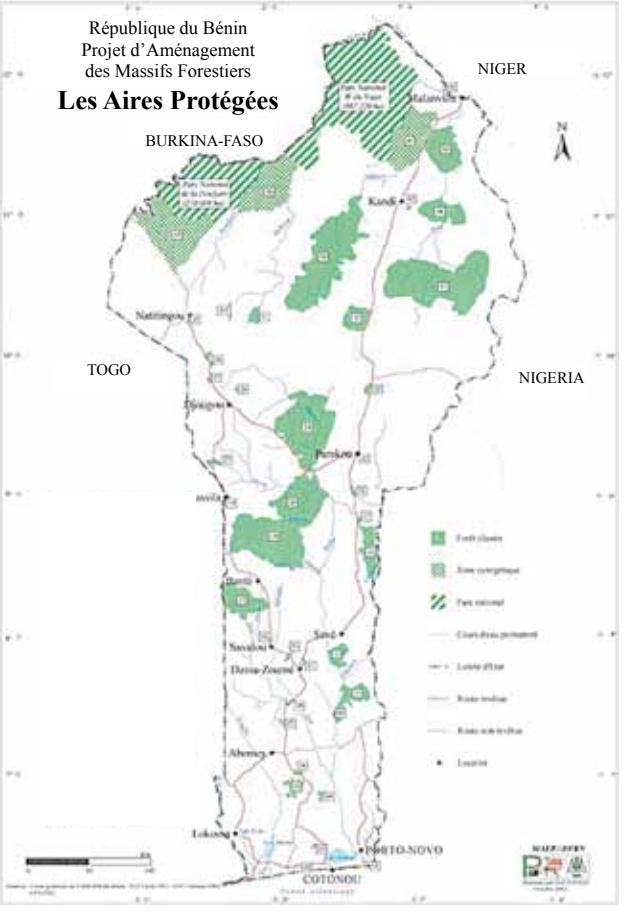
3. Protected areas and their history.

Nearly 20% of the country's area is officially under protection. Yet, the intensity of this protection is quite variable depending on the status of these protected areas.

3.1 Diversity of status.

Three types of protected areas can be differentiated in Benin: national parks and their adjacent territories are mainly located in the North, classified forests of the state domain in the mid-belt and commons under community regulation in the South, especially in wetlands. The last ones have only been recently acknowledged and are not included on maps of the protected domain (Figure 3.9).

Figure 3.9 Benin. Protected Areas Already Recognized by Law.



Source: MAEP, 2002

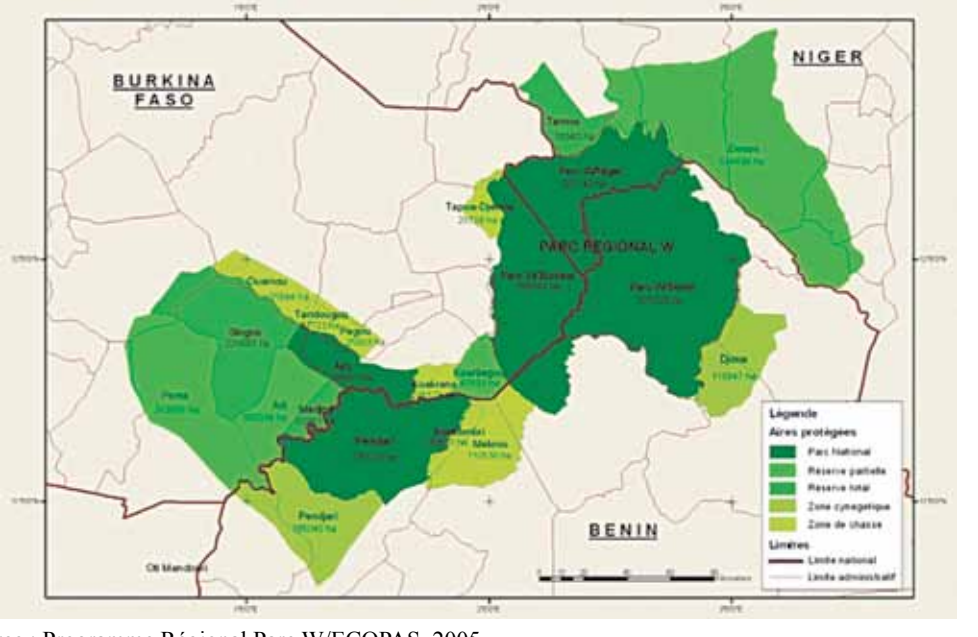
Table 3.1: Benin. Protected Areas by type.

Entities	Category	Area (km²)	IUCN type	RAMSAR	Observations
National Parks and other adjacent lands					
Pendjari Biosphere Reserve	National Park	2,750	II	no. 1669 Pendjari River Wetlands -1,448 km²	Inscription on the list of World Heritage requested
	Cynegetic areas	1,777	IV		
W Biosphere Reserve	National Park	5,633	II	no. 1668 - Floodplains of the rivers Niger, Mékrou and Alibori - 8,955 km²	Part of the transnational W Reserve; Pendjari and W mart of the WAPOK complex
	Cynegetic areas	2,320	IV		
Main natural forests of the classified domain					
Goungoun & Sota	Classified forests	1,162	VI		Adjacent to W
Trois Rivières & Alibori Supérieur		5,150			
Ouémé Superieur & N'Dali		1,472			
Wari Maro, Monts Kouffé & Agoua		3,056			Could be transformed into a Reserve
Tchaourou-Toui-Kilibo		500			
Ouémé-Boukou & Ketou-Dogo		633			
Lama "kernel"		155	Ib		surrounded by state Teak plantations ; transformed into a Total Reserve, accessible to tourists
Community Protected Areas targeted for formalised protection					
Swampforest Lokoli	none	20	IV - VI ?		Red belly monkey
Swampforest Zinvié,		10		Belongs to site no. 1018- lower Ouémé Valley, Porto-Novo lagoon and Nokoué lake -916 km²	Marshbuch
Adjamey Wetlands,		8,3		Belongs to site no. 1017 - Couffo valley, coastal lagoon, Ahémé Lake -475 km²	Hippos - already a Reserve recognised by the Commune
Other meaningful community protected areas					
Togbin Mangrove, Gnanhouizoumé Wetlands, etc.	none	3	?	Belongs to site no. 1017	
Sacred forests		184	?		Sacred sites, numerous - 3000 forests

Sources: MEHU, 2002 and CEBEDES, 2009

National parks in the North belong to the largest West African cross-border protected area spreading over Benin, Niger and Burkina-Faso (see Figure 3.10). Niger, Burkina Faso and Benin joined hands for developing more efficient protection measures, especially for the threatened W National Park. Figure 3.10 depicts the respective location of the Pendjari Park and the cross-border W Park. Contiguous to these parks (in dark green on the picture), partial reserves (in Niger and Burkina-Faso only) and controlled hunting areas (4 in Benin) can be found (in pale green).

Figure 3.10 Benin. WAPOK Complex of natural protected areas in the northern part and neighboring countries.



Source : Programme Régional Parc W/ECOPAS, 2005

National parks are parts of Biosphere Reserves that are organized in concentric belts: (1) zones under total protection; (2) areas allowing tourism activities; (3) game areas, where sport hunting is allowed under strict control; and (4) buffer zones, where restricted farming and cattle raising activities are tolerated. Parks do not allow any encroachment and circulation of cattle is restricted to corridors or completely prohibited. Farmers have therefore resettled in the buffer zones at the border of the game or park areas. In Benin, the two national parks (Pendjari Park and transnational W Park) and their three game hunting areas cover 843,000 ha and 420,000 ha, respectively. These areas belong respectively to the IUCN Categories II ("Protected area managed mainly for ecosystem protection and recreation") and IV ("Habitat/ Species Management Area: protected area managed mainly for conservation through management intervention) (Dudley, 2008).

The international importance of these areas has also led to the inscription of their wetlands on the RAMSAR list.

Gazetted forests - Fifty-six forests and plantations have been classified as State domains, Gazetted forests cover 1,435,000 ha, but only part of this area is still forest. Most of the gazetted forests are located in the northern and middle part of the country (see Figure 3.9). Gazetted areas are managed as productive areas and they could be considered as "Managed Resource Protected Areas" (IUCN type 6) but their protection is difficult and they are threatened by illegal logging, land clearing and bush fires lit by herd keepers and hunters up to a yearly rate of destruction assessed at 1,000 ha.

Commons - Apart from these officially protected areas, areas under community management and protection can be found, especially in wetlands, as well as numerous sacred groves under regulation of priests and religious rules. Sacred forests still constitute an endogenous form of *in situ* conservation. Nearly 3,000 sacred forests have been censed in 1998 by Agbo & Sokpon, most of which only spread over small areas (0.2% of the country's area) but are well preserved by traditional religious practices. In wetlands, most of the mangroves have been turned into firewood and remaining stands are evaluated at 1,150 ha (FAO, 2007). Efforts are done for their reforestation. Swamp forests and Raphia stands are managed as Commons. Nearly no efforts for protecting such scattered resources had been done officially until Benin signed the RAMSAR convention in 2000. Currently, a new status for these areas, based on the recognition of community-based protection, is being discussed in Benin and other countries in West Africa. IUCN for example defines « areas of the autochthonous community heritage » as natural and modified ecosystems with a significant biological diversity, ecosystem services and cultural values conserved by authochtonous populations and local sedentary and mobile community by the use of traditional rules and other efficient ways » and supports such efforts (IUCN/PACO, 2009).

3.2 Back to a pact with communities.

Differences in the statuses of protected areas are the result of historical processes.

3.2.1 Community management.

In pre-colonial times, management of natural resources relied on locally developed rules based on local knowledge. These rules regulated access, for example, for equitable use and also protected some species, which were known to be scarce and useful because of their medicinal and religious importance or because of their contribution to the diet (fruit, tubers, fish, etc.). Traditional natural resource management is characterized by specific features. Rules are developed and applied by communities sharing the same cultural and geographic area; they rely on customs, prohibitions and taboos, myths and tales. Many of these natural resources are regarded as deities. Rules are enforced by traditional institu-

tions embodied into local groups, such as hunting or fishing associations, deity adepts, secret societies and chieftaincy (local dignitaries, landlords, healers and priests).

Some of these rules can still be observed nowadays, such as a yearly no-fishing season or specific ceremonies that should be performed before hunting large animals, which, in fact, restrain the harvesting intensity. Respect of rituals can also be considered as a recurrent remembrance of the value of a specific resource in which a deity is rooting. But not all forests were under the management of rural people and not all species received specific protection measures either. This allowed practices to degrade the environment in a context of increasing demographic pressure. Extensive farming practices relying on fire-based forest clearance destroy the existing natural richness.

When the colonial and post-colonial State took control over some of the natural resources in classifying forests, traditional institutions were weakened. The continuous expansion of new religions, which do not cope with animist beliefs, also contributed to this process. Nevertheless, some of the traditional management and protection practices still persist now, especially for Commons. Wetlands and sacred forests are still regulated by endogenous institutions.

3.2.2 Setting up State control.

During the colonial period, the administration took over the management of natural resources including forests. In 1938, the Dahomey[2] Water, Game and Forestry Service was created for implementing the Forest Protection Act. This law was followed by a set of texts and laws, as in all French speaking countries of West Africa (AOF), which aimed at maintaining a forest cover under state management for productive timber harvesting, hunting and recreational activities. From 1940 to 1955, 46 forests with an area of about 1,303,000 ha were gazetted by the colonial administration. In 1954, the actual Pendjari Biosphere Reserve was classified as a game area. In these gazetted areas, land clearing, uncontrolled felling of trees, overgrazing and poaching were prohibited. Rules were designed to restrain anyone from accessing forests, including local populations. User rights of the border populations were limited to the gathering of dead wood and fruit picking. The people concerned resigned themselves to the loss of their rights because at that time arable land was still available. This policy was maintained after independence in 1960 and until the onset of democratization in the nineties. But in the eighties, protection of classified forests became more and more difficult to provide because of the increasing land pressure, on one hand, and the drastic reduction in the number of forestry officers under structural adjustment on the other hand. Democratization also made a coercive policy difficult to legitimize. Protection with, and not against, people became the new motto.

[2] Dahomey was renamed Benin in 1972.

3.2.3 Co-management.

New laws were passed in the nineties (the democratization era). The 1993-09 Forestry Law (République du Benin, 1993) restricts State management rights to domains which have been subjected to a classification procedure (national parks, gazetted forest and state plantations) and foresees that these domains have to be managed according to a plan in a sustainable way. It also grants populations at the borders of these domains some user rights (fishing, gathering and grazing). Forests outside this classified domain are still under State regulation but the rights of private owners to manage forests according to specific rules are also recognized under the condition that permits are requested (land clearing) and taxes paid (timber logging). At the same time, pilot projects were testing co-management procedures with forest border residents and the forestry administration in a few State forests.

Game reserves had been partly transformed into National Parks after independence but they also experienced a major shift in more recent years. In 1994, the Pendjari National Park was turned into a Biosphere Reserve with UNESCO support. The principle of a UNESCO biosphere reserve is to pool together areas under strong conservation and areas where specific uses are allowed for immediate benefits of the border populations, in order to meet their needs and gain their support to protect according to the motto: Conservation with, and not against, people. The process was extended to the W National Park later on. The management of this reserve was entrusted to a new administrative entity, the Wildlife Reserve Management Centre (CENAGREF) created in 1996, whereas the Forestry Division kept the control of gazetted forests.

At that time, two somehow different administrative traditions developed and evolved in Benin concerning conservation, but both had ambitions to cooperate with local users.

Participatory procedures have been developed for a first set of classified forests since 1992. Co-management committees were set-up with forest resource users and forestry officers. Committees design and validate a management plan for their classified area. They delimit areas where timber logging, grazing, hunting, and farming are possible according to a set of rules and under the condition of following permits and making tax payments, as well as areas under protection for regeneration and enrichment by reforestation. At least ten of the 38 gazetted forests have a co-management plan. Such plans may have been designed with care and real participation of all social groups, even the marginal ones. The ability of the forestry administration and of the local committees to enforce the plans' rules is less evident. There are many negative incentives (such as bribery) not to comply with the jointly decided restrictions. Too much zeal should not be shown in fining offenders, who belong to the local community and who bring income to it or to the administration. In spite of these difficulties, the co-management procedures are currently being extended to other forests. Additional procedures for controlling resource use through their marketing channels are being developed.

Participatory procedures were also developed for the national parks and their surrounding hunting areas. The 2002-16 Wildlife Law makes systematic involvement of people living close to protected areas statutory and allocates to people living at their borders a share of the income as an incentive to protect these areas (Assemblée Nationale, 2004).

Local Associations for the Management of Village Fauna Reserves (AVIGREF) were organized and are nowadays involved in the management of the reserves as partners of the CENAGREF administration. They receive part of the income generated by tourism in the park (30% of the hunting fees as well as the meat from the game hunted by international hunters). Such income is invested in development infrastructures and activities. Local actors got more and more involved in the execution of some activities in the parks such as tracking wildlife, guiding and hosting tourists, and so forth. Thus, mistrust and tension that had existed between populations and forestry administration were reduced. Local village associations nowadays not only overtake functions of guidance of the different types of visitors but also of protection against poachers (e.g. eco guards and auxiliaries working with CENAGREF anti-poaching units).

Activities, such as farming, fishing, bee-keeping, and hunting, carried out by the local populations within a transition zone around Pendjari are subject to contractual arrangements. In such a framework, micro-projects may be designed with the local people living in buffer areas near the Reserve so that they develop alternative income generating activities and benefit from credit (Kolbicke, 2005). According to a World Bank progress report, 10% of the households adjacent to Pendjari or W National Parks benefited from micro credits or grants in the early years of this millennium. Some of the village associations enter biological value chains. Others develop village hunting areas in the buffer area for small animal (guinea fowl, rabbits, etc.) hunts in order to capture additional revenues for lower income hunters. They cannot organize the venue of big game hunters from abroad, whose expenditures profit formal contractors. Further associations develop eco tourism initiatives.

Participation, significant additional income and control of both fire and poaching have had positive ecological impacts. According to the ecological monitoring system in Pendjari, the density of fauna and flora species under observation increased by more than 20 percent between 2000 and 2005. In the W Park, where intervention began later, farms and herds were successfully banned out of the Park (The World Bank, 2006). Such successes in the protection of the areas against encroachment and illegal uses can be attributed to the consequent approach of involving communities in activities and sharing benefits with them. It may also be the result of the low economic incentives of taking these savannas into use. Competition for resources is lower than in the forest belt where high value timber logs, fertile soils and good grazing land attract both traders and farmers.

3.3 State institutions and administrative settings implementing conservation policies.

The Ministry for Environment and Protection of Natural Resources is in charge of the implementation of the policies concerning protected areas. In the 2009 budget, the amounts voted for this Ministry represent 1.6% of the total budget, far less than the education and health sectors. The Ministry has designed three programs, one especially responsible for the implementation of international conventions the country has ratified and one for the management of natural resources. Various administrative entities within the Ministry are directly involved in the management of protected areas:

The Forestry Division (DGFRN) is the eldest entity and is, among others, devoted to the implementation of the forest policy through interventions in classified areas (gazetted forests) as well as other protected areas outside the classified domain (e.g., in newly created communal forests or in private forests). It is decentralized at the province level and dispatches forestry officers in outposts near gazetted forests and along main transit roads. The functions of the forestry officers are numerous and somewhat contradictory: extension and advisory for people interested in plantations; permit delivery for timber loggers, people having to fell palms and teak, for charcoal traders, and so forth; enforcement of the law and prevention or repression in case of illegal practices, especially in gazetted forests; and facilitation of management committees in gazetted forests. The Forestry Division has long been within the Ministry of Agriculture so that its agents were working as a team with agricultural extension agents. Then it was relocated within the Ministry for Environment and Natural Resources Protection after the creation of the latter. In 2007, 153 agents were working at the national level and 396 at the decentralized level. This means that a local forestry officer or ranger has to take care of 37 km² of forests in the classified domain, and he is also supposed to work outside the classified domain (FAO, 2008 & 2010).

The Wildlife Management Center (CENAGREF) has been set up for the management of the national parks and game hunting areas. CENAGREF is an autonomous agency created in 1996 under the Ministry of Environment and Protection of Nature and under the responsibility of a multiple stakeholder Board (Guedegbe, 2008). A trust fund is being created for financial autonomy of the management of the parks, which are now depending on the versatile funding of donors. CENAGREF employed 104 persons, 11 at national level, 39 in Pendjari and 54 in W Biosphere Reserves. Even if all outposted persons were working in the reserve (in fact there are also in charge of the administration), an average worker takes in charge 134 km² (FAO, 2010).

The Benin Agency for Environment (ABE) is also given management autonomy in order to implement the National Environmental Management Plan. It mainly operates outside officially protected areas and has focuses on wetlands and coastal areas.

The entity in charge of 150 km² State teak plantation management is the wood national office (ONAB).

Many interventions take place within projects. Projects may be hosted by one of these administrative bodies or keep their financial and administrative autonomy with a separate management unit and a loose relationship to administration through reporting and joint monitoring. Table 3.2 presents some of the different projects in Benin to date. It presents the type of protected areas at which it is aimed, the structure responsible for the management, the objectives of the project and the budget. Efforts are currently to develop a coordinated program approach in which all projects would have to be inserted with a unified set of administrative and financial procedures.

Table 3.2 Benin. Main projects and interventions in protected areas. 2009.

Type of Protected Area	**Project Name**	**Administrative Entities in Charge**	**Allocated Budget 2009 (Millions of US$)**	**Main Objective**
National Parks and Game Hunting Areas	Conservation and Management of National Parks (PCGPN)	CENAGREF (Wildlife Management Centre)	0.22	Participatory management, conflict mitigation within and across countries, tourism promotion of parks
	Conservation and Management of Natural Resources Program (ProCGRN)	Pendjari National Park & CENAGREF/	0.12	Promotion of tourism in Pendjari, support to organizations and initiatives of the riparian populations and to the trust fund
	Transnational projects (Benin, Niger, Burkina-Faso) (ECOPAS)	CENAGREF	End of funding period	Regional coordination among actors related to the Pendjari, 3W and other contiguous protected areas
New Protected Areas	Support to the Development of Protected Areas (PADAP)	CENAGREF (Wildlife Management Centre)	0.26	Design rules, conduct studies for new areas to be put under protection as community protected area

Type of Protected Area	Project Name	Administrative Entities in Charge	Allocated Budget 2009 (Millions of US$)	Main Objective
Classified Forests	Forests and adjacent land management project (PGFTR)	DGFRN (Forestry Division)	7.47	Design and implement forest co-management plans in 22 gazetted forests; infrastructure in and around the forests
	Forest Management Project (PAMF)	DGFRN (Forestry Division)	1.8	Support co-management committees and inventory resources for better use in 3 large gazetted forests
	National Budget own resources	DGFRN	?	Funds are allocated to the DGFRN and its subdivisions but it is not possible to determine the share specifically allotted to the protected areas

Source: Adapted from MEPN, 2010, Budget Execution Report of the Ministry for Environment and Protection of Natural Resources.

4. Main Threats and Challenges in Protected Areas

Main threats to protected areas are related to land clearing for agriculture, timber and game harvesting above the sustainable threshold, overgrazing and bush fires. The deforestation pace has hardly been decreasing (1.3% between 1981 and 1990; 1.2% between 1991 and 2000). Satellite pictures in 1975 and 2000 had already displayed how forests in the classified domains have been destroyed, and according to the recent national forest inventory, the trend has not been reversed since.

4.1 Land clearing for farming.

As already stated above, population density is high in Benin and a large portion of the population still mainly relies on farming for its livelihoods. Farmers still clear forests and woody savannahs for crops with high soil fertility requirements, such as yams, and for feeding their growing families. Traditionally, long term rights over farmland are obtained

by forest clearing. It is, therefore, strategic for farmers to assess their rights on new areas in a context of increasing competition over land when they intend to transmit land to several sons. Migrants from regions of low productivity in search of a better future also target areas with forest remains in the hope to get long term land rights, and such areas may well be located near or within forests of the classified domain.

4.2 Grazing in protected areas.

Livestock is developed in the northern part of the country and was evaluated at 1,300,000 heads of cattle in 1996, with a yearly growth rate of 3.5%. Cattle feed on fields after harvest and move away from fields in the rainy season in order to avoid conflicts; they move over longer distance southwards at the end of the dry season in order to find fodder, young grass and water and are attracted by forests of the classified domains.

Transhumance concerns local herds; but, since the drought in the seventies, it also concerns Sahel livestock keepers in serious need of fodder. In fact, it can be observed that the high quality of grazing land after early fires and the availability of water attracts many Sahel herds within the W and, to a lesser extent, the Pendjari Biosphere Reserves. In 2003, thousands of herds, hundreds of thousands of cattle, have been counted in an aerial census in the Benin part of the WAPOK Corridors have been delimited in order to control cross-border movements through the regional complex of protected areas (Programme Régional Parc W/Ecopas, 2004).

Usual negative impacts of high concentration of livestock therefore affect protected areas: from trimming of fodder trees (*Pterocarpus erinaceus, Afzelia africana, Khaya senegalensis*) up to their destruction; overgrazing; soil compaction, and etc. Moreover, cattle compete with wild animals for resources.

4.3 Timber illegal harvest.

Local production of timber is low, and most teak production from the State plantations is for export. Therefore, the growing local consumption puts forests under increasing pressure.

The last evaluation of timber harvest (Bertrand & Agbahunga, 2009) reveals that out of 652,000 m^3 of logs harvested yearly, 92% originate from natural forests and 8% from teak plantations. Three quarters of the harvest come from illegally logging within the protected domain by obtaining permits as imports from neighboring countries. According to this assessment, 469 thousand cubic meters of timber are harvested per year in classified forests, while the yearly sustainable production level is assessed at 38 thousand cubic meters. Therefore, some species are about to disappear from natural stands: *Antiaris africana* and *Khaya* sp., which were the preferred species, can no longer be found easily and are replaced by less valued redwood species, such as *Isoberlinia doka* and *Pterocarpus erinaceus* or by *Ceiba pentandra* for coffering.

This last evaluation is a striking contrast to an evaluation performed in the forestry sector two decades earlier (General Woods & Veneers Ltée – Bénin Consulting Group, 1997). The latter probably had overestimated the potential of the vegetation stands and the degradation of their productivity through mismanagement.

The timber commodity chain involves a few formal traders, who obtain permits for at least part of the logs (logging permits, import permits) and organize transport. They subcontract local informal loggers, who are in charge of sending teams into the forest, felling the trees and processing them into tradable beams. There are local stakeholders, whose interest is to further harvest timber. A large range of licit and illicit taxes are perceived on each load until it reaches its destination so that it is also in the interest of the administration and of local authorities to promote timber trade. It is a cause of great losses for the State budget. In 2002, WWF estimated that Benin was loosing US$ 1 million a year due to the legislation and its implementation (WWF & the World Bank, 2002)

4.4 Firewood and charcoal.

In 2007, more than 92% of the rural population and 79% of the urban population relied exclusively on fuel wood as energy for cooking and 8% and 21%, respectively, relied on it partially. Most of the consumption is in the form of charcoal (yearly, 1.1 million tons of firewood and 13.3 million tons of wood processed into charcoal). The production, including losses, is therefore evaluated at 16.5 million tons of fuel wood, while the sustainable production out of forests and fallows is assessed at 4.8 million tons (Bertrand & Agbahungba, 2009). Dependency on fuel wood has been decreasing during the last few years, and the Ministry of Environment has promoted gas cooking and fuel wood saving cookers, but not to the point that reverses trends. It is expected that the demand for fuel wood will no longer be satisfied in 2017 (Sepulchre et al., 2008).

Charcoal commodity chains are well established, and the profitability front steadily moves northwards; it is now further than 300 km from the coastal urban markets. The activity generates a low but essential income for numerous young and asset-poor people, who perform it on a seasonal basis and sometimes as a pre-paid job for rural collectors. For traders organizing permits, transport and storage, this activity is very profitable. Theoretically, charcoal production is performed according to quota in classified forests with management plans, but the activity is difficult to control. Projects have been promoting fuel wood plantations over the last decade in the southern part of the country and rehabilitation of degraded forests of the protected domain in the mid and northern belts, but here again, actual efforts cannot reverse the trends.

A specific case of endangered fuel wood species concerns the last remains of mangrove (*Manilkara obovota*, *Rhizophora racemosa* & *Avicennia africana*), which is being destroyed for traditional salt processing and fish smoking along coastal lagoons.

4.5 Hunting, poaching and animal trafficking.

Hunting is a traditional activity in rural areas. Farmers use traps in order to get some meat and protect their crops from rodents and young boys in order to complement their diet. Hunting is widely performed in the dry season in association with bush fires and concerns mainly rodents. In some ethnic groups, hunting parties are also organized as traditional events gathering large groups. They have strong cultural ties and are regulated by specific institutions. Therefore, hunting itself could not be prohibited but only regulated. Aside from such social events concerning male adults, specialized professional hunters can be found in all forests and savannahs.

Species hunted are mainly rodents, such as Gambian rats (*Cricetomys gambianus*), giant rats (*Cricetomys emini*), grass cutters (*Thryonomys swinderianus*), crested porcupine (*Histrix cristata*), striped ground squirrels (*Xerus erythrthropus*), birds (*Francolinus* sp.; *Numida meleagris*), snakes and other reptiles, monkeys, bats, and more seldom, duikers (Codjia et Heymans, 1988). Assogbadjo et al. (2005) have shown that near a forest in the South, adjacent populations were consuming rodent bush meat six times per month.

Most of the hunting activities at a significant scale are illicit. The importance of hunting is therefore difficult to assess. According to raw estimations performed by Bertrand & Agbahungba (2009), meat consumption could reach 70,000 tons per year, half in cities where bush meat is mainly consumed in street restaurants, and half in rural areas. Such quantities have to be converted in raw weights.

In 1983, Benin ratified the Washington Convention on International Trade of Endangered Species (CITES), but thousands of snakes, tortoises, varans, parrots, monkeys were said to be exported alive for the pet trade or the leather industry and for rituals and medicinal purposes in the nineties. Nowadays, snakes are still exported for the pet trade by at least 10 export firms authorized by the administration. In some cases, snakes are being raised in formal ranching farms, but snake farms also seem to be supplied from the wild (Toudonou et al., 2004).

Classified forests attract specialized hunters. On one side, putting parts of these forests under total protection allows for an increase of animal stands. On the other hand, lack of control allows for higher uptake. Monographs around some of these forests evaluate that a significant share of the households rely on hunting and poaching for their income. As already mentioned, poaching and trafficking put many species at great risk.

Hunting activities are also performed in the game areas around the National Parks under the control of the administration and with better performance. In the fifties, part of these areas had been classified as a game reserve and first, decreases in animal populations could be observed. Over the last two decades, legal hunting activities have been reorganized in order to combine sound ecological quota definition with the attraction of high-income trophy-keen hunters from rich countries. While the Parks were improving their coopera-

tion with border population, it was also granted a higher share of the revenues: 30% of the taxes and the meat are given back to the village associations, which sell the meat locally at low prices. Hunters from abroad are accommodated by formal contractors but the activity also creates some jobs for rangers, cooks, taxidermists, and so forth. Moreover, some village associations try to develop their own hunting areas, which should attract medium income earners interested in hunting activities as a way of discovering nature.

4.6 Cohabitation problems with the wild.

Cohabitation with the wild is an issue for migrating species, such as elephants, that move from national parks and their adjacent game areas to some of the northern classified forest without the shelter of appropriate corridors. They may destroy crops in adjacent villages without being a sufficient source of income for local populations through tourism as compensation, especially in the W complex.

4.7 Bush fires.

The occurrence of bush fires in Benin is alarming (Alimi, 2010). As mentioned above, young men and boys use fire for hunting rodents and snakes. Fires around villages are said to contribute to the reduction of crop pests. The same area may well be set on fire several times per dry season and some of these fires spread into non harvested fields, plantations and protected areas. Fire is used by farmers for land clearing at the end of the dry season and by herd keepers for the destruction of old lignified high grasses and the growth of young grass shoots. In both cases, fires are provoked during the very dry and hot season and easily spread into dry forests where they feed on accumulated dry biomass, causing high temperature, raging flames and destruction. Livestock keepers are attracted by classified forests and deliberately set them on late fire in order to feed their cattle.

As prevention, farmers are supposed to set early fires in grass savannahs and grass fallows in order to prevent major damage to the vegetation. Village fire committees are in charge of this task. Forests are to be protected from fire through buffer areas of plantations. But these measures are still insufficient to prevent late fires in protected areas.

In classified forests under management, fire management strategies are very diverse in the ways they operate and their efficiency. Some pilot projects have been financing early fire setting by the forest co-management committees, but the sustainability of such measures is not ensured. Classified forests without co-management have no fire prevention strategies.

In national parks and their adjacent game areas, early fires result from management practices for promoting grass growth and visibility for tourism purposes on around 20% of the areas. Fire monitoring seems to be more efficient.

4.8 Gathering activities on non wood forest products.

Many usable products are gathered in protected areas. Surveys by people living at the border of protected areas show their sound knowledge about actual uses of a large range of species. Vodouhê et al. (under review) list 72 species from the Pendjari reserve described by local communities as being used as food, building material, medicine, and so forth.

High grasses are collected in protected areas that are also protected from fire. They are used for roofs and fences. Products are mainly gathered for home consumption or very short chain trade. Fibers and wrapping materials are currently gathered in forests and wetlands by poor women and sold on markets or processed into handicrafts. Many species are used for food purposes: leaves complement the diet in the dry season; fruits and nuts are used raw or after processing into fat, seasoning or beverage; snails and insects also complement the diet and are sold as snacks at markets.

More than 500 species had been censed for medicinal purposes in Benin in the nineties (Adjanohoun et al., 1989). A decade later, the number had reached 800 (Sinsin & Olowabi, 2001). The list is not comprehensive, and work is in progress. Some species have multiple uses and treat many diseases and disorders; for example, tree species, such as *Khaya senegalensis* and *Milicia excelsa* (Agbahungba et al., 2001; MAEP, 2007) are traded on numerous markets. Bertrand & Agbahunga (2009) also found *Nauclea latifolia*, *Annona senegalensis*, *Garcinia kola*, *Tamarindus indica* and *Xilopia aethiopica* in most markets. Chewing sticks from dozens of species are also very popular. Commodity chains are developing for bringing medicinal plants to urban markets from most of the protected areas.

In most cases, when plants are concerned, being used is an incentive for protection rather than a source of threat for a species. Nevertheless, species used as a whole plant, for their roots, their barks or as fodder through pruning may well be seriously disturbed and species with multiple uses may be endangered. When animals or animal products are concerned, being used is in most cases a potential source of disturbance. Honey, for example, is gathered by destroying the wild bee hives. In some cases, intensive and multiple uses of a species lead to its domestication. Trees, such as shea and locust trees (*Vitellaria paradoxa* and *Parkia biglobosa*), are being protected and even planted in fields and farmlands turned into typical agroforestry parks. Snails, bees and grasscutters are becoming popular raised species. Some herbaceous medicinal plants, especially those daily used in baby care, are protected in home gardens. All these efforts reduce the pressure on the natural stands but may remain insufficient for those species more sensitive to overharvesting and fires.

5. Conclusions

A protected area is a well defined, recognised and dedicated space managed by all efficient means in order to ensure in the long run nature conservation as well as associated ecosystemic services and cultural values. Not all protected areas in Benin fulfil all these conditions.

Efforts are currently being made in order to reverse the trends of protected area degradation. Politicians will develop conservation strategies for people and with them already yield support from local communities around protected areas. Results can already be observed around the National Parks in the North, where illicit activities have steadily decreased while local populations get a greater share of the benefits.

But, there still are difficulties due to the different objectives assigned in Benin to the different types of protected areas, to the diverse management strategies and to the lack of coordination among administrative entities. In classified forests of the protected domains, regulations concerning prevention of late fires, forest clearing as well as quota and zoning of product harvesting seem to be insufficiently enforced. Taxation systems constitute a negative incentive to protection because the higher the licit and illicit harvests or grazing in protected areas, the higher the taxes to be collected by the administration and the municipalities or worse to be diverted as briberies. The actual situation of these protected areas is a concern among decision-makers and scientists. Recently, a national workshop of specialists recommended to turn some of the forests of the classified domain (for example, Monts Couffé & Wari Maro [2165 km²]) into national parks and game areas before it is too late to save them and to revise the general management strategy of classified forests (Sinsin et al., 2007).

Moreover, most of the significant natural resources in the South are not included among formal protected areas. During the same workshop, it was also recommended to develop an official status and a strategy for community protected areas, especially in wetlands. CENAGREF took this issue and a new program has been designed for this objective.

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PART II

Methodological Approach and Adjustments

Introduction

The International Centre of Economic Policies for Sustainable Development (CINPE-UNA) from Costa Rica; the Nature Conservation Division, Department of Forest under the Ministry of Agriculture, Royal Government of Bhutan; and the Centre Béninois pour l'Environnement et le Développement Economique et Social (CEBEDES) in Benin decided to join efforts within the framework of the program for south-south cooperation in order to conduct the project "Systematization and analysis of the contributions of national parks and biological reserves on economic and social development in Costa Rica, Bhutan and Benin."

The central question is what contributions are made by the protected areas to the local, regional and national economies. The answer becomes quite complex because the economic contributions should not have to be reduced to the economic resources that are received by entrance fees to the parks and the money which some concessionaires pay to take care of certain services and other financial resources that enter to the parks. Also, many communities exist around the protected areas and live on the activities that have arisen due to the existence of the parks and biological reserves. The approach should investigate which activities are developed around the national parks and biological reserves, how to identify them and measure their intensity, temporality and location, as well as how much incomes or benefits they generate. The approach should not be restricted to the accounting of economic benefits but should take other social and cultural dimensions related to the livelihoods of families around national parks and biological reserves.

The economic valuation of benefits implies a methodological problem that must be addressed. This problem refers to the selection and precision of a methodology adapted from a series of natural resource evaluation alternatives, including methods of "pure" environmental accounting, quantitative methods of monetary valuation (like the change of productivity method), approaches of payment availability/compensation, based on the perception of the subjects affected (like the contingent valuation) and non monetary methods based on qualitative scenaries (like the analysis of multiple criteria). The implied methodological problem also talks about the scale of the study. It is clear that benefits extend far further than the Park/Reserve boundaries and that the contributions will differ according to the scales of affectation attributed to the parks and reserves. Therefore, in the investigation process, socio-economic contributions have to be studied from the local to the national scale and the decision needs to be taken based on a case by case basis on the geographic boundaries of the zones of influence of the park or reserve under study, to determine whether their economic contributions find more manifestations in the nearer zones, in the region or province or to national scale.

In 2002, CINPE and INBio created an innovative methodology that combines the cluster and value chain approaches and analyzes the national parks and biological reserves not as sources of costs, as they are usually viewed, for the community and the environment, but rather as an investment. The results generated recommendations of environmental policy for national parks.

No real methodological problem has to be faced in order to quantify the contributions of the protected areas based on accounts at national level, although it may take some time to collect the data in all the zones of the country, whenever they exist. Nevertheless, the innovation of this proposal is that we try to: a) quantify the real contributions that the protected areas generate to the national economy at different scales; and, at the same time b) replicate the methodology in different places and moments in time. This replicating allows for future comparisons, comparative analyses and even deduction of policy recommendations.

This part of the book presents the methodology created by CINPE and INBio in 2002 in Chapter 4; the adaptation to the methodology by the NCD from Bhutan in Chapter 5; the validation and adjustment of the methodology for the Costa Rican case in Chapter 6; and the adaptation of the methodology for CEBEDES in Benin in Chapter 7.

Chapter 4

General Methodological Approach[1]

Mary Luz Moreno Díaz

1. Introduction

The present investigation intends at assessing actual socioeconomic contributions of a protected area. A methodological analysis made by Fürst et al. (2004) leads to the conclusion that for that purpose an economic valuation or an environmental accounting of the resources and services provided by protected areas of the National Parks and Biological Reserves (NPBRs) is not the appropriate methodological tool for the specific case under study. The main reason for such a methodological assessment lies in the very nature of the problem addressed in this study. The main object under investigation is the real development induced by the conservation and not an intangible value to be estimated by the techniques of economic valuation of resources available so far.[2] Moreover, their aptitude and applicability to the case of ecosystems and environmental services of high complexity and multi-functionality is very controversial.[3] This implies that the same object of study requires an empirical assessment of current existing effects of the conservation efforts on the socio-economic development at national and local levels, based on existing or directly obtained information. It also implies, a systematic inventory of the socio-economic benefits associated with the existence and maintenance of the NPBR areas as well as their assessment.

Therefore, it is argued that the *cluster* analysis –a set or conglomerate of linked socio-economic activities induced by the NPBR areas and surrounding them – might be a much more appropriate method. At best, such an essentially empirical analysis should be combined with a specific (partial) application of the evaluation of value-adding chains at different spatial scales. To address this, information is arranged within a matrix that combines the socio-economic activities directly related or indirectly linked to the NPBRs according to their spatial-territorial scales; for each activity and each level of scale, the actors involved, which are mainly the direct and indirect users of the NPBR areas; their contributions to development through induced or linked activities and the valuation of these contributions by means of different types of information (numerical, qualitative, rating) are assessed.

[1] This chapter is based on Furst & Moreno, 2003.

[2] Moran & Pearce, 1997; Pearce & Moran, 1994; Garrod & Willis, 1999; Georgiou et al., 1997; Rietbergen-McCracken & Abaza, 2000; Vasquéz et al., 2007.

[3] See, among many others, Facheux & O'Connor, 1998 and O'Connor & Spash, 1999.

1.1 Analysis of cluster for the development induced by National Parks and Biological Reserves.

The following presents the cluster-chain (or conglomerates of interrelated activities within a chain of income generation), approach as the methodological option that most suitably addresses the type of problem under study. It must be stressed again that the main focus of the research carried out was on the pattern of emerged development, as the result of "effects of backward and forward chaining" (Hirschman, 1973) provided in connection with the creation or persistence of the park or reserve.

a. External Effects (Externalities)

National parks and biological reserves are natural assets that –in socio-economic terms– generate a phenomenona that in the analysis of the development is referred to as *externality*,[4] because they occur at distance from the assets and are mainly unintended consequences of economic operator's actions affecting other stakeholders. There are different types of externalities. Technological and environmental externalities are mainly positive when the NPBRs induce for example water and soil conservation reducing costs and allowing for specific activities; but can be also negative if the activities allowed by the NPBRs (irrigation, mass tourism) have negative effects due to inadequate choice of technological processes. There may be also what Scitovski calls pecuniary "externalities"[5] when the development of a cluster around one NPBRs increases competition among businesses, affect market prices or even prevent development in other places.

External effects from protecting areas (on local, national and international societies) are mostly positive since a conglomerate of socio-economic activities (provision of goods and services that are productive, recreational, etc.) takes advantage of goods and services

[4] The *externality* approach to explain the socio-economic development goes back to Scitovsky (1973), who difference the *pecuniary external economies* (industries or complementary activities, one with each other, with the greatest indivisible potential of benefits linked to the expansion and innovation in both, when one registers the highest possible impulse) from the *actual technological external economies* (direct interdependence among producers because of the flows of complementary input-product). It appears that the Scitovsky's *pecuniary externality* is very relevant to the subject of this study, as it benefits the activities surrounding the park through the creation of this one as a case of indivisibility of the asset (natural) that was reversed in time and that causes subsequent investments in activities around it. The concept of externalities has found, in the theory of development and innovation, an extension towards other effects beyond the immediate sphere of production. Today positive externalities arise as the *institutions, information* (decision making process based on a procedure of greater transparency and coordination), *learning over time ("learning by doing") and organization / network interaction*, which in some way or another all require a public policy for their proper promotion outside the market (for more details, see: Salazar-Xirinachs, 1996: 23 & ss; 28 & ss., as well as the excellent review about its recent development by Stewart & Ghani, 1991: 572 & ss.).

[5] Not all authors would characterize such effects as externalities the way Scitovsky did

generated around the park or reserve. These goods and services are used by chains associated with activities performed at higher scales. This results in the emergence of subsequent socio-economic impacts at micro-regional, regional, national and international scales, then a socially positive externality can be mentioned due to the existence of the NPBR, which potentially leads to a vertically and horizontally linked development process. But quantification should consider both the positive aspects described above, as well as the negative effects associated with the human activity linked to natural assets. For example, the visiting of tourists involves the generation of solid wastes, which, if they do not receive adequate treatment, result in pollution that negatively impacts natural ecosystems.

Clearly, an externality attached to the initial induction of a sequential process of development is different from the externality that is recognized and evaluated in the impact analysis and environmental cost (Pearce & Turner, 1995). In contrast to the second (reduced to the affectation of utility because of an environmental damage), the first corresponds to a wide range of indirect effects of chaining and connection (from the point of view of the structural change in the pattern of socio-economic development) that, at first sight, is concentrated in an area around the NPBR (in the so-called *zone of influence*). Such impulse of development also covers the emergence of service and production activities in geographical areas beyond the zone of direct influence. It involves territorial units in the chain of effects produced by the NPBR, including the micro-region, region, country and global environment.

b. Clusters

For the purposes of this particular study, the cluster must be understood methodologically as a reactive process to a destabilizing initial impulse of the *status quo*. In this case, there is a sectorial and territorial concentration of activities and enterprises that arises because of the concentration of natural resources providing products and services. As soon as economic activities develop relying on these localized opportunities, cluster of interlinked businesses may develop if there is a mix of competitive pressure and creative cooperation. Linkages may be horizontal among operators performing similar activities and cooperating in diverse ways and vertical if they develop complementary activity along a same value chain, one being the provider of the other. Therefore *clusters* are linked to value-adding chains.[6] Chain developments induce *bottlenecks* (demands for raw material and services to be provided by others) and as a response, the development of some derived value chains, which in turn let the clusters further grow. Economic operators increasingly interact with each other in terms of production and organization.

[6] See Porter, 1990, 1999 for the general cluster-chain concept. Also, see Altenburg & Meyer-Stahmer, 1999 with respect to the experience of promotion of clusters in Latin America, as well as Ramos, 1999 for the particular case of clusters regarding natural resources; the latter is the most relevant to our study.

One cluster inducing the development of one or several value chains, which in turn induce the emergence of derived value chains, which let the clusters grow, a whole dynamics of development may appear. Therefore, we can describe such organization patterns with the concept of *unbalanced development* of Albert Hirschman (1973), who postulates the start of a socio-economic dynamics in the form of a *set of cluster-chains* that progressively develop more and more linkages as an innovative social investment in a development potential.[7] Such potential is given in this case by the public investment into conservation and depends ultimately on the conservation or lack of conservation of the assets in the NPBR. It may even create a pattern of emerging development resulting from the "effects of backward and forward chaining" (Hirschman, 1973) provided in connection with the creation or persistence of the park or reserve.

c. Typical clusters and chains developing around the NPBR´s

Direct and indirect relationships between the NPBR and tourism development have been discovered since twenty years and tested empirically by a series of studies for their validity at national, micro-regional and local levels. The role of nature is emphasized in this connection as an intangible factor of international competitiveness in the global market for tourism in order to enjoy ecology (Acuña & Villalobos, 1999; Acuña, Villalobos & Ruiz, 2000; Inman et al., 1998; INCAE, 1999; Kaune, 2002). Studies in Costa Rica have pointed out how complex the environmental tourism cluster is, involving not only firms, venture capital companies and banks but also a range of well internationally connected research institutions, NGOs and state institutions. But not all clusters have been growing at such a pace nor developed such complex linkages. Something similar seems to be valid for the case of research related to biodiversity and bioprospection from the perspective of conservation and development (Reid et al., 1994; Garcia, 2002).

[7] Such *cluster concept* is quite different from that of Porter (1990, 1999) and others (INCAE, 1999) who reduce the boost to the vertical and horizontal formation (geography) integrated in the conglomerate to the synergetic effect favorable for global competitiveness and efficiency of cooperation in a network. Examples of this are: the famous industrial districts in Europe (Schmitz & Musyck, 1993); the new eco-tourism cluster around the natural resources like protected wildlife areas in developing countries (i.e., for Costa Rica; Inman et al., 1998); or more specifically, for Monteverde (Acuña, Villalobos & Ruiz, 2000). In such an approach the cluster is seen as a vehicle for joint competitiveness among the enterprises linked and whose individual levels of competitiveness depend on other enterprises and related activities, as well as the efficiency of a set of organizational and institutional linkages. In Hirschman´s cluster-chain approach, the dynamic-synergetic effect of the socio-economic development and innovative learning in the school of Schumpeter-Scitowsky-Hirschman are more emphasized. With this, more attention is put on the initial boost of such dynamics in terms of investment complements and chaining between activities and institutions. Such a boost and sequence are interpreted as an indirect effect of the creation of the park or reserve from a strategic decision of *societal* nature. In this case, the decision of the Costa Rican State to invest in long term protection and maintenance of the natural assets of the park or reserve.

From the discussion so far, one can deduce that the *cluster analysis* –working closely with the *evaluation of chains*– is offered as the most appropriate methodology for addressing the *societal externality*, which characterizes protected areas from a development perspective boosted by innovations. In this case, the original innovation (force of initial impulse) is interpreted as the decision made (by the society) to maintain the ecological services of the park, and the externality generated by such an innovation is conceived as exploiting new opportunities in the socio-economic sphere that are induced or at least related to the existence of the park or reserve (for the unbalanced development and chained by socio-economic innovations, see Hirschman (1973)). In this regard, the analysis should clearly define the economic and social variables that are considered to measure the benefits generated by the existence of the NPBR.

Cluster analysis is a suitable tool for identifying productive activities (including research projects in or related to the parks and reserves) and reproductive activities (in social sense and including recreation of different levels and qualifications) interlinked and linked to the natural assets of the Park. This allows attributing the contributions of the NPBR to the emergence and consolidation of such socio-economic activities in order, then, to estimate, both through numerical calculations and through qualitative indications, the benefits in terms of employment, remuneration, income per visit, etc.

The instrument that is perceived as the most conceptually and operationally useful to carry out the type of analysis outlined is, thus, the combination of local cluster analysis and transversal and vertical chains (that is, from the place of origin to final destination, passing through the chained links at micro-regional, macro-regional, national scales and if ever, international scale). With this, multiple forwards linkage effects of the NPBR on socio-economic life can be identified (from its location to a higher level of spatial scale).

d. Challenges

Identifying and defining the various facets of impacts induced by a protected area, the activities and chains linked to it at different scales are challenging tasks. In particular, this applies to the observable overlap between the spatial-territorial scales and the resulting problem of attributing and accounting for socio-economic benefits to the geographic units positively affected by the existence and preservation of NPBRs. The analysis should clearly define the economic and social benefits generated by the existence of the NPBR even if these benefits are not recorded in official accounting. For example, around parks, people previously immersed in rural poor living conditions are given more qualified and remunerative employment in the ecotourism sector. This example can be extended to a scale beyond the direct influence area of the park.

Additionally, the double counting of the benefits associated with the activities developed within the chains should be avoided and benefits generated out of the NPBR should be separated from the others. The way each chain is organized has to be described in great

details. These limitations are taken into account in this study upon describing and quantifying the contributions of the NPBR.

In order to move to a more operational methodological level, in the following section, a matrix designed to incorporate the elements of the cluster conceptually outlined into an array overview is presented.

1.2 Methodological matrix for guiding the collection and systematization of the required information.

A cluster analysis concerning the contributions of the NPBR to the socio-economic development can be carried out based on a matrix that structures the possible direct and indirect impacts on the development as well as in the spatial levels of such impacts. A matrix of this nature is documented in Table 4.1. Its main purpose is to guide the collection and systematization of the information sought; it processes and evaluates the available information to have an array overview of the socio-economic contributions attributed to a determined NPBR. In particular, it is considered relevant in this process to distinguish between the different scales of analysis (rows of the matrix) when the corresponding information is obtained from the various contributions to the socio-economic development through the conservation of the park or reserve considered.

Table 4.1 Costa Rica. Matrix for the identification, location and evaluation of the contributions related with the socio-economic activities and actors involved.

			Corresponding Park / Reserve	Pi y / o Ri						Pi / Ri					Pi / Ri					Pi / Ri	Pi / Ri
			Type of contribution (good /service / externality)	A1	A2	A3	…	An	A1	A2	A3	…	An	A1	A2	A3	…	An		
Scope- Scale of the contribution	**Type of present activity**	**Type of user / Benefited □st akeholder□**																			
				Valued contributions from Pi and/ Ri						**Valued contributions from Pi and/ Ri**					**Valued contributions from Pi and/ Ri**						
Direct- Inmmediate	Act1 Act2 Act3 . . . An	B1,j (j=1,..,n) B2,j B3,j . . . Bn,j		V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2						V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2					V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2						
Local (area of direct influence)	Act1 Act2 . . . Actn	B1,j (j=1,..,n) B2,j B3,j . . . Bn,j		V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2						V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2					V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2						
Micro-regional	Act1 Act2 . . . Actn	B1,j (j=1,..,n) B2,j B3,j . . .Bn,j		V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2						V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2					V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2						
Basin downstream	Act1 Act2 . . . Actn	B1,j (j=1,..,n) B2,j B3,j . . .Bn,j		V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2						V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2					V1 V2 V3 V5 … n.d. … n.d. V2 … V4 n.d V1 … … … … … … … … … … … … V3 n.d. V5 n.d. V2						

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			Corresponding Park / Reserve	Pi y / o Ri	Pi / Ri	Pi / Ri	Pi / Ri	Pi / Ri
Regional	Act1 Act2 . . . Actn	$B1_{,}j$ (j=1,..,n) $B2_{,}j$ $B3_{,}j$ . . $.Bn_{,}j$		V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2	V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2	V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2		
National	Act1 Act2 . . . Actn	$B1_{,}j$ (j=1,..,n) $B2_{,}j$ $B3_{,}j$ . . $.Bn_{,}j$		V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2	V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2	V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2		
Global	A1 A2 . . . An	$B1_{,}j$ (j=1,..,n) $B2_{,}j$ $B3_{,}j$ . . $.Bn_{,}j$		V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2	V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2	V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2		

1.2.1 Meanings of the rows and columns.

The elements in Table 4.1.have the meanings explained below in the following order: first, the rows (types of activity, type of user) grouped according to the corresponding scale, and then, the columns (types of contribution) grouped by the different parks or reserves.

1.2.1.1 Blocks of rows.

a) Scope / scale of the contribution

The contributions to the development thanks to the existence of the NPBR have different scopes on a spatial-territorial scale. The effects / links can be distinguished:

- In the direct-immediate field (evident inside the park itself);
- In local terms, that is, in the area of direct influence;
- At the micro-regional level (micro basin or province);
- At the regional level (in socio-geographical or administrative terms);
- At the national level (across the country as a territorial-administrative unit); and
- Sometimes, at the international level (in individual cases, such as a grant or patent, royalties from international institutions related to biodiversity research).

When the NPBR is part of a watershed, the basin downstream appears to be very relevant to the scale of socio-economic impact to be considered in the study. For example, the benefits of hydroelectric generation that uses the water of the rivers born basin upstream in the park or reserve under study. In this case, usually the basin downstream areas are located between the micro-regional and regional scale.

It is clear that this zoning of occurred or registered effects does not fully solve the problem of how to attribute the contributions identified to the most relevant sites without creating double-counting biases by registering the same benefit in different areas of influence.

On the other hand, in the approach of the spatial scales of contributions, the chain of socio-economic nature for those contributions to the development that goes beyond its link in the local field (area of direct influence of the NPBR) can be considered, at least partially, through different stages of use and generation of value added links in large part consistent with the scales considered in the matrix.

b) Types of activity induced by the NPBR.

In order to slighting diminish the problem of single attribution of the contribution generated to its corresponding scale, the rows relevant to these scales (or areas of influence) listed with Act 1, 2, ...w(*n*) represent the different socio-economic activities which are

specified in different coverage areas indicated in section a) and which provide the contributions regarding the ultimate purpose of the activity considered (see the respective columns in the matrix). Therefore, each scale belongs to a particular set of activities that are generated by the park. As an example at the local level (area of direct influence), the tourist activity of accommodations or hostels or guesthouses in direct proximity of NPBR can be mentioned. Thus, they benefit the community most related to the park. At a higher level, at the national level, for example, something similar but very different in its economic significance, can be said for international and national nature-oriented tourism (with destination priority for the visitation of NPBR).

In the glossary corresponding to the A-1 matrix, a brainstorm of the possible activities more relevant to the different scales is carried out. This listing is only intended to structure, as a kind of hypothetical-methodological guide, the format of the search and management of secondary and primary data of this study. It is in no way intended to predetermine them.

c) Type of user.

Similar to what was agreed for the activities in b), it is useful to relate the profile or the group of direct or, for the most part, even indirect users of the NPBR with the socio-economic activity that provides a benefit or costs a fee (e.g., the price of the ticket to the Park collected from the tourist). So, the matrix induces a collection and systematization of the benefit and cost information from the actors who are involved in the activities generated, thus trying to approximate the corresponding contribution and its value (monetary or non monetary) in a better defined way. This would establish a net profit relation for the user between the activity that serves as the vehicle for the benefited actor and the type of contribution generated by the same activity. Moreover, this qualified contribution could be attributed by activity for the user at the most relevant level of scale to count the net benefit (discounting from this one the expense necessary for getting enjoyment or income earned by the existence of the parks under study).

As it is embodied in the glossary corresponding to the A-1 matrix, a number of potential beneficiaries are designated in return for their activities and respective scales. It has the same brainstorming nature and the same purpose as the hypothetical-methodological guide. An example is a quite reasonable case of families involved in ecotourism at the level of MIPYMES on the local, community scale.

1.2.1.2 Blocks of columns.

a) Corresponding Park / Reserve.

In principle, this component of the matrix includes all the NPBRs in the country under analysis. The information will be obtained from mostly secondary sources. This grouping of NPBRs for the specific contributions will be reserved for the selected case studies, for

which the analysis of their contributions will be broadened and based on primary information (through interviews with users and key actors) in addition to secondary data found on the national scale (in the initial exploratory phase).

b) Type of contribution (good, service and/or non-quantifiable externality).

In this item, those contributions of different dimension, economic and social expression, attributed to the park under particular study are recorded and estimated since they have some cause-effect relationship with the corresponding activities as direct and indirect results of the park or reserve. Besides a relationship of benefit (measured in monetary terms only in exceptional cases, such as the payment to the guides of the park) with the user or actor affected by the respective NPBR is considered.

Undoubtedly, establishing these relationships in a single and measurable way will be not always possible; however, the scheme as such is useful to discover and systematize information available from this contribution-activity and contribution-beneficiary perspective to approximate a greater informative and classification transparency of such contributions attributed to parks and assessed on their corresponding scales.

In the following sections, some specific examples of contributions are listed according to a more didactic than operational classification of values of use (direct / indirect), option and existence values, common classification in literature on economic valuation (Pearce & Turner, 1995, Chap. 9) and also the approach to the conservation of protected areas (Munasinghe & McNeely, 1994, p. 34; UICN, 1998, pp. 11-13). Of course, the latter (option value & existence value) will not be objects of this study since this would require an approach (valuation) very different from that proposed here. However, they are useful to illuminate some of the more general background of this issue indirectly when talking about the contribution of the NPBR, even though its difficult evaluative treatment should be considered in future studies.

Finally, it is clear that many of the identifiable contributions tend to be positive externalities that are not subject to monetary quantification or even rough estimation of their benefits. In these cases, for example, of the effect of greatening the community's cultural identity and the respective social empowerment around the park as natural-cultural heritage, the evaluation should be limited to the mere mention or general characterization, without seeking such measurement beyond identification.

1.2.2 Block of cells.

1.2.2.1 Valued contributions (V1, 2, ... n *in the cells).*

The types of contribution listed in the columns of the matrix represent the contributions identified through documentary analysis of precedents and existing studies as well as the effects of development revealed in field research (case studies). Their corresponding valu-

ations are recorded in the matrix cells where the activities with their respective actors are intersected with the contributions identified. It is clear that the assignment of concrete value will be possible only for the minority of the contributions attributed to socio-economic activities related to the park or reserve. The vast majority of the respective cells are going to be empty because of they are not going to find an unbundled and discreet value. On the other side, the empty cells invite more empirical information about such contributions interrelated with induced activities. In this sense, it stimulates the collection and breaking down of the more relevant information to the thematic issue discussed in the study, thus serving as an inductive guide of considerable methodological use.

In addition, it catches the attention about the quality level of the statistical information, whether available or deferrable. In section 3 of the methodological matrix, such quality of information is classified according to a hypothetical brainstorming about the type, reliability and acceptability of such evaluative information. This effort to classify eventually has a practical use when it gets to the stage of revalidation of the information collected and processed to obtain approximations of the values at stake. Only then should it be assimilated to this classification, which is neither complete nor proven so far.

With the general matrix that has just been stated, there has been a first step abstract. Yet to methodologically support the study elaborated, a second step is to always set up the same matrix with much more illustrative hypothetical information to demonstrate the way the research started. This step is to be carried out below for the activities of research, tourism and electric generation.

1.2.3 Activities and beneficiaries (in the form of hypothetical-real examples).

a) For the dimension of direct impact or in situ *scale (within the Pi or the Ri).*

Act 1: Collection of species of value of biodiversity and medicinal plants (indigenous communities)

B3,1: Semi-taxonomists devoted to the collection of species and medicinal plants
B3,2: … (Pending identification)
…
…
B3,*n*: … (Pending identification)

Act 2: "Naturalist" walks guided by staff from Pi or guides with license

Bn, 1: Trained local guides
Bn,2: … (Pending identification)
Bn,n: ... (Pending identification)

b) For the dimension or local scale (neighboring community).

Act 1: Ecological micro-tourism (MIPYMES)

B1,1: Local families devoted to ecotourism
B1,2: Local micro-enterprises devoted to ecotourism

B1,3: National and international tourists
…
B1,*n*: Neighbors hired for accommodations and eco-tourism activities at micro-scale

Act 2: Processing and sale of fruits / plants (MIPYMES) - Commerce

B2,1: Families devoted to the primary processing and sale of fruits / plants
B2,2: Micro-enterprises devoted to the primary processing and sale of fruits / plants
B2,3: … (Pending identification)
…
B2,*n*: … (Pending identification)

c) For the dimension or micro-regional scale (zone of direct impact or buffering).

Act 1: Ecological tourism (MIPYMES)

B1,1: Family enterprises devoted to ecotourism
B1,2: Small and medium enterprises (PYME) devoted to ecotourism
B1,3: National and international tourists
… (Pending identification)
B1,*n*: Residents hired for accommodations and eco-tourism activities at micro-scale

Act 2: Processing and sale of non-timber yielding products (MIPYMES) - Commerce

B2,1: Small and medium enterprises (PYME) devoted to the processing and sale of non-timber yielding products
B2,2: Enterprises and branches devoted to the primary processing and sale of non-timber yielding products
B2,3: … (Pending identification)
…..
B2,*n*: … (Pending identification)

d) For the dimension or scale of basin downstream.

Act 1: Hydroelectric generation

B1,1: Cooperatives and micro-enterprises devoted to hydroelectric generation
B1,2: Projects of ICE devoted to hydroelectric generation
B1,3: Projects of CNFL devoted to hydroelectric generation
…
B1,*n*: Users of electric energy in general

Act 2: Surface water intake, distribution and sale of water

B2,1: Cooperatives and micro-enterprises devoted to surface water intake and sale of drinking water
B2,2: AyA and other public enterprises of water supply
B2,3: Enterprises of beverages dependent on the surface water intake and drinking water supply
…..
B2,*n*: Users of drinking water and water suitable for irrigation in general

e) For the dimension or macro-regional scale.

Act 1: Commercial tourism of nature

B1,1: Micro-enterprises devoted to ecotourism at regional level
B1,2: Medium and big enterprises devoted to ecotourism at regional level
B1,3: National and international tourists
…
B1,*n*: Residents hired for accommodations and eco-tourism activities at micro-scale

Act 2: Agro-industry based on raw material coming from Pi and/or Ri (MIPYMES)

B2,1: Micro-enterprises devoted to agro-industry based on natural raw material (coming from Pi and/or Ri)
B2,2: Medium and big enterprises devoted to agro-industry based on natural raw materials
B2,3: … (Pending identification)
…..
…..
B2,*n*: … (Pending identification)

f) For the dimension or national scale.

Act 1: Commercial tourism at great scale directed by nature

B1,1: Enterprises directly devoted to ecotourism at national level
B1,2: Enterprises devoted to activities related to ecotourism (tour-operators, providers of materials and services)
B1,3: National and international tourists
…
…
B1,*n*: Workers and professionals hired for accommodations and eco-tourism activities at national level

Act 2: National agro-industry based on raw materials coming from Pi and/or Ri

B2,1: Micro-enterprises devoted to agro-industry at national scale
B2,2: Medium and big enterprises devoted to agro-industry at national scale
B2,3: Enterprises devoted to activities related to agro-industry at national scale
…
…
B2,*n*: … (Pending identification)

g) For the dimension or global scale.

Act 1: International tourism by nature

B1,1: Enterprises (tour-operators, airlines, chains of hotels, etc.) directly devoted to eco-tourism at international level
B1,2: Enterprises devoted to activities related to ecotourism (providers of services, etc.) at international level
B1,3: International tourists
…
B1,*n*: Organizations (NGO) that promote ecotourism at international level

Act 2: Biotechnological industry based on biogenetic information

B2,1: Foreign institutes and universities abroad that research biogenetic information at international level

B2,2: Transnational enterprises devoted to applied research, agro-productive and pharmaceutical-therapeutic processing of the biogenetic information

B2.3: … (Pending identification)

1.2.4 Contributions classified according to the type of economic and ecological value.

A. Values of usage.

a) Values of direct usage:

A1: Tapping point inside the park or reserve
A2: Productive (hydroelectric, etc.), consumptive and recreational use of the water outside the park or reserve
A3: Recreation (used by different types of ecotourism)
A4: Education (environmental, scientific, common taxonomy of biodiversity, etc.)
A5: Knowledge and research (environmental, scientific, etc.)
A6: Species and organisms for their primary taxonomy (chemical and genetic)
A7: Species for their secondary bio-prospection and of value added on the international chain
A8: … (Pending identification)
...
A*n*: … (Pending identification)

b) Values of indirect usage

A1: Recharge of subterranean water (protection of aquifers)
A2: Control of floods
A3: Control of erosion (retention of nutrients)
A4: Stabilization of micro and macro climate
A4: Prevention of natural disasters
A5: Provision of habitat for fauna
A6: *In situ* provision of biodiversity
A7: Absorption of carbon
A8: Protection of basins
…
A*n*: Services of ecosystem in general

c) Optional values

A1: Storage of future information
A2: Possible offer of future usages (direct –e.g., non-timber yielding– and indirect –i.e. climate stabilization)
…
A*n*: … (Pending identification)

B. Non-usage Values.

Values left to others

A1: Intangible values of direct usage to benefit other people who are not present (future generations)
A2: Intangible values of direct usage to benefit other people who are not present (future generations)
…
A*n*: … (Pending identification)

Values of existence

A1: Biodiversity
A2: Landscape (scenic and spiritual beauty)
A3: Community and indigenous identity
A4: Culture and patrimony
A5: Ritual and spiritual values
…
A*n*: … (Pending identification)

1.2.5 Expressions and characteristics of the value or evaluation to find the contributions (see matrix cells).

V1 = Statistical information available and mainly determined by the market (e.g., income with respect to tickets to the National Park Pi, income with respect to sale of tourist services, etc.)
V2 = Available statistical information, but with slant of being double-counted
V3 = Applicable information from techniques of plausible valuation, e.g., changes in productivity (or in values of land) as consequence of park Pi
V4 = Information of value socially accepted and co-participated
V5 = Information of value socially not accepted and difficult
n.d. = Information statistically not available and technically not differentiable (immeasurable in numerical values)

The methodological matrix presented in Table 4.1 and the explanation about its use is presented as a general guide to the collection and systematization of the information listed at both the national (contributions attributed to all PNRB areas in the country) and at the level of each individual park or reserve. For the latter purpose, it would be convenient to deepen the information gathered for the national level in case studies, requiring selections of some cases among the NPBR in the country. Such a selection should be made through a conservation workshop and development experts.

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Chapter 5

Bhutanese Adaptation of the Methodological Approach

Sonam Choden

1. Introduction

Bhutan is blessed with rich biological resources despite being a small country. The unique location of the country in the Eastern Himalayas between the two bio-geographic realms of tropical Indo-Malayan and the temperate Palearctic has blessed the country with rich biological diversity (NCD, 2004). The country has good forest cover at 72.5 percent (MoA, 2002), and the 2008 Constitution of Bhutan mandates forest cover to be maintained at 60 percent for all times to come (RGoB, 2008).

The Royal Government of Bhutan's commitment towards conservation of biological resources has been reflected by setting aside 42.71 percent as protected areas and 8.61 percent as biological corridors that link the protected areas (MoA, 2009). There are currently ten protected areas (five national parks, four wildlife sanctuaries and one strict nature reserve), which harbor rich sub-tropical, temperate and alpine ecosystems and wildlife.

The protected areas in Bhutan are important, not only for conservation and protection of biological resources but also for the livelihoods and sustenance of local communities. This is because, unlike protected areas in Benin and Costa Rica, Bhutan's protected areas have local communities living in and around these areas. It's the government's policy to allow the local communities, who are legal residents, to continue to live there and have rights to natural resources in accordance with the provisions of the 1995 Forest and Nature Conservation Act and the 2006 Forest and Nature Conservation Rules. As such, Bhutan's conservation policy integrates people's participation in the socio-economic development as well as conservation of rich biodiversity. The main objectives of protected area management in Bhutan are conservation, sustainable use and management of natural resources.

The local communities depend on protected areas for various timber and non-timber resources used for food, medicines, fibers, agriculture farming and livestock rearing. Besides, the valuable ecosystem services, such as air, water, protection from natural disasters and so forth, are also equally important. Most of the protected areas are important water sources for hydropower projects such as Chukha, Kurichu and Tala, to generate hydroelectricity, which earns the highest revenue for the country. The protected areas also attract many international tourists for trekking, bird watching and other recreational activities.

The above socio-economic benefits are not only confined to local communities living in and around these protected areas but also extend to regional and national beneficiaries. These benefits have never been quantified before. As such, the local communities and the Bhutanese people in general are ignorant about the valuable contributions of protected areas to the social and economic development of Bhutan. It is in this regard, that this south-south reciprocal cooperation project between Bhutan, Costa Rica and Benin and funded by the Kingdom of Netherlands, was initiated in November 2008 to systematize and analyze the contributions from protected areas to the country's social and economic development. The Nature Conservation Division (NCD) under the Department of Forests and Park Services, Ministry of Agriculture and Forests, Royal Government of Bhutan was a collaborator to the project along with the Centre for Economic Policies and Sustainable Development (CINPE) under Costa Rica's Universidad Nacional (UNA) as lead agency and CEBEDES, Benin also as a collaborator.

2. Research Design

The study was based on a methodological framework developed in Costa Rica in 2002, which used cluster analysis and approaches to analyze national parks not as costs but rather as an investment for the community and the environment (CINPE, 2009). The Costa Rican methodology of 2002 was adapted for Bhutan taking into account the situation and context of National Parks in Bhutan, which was different from that of Costa Rican National Parks**.** The adapted methodology was used to generate information at two levels:

a) The national level: Systematization and quantification of socio-economic contributions from the protected areas (national parks/reserves/sanctuaries) at the national level was done through a bibliographic review of the available secondary information from various documents, agencies and stakeholders.

b) The case study level: Three protected areas were selected as case studies to systematize and quantify socio-economic contributions at local, regional and national levels based on detailed field work and bibliographic review. The national level contributions from the three case study parks also served as input for the national level study.

The methodology adapted for Bhutan, along with processes applied, is discussed below.

2.1 Bibliographic review.

A bibliographic review of national level contributions from protected areas was done initially by reviewing published government documents and reports as well as information gathered from government offices, mostly under the Department of Forests and Park Services, including the NCD. The review was a continuous process throughout the project period using published documents and reports and also information gathered from other

related agencies, such as Tourism Council of Bhutan, Association of Bhutanese Tour Operators, Druk Green Power Corporation Limited, Gross National Happiness Commission, Policy and Planning Division of Ministry of Agriculture and Forests and other agencies. Information was also collected from park offices and other reliable sources.

The bibliographic review for the three case study parks began after the selection of the case study parks based on the selection criteria developed. The review continued throughout the project period based on the published documents, reports and other information available both within the Department of Forests and Park Services and other related agencies.

2.2 Cluster matrix adaptation.

The CINPE project team from Costa Rica visited Bhutan from December 8-10, 2008 and introduced the methodology and the cluster matrix to the Bhutanese team and also shared the findings of the 2002 study. A total of 16 participants were present during the methodology presentation meeting held on December 9, 2008. Following that, a technical research committee consisting of 11 members was formed to guide the research process in Bhutan; a list of members can be found in Annex 5.1.The Bhutanese team adapted the cluster matrix for Bhutan based on the objectives and the context of protected areas in Bhutan; the adapted matrix is in Annex 5.2.The cluster matrix was especially adapted taking into account the local communities, which live in and around the protected areas and use park resources for their livelihoods.

Moreover, the scale of contributions from protected areas was also simplified and limited to only local (inside the park administration), regional (outside the park administration) and national (at the centre of country's administration, i.e., Thimphu, the capital city of Bhutan) levels. The adapted matrix was presented to the research team and experts consisting of 16 participants on February 20, 2009 and further refined based on expert comments and feedback.

2.3 Selection of case studies.

The three case study parks were selected for in-depth study to quantify the socio-economic contributions at local, regional and national levels in February 2009. These three parks were Bumdeling Wildlife Sanctuary (BWS) in the North-east, Jigme Dorji National Park (JDNP) in the North-west and Jigme Singye Wangchuck National Park (JSWNP) in the South-central. The parks were selected based on a criteria, such as ecosystem system representation, regional distribution, available socio-economic information and other related criteria (see them in Annex 5.3).The parks selected were endorsed by the technical research committee and the stakeholder's workshop participants in March 2009.

2.4 Identification of preliminary socio-economic contributions/clusters.

The final adapted cluster matrix was applied in the stakeholder's workshop organized in Thimphu from March 5-6, 2009, which was attended by over 40 participants representing various stakeholders related to protected areas. The main objective of the workshop was to endorse the adapted methodology and identify the preliminary contributions from protected areas to the social and economic development of Bhutan using the cluster matrix adapted from that of Costa Rica.

The workshop generated the preliminary socio-economic contributions from protected areas at the national level and also for the three selected case study parks. The workshop output provided a broad idea on the systematization and quantification of socio-economic contributions from protected areas. Based on this broad framework, the bibliographic review was done and the field methodology plan designed for three case study parks in May 2009.

Figure 5.1 Bhutan. Participants at stakeholders' workshop. May 2009.

Source: S. Choden. 2010.

2.5 Design of survey instruments.

Based on the field methodology plan and output from the stakeholders' workshop, survey instruments were designed for key target beneficiaries to collect the required information from the three case study parks. A total of eight survey instruments were designed (see Table 5.1) in consultation with the lead agency, research committee and other experts in June-July 2009. A total of four meetings/consultations were organized on June 26, July 6, July 13 and July 20, 2009 to further refine and finalize the survey questionnaires, sampling methodology and field survey methodology plan.

Table 5.1 Bhutan. Survey instruments designed.

S.I. No.	Survey Instruments	Target Group
1.	Farmers questionnaire	Communities living inside the park
2.	Non-Wood Forest Product (NWFP) questionnaire	NWFP enterprises
3.	Schools/Institutes/Monasteries/temples	
4.	Key actors questionnaires	Community leaders/park staff and other agencies
5.	*Cordyceps* collectors questionnaire	*Cordyceps* (medicinal plant) collectors inside the park
6.	*Cordyceps* traders questionnaire	*Cordyceps* traders based outside the park
7.	Tour operators questionnaire	Tour operators/agencies based in the region and in the capital
8.	Hydro-power agencies sheet	Hydro-power plants based in the region

Sources: Choden and Wangyal, 2010; Tashi, Lhaba & Choden, 2010; Dhendup, Wangchuk & Choden, 2010

Three of the questionnaires from Sl. no. 1, 5 & 6 were also field tested on July 15, 2009 and further refined. After the finalization of the survey instruments, two trainings were organized for the survey team members, one in Thimphu for JDNP and JSWNP teams on July 28-29, 2009 and another in BWS for the BWS team on August 4, 2009. A total of 65 participants were trained for field data collection from the three parks. Out of the eight survey instruments designed, six instruments were applied in JDNP and BWS and four in JSWNP. The instruments applied were for farmers, key actors, schools/institutes, NWFP enterprises, *Cordyceps* traders and *Cordyceps* collectors.

Due to lack of time, the survey instruments designed for tour operators and hydro-power agencies could not be applied. Instead, available secondary information in the form of annual reports and other publications for 2008 from the Tourism Council of Bhutan and the Druk Green Power Corporation Limited were used.

2.6 Sampling.

Based on the overall cluster analysis methodology framework and cluster matrix adapted from Costa Rica, field surveys were designed using structured questionnaires for key target beneficiaries in the three case study parks. A total of six different sets of questionnaires for farmers, NWFP enterprises, schools/institutes, key actors, *Cordyceps* traders and *Cordyceps* collectors were used to collect the required information based on the study objectives. Besides that, additional information were collected from the Park Range offices and RNR extension offices and Park head offices as well as from other secondary sources.

Since farmers group was the largest target group to be covered with a total of 1,037 households in BWS, 653 in JDNP and 571 in JSWNP, sample size was calculated using the

web based sample size calculator from survey system website at www.surveysystem.com/sscalc.html recommended by lead agency CINPE. Using a confidence level of 95 percent and confidence interval of 5 and using household as a sampling unit, the total number of households to be sampled for farmers group in the three case study parks were generated as shown in Table 5.2.

For *Cordyceps sinensis*[1], randomly selected collectors and traders linked to BWS and JDNP case study parks, where *Cordyceps* are found and collected, were interviewed during the annual *Cordyceps* auctions organized by the Ministry of Agriculture and Forests. The auction for JDNP was held in Thimphu on July 15-16, 2009 and in Paro on July 18, 2009 and for BWS auction was held in Trashiyantse on July 27, 2009 and in Khoma, Lhuntse on July 29, 2009.

Figure 5.2 Bhutan. *Cordyceps sinensis*-the priced product.

Source: S. Choden. 2010.

Figure 5.3 Bhutan. Farmers displaying their collection at a Thimphu auction.

Source: S. Choden. 2010.

Based on the sample sizes and sampling percentages generated for the case study parks, the households to be sampled were selected by clustering smaller villages with larger villages under each Park Range to form major village clusters. Then, for each major village cluster, households to be sampled were selected randomly from the list of all households provided under each Park Range using Microsoft Excel rand function. Care was taken to also include households from smaller villages. This was repeated for all major village clusters under the Park Ranges of the three case study parks.

[1] *Cordyceps sinensis* –commonly known as *Yar-tsa-Gueb-bub* in Bhutanese, which means "winter-worm, summer-grass" – is a highly priced commodity in the international market and used as an important ingredient in traditional Bhutanese, Tibetan and Chinese medicine. The collection and trade of *Cordyceps* was legalized in 2005 by the Royal Government of Bhutan to benefit local communities.

This exercise generated a list of randomly selected households to be surveyed for the three case study parks along with the names of the head of each household, house number and village, which was used to interview the sampled households using farmers survey questionnaires. For other target groups, such as NWFPs, schools/institutes inside the park, they all were covered since sampling was not required due to small numbers. As key actors, only selected people having knowledge and experience on park management issues were surveyed. This included community leaders, park staff and other stakeholders of case study parks.

Table 5.2 Bhutan.Number of households sampled in three case study parks.

Name of Park Range	No. of Households Sampled	Sampling Intensity(SI)
Case study park 1: BWS		
Dungzam Park Range	101	
Sherimung Park Range	89	
Khoma Park Range	85	
TOTAL	275	27%
Case study park 2: JDNP		
Soe Park Range	21	
Lingzhi Park Range	25	
Rimchu Park Range	90	
Gasa Park Range	86	
TOTAL	222	35%
Case study park 3: JSWNP		
Tangsibi Park Range	37	
Langthel Park Range	28	
Trong Park Range	33	
Jigme Choling Park Range	06	
Korphu Park Range	78	
Athang Park Range	47	
TOTAL	229	40%

Sources: Choden and Wangyal, 2010; Tashi, Lhaba & Choden, 2010; Dhendup, Wangchuk & Choden, 2010

2.7 Field work.

Field work was conducted simultaneously in the three case study parks from August-October 2009 led by three teams. Field work in JDNP was led by Mr. Sonam Tashi, Deputy Research Officer from the Forestry Research Development Centre, Yusipang and Mr. Lhaba, Park Ranger and focal person for JDNP. For JSWNP, the field work was led by Mr. Namgay Dhendup, Assistant Forest Officer, NCD and Mr. Kesang Wangchuk, Asistant Forest Officer and focal person for JSWNP. And for BWS, it was led by Ms. Sonam Choden, Senior Forest Officer and Project Manager, NCD and Mr. Jigme T. Wangyal, Assistant Forest Officer and focal person for BWS. Also, 25 enumerators for JDNP, 15 for JSWNP and 21 for BWS were involved in the field work.

The survey instruments applied and numbers of respondents are given in Table 5.3.

Table 5.3 Bhutan. Survey instruments applied and respondents covered in three case study parks.

S.I. No.	Case Study Park/Instruments Applied	No. of Respondents
1	**BWS**	
	Farmers	275
	Schools/Institutes	15
	NWFP Enterprises	14
	Key Actors	08
	Cordyceps Traders	03
	Cordyceps Collectors	05
	TOTAL	320
2	**JDNP**	
	Farmers	222
	Schools/Institutes	11
	NWFP Enterprises	0
	Key Actors	12
	Cordyceps Traders	04
	Cordyceps Collectors	19
	TOTAL	268
3	**JSWNP**	
	Farmers	229
	Schools/Institutes	15
	NWFP Enterprises	15
	Key Actors	17
	TOTAL	261

Sources: Choden & Wangyal, 2010; Tashi, Lhaba & Choden , 2010; Dhendup, Wangchuk & Choden, 2010

2.8 Data management and analysis.

Between October and December 2009, the data gathered from the case study parks were entered into six Microsoft Access databases designed based on the survey questionnaires. This program was used for data entry and data management convenience in comparison with Microsoft Excel. The databases were designed by RNRRC Yusipang and also presented to the research committee and participants during the field methodology presentation meeting organized in July 2009. They were modified slightly during the actual data entry process to make it more user-friendly and better organized.

All the data entered into the databases were re-checked by the team leaders in January-February 2010. Analysis was done from March to May 2010 by exporting data from Microsoft Access to Microsoft Excel. Additional information required for the national level contributions as well as for the three case study parks were also collected during that period.

2.9 Validation workshops.

Three validation workshops were organized in the three case study parks by the research team leaders and park focal persons in late May 2010. The main objectives of the workshops were to validate the findings from the case study parks and also to identify threats and issues related to protected areas and come up with policy recommendations.

The findings were presented to park staff involved in field work as well as other stakeholders from local and regional levels. Aside from sharing field work results, group work was also conducted with participants to identify strengths, weaknesses, opportunities and threats (SWOT analysis). Based on SWOT analysis, threats and issues were prioritized and recommendations made to address them. Additionally, the workshop came up with standardized units for quantification of socio-economic contributions related to three case study parks (see Annex 5.4). The validation workshops were organized for JSWNP on May 25, 2010, for BWS on May 26, 2010 and for JDNP on May 31, 2010 at the respective Park head offices and attended by about 20 participants each.

After the validation workshops, the research team leaders met and finalized the reports based on the workshop outcome and feedback.

The findings were also presented at the national level workshop organized between Bhutan, Costa Rica and Benin on June 15, 2010 in Thimphu. During the workshop, the three countries shared their findings on the contributions from protected areas to the social and economic development in the three countries with the Bhutanese stakeholders. A total of 66 participants were present during the workshop, the opening session of which was graced by the Honorable Minister of Agriculture and Forests, Dr. Pema Gyamtsho.

Figure 5.4 Bhutan. Participants from three countries at the national workshop in Thimphu. June 15, 2010.

Source: S. Choden. 2010.

The comments and feedback from the national workshop were incorporated into the final reports compiled from July to August 2010.

3. *Conclusions and recommendations.*

With the support from the CINPE team and other experts and stakeholders, the Bhutanese team was able to adapt the methodology without much difficulty. But due to the limited time of the project, the adapted methodology could not be fully field tested before actually applying in the case study parks. Out of eight survey instruments designed, only six were applied and only three were field tested due to lack of time. Although most of the required information could be gathered through field work and also secondary sources at the local level, most of the information for regional and national levels had to be based on secondary sources. The secondary information had to be gathered from different documents, offices and individuals and was not readily available.

The methodology focused on quantifying only socio-economic contributions from protected areas and in the process many of the important ecosystem services were not taken into account except for water resources. This was also the concern expressed by some of the workshop participants and, as such, a more vigorous methodology needs to be developed in the future building on this current methodology to quantify the ecosystem services from protected areas.

Moreover, due to limited time and capacity, a more detailed cluster analysis identifying the various users, products/services and the value chains at local, regional and national levels from protected areas could not be done. This could be built into future studies.

But nevertheless, the methodology was adapted successfully and applied for the first time in Bhutan to systematize and analyze some of the important socio-economic contributions from protected areas to the country. Some of the lessons learned and observations made are given below.

- The use of a multidisciplinary survey team representing different agencies other than park staff, such as agriculture, livestock, research and so forth, from both the central and field offices is recommended to avoid biases in responses. If possible, use of a well trained neutral survey enumerator is recommended.
- The fact that park focal persons and the Park Range Officers were made responsible for coordinating field work in their respective areas helped to make them more accountable and responsible in their respective areas. This also helped in gathering secondary information.
- The one day survey training organized to familiarize the survey team members with the field work, although useful, was very short. Such trainings in the future should be organized for a duration of at least 2-3 days to cover all relevant topics and plan survey work smoothly.
- The 16 page farmers survey questionnaire was too long and was the most challenging survey to be conducted. It took over two hours to interview one respondent alone. Such long questionnaires should be avoided in the future by limiting them to only what is required.
- All questionnaires were designed in English and each question had to be translated into the national language, Dzongkha, and other local languages at the time of the interview depending on the respondent's understanding of these languages. Therefore, there has to be a common understanding and common interpretation of the questions by all survey team members for which proper briefing is required prior to conducting the survey.
- The majority of the respondents to the farmers survey were illiterate and had never been to school so it was challenging to interview them and translate their responses into English in the survey form.
- Since the sampling was done randomly, at times, the randomly selected household member did not reside in the area, and in such cases, the nearest household had to be used as a substitute.
- The majority of the villages in the three case study parks were located in remote areas without access to roads and had to be reached by walking on foot for several days and transporting goods by porters/ponies. The scattered nature of the villages themselves and the households living in these villages made it take longer to reach these areas.
- Most of the interviews with farmers had to be conducted at night as they were busy during the day time with farming and other activities and were not usually at home. Moreover, August to September was farming season and farmers were busy with agricultural activities. In some cases, repeated visits had to be made to interview the right person, who could answer the questions.

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5. Annexes

Annex 5.1 Bhutan. Technical committee members that made up the research project.

Systematization and analysis of the contributions of national parks and biological reserves to the economic and social development in Bhutan, Costa Rica and Benin

1. Mr. Karma Dukpa, Director, Department of Forests (DoF) Chairman
2. Dr. Sangay Wangchuk, Nature Conservation Specialist, DoF
3. Dr. Sonam Wangyel Wang, Chief Forest Officer, NCD and Chief Forestry Officers FRDD, FPUD-DoF.
4. Dr. Lungten Norbu, Program Director, RNRRC Yusipang representing Council of RNR Research
5. Chief Forest Officers from Jigme Dorji National Park, Jigme Singye Wangchuck National Park & Bumdeling Wildlife Sanctuary
6. Representative from National Biodiversity Centre, Serbithang
7. Representative from National Environment Commission
8. Representative from Policy Planning Division, MoAF
9. Representative from National Mechanism Office SDS-GNH.
10. Mr. Sonam Lhendup, Asst. Statistical Officer, National Statistical Bureau
11. Ms. Sonam Choden, Sr. Forest Officer, Nature Conservation Division, Project Coordinator

Roles of the technical committee members:

- To guide the research process for the smooth implementation of research activities planned under the reciprocal project.
- To contribute in the adaptation of the research methodology for Bhutan.
- To attend technical meetings to discuss the progress of the research activities.
- To contribute in the selection of national parks for case studies.
- To contribute in designing appropriate survey instruments for data collection in the field.
- To provide overall technical support in the implementation of research activities.

Annex 5.2 Bhutan. Adapted methodological Matrix of Bhutan's identification, location and evaluation of contributions related to socio-economic activities and stakeholders involved.

(Refer to Matrix Guide for details)

			Specific Park (P) or Sanctuary (S)	**P/S**						**P/S**				**P/S**					**P / S**	**P/ S**
			Kind of Contirbution (Good /Service / Externality)	C1	C 2	C 3	C 4		C*n*	C1	C2	..	C*n*	C1	C2	C3	..	C *n*		
Scope-Scale Input	Category of Current Activity	Category of Benefited Stakeholder/ Beneficiaries																		
				Valued Contributions from Park/Sanctuary						Valued Contributions from Park/Sanctuary				Valued Contributions from Park/Sanctuary						
Local	Act 1 Act 2 Act 3 . . . A*n*	B1,j (j=1,..,*n*) B2,j B3,j . . . B*n*,j		V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2						V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2				V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2						
Regional	Act 1 Act 2 . . .	B1,j (j=1,..,*n*) B2,j B3,j .		V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1						V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1				V1 V2 V3 V5 □ n.d. ... n.d. V2 ... V4 n.d V1						

			Specific Park (P) or Sanctuary (S)	P/S	P/S	P/S	P / S	P/ S
	Act *n*	. . B*n*,j		... ... V3 n.d. V5 n.d. V2	... ... V3 n.d. V5 n.d. V2	... ... V3 n.d. V5 n.d. V2		
National	Act 1 Act 2 . . . Act *n*	B1,j (j=1,..,*n*) B2,j B3,j . . .B*n*,j		V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2	V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2	V1 V2 V3 V5 ... n.d. ... n.d. V2 ... V4 n.d V1 ... ... V3 n.d. V5 n.d. V2		

ADAPTED MATRIX GUIDE FOR BHUTAN

I. ACTIVITIES AND BENEFICIARIES:
- LOCAL LEVEL (inside the park)

Activity 1(Act 1): Collection of NWFPs (Mushroom, ferns, cane, medicinal plants, incense, orchids, etc.)

Beneficiaries (B1)

B1,1: Local people who collect NWFPs inside the park for personal and commercial use
B1,2: NWFP micro-enterprises
B1,3: Local visitors/tourists
B1,*n*: (Pending identification)

Activity 2: Collection of forest products (timber, shingles, firewood, fencing, etc.)
Beneficiaries (B2)
B2, 1: Local people who have been issued permits to harvest forest products for personal use.
B2, 2: Forest product micro-enterprises (dapa making, handicraft, firewood dealer, etc.)
B2, *n*: (Pending identification)

Activity 3: Tourism
Beneficiaries (B3)
B3, 1: Local people involved in tourism as local guides, cook, portering, pack pony, etc.)
B3, 2: Micro-businesses dedicated to eco-tourism (hotels, restaurants, handicrafts, home stays, etc.) inside the park
B3, 3: National and international tourists
B3, *n*: (Pending identification)

Activity 4: Hydro-power generation
Beneficiaries (B4)
B4, 1: Mini hydro-power projects inside the park
B4,2: Users of electricity inside the park
B4,*n*: (Pending identification)

Activity 5: Availability of drinking water and irrigation water
Beneficiaries
B5, 1: Government enterprises in charge of drinking water and irrigation water in the park
B5, 2: Private and community enterprises involved in drinking water supply and irrigation in the park
B5, 3: Micro-enterprises dependent on drinking water inside the park
B5, 4: Users of drinking water and irrigation water inside the park
B5, *n*: … (Pending identification)
Activity 6: Livestock rearing
Activity 7: Agriculture
Activity *n*: Pending identification

- **REGIONAL LEVEL (Outside the park in the buffer areas and outside)**
  Activity 1: Collection of NWFPs (Mushroom, ferns, cane, medicinal plants, incense, orchids, etc.)

Beneficiaries (B1)
B1,1: People from the region, who collect NWFPs inside the park for personal and commercial use
B1,2: NWFP micro-enterprises in the region who use NWFPs from the park
B1,*n*: (Pending identification)

Activity 2: Collection of forest products (timber, shingles, firewood, fencing, etc.)
Beneficiaries (B2)
B2, 1: People from outside the park but within the region, who have been issued permits to harvest forest products for personal and commercial purposes
B2, 3: Forest product micro-enterprises (dapa making, handicraft, firewood dealer, etc.) located outside the park but use resources from the park
B2, 4: Natural Resources Development Corporation Limited-field units who use forest products from the park
B2, *n*: (Pending identification)

Activity 3: Tourism
Beneficiaries (B3)
B3, 1: Local people in the region involved in tourism as local guides, cook, portering, pack pony, etc.)
B3, 2: Micro-businesses dedicated to eco-tourism in the region (hotels, restaurants, handicrafts, homestays, etc.)
B3, 3: National and international tourists
B3, *n*: (Pending identification)

Activity 4: Hydroelectric generation
Beneficiaries (B4)
B4, 1: Bhutan Power Corporation projects in the region in charge of hydroelectric generation from water resources inside the park
B4, 2: Mini hydro-power projects in the region in charge of hydroelectric generation from water resources inside the park
B4, 3: Private projects in the region in charge of hydroelectric generation from water resources inside the park
B1, *n*: Users of electricity in the region produced from water resources inside the park

Activity 5: Availability of drinking water and irrigation water
B5, 1: Government enterprises in the region in charge of drinking water and irrigation water from the park
B5, 2: Private and community enterprises in the region involved in drinking water supply and irrigation from water resources inside the park
B5, 3: Beverage companies in the region dependent on availability and supply of drinking water from the park
B5,4: Users of drinking water and irrigation water from the park in the region
B5, *n*: … (Pending identification)

Activity 6: Livestock rearing
Activity 7: Agriculture
Activity *n*: Pending identification

- **NATIONAL LEVEL(at the central level confined to the country's center of administration i.e. Thimphu, capital city of Bhutan)**

Activity 1: Collection of NWFPs (medicinal plants, incense, etc.)
Beneficiaries (B1)
B1, 1: Institutes and colleges at national level that collect NWFPs from the park (ITMS, NBC, etc.)
B1, 2: NWFP micro-enterprises at national level (Bio-Bhutan)
B1, *n*: (Pending identification)

Activity 2: Collection of forest products (timber, shingles, firewood, fencing, etc.)
Beneficiaries (B2)
B2, 1: Use of forest products (timber, shingles, etc.) for national projects
B2, 2: Private/community forest product micro-enterprises at national level which use resources from the park.
B2, 2: Natural Resources Development Corporation Limited
B2, *n*: (Pending identification)

Activity 3: Tourism
Beneficiaries (B3)
B3, 1: Companies directly involved in eco-tourism at national level (TCB)
B3, 2: Companies devoted to activities related to eco-tourism at national level (tour operators, suppliers, materials and services)
B3, 3: National and international tourists
B3, 4: Workers and professionals employed in accommodation and eco-tourism activities at national level
B3, *n*: (Pending identification)

Activity 4: Hydro-power generation
Beneficiaries (B4)
B4, 1: National level hydro-power projects using water resources from the park
B4, 2: National level enterprises using electricity produced from water resources inside the park
B4, *n*: (Pending identification)

Activity 5: National raw material-based agro-industry from Park/Sanctuary
Beneficiaries (B4)
B2, 1: Micro-enterprises devoted to agribusiness at national level
B2, 2: Medium and large companies devoted to agribusiness at national level
B2, 3: Companies engaged in activities related to agribusiness at national level
B2, *n*: ... (Pending identification)

II. CONTRIBUTIONS CLASSIFIED BY KIND OF ECOLOGICAL AND ECONOMIC VALUE

A. Use values

a) Direct-use values:

C1: NWFP and forest resources used by different users
C2: Water intake/use inside the park or sanctuary
C3: Productive (hydroelectric, etc.), consumptive and recreational water use outside the park or sanctuary
C4: Recreation (used by different kinds of eco-tourism)
C5: Education (environmental, scientific, traditional taxonomy of biodiversity, etc.)
C6: Farming (Agriculture, Livestock)
C7: Knowledge and research (environmental, scientific, etc.)
C8: Species used in traditional medicine
C9: Species for secondary bio-prospecting and added-value in the international chain
C10: … (Pending identification)
C*n*: ..... (Pending identification)

b) Indirect use values:

C1: Flood control
C2: Erosion control (retention of nutrients)
C3: Stabilization of macro and micro climates
C4: Natural disaster prevention
C5: Habitat for wildlife
C6: *In situ* facilitation of biodiversity
C7: Underground water recharge (aquifer protection)
C8: Carbon capturing
C9: Watershed protection
C*n*: Ecosystem services in general

c) Optional values

C1: Future information storage
C2: Possible supply for future use (direct: non-timber; and indirect: climate stabilization)
...
Cn: (Pending identification)

B. Non-use values

Values for future generations

C1: Non-tangible direct use value to benefit future generations
C*n*: (Pending identification)

Existence values

C1: Biodiversity
C2: Landscape (beauty and spiritual)
C3: Community and traditional identity
C4: Culture and heritage
C5: Values and spiritual ritual
C*n*: ... (Pending identification)

III. EXPRESSION AND CHARACTERISTICS OF VALUE OR EVALUATION TO IDENTIFY CONTRIBUTIONS (see matrix cells)

V1 = Statistical information available and largely determined by the market (i.e., earnings from hydro-power, NWFP, forest products, etc., income from tourist services sale, etc.)
V2 = Statistical information available but at risk of being double-counted
V3 = Computable information from plausible valuation techniques (i.e. changes in the productivity or land prices) as a result of the park Pi
V4 = Socially accepted and co-participated value information
V5 = Non socially accepted and conflictive value information
n.d.= Non available statistical and technical information (immeasurable in numeric values)

*Annex 5.*3 Bhutan. Selection criteria matrix used for selection of case study parks.

Criteria / *Protected Area**	***JDNP***	***JSWNP***	***TNP***	***RMNP***	***BWS***	***SWS***
1. Regional representation	x	x	x	x	x	x
2. Ecosystem type and significance	x	x	x	x	x	x
3. Protected area types	x	x	x	x	x	x
4. Tourism activities	x	x	x			
5. Economic revenue generating activities	x	x			x	
6. Existing available information on socio-economic activities	x	x	x		x	
8. Not currently funded through any projects	x	x			x	
	x	x			x	x
TOTAL	**8**	**8**	5	3	**7**	4

* Only protected areas under management in 2008, which were six out of ten protected areas in Bhutan, were included for selection.

Annex 5.4 Bhutan. Standardized units used for valuation of natural resources from case study parks.

Resource type	Average girth in inches	Average height in feet	Volume in cubic feet (cft)	Unit value in Nu.	Source
Flag post	10	25	1.38	172/pole	JDNP validation workshop
Fencing post	12	6	0.48	60/post	JDNP validation workshop and revised price of logs as per letter no. DOF/FMS/2010/3310 dated Feb. 19th, 2010 of the Department of Forests and Park Services
Drashing (timber for house construction)	84	30	116.98	14586/tree	
Shinglep (timber for roofing)	84	30	116.98	14586/tree	
Cham size tree (timber for house construction)	37	20	15.13	1886/tree	
Tsim (timber for house construction)	18	15	2.69	334/tree	
Dangchung (timber for house construction)	8	12	0.42	53/tree	
Sand				215/truck load	JDNP validation workshop
Stone/boulder				601/truck load	
Mushroom billet				10/piece	Market rate NWFP Interim Framework 2009
Mushroom				30/kg	
Leaf litter				30/back load	
Fodder				40/back load	
Firewood				21/head load	JDNP/FAO
Bamboo				2/piece	BWS validation workshop
Ferns				5/bundle/rolls	BWS validation workshop
Water				1.25/unit	Tashiyangtse municipal rate
USD				1 USD = Nu 43.5	National Statistical Bureau 2009

Chapter 6

Costa Rican Adaptation of the Methodological Approach

Mary Luz Moreno Díaz

1. Introduction

The knowledge gained during more than 50 years within the National System of Conservation Areas (SINAC), as well as in terms of protection and conservation of biodiversity, has forced the country to remain in a constant process of innovation in the field of law, taking advantage of the framework and international and regional context. Moreover, the experience has enabled steady improvement the Costa Rican legal framework on environmental matters to take place and suited it to current demands. The SINAC has been protecting not only the biological richness of the ASPs but also the opportunity for a lot of communities and economic activities to generate income.

There is no doubt that, in Costa Rica, the National Parks and Biological Reserves (NPBRs) are extremely important to the country. They constitute the greatest part of the Wildlife Protected Areas (ASPs) and have the main objective of promoting biodiversity. Conservation can be considered inseparable from the process of development in a society endowed with rich ecosystems and natural resources, as Costa Rica is. So, the following question can be asked: how do conservation and development interact dynamically on the different space scales from their joint manifestation? That is what this study is most interested in studying. The fundamental subject is the socio-economic meaning of the NPBRs. Nevertheless, the questions of which meaning and for who remain? It would seem that the hypothesis behind these last two questions is clear: the NPBRs, as elementary parts of the ASPs, are extremely significant for the conservation and the socio-economic development of people.

The methodological approach developed in Chapter 4 and adjusted in this chapter to Costa Rican reality is focused on evaluating what the nature contained in the NPBRs means for the socio-economic development of Costa Rica and not on the value of nature in monetary terms. Therefore, the socio-economic contributions of the NPBRs will be evaluated from the markets and the real prices in relation with new activities that have been developed, or are emerging, thanks to the use of the resources and ecological services provided by areas under natural protection.

Part 2 of this chapter presents all the methodological steps followed in the case of Costa Rican in order to develop the methodology selected.

2. Research Design

The research methodology applied in Costa Rica was based on the methodology applied for the country in 2002 (Furst et al., 2004), and it is presented in Chapter 4 of this book. This methodological approach uses cluster-chain analysis and focuses the analysis on the contributions that the NPBR generated simply by existing. In this approach, NPBRs are considered an investment and not a cost for society.

According to the methodology, the information was generated at two levels:

a) National contributions from NPBRs in general based on bibliographic review - A detailed revision of the bibliography found in different Costa Rican institutions was elaborated in order to determine the socio-economic activities that are being developing around NPBRs. Also, some interviews were conducted with professionals that work in these areas.

b) Specific contributions from three national parks at local, regional and national levels based on detailed study and field work - Three NPs were selected in a workshop by professionals who work directly or indirectly in these areas.

2.1 Sharing the methodology with Bhutan and Benin.

The Costa Rican team shared the methodology with the Bhutanese and Beninese teams in order for them to adapt it to their own realities.

The Costa Rican team from the International Centre on Economic Policies and Sustainable Development (CINPE) under the Universidad Nacional (UNA) in Costa Rica visited Bhutan December 9-10, 2008 and Benin January 10-18, 2009 and introduced the general methodology to the teams from both countries as well as sharing the findings of the 2002 study. Then each one of the teams started to adapt it and develop the project. The Costa Rican team provided technical support to the Bhutanese and Beninese teams and made two more trips to each country in order to have meetings in which the advances of the Costa Rican case study were shared and some doubts about the methodology were solved.

The Bhutanese and Beninese teams visited Costa Rica in order to learn about the management of the Wildlife Protected Areas in this country and held meetings with the director and personnel of SINAC. Then these teams had reciprocal visits in order to learn about the management systems in these countries. The three teams kept constant communication by e-mail as well.

2.2 Validation of the methodological approach.

In the Costa Rican case, even when the methodological approach was validated in 2002, a second validation was necessary because it was important to know if the changes made by the SINAC from 2002 to 2009 would have any effect on the methodology approach.

In order to validate the methodology for Costa Rica, a workshop was carried out on February 19, 2009 with specialists from several institutions in Costa Rica, and the suggestions are presented in Annex 6.1. After including the suggestions, the bibliographic review started in order to quantify the benefits from all NPBRs to the socio-economic development of Costa Rica.

In order to calculate the benefits from tourist activity on the NPBRs, the methodological approach used in 2002 for Costa Rica was adjusted and is presented in Annex 6.2. The results of the application of this methodology are presented in Chapter 9. For the generation of hydroelectric power with water that is protected in Costa Rican NPBRs, a methodological approach was used and is presented in Annex 6.3.

An approach of the benefits from the existence of NPBRs for the storage of carbon dioxide was developed in this study and is presented in Annex 6.4.

2.3 Selection of case studies.

For the selection of case studies for Costa Rica, a workshop was conducted based on a matrix with some relevant criteria that are presented in Annex 6.5.

The three National Parks selected for in-depth study to quantify the socio-economic contributions at local, regional and national levels were Palo Verde (PVNP), Rincon de la Vieja (RVNP) and Corcovado (CNP) National Parks. Later, the decision to include Isla del Caño Biological Reserve (ICBR) to complement the CNP analysis was taken. The parks were selected based on selection criteria, such as ecosystem system representation, regional distribution, available socio-economic information and other related criteria.

2.4 Identification of preliminary socio-economic contributions/clusters.

A bibliography review was made and a field trip was conducted to each one of the national parks selected in order to obtain preliminary socio-economic contributions from the three selected case study parks.

2.5 Design of survey instruments.

The surveys elaborated for the 2002 project were re-designed for the new case studies taking into account the information gathered about each one of the national parks. New surveys should be elaborated for Palo Verde and Corcovado-Isla del Caño. A total of 25 surveys were designed for the three case studies. (See table 6.1).

Table 6.1 Costa Rica. Survey instruments designed.

No.	Survey Instruments	National Parks Applied
1.	Tourist	RVNP, CNP-ICBR, PV
2.	Hotels	RVNP, CNP-ICBR, PV
3.	Related Activities	RVNP, CNP-ICBR, PV
4.	Tour Operators/Travel Agencies	RVNP, CNP-ICBR, PV
5.	Key Actors	RVNP, CNP-ICBR, PV
6.	Transportations	CNP-ICBR
7.	Students	RVNP, PVNP
8.	Teachers	PVNP
9.	Researchers	RVNP, PVNP
10.	Stockbreeders	PVNP

Source: Own Elaboration

2.6 Sampling.

For almost all the activities mentioned in the table above, the total population was surveyed. Only in the cases of tourists, students, professors and researchers were samples obtained.

For the calculation of the sample size in each one of the case studies, the following formula of finite population size was used (Hernández, 2010):

$$n = Z_{\alpha}^{2} \frac{N \cdot p \cdot q}{i^2 (N-1) + Z_{\alpha}^{2} \cdot p \cdot q}$$

Where:

n = the sample size (number of surveys that will be applied);

N = the population or universe size (total number of possible interviewees);

α = significance level of 5%;

$Z_{\alpha/2}$ = value corresponding to the distribution of Gauss of 1,960; it depends on the level of confidence that is assigned;

$1-\alpha$ = confidence level of 95%;

p = expected prevalence of the visitation to the park, which is the proportion of individuals in the population that have the characteristic under study (generally unknown and often assumed that p=q=0.5, which is the safest option);

q = 1-p; the proportion of individuals who do not have that characteristic;

i = 5% sampling error that is expected; the difference that exists between the results that we get by asking for a sample of the population and the one we would get if we asked the entire population

2.7 Field work.

The collection of the information was made in different seasons of the years 2009 and 2010 for the different National Parks selected. In general, four field works were planned for each one of the National Parks. A total of 1,215 surveys were applied, as is shown in Table 6.2.

Figure 6.1 Costa Rica. Rincón de la Vieja NP Dec. 3th, 2009.

Source: Otoya, M. 2010.

Figure 6.2 Costa Rica. Corcovado NP Jan. 20th, 2010.

Source: Salas, F. 2009.

T*able 6.2* Costa Rica. Instruments applied during fieldworks.

Surveys	**Number of Surveys Applied**
Tourists	737
Hotels	75
Related Activities	38
Tour Operators/Travel Agencies	15
Key Actors	34
Haulers	8
Students	137
Teachers	129
Researchers	30
Stockbreeders	12
TOTAL	1,215

Source: Own Elaboration

2.8 Data management and analysis.

The data gathered from the case study parks were entered into databases designed based on the survey questionnaires using Excel.

2.9 Validation workshops.

Three validation workshops were organized in the three case study parks. The main objectives of the workshops were to validate the findings from the case study parks and to identify threats and issues related to protected areas and come up with policy recommendations.

After the validation workshops, the research team leaders met and finalized the reports based on the workshop outcome and feedback. The findings were also presented at the national level workshop on August 24, 2010.

The SINAC is the direct beneficiary of the results of the project. Because of this, the CINPE team made a workshop in which the methodological approach and the results were presented in detail to the SINAC professionals. The objective was that the results be updated yearly not only at the national level but also in each one of the NPs in Costa Rica.

3. Conclusions and recommendations on the methodology.

The cluster-chain methodology created and applied in Costa Rica in 2002 was validated in order to be applied in 2009. The methodology proved to be flexible and can be applied in different periods of time in order to update the contributions of the NPBRs to economic and social development in Costa Rica. Some aspects that have to be taken into account in the application of this methodology are presented below.

3.1 For aggregate quantification.

The aggregate quantification to obtain national, regional and local contributions to the NPBRs located in all the national territory based on secondary information should be allowed.

However, the information available for the quantification of the contributions of NPs and BRs can be relatively small and widely dispersed. This makes it difficult to systematize and measure the main contributions identified at the national level.

The contributions of the NPBRs to the socio-economic development at local, regional and national levels are difficult to identify as belonging to the parks and reserves since the information found is spatially located at the geographic and territorial fields of the conservation area. Then their real contributions to the national development are primar-

ily given indirectly. This is because the protected areas studied as a whole so far have complex ecological functions and environmental services that generate multiple benefits (e.g. biodiversity), but this is very difficult to attribute to a particular NPBR within the conservation areas.

In this sense, the work for the aggregate quantification the contributions have to be directed to find the greatest quantity of information available about NPs and BRs. This information has to be analyzed comprehensively, which means that some information generated for one institution can be complementary to that generated by other information.

3.2 For Case studies.

For the case studies, each step has to be evaluated carefully and always has to be validated by the stakeholders that are part of the process. Special care must be taken with the following aspects:

- The identification of the activities related to the existence of the National Park selected. It's very important to analyze which activities really depend on the existence of the NP and how they do so. In this sense, it is very useful to structure a matrix using secondary information and a visit to the place.
- The delimitation of local, regional and national levels of the influence of the activities identified. To this end, it is very useful to identify the areas first and then have a workshop with the main stakeholders that carry out these activities in order to evaluate and validate the first approach made.
- The elaboration of the surveys. In order to structure the surveys, the methodology has some guides to learn how to structure them. But the surveys have to be adapted to each case study. In some cases, new surveys should be structured taking into account the relevant questions in order to obtain the contributions. It's important to take measures to avoid the traditional mistakes when working with surveys.
- Results. Once all the field work is conducted, the systematization is very demanding and it's very important to be careful in order to avoid double counting.
- Validation. Each one of the results should be validated in workshops with the stakeholders who participate in the study.

4. Bibliography.

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5. Annexes

Annex 6.1 Costa Rica. Methodological recommendations: Workshop on cluster-chain methodology for NPBR.

This workshop was attempted for 40 experts at the CINPE Auditorium on February 19, 2009. The project team presented the methodological approach used in 2002 project, and the experts made the following observations:

1. To clarify and define the specific economic and social variables included;
2. To separate contributions that are generated from NPs and those that are not;
3. To consider the net profit, including negative impacts (sewage, solid waste, etc.);
4. To clarify the possibility of "double counting" into the value chains;
5. To remark on how every value chain is organized qualitatively;
6. To include these additional socio-economic sectors:
    a. Sustainable agriculture / traditional agriculture (microclimate, water, pollination / livestock / fisheries);
    b. Forestry sector (plantations of native species);
    c. General trade;
    d. Biological corridors and private reserves;
    e. Water (drinking water / irrigation);
    f. Indigenous communities;
    g. Enterprises; and
    h. Health.
7. To clarify how the economic benefit returns to each case study (control and protection related to the NP or BR);
8. To remark that 2009 is an atypical year since it includes a financial crisis affecting the global economy;
9. To define clearly who will use the study and how;
10. Additional sources of information:
    a. UN/GEF- http://www.un.org/
    b. CRUSA Foundation- http://www.crusa.cr/indephp?con=&bus=&lan=ing

c. CATIE- http://www.catie.ac.cr/magazin_ENG.asp?CodIdioma=ENG

d. EARTH- http://www.earth.ac.cr/ing/index.php

e. OET- www.ots.ac.cr

f. CCT- http://www.cct.or.cr/

g. Costa Rican Ministry of Environment, Energy and Telecommunications- www.minae.go.cr

h. Costa Rican National System of Conservation Areas- http://www.sinac.go.cr/

i. Universities- http://www.una.ac.cr/, http://www.ucr.ac.cr/ and http://www.uned.ac.cr/

j. National and international NGOs-http://www.rec.org/rec/databases/ngo-directory/ngofind.html

Annex 6.2 Costa Rica. Methodology to quantify the contribution of the NPBRs on the tourism activity.

First, the percentage of tourists who have visited the NPBRs should be determined for the year under analysis. To achieve this, the non-resident charts from the ICT provide information titled “Interviewees by region of residence as to if they made a visit to any National Park.” This one shows what percentage of tourists interviewed answered that they had visited an NPBR.

For 2009, 58.9% is taken as given proxy data to record the expenditure of tourists that can be directly attributed to the existence of the NPBR. This is because the current structure of the available statistics does not provide specifically this data. So, this procedure is the best way to get real data based on official information available for 2009.

Once you have the visitation percentage, this 58.9% is applied to each one of the total expenditure items with respect to tourism (see Figure 6.3). For example, the total expenditure attributed to the NPBR in the lodging item amounts to 315,287,695 dollars, representing 58.9% of the total expenditure as tourism in this item (535,293,200 dollars). This procedure continues until completing all the expenditure items (accommodations, transportation, food, entertainment and other expenses).

Figure 6.3 Costa Rica. Total expense attributed to NPBR.

Cross multiplication allows the percentages of the total expenses of tourists, which are attributable directly to the existence of the NPBR, to be obtained, that is, the total expense attributed to the NPBR.

535,293,200 → 100
? → 58.9

This implies that 535,293,200 shall be multiplied by 58.9. The result of this operation will then be divided by 100 to obtain the amount that corresponds to 58.9%, which, in this case, is 315,287,695.

Third, the average expenditure per tourist (AET) is also available in the ICT Non-Residents Chart (Chart 43.1 from the ICT database). It is under the title "Average Expenditure per Tourist (AET) in Costa Rica by Region of Residence According to Main Motive of Visit and the Way They Organized the Trip," and reports that the GMP amounts to 1,244 dollars for that year. This data is taken as the total expenditure of each tourist that visits a NPBR.

For each component, the total expenditure is 1,244 dollars, and the relative weight (%) of each item, such as transportation, food, and so forth, is derived. For example, the transportation expenditure can be calculated by applying Rule 3 again (see Figure 6.4) to obtain the amount of money that each tourist spends on moving within Costa Rica. This is taking

into account the percentage corresponding to transportation (15.4%), which is derived from the ICT Non-Residents Chart.

Figure 6.4 Costa Rica. Composition of the AET.

Cross multiplication allows the percentages of the items that make up the average expenditure per tourist (AET) to be obtained. In this example, the GMP is 1,244 dollars, which in turn is composed of various expenditures for which the percentages are provided in the ICT Non-Resident Chart. Taking into account the transportation, the following calculation can be made:

1,244 100 ⟶

? ⟶ 15.4

This implies that 1,244 shall be multiplied by 15.4. The result of this operation will then be divided by 100 to obtain the amount corresponding to 15.4% from 1,244, which, in this case, is 191.6.

Annex 6.3 Costa Rica. Methodology to estimate the total income by sales of energy derived from hydroelectric generation in projects near an NPBR.

The methodological aspects used to obtain the figures related to the estimation of total income due to the sale of energy in Costa Rica are explained below. This uses as a reference the hydroelectric generation in projects located in the vicinity of National Parks and Biological Reserves for the 2007-2009 period. This distinction is important in the implementation of the methodology since the study considers the quantification of the contributions that are attributable to the existence of the NPBRs. This implies, for the purpose of the hydroelectric generation, the provision of the environmental service of protection of water resources in quality and quantity to produce such clean energy.

The ICE sales and subscriber information for the year under analysis (e.g., 2009) and reported by the Sectorial Directorate of Energy are used as a basis for taking the total energy generation reported on ICE sales. From these, 79% were calculated as hydroelectric generation, and the remaining 21% of energy comes from other sources, such as geothermal, thermal, wind and/or biomass.

Once the amount of hydroelectric generation is obtained, the percentage of such energy that is produced and effectively sold to consumers (using the data provided by the Sectorial Directorate of Energy of Costa Rica) is calculated, that is, the figure that represents a generated monetary income. Then the amount sold in hydroelectric generation is divided into the amount produced by the hydroelectric plants (60% for 2009). This is due to the fact that the quantification must include only the energy that effectively is sold to consumers, and therefore, it represents the generation of a monetary income. This is how the methodology applies an adjustment to consider that even though all the energy produced is consumed, it is not necessarily sold, and therefore, it does not report a monetary income when the study is carried out.

The following step consists of taking the average ICE price of electricity for the year under analysis (based on the information from the DSE) and multiplying it by the coefficient of the hydroelectricity generation in KWH (60% in the example, that is, the one that is effectively sold and therefore reported a generated monetary income).

So, when the figures reported are taken from the hydroelectric plants, 60% is obtained for the generation of hydroelectricity in KWH by plants that depend on the existence of the NPBRs for production. These are determined as a result of the analysis of the information provided by the National Institute of Energy of Costa Rica. This allows establishing the plants that are located in the vicinity of NPBRs according to the information provided by the Costa Rican Electricity Institute (ICE) for each one of the years analyzed.

Once the total income figures are obtained in colons, they are converted into dollars. In order to do so, an average exchange rate (AER) is calculated between the average sale exchange rate and the average buy exchange rate. This is used to calculate the AER for 2007 (AER = ¢516.62), 2008 (AER = ¢526.23) and 2009 (AER = ¢573.35).

Finally, the total income amount in colones is divided by the exchange rate obtained in order to get the total income in dollars, according to the following formula:

$$\text{Total income in dollars} = \frac{\text{Total income in colones}}{\text{Exchange rate}}$$

Annex 6.4 Costa Rica. Methodology to estimate the environmental service of CO_2 storage in the NPBR.

The methodological aspects used to obtain the figures related to the estimation of the environmental service of storage of carbon dioxide (CO_2), which is reported by the existence of the PNRB, are explained below. It uses as a reference the forest cover data for forests located in National Parks and Biological Reserves obtained from INBio (2004). This distinction is important in the implementation of the methodology explained in Chapter 4, since the study considers the quantification of the contributions that are attributable to the existence of the NPBRs. In the case of the storage of CO_2, this implies the provision of an environmental service that contributes toward mitigating the impacts of climate change.

The information regarding cover of forests in National Parks and Biological Reserves reported in Furst, et al (2004) is used as a basis for making the calculations. According to it, the NPs have 54% wooded cover while the BRs conserve 81% as forests.

Next, the number of hectares that correspond to forests cover inside NPBRs is calculated. For the purpose of calculating the average CO_2 storage in tropical primary forest, the figure for forests in NPBRs is multiplied by 143, which corresponds to the tons of CO_2 stored by each hectare of forest (using Russo, no date, as a reference). This procedure is repeated for the calculation of the average storage on tropical forest grounds, where the factor used is 88 tons of CO_2 stored by each hectare of grounds in forest. Both figures are added up to obtain the total CO_2 storage in NPBRs.[1]

ENCC (2008) considers a range of prices for the emissions of CO_2 that varies between US$2.5 and US$6. Given that the carbon market remained alive at the time this study was being carried out, the price that is taken as a reference for the calculation is an average price between the two values mentioned above. Thus, the grand total of CO_2 storage in NPBRs is multiplied by US$4.25 to obtain a monetary equivalent of the environmental service of CO_2 storage that is associated with the existence of the NPBR.

[1] In this point, it is assumed that all tropical forests in NPBRs store an average of 143 tons of CO2 for each hectare of forest, and on average 88 tons of CO2 for each hectare of grounds in forest. In the case of the market of CO2 emissions, establishing new estimations will be necessary to segment the quantities of CO2 stored in the different kinds of ecosystems present in the NPBRs. Calculations that should respond to the standards that would be established in the agreements that eventually would be signed in future conferences of the United Nations about climate change.

Annex 6.5 Costa Rica. Selection of the case studies.

Matrix of Criteria for the Selection of PNRB Project Parks and Reserves (Pag. 1)

Decision Criteria	1	2	3	4	Observations
1) Availability of infrastructure (socio-economic and environmental) in the area of influence					
1.1 Existence of infrastructure that facilitates the visitation (hotels, restaurants, businesses, etc.)					
1.2 Existence of related recreational services (guided tours, diving, canopy, horseback riding, walks, guide services, information about the site, etc.)					
1.3 Local empowerment for the provision of related services					
1.4 The park has infrastructure and adequate services for the attention of the visitors (toilets, access to drinking water, trails, etc.)					
1.5 Type of tourism (ecological, rural community, adventure)					
1.6 Income generated to the surrounding communities					
1.7 Income generated to the country					
2) Amount and availability of information					
2.1 Availability of systematized information about the NPBRs in conservation areas at the NPBR and Central SINAC offices					
2.2 Existence and availability of NPBR projects, research and studies					
3) National and international pertinence					
3.1 Ecological and biological importance					
3.2 International recognition (Ramsar Site, World Heritage, Biosphere Reserve)					
3.3 Annual national and foreign visitation					
3.4 Generation of environmental services					
4) State management - participating management					
4.1 Presence of organized local communities that interrelate or benefit from the park/reserve					
4.2 Performance in the state management					
4.3 Synergy between the state management and local actors					
5) Diversity of landscapes, ecosystems, and species					
5.1 Diversity of landscapes (mountain, coast, volcanoes, rivers, lakes, etc.)					
5.2 Diversity of ecosystems (life zones, types of forest, types of wetland, etc.)					
5.3 Diversity of species (total estimated richness of species; diversity of known flora and fauna, macro-mushrooms, and microorganisms; levels of endemism of unique species; habitat of threatened species or species of special interest for the country and international community; etc.)					

Matrix of Criteria for the Selection of PNRB Project Parks and Reserves (Pag. 2)

Decision Criteria	1	2	3	4	Observations
6) Sources of pressure / conflicts					
6.1 Disorganized socio-economic development (urban, residential, agricultural, industrial)					
6.2 Illegal extraction of natural resources					
6.3 Overexploitation by using resources in the buffering zones					
6.4 Pollution due to solid and liquid wastes in the NPBR					
6.5 Conflicts between the socio-economic activities that use the environmental services from the park					
7) Water (inside and outside)					
7.1 Importance of the park for the protection and conservation of the water resources					
7.2 Water demand for socio-economic purposes (industrial, commercial, agricultural, aquacultural, residential) in the area of influence of the park					
7.3 Vulnerability of water resources					
8) Research					
8.1 Amount of research carried out in the park/reserve					
8.2 Variety of research carried out in the park/reserve					
8.3 Incidence of the research carried out in the park/reserve					
9) Potential for energy generation					
9.1 Potential for environmentally sustainable generation of electric energy using the water resources the park protects					
9.2 Potential for the environmentally sustainable generation of electricity from geothermal resources the park protects					
9.3 Potential for the environmentally sustainable generation of energy from other types of renewable resources in the park					
10) Generation of other environmental services					
10.1					
10.2					
10.3					

Chapter 7

Beninese Adaptation of the Methodological Approach

Anne Floquet

1. Introduction

In Benin, protected areas cover a relatively wide range of vegetation types. Hundreds of plant species have been identified as being consumed for their leaves, fruits, seeds, roots, tubers and flowers, as have mushrooms, small mollusks, insects, etc. A visit to rural and urban markets shows the importance given to these resources by the population. These resources are not only used directly for home consumption but are also processed, transported and traded. They then build the basis for short and long commodity chains. Wood is also harvested, processed and traded at a large scale.

Aside from marketable products derived from protected areas, there are other services, which are or could be drawn from protected areas. Visitors enjoy the scenic beauties of natural landscapes, wild animals in their natural environment, bathing, hunting, safari walking, trekking, discovering other ways of living and other amenities in close relationship to wildlife. The consumption of such amenities is the basis for developing vibrant worldwide tourism chains. In Benin, on-going development can also be observed.

Another amenity also develops among consumers worldwide, who become more and more conscious of the environmental degradation taking place on our limited planet. Knowing that a valuable environment is being protected is appreciated by consumers; they are ready to pay a premium for a conservation product rather than for a plain product cultivated at the costs of forests, soils and farmers' health. Such income is supposed to be reinvested in conservation in and around protected areas. In Benin, biological cotton around the Pendjari Park might well benefit from this income. Products grown or raised as an alternative to the wild ones (plantation wood & animal ranching) are not always traceable as having been raised in the vicinity of a protected area. They do not always benefit from this premium, but at least they have been promoted for these purposes.

Increasing awareness of the issues related to conservation or at least the need to sustainably manage products from protected areas also brings public funds to be invested in activities related to protection. Administrations are set up as well as programs for sustainable management of the protected areas and their riparian communities. Considerable investments have been made in and around protected areas in the last decade in Benin which provides local employment. Wildlife and vegetation monitoring activities are being set up as well as control and antipoaching. In some contexts, employment is created

for the rehabilitation of the degraded protected areas and their protection against fire. Landowners may also be subsidized for setting up plantations, keeping land forested or rehabilitating degraded forests around or within protected areas.

Natural protected areas also host a range of research activities, which could not be performed elsewhere. Such activities attract public or private funding from the State, international donors and NGOs and from abroad if potentially usable products are concerned (for example, for pharmaceuticals). All these activities are embedded within service chains.

Worldwide environmentalists donate to local organizations for protecting threatened species and their areas. Activities are financed within and around the protected areas creating employment, promoting alternative income generating activities and public services for the riparian communities, and developing training and education on environmental issues.

Last but not least, protected areas produce environmental services, some of which improve the benefits of enterprises using the resources the protected area has contributed to protect. Such externalities are probable and positively affect activities performed in valleys. In Benin, such contributions are hardly acknowledged, and there is a scope for their assessment.

Activities developed around protected areas may be grouped in clusters, involving specific types of private and public stakeholders and different types of commodity and service chains (see Table 7.1).

The tangible products clusters take in account tree and game products, non wood forest products harvested as well as farm products, which all constitute main incomes of rural smallholders. Provision of touristic services concerns a second type of clusters and related chains, management and research a third type and environmental services a last type.

Some of these activities are performed by a dense network of private stakeholders and micro, small and medium enterprises, which build clusters at local or regional levels. Some of these clusters may be the backbones of the local or regional economies, as could be depicted in this study.

All these contributions remain largely unacknowledged because, in Benin, protection is considered a source of losses by many stakeholders: loss of farmland; loss of timber and game because of the restrictions in uses; loss of public funds because of the costs of the protection; etc. In order to reveal another picture of reality, the Benin Center for Environmental, Economic and Social Development (CEBEDES) entered a partnership with CINPE in Costa Rica and The Nature Conservation Division in Bhutan. CINPE was proposing a methodology for measuring contributions of protected areas to the socio-economic development. The project design allows for comparative perspectives.

Table 7.1 Benin. Activities related to protected areas.

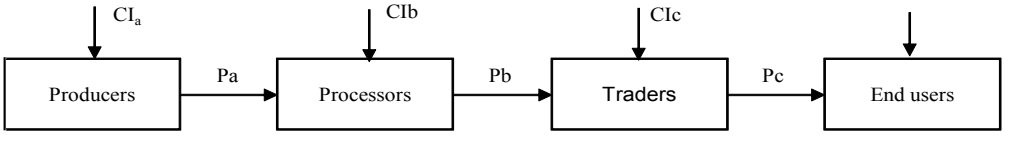
Types	Chains	Importance in the country
Tree and game products	Timber, firewood, poaching commodity chains	High in classified forests
NWFP	Numerous NWFP commodity chains	High in all protected areas
Alternative income generating farm products	Perennial plantation product chains Domesticated wild product farming, Bee keeping Biological farming	High around and in protected areas Medium Low
Tourism services	Accommodation, transport, management of the tourist venue up to the sites Safaris and sport hunting within and nearby the protected areas	Medium in parks
Management services	Monitoring, enrichment, fire control services in the protected areas Administration and taxation Public infrastructure provision around the protected areas	Medium
Knowledge generation services	Research and education Lobby	Medium
Environmental services	-	Not acknowledged nor measured

Source: Authors

2. Tracing Value Chains

People around protected areas rely on a large number of products, most of which have not been economically assessed or, at best, have been assessed only in monographic studies. On the other hand, such products are traded, in many cases to urban markets and sometimes abroad. Product harvest, processing, transport and trade involve a large range of very small entrepreneurs, labourers and petty service providers. Their identification implies following them in all segments of the value chain in a systematic manner in order to avoid double counting the income generated as well as forgetting important stakeholders. We adapted the cluster-chain methodology to our specific difficulties (Floquet, 2009) and made great use of the EASYPOL value chain analysis framework (Tallec and Bockel, 2005).

Figure 7.1 Benin. Flows of intermediate input entering the chain.



CI = intermediate input, P = end value of the products

Source: Adapted from Tallec and Bockel, 2005

Using the production and trading accounting method was chosen. On one hand, the value added by entrepreneurs at every segment of the chain is assessed up to the end value of the product(s) of the chain. On the other hand, at every segment of the chain, entrepreneurs have been using this added value for paying taxes, labourers and their own engagement.

Table 7.2 Benin. Production-trading account of an enterprise/chain segment.

Utilisation	**Supply**
Stocks at the beginning of the period	**End stocks**
Intermediate Inputs • Purchases • Purchased labor, supplies and services • Transport • Miscellaneous expenses	Sales Internal work undertaken by the enterprise Subsidies
Value Added • Waged laborers remunerations • Financial charges • Taxes • Depreciations • Net profit	
TOTAL	TOTAL

Source: Tallec et Bockel, 2005, p. 8

Eventually, the end value of the product at user level can be mainly decomposed into inputs and service provision, incomes of enterprises, labour wages as well as taxes. Some distribution channels are complex and products may be traded in very diverse markets at different levels. It was demanding to follow surveyed commodities up to all their end users.

2.1 Spatial levels of economic benefits

One of the specificities of the methodological framework in use is the allocation of the benefits at the local, regional or national levels. In Benin, the local level is defined as a group of communities directly affected by the protected area. The regional level mainly concerns mid-sized towns, where markets, infrastructures and, therefore, downstream segments of the chains are located. Main urban markets are located at the national level along the coast.

3. Investigation Design

The investigation included the following steps:

- Assessments of the benefits of protected areas according to documentation and resource persons;
- Selection of three protected areas during a national workshop;
- Identification of relevant product and service chains around these areas;
- Chain by chain investigations;
- Data entry into a database;
- Data processing into product and service accounts and analysis;
- Validation workshops at regional and national levels and external reviewing.

3.1 Assessments of the benefits of protected areas according to documentation and resource persons.

This step was supposed to be performed in preparation for the case studies, but in fact it was an ongoing process throughout the study. In spite of efforts, such as the new forest inventory in 2007 (Sepulchre et al. 2008) and an assessment of the contribution of the forestry sector to Benin Gross Domestic Product (Bertrand and Agbahungba, 2009), technical and economic data remain very scanty and contradictory, and sometimes field results had to be waited for in order to evaluate the credibility of statistics. We also had to compare our data with a large amount of monographic studies and there is still scope for a systematic Delphi study (Floquet, 2010).

3.2 Selection of thee protected areas during a national workshop.

A typology was designed differentiating three kinds of protected areas. First, National Parks (Pendjari and W) and their adjacent hunting areas are large biosphere reserves that provide total protection and cynegetic areas without any farmland. They are under the responsibility of the Wildlife Institution (CENAGREF). National Parks can only be found in the North at the upper borders of the country.

Another kind is State gazetted forests, which are quite numerous. Many of them should be managed according to a participatory management plan, allowing moderate timber logging and further harvest. They are under the responsibility of the Forestry Department (DGRFN). They are mainly located in the mid belt of the country.

The last kind is Community protected areas, which include some wetlands and sacred groves. Most of them are rather small, but wetlands are more significant because of their size and ecological value. Up until now, only researchers and NGOs kept an eye on them, but there are attempts to give them a new institutional status. Most of them are located in the South.

A review of the main characteristics of protected areas was prepared and submitted to a group of experts during a workshop at the national level (CEBEDES, 2009). The typology was validated during the national workshop. During the workshop, the most relevant choice between W and Pendjari biosphere reserves was also discussed. Pendjari was selected because of the higher availability of data on park management and tourism and because of its longer experience regarding inclusive co-management.

While in Costa Rica, investigations focused on areas under conservation, such as national parks and excluded gazetted forests. In Benin, the decision was made to include gazetted forests and community protected areas in the scope of our work. State gazetted forests are considered productive rather than protected areas in national terminology. However, most of the remaining forests are located within this domain, and considerable financial efforts are devolved to their sustainable co-management in order to reverse destructive trends. The choice of the oldest state forest under participatory management, the Tchaourou Toui Kilibo forest (TTK), was approved widely.

It is also planned to extend protected areas to some of the community managed wetlands and swamp forests in Benin. Therefore, one of these was included as a case study. Many institutions are currently interested in the Hlan wetlands as a pilot for designing new institutional arrangements (CENAGREF), delimiting an area under total protection as a sanctuary for the red bellied monkey (IUCN, Nature Tropicale, University, etc.) and promoting ecotourism (CEBEDES, especially through its South South Cooperation Project PSC 22P07). So, the Hlan protected area was immediately selected for this research.

3.3 Identification of relevant product and service chains.

A first range of exploratory appraisals was conducted in May-June 2009. In each area, markets at local and regional levels were visited and group discussions conducted with traders in order to identify products supplied by the protected area. Group discussions were also conducted in a large range of riparian villages in order to identify the contribution of products and services to local incomes by ranking procedures. A list of important commodities and services was established out of both surveys for each area.

At market levels, a census was performed in order to evaluate the number of persons contributing to a chain in each of its segments: traders were asked about the number of their suppliers and purchasers as well as their origin. Some uncertainty remains at the end because suppliers may sell products to several traders and may be counted twice. The census was conducted in order to perform a stratified sample later on.

Table 7.3 Benin. List of products and services identified as important for the protected area and number of persons surveyed.

	Pendjari	**TTK**	**Hlan**
Wood and poaching clusters			
Timber		77	
Fuel wood		85	
Hunt		19	
Non wood forest products clusters			
Locust bean	61		
Shea butter	72		
Medicinal plants	2		
Fishing	91		27
Raffia			43
Rattan			7
Snails			26
Alternative farm income generating activities			
Beekeeping	10	17	
Cashew plantation		145	
Tourism cluster			
Small game sport hunting	17		
Large game sport hunting	1		
Tourism	28		
Research and development projects	6	6	8
TOTAL	288	349	111

Source: Author

3.4 Individual surveys.

Individual surveys were conducted for each of the selected chains and concerned samples of producers or gatherers, collectors, processing operators, wholesalers and petty wholesalers, sometimes brokers, and some of the large end users, such as street restaurants, carpenters, large scale urban retailers, etc. Every enterprise was surveyed about the income drawn from a selected chain and asked about the share of products it obtained from the protected area.

Systematic sampling was difficult because of the high number of value chains and segments within each chain and the lack of initial knowledge concerning the size and structure of the whole statistical populations. If there are 50 petty traders and one wholesaler marketing larger quantities than the 50 petty traders, sampling should not exclude the large trader, who only represents himself. Stratified sampling was performed in order to avoid small

sample bias due to a heterogeneous population. All wholesalers were surveyed if it was possible to meet them since they represent a particularly important segment of the chain in order to assess total quantities supplied by the protected areas.

Table 7.4 Number of localities and people surveyed.

	Pendjari		TTK		Hlan	
	Localities	**People**	**Localities**	**People**	**Localities**	**People**
Local	9	258	11	332	5	83
Regional	2	22	1	3	4	19
National	1	2	1	8	2	1
Administration & projects		6		6		8
TOTAL	12	288	13	349	11	111

Source: Floquet et Alladatin, (2010); Floquet et Lawani, (2010); Floquet et al., (2010).

Tourism enterprises at local and regional levels and tourism agencies at national levels were listed and surveyed (if they had activities in relation with the protected area under survey). The share of their clients visiting the protected area was also evaluated.

The most difficult surveys concerned research and development projects and administrations. They had not cut their budget according to one specific protected area, and it was difficult for them to determine the share of their spending concerning the protected area, how employees are allocated to a protected area and whether they live in it or nearby (and spend parts of their salaries there). For research projects, it is also difficult to evaluate after the fact how many man days are spent on research in specific areas. In many cases, these benefits are under evaluated at protected area level.

Altogether 748 enterprises and agents were surveyed. Product chains were surveyed in July-September 2009 by research teams. Tourism enterprises were surveyed at the same time and again during the tourist season in January-May 2010. Tourists were then also asked about their whole journey in order to assess how the Pendjari protected area influenced tourism in nearby and further sites. Survey teams installed stands with posters at places where tourists used to rest at noon in order to have the forms filled with minimal disturbance. 114 groups of tourists were surveyed at park gate or within it at three different periods of the touristic season, described their journey and gave their appreciation. Among them, 90 groups filled usable expenditure survey forms in behalf of 451 visitors.

A unified database was constructed in order to manage all information in MS office ACCESS 2003. Particular attention was given in data control, especially in checking flows from segment to segment within a chain (all products flowing out of a segment must be found entering the next segment downstream). Sometimes inconsistency made it necessary to survey again specific aspects of a value chain.

4. Conclusions and Recommendations on the Methodology

Given the low quality of information out of statistics, it would be necessary to extend the survey to all protected areas in Benin. Since the methodology is new and there were some trials and errors, and a set of general recommendations on the method can be formulated.

- Products and services are highly diverse and the research team first has to acquire sound knowledge of the processes and products concerned and an initial set of estimates of vernacular terminologies, quantities, local units used, prices, etc. Markets are good places to identify a first set of relevant products and conduct exploratory group discussions.
- Aggregation of survey results is a main issue; great care has to be taken for the census at all segment chains and for all sampling procedures. All large scale agents in a chain should be surveyed. All segments should be surveyed up to the end users at their different levels. End users may be found at the same time at local, regional and national levels. The higher the level, the lower the dependency from the specific protected area; thus, only a share of the income can be attributed to it. It is very useful to check quantities and values leaving a segment and entering the next one in order to detect possible errors (survey, data entry or census errors) during the survey and not to way until the end of it.
- Survey errors can be prevented. Unwillingness to display trade benefits is usual but should not be a hindrance. People are ready to talk about their costs, and sale prices are easy to survey. Information will be readily provided by those who purchase the product at the next segment of the chain.
- The survey of projects and program costs has to be conducted step by step. It should begin with the leaders (often at national levels), who may give an over aggregated picture. They should be asked for authorization so that regional and local managers can also be surveyed on the operational aspects of the expenditures and on the time allocation of the personnel. Systematic survey sheets could be developed for management activities within parks, such as rehabilitation, nurseries, fire prevention, patrolling, etc.
- Household surveys are useful in order to cross check the value chain results at the local level, but national surveys may not adequately address the issue of illicit activities.
- Tourist expenditure survey data can be used to cross check the tourism chain data if the survey is conducted over the whole year and with a very systematic sampling procedure allowing for aggregation on the whole population. Given the difficulties of such sampling without bias, surveying all tourists may be a better option.

- A working definition has to be agreed upon concerning alternative income generating activities, which have been promoted in order to reduce pressure on natural resources.
- Environmental services have to be addressed by ecological researchers so that they can be economically assessed.

The methodology is powerful in making the many very small enterprises, and the numerous workers and service providers (such as transporters) that they employ, visible. In many cases, the contribution of protected areas through their non tree products had been underestimated in the past as had the number of people whose livelihoods is influenced by them.

Some preliminary questions were raised at the onset of the investigation. If the empirical validity of the value chain concept was not questioned, all products and services generated around a protected area being brought to final users through a range of operators, the validity of the cluster concept in the Beninese context was. There may be linkages among operators of the touristic sector, but are there linkages among operators in the NWFP sector who are not concerned by the same commodity? More, are there other players such as administration and support and facilitating institutions linked to these small firms who are mostly operating in the informal sector? If not can we still speak about (embryonic) clusters with at least a few observable externalities of agglomeration?

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PART III

Contributions of the Existence of National Parks and Biological Reserves in Bhutan, Costa Rica and Benin

Introduction

The existence of National Parks and Biological Reserves not only allowed the countries to have rich biological diversity but also to generate great economic and social richness at local, regional and national levels. This last aspect has been under studied for several reasons: lack of knowledge in methodologies that can be used in this calculation, lack of human and economic resources, lack of political interest and so forth.

The lack of information about the contributions of NPs and BRs at local, regional and national levels has made the general public and several public and private organizations think that these areas are a cost for the governments more than an investment. Because of this, the national and external budget for these areas are, in most cases, not big enough to cover all the necessities of these areas, and this contributes to the deterioration of the resources that they protect.

This chapter of the book presents an effort to quantify the socio-economic contributions of NPs and BRs in Bhutan, Costa Rica and Benin. With these results, there will be poof that NPs and BRs generate a lot of benefits to different economic activities and social groups at local, regional and national levels. This information will be very useful not only for the state to improve the management in these areas but also for the economic and social activities that depend on the existence of NPs and BRs and were not aware of their importance in their activities.

The general methodology applied to calculate the contributions is presented in chapter 4, and the specific aspects applied for each one of the countries are presented in Part III. The results and analysis presented are for the contributions of the existence of all the NPs and BRs in each one of the countries to its own socio-economic development. Then the results of three case studies are presented for each one of the countries; that is, nine protected areas are analyzed in this chapter.

Because of the particularities of each one of the countries and each one of the case studies selected, the analysis was made for different periods of time. For Bhutan, the contributions were calculated for 2008 in the general results and for the three case studies, whereas for Costa Rica, the analysis was made for 2009 for national contributions and for two of the three case studies. For Corcovado National Park-Isla del Caño Biological Reserve, the results were calculated for 2008. Lastly, for Benin, the results at the national level were calculated taking into account several years because of the difficulty of gathering information for only one year, while in the case studies, the contributions were calculated for 2009.

A detailed analysis is presented for Bhutan in Chapter 8, for Costa Rica in Chapter 9 and for Benin in Chapter 10.

Chapter 8

Contributions of the Existence of National Parks in Bhutan

Sonam Choden

1. Introduction

This chapter presents the estimated value of contributions in 2008 at the national level from the six protected areas that were operational in 2008 and the contributions from the three case study parks at the local, regional and national levels. The contributions were from the four main socio-economic clusters of resource use (timber, non-timber and natural pasture), ecosystem services (drinking water, irrigation water and hydropower), conservation (fines and penalties) and tourism clusters (tourism royalty, tourism development fund, hotels, transport, tour operators, handicraft sales).

The total contribution in 2008 from the six protected areas at the national level was Nu.1,150.147 million (US$ 26.441 million). Out of that, a negligible 0.08% contribution was from the resource use cluster, 96.52% from the ecosystem services cluster (related to hydro-power), 0.04% from the conservation cluster and 3.36% from the tourism cluster. The contribution of the six protected areas at the national level to the 2008 GDP was 2 percent.

The total contributions from Bumdeling Wildlife Sanctuary (BWS) Case Study Park to the social and economic development of Bhutan at the local, regional and national levels in 2008 from the four clusters were Nu. 50.32 million (US$ 1.16 million). Out of that, 67% were contributions at the local level, 3% at the regional level and 30% at the national level. The BWS contribution to the GDP in 2008 was 0.1 percent.

The contributions from Jigme Dorji National Park (JDNP) Case Study Park at the local, regional and national levels from the four clusters were Nu. 1226.5828 million or US$ 28.1973 million in 2008. The contribution from the JDNP to the GDP was 2 percent.

The total contributions from Jigme Singye Wangchuck National Park (JSWNP) at the local, regional and national levels in 2008 from the four clusters were Nu. 38.575 million (US$ 0.887 million).The contribution to the GDP was 0.1 percent.

2. National Level Contributions

The national level contribution refers to only those contributions from protected areas that benefit national level beneficiaries located at the centre of the country's administration, which is the capital, Thimphu. For quantification of national level contributions, national

level contributions from three case study parks were used together with secondary information gathered from three other protected areas of Bhutan that were operational in 2008. They were: Thrumshingla National Park (TNP), Royal Manas National Park (RMNP) and Sakteng Wildlife Sanctuary (SWS). The other three protected areas, Khaling Wildlife Sanctuary, Phibsoo Wildlife Sanctuary and Wangchuck Centennial Park, were not operational in 2008.

Based on the adapted cluster analysis methodology, the systematization and analysis of socio-economic contributions from protected areas at the national level has been broadly grouped under four main clusters generated from the three case study parks:

a. Resource Use Cluster,
b. Ecosystem Services Cluster,
c. Conservation Cluster, and
d. Tourism Cluster.

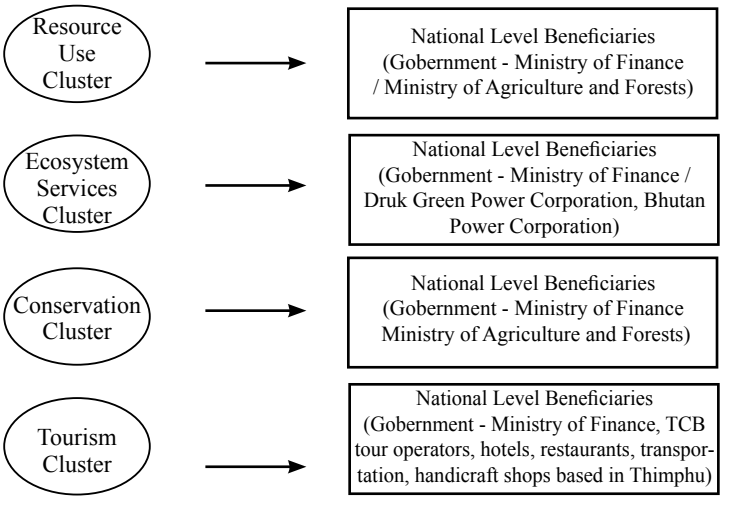
The Resource Use Cluster includes timber and non-timber resources from protected areas used by local and regional communities. The royalties or revenue generated from the use of natural resources from protected areas, which are deposited annually into the government revenue account, constitute national level contributions related to the Resource Use Cluster.

The contribution from the Ecosystem Services Cluster at the national level includes revenue generated from hydro-power produced using water from the protected areas. In addition, other important ecosystem services from protected areas that are not quantifiable, but are important, are also mentioned.

The Conservation Cluster includes revenue generated from fines and penalties levied on offenders involved in illegal activities in protected areas and deposited into the government revenue account. The annual government conservation budget allocated for the management of protected areas to carry out different programs and activities has not been considered since, logically, it is the cost of managing protected areas and not contributions from protected areas.

The Tourism Cluster includes contributions from royalties, the Tourism Development Fund, income to tour operators, hotels/restaurants, transportation and handicraft shops at the national level. The main socio-economic clusters and beneficiaries linked to protected areas at the national level are presented in Figure 8.1.

Figure 8.1 Bhutan. Socio-economic clusters and beneficiaries linked to protected areas at the national level.



Source: Choden & Wangyal, 2010

For the Resource Use Cluster, the national level beneficiary is the government, where all royalties collected from resource use from protected areas are deposited as revenue into the government account.

The beneficiary of the Ecosystem Services Cluster at the national level, in terms of hydropower revenue generated annually by the sale of power both inside and outside Bhutan, is the Government–Ministry of Finance, Druk Green Power Corporation Limited, Bhutan Power Corporation Limited and Bhutan Electricity Authority.

The beneficiary of the Conservation Clusters at the national level is the Government–Ministry of Finance, where annual fines and penalties collected from offenses in protected areas are deposited into the central government revenue account.

The beneficiaries of the Tourism Cluster at the national level from protected areas are the Royal Government of Bhutan (Ministry of Finance), Tourism Council of Bhutan (TCB), tour operators, hotels/restaurant owners, handicraft shops and transport owners based in Thimphu.

2.1 Estimation of socio-economic contributions from protected areas at the national level.

The estimated value of contributions from protected areas to the social and economic development at the national level has been quantified in detail below into the following four main clusters: Resource Use, Ecosystem Services, Conservation and Tourism.

2.1.1 Resource Use Cluster.

Resource utilization is one of the main activities in the protected areas due to the presence of local communities inside the park. Resources are allocated in a sustainable way through a permit system and in accordance with the entitlements and procedures specified in the 2006 Forest and Nature Conservation Rules (FNCR) and the 1995 Forest and Nature Conservation Act. Resources are only allocated from the multiple use and buffer areas of the park and from the nearby forest surrounding the settlements but not from the core areas of the park, which are strictly protected. Also, only those legally registered households falling inside the protected areas are entitled to resource use.

The local communities living in the protected areas of Bhutan use a number of resources from the forest in the protected areas for their livelihoods. They are broadly categorized into rural timber and non-timber resources, also known as non-wood forest products. The timber is mostly used for construction and renovation of houses. Each legally registered household/family is entitled to timber for house construction once every 30 years and for house renovation once every five years. Permits are required for timber, firewood, poles, bamboo, sand, stone, and gravel as well as for those non-wood forest products which are used for commercial purposes.

Permits are not required for personal household use of resources such as non-wood forest products and also manual dry firewood collection. For all other resources, permits are required, and also, subsidized royalty/tax needs to be paid to the park office at the time of processing the permit. The park offices in turn deposit the revenue collected into the national government account, which forms one of the national level contributions from the protected areas. Besides the royalty, protected area offices also collect fines and penalties from people/agencies involved in illegal activities related to forest resources, which also get deposited into the national government account.

2.1.1.1 Estimated value of contributions from Resource Use Cluster.

The total national level contribution from the Resource Use Cluster from the six protected areas (BWS, JDNP, JSWNP, TNP, RMNP and SWS) was Nu. 0.8833 million (US$ 0.0203 million), as shown in Table 8.1.This is the contribution generated by royalties collected from use of both timber and non-timber resources by local and regional communities from these six protected areas, which was deposited into the government revenue account in 2008. The protected areas not reflected here were not operational then and lacked resource use information.

Table 8.1 Bhutan. Royalties collected for resource use from protected areas in 2008.

Name of Park	Royalty collected from resource use in 2008 (Nu.)	Royalty collected from resource use in 2008 (US$)[1]
BWS	327,782.00	
JDNP	178,084	
JSWNP	89,362.00	
TNP	131,719.62	
RMNP	67,686.00	
SWS	88,617.00	
Total	883,250.62	20,304.61
Total in millions	0.8833	0.0203

Source: Park Offices, 2009

2.1.2 Ecosystem Services Cluster.

The glaciers of northern Bhutan found within the JDNP, WCP and BWS protected areas are an important renewable source of water for Bhutan's rivers. Glaciers and glacial lakes constitute about 10 percent of the total surface area of Bhutan. The four major river systems of Bhutan are Drangme Chhu, Puna Tsang Chhu, Wang Chhu, and Amo Chhu. All of them flow from the Himalayas in the north to the southern foothills of India to join the Brahmaputra River (National Statistical Bureau [NSB], 2009b). The water from these four major river systems has the potential to generate 30,000 MW of hydro-power, out of which 23,495 MW are feasible economically. Currently, Bhutan has installed hydro-power generation capacity of 1,488 MW (DGPCL, 2009), as shown in Table 8.2.

The installed capacity of 1,488 MW constitutes only 4.96% of the total hydro-power potential but contributing to 40% of the country's revenue. Bhutan's vision is to achieve 10,000 MW of installed capacity by 2020 (DGPCL, 2009). The water for the majority of the hydro-power plants in Bhutan comes from the country's protected areas. The sources of water for Bhutan's major hydro-power plants (Chhukha, Kurichhu and Tala hydro-

[1] US dollar conversion is based on the exchange rate 1 USD = Nu. 43.5 used by the National Statistical Bureau Office in 2008 for GDP estimation.

power projects) are the protected areas, and they generate an installed capacity of 1,416 MW of power. The total revenue from these three hydro-power plants in 2008 was Nu. 11,487.4 million (US$ 264.08 million), as shown in Table 8.3.

Table 8.2 Bhutan. Current installed hydro-power capacity.

S.I. No.	Name of hydro-power plant	Capacity
1.	Chhukha	336 MW
2.	Kurichhu	60 MW
3.	Basochhu	64 MW
4.	Tala	1,020 MW
5.	23 Plants (> 3 MW)	8 MW
	Total	1,488 MW

Source: DGPCL, 2009

Table 8.3 Bhutan. Revenue earned in 2008 from hydro-power plants linked to protected areas (Nu. in millions).

Name of Plant	Revenue from total power sales 2008	Revenue from domestic sales 2008	Revenue from export to India 2008
Chukha	3,795.9	71.4	3,724.5
Kurichhu	526.7	177.7	349.0
Tala	7,164.8	205.6	6,959.2
Total (Nu. in millions)	11,487.4	454.7	11,032.7
Total (US$ in millions)	264.08	10.45	253.63

Source: Royal Monetary Authority (RMA), 2009

2.1.2.1 Estimated value of contributions from Ecosystem Services Cluster (hydro-power)

Among the six protected areas, the sources of water for the Kurichu, Chukha and Tala hydro-power plants are mainly within the BWS and JDNP. In the case of the Kurichu plant, the BWS contributes 26.6% of the water from the Khoma Chhu (DGPCL, 2008), which is a BWS source. In the cases of Chukha and Tala, the water comes entirely from the JDNP.

Using the above estimates regarding sources of water, the value of contributions related to hydro-power from protected areas for 2008 has been estimated at 10%[2] of the annual revenue generated by both the domestic and exported sale of power, which is Nu. 1,110.08 million (US$ 25.52 million), as shown in Table 8.4.

Table 8.4 Bhutan. Estimated contribution from hydro-power plants linked to protected areas.

Name of Protected Area (PA)	**Name of Plant**	**Revenue from total 2008 power sales (Nu. in millions)**	**Revenue from power sales related to PA (Nu. in millions)**	**Estimated contribution from PAs (10% of total revenue [Nu. in millions])**
BWS	Kurichhu	526.7	140.10	14.01
JDNP	Chukha	3,795.9	3,795.9	379.59
	Tala	7,164.8	7,164.8	716.48
Total Contributions from Protected Areas (Nu. in millions)				1,110.08
Total Contributions from Protected Areas (Millions of US$)				25.52

Source: Estimate based on DGPCL 2008, RMA, 2009 and Social Forestry Division (SFD) 2009

Besides the above value of contributions from the Ecosystem Services Cluster, the other important contributions of protected areas at the national level are the intangible ecosystem services, such as the regulation of air; water; climate; carbon sequestration; mitigation of climate change; natural disaster prevention; biodiversity conservation; habitat for flora and fauna including endangered species, such as black-necked cranes; pollination; research; educational, spiritual, aesthetic and many other types of conservation; and social and cultural benefits. Many nationally significant cultural heritages are also found in protected areas, such as the BWS, JSWNP, TNP and so forth.

2.1.3 Conservation Cluster.

The value of the contribution from the Conservation Cluster includes fines and penalties collected from forest produce offenses in protected areas, which get deposited into the government revenue account. The fines and penalties for wildlife offenses are rewarded directly to the informers as an incentive to monitor wildlife offenses and do not get deposited into the government account.

[2] Ten percent has been taken based on the similar approach used to fix royalty rates for Non-Wood Forest Products (NWFP) in the Interim Framework for NWFP, 2009, where 10% of the market rate was used to fix the royalty rate by the Social Forestry Division, Department of Forests and Park Services.

The total estimated value of the contribution from the Conservation Cluster at the national level from protected areas in 2008 was Nu.0.508 million (US$ 0.0116 million), as shown in Table 8.5.

Table 8.5 Bhutan. Estimated value of the contribution from the Conservation Cluster.

Name of Park	Royalties collected from fines and penalties in 2008 (Nu.)	Royalties collected from fines and penalties 2008 (US$)
BWS	0	0
JDNP	17,181.00	395.00
JSWNP	25,401.00	584.00
TNP	0	0
RMNP	460,351.41	10,583.00
SWS	5,500.00	126.00
TOTAL	508,433.41 (0.508 million)	0.0116 million

Source: Park Offices, 2009

2.1.4 Tourism Cluster.

Tourism is the second highest revenue generator for the country after hydro-power. Culture and nature form the main attractions for tourism in Bhutan. The number of tourists visiting Bhutan has increased exponentially over the last three decades with just 287 tourists in 1974 to 27,636 in 2008. Bhutan has followed a *high value*, *low volume* tourism policy to reduce the negative impacts of unsustainable tourism and ensure the preservation of the environment, culture and values (Tourism Council of Bhutan [TCB], 2008).

In 2008, the total number of visitors was 27,636, which was an increase of 31 percent (21,094) from 2007. The gross earnings from tourism were US$ 38.8 million with US$ 13.8 million as direct revenue for the government in the form of a 30 percent royalty/tax levied per tourist in 2008. Out of the total number of visitors, 2,989 (10.8%) combined a cultural tour with one trek while only 1,210 (4.4 %) came solely for trekking in 2008 (TCB, 2008).

Currently, the benefits from tourism are mostly confined to national level beneficiaries, such the government, the Tourism Council of Bhutan, tour operators, hotels, restaurants, transport agencies and handicraft shops located in the capital and in certain regional areas. Bhutan's *high value*, *low volume* tourism policy is based on a fixed tariff system, and all tourists have to come through a registered local travel agent paying a fixed rate of US$ 200 per day, 30% of which goes to the government as a royalty (tax). The remaining 140 dollars spent go toward accommodations, food, transport, guiding services and income to tour operators. An additional 10 dollars charged per tourist per visit went to the Tourism Development Fund (TDF) managed by TCB, which has now been dissolved.

Tour operators are one of the main beneficiaries of tourism at Bhutan's national level. As of December 2008, there were 475 registered travel agents, but only 53.8 percent of them were operational. The top 12 tour operators accounted for 51.5 percent of total bed nights in 2008. The gross income earned by tour operators in 2008 was US$ 24.7 million with a net income of US$ 23.9 million (TCB, 2008).

Hotels and restaurants are also the beneficiaries of tourism at the national level. There were a total of 132 hotels registered with the TCB in 2008, including luxury and regional hotels. The growth of the hotels and restaurants is directly related to the annual increase in tourist numbers. In 2008, the hotel and restaurant sector expanded significantly by 45.4 percent compared to only 7.4 percent in 2007 and constitutes 1.1 percent of the nominal GDP (RMA, 2010).

The handicraft/souvenir shops are also other beneficiaries of tourism at the national level. The TCB survey in 2008 revealed that 75.8 percent of tourists spent less than US$ 500.00 for shopping and food. This is on top of the tour packages offered by tour operators, which include tourism royalty, hotel, food, transportation and guiding services.

The tourism activities in the protected areas have been very limited except for trekking, which is also not managed by the parks. The only managed tourism program inside a protected area is the Nabji Community Based Tourism Program in JSWNP initiated in 2006. The other recent initiatives include the Annual Mushroom Festival in TNP that started in 2008 and the Annual Nomadic Festival in WCP which initiated in 2009. More initiatives are planned to open in protected areas for nature based tourism to benefit local communities. The government has identified ecotourism as a priority program during the 10th FYP based on its huge potential in the protected areas.

2.1.4.1 Estimated value of contributions from Tourism Cluster.

Out of 1,210 tourists who came trekking in 2008 (TCB, 2008), the number of tourists who trekked in the protected areas was 650 (NCD 2008), which constituted 2.4 percent of the total arrivals for 2008. Thus, from the total tourism royalty of US$ 13.8 million generated in 2008 (TCB, 2008), the royalty from trekking in protected areas was US$ 0.3312 million, which makes up a direct contribution from protected areas.

Besides the royalty, other contributions are from the TDF,[3] hotels, food, transport and income to tour operators estimated based on information from the Bhutan Tourism Corporation Limited, TCB and Association of Bhutanese Tour Operators (ABTO). The average number of days spent in Bhutan to visit the BWS is 8 days; JDNP is 11 days; JSWNP is 8 days; and TNP is 4 days. Based on these figures, the values of contributions at

[3] Tourism Development Fund–Each tourist pays US$ 10 per visit, which go into the TDF managed by the TCB.

the national level from royalties, the TDF, food, transport and income to tour operators were estimated, accordingly, except regarding hotels, for which only 2 days spent in Thimphu were considered under the national level contribution. The rates for the following services are based on the average estimates made by the Bhutan Tourism Corporation Limited: hotel in Thimphu, Nu. 2,500.00 per tourist per night; food, Nu.1,200.00 per tourist per day; transport, Nu. 1,000.00 per tourist per day; and net income to tour operator, US$ 25.00 per tourist per day.

The total estimated value of contributions from the Tourism Cluster from protected areas in 2008 was Nu. 38.6760 million (US$ 0.8891 million), as shown in Table 8.6. The contribution from RMNP and SWS was nil as these two protected areas were not open to tourists in 2008 and the few visitors were government guests and technical experts.

Table 8.6 Bhutan. Estimated contributions from the Tourism Cluster in protected areas at the national level for 2008.

Protected Areas	BWS	JDNP	JSWNP	TNP	RMNP	SWS	Total
No. of tourists in 2008 [4]	22	486	105	156	0	0	
Tourism Royalty (Nu.)	459,360.00	13,953,060	2,192,400.00	1,628,640.00			
TDF (Nu.)	9,570.00	211,410	45,675.00	67,860.00			
Hotel (Nu.)	110,000.00	2,430,000	525,000.00	780,000.00			
Food (Nu.)	52,800.00	1,166,400	756,000.00	374,400.00			
Transport (Nu.)	176,000.00	5,346,000	420,000.00	62,400.00			
Tour Operators (Nu.)	191,400	5,813,775	913,500.00	678,600.00			
Guiding (Nu.)			92,000.00				
Handicrafts (Nu.)			105,000.00				
Total (Nu. in millions)	0.9991	28.9207	5.1643	3.5919	0	0	38.6760
Total (US$ in millions)	0.0230	0.6648	0.1187	0.0826	0	0	0.8891

Sources: Estimate based on secondary data from ABTO, BTCL, TCB, and NCD

2.2 Summary of national level contributions from protected areas.

The total contribution from the six protected areas at the national level in 2008 was Nu.1,150.147 million (US$ 26.441 million). Out of that, a negligible 0.08% contribution was from the Resource Use Cluster, 96.52% from the Ecosystem Services Cluster related to hydro-power, 0.04% from the Conservation Cluster, and 3.36% from the Tourism

[4] Figure for tourist number based on NCD park permit database, 2008.

Cluster, as shown in Table 8.7. Thus, the hydro-power contribution from the Ecosystem Services Cluster generated the maximum value of contribution, followed by the Tourism Cluster, at the national level from protected areas. The contribution to the GDP[5] in 2008 at the national level from protected areas was 2%.

Table 8.7 Bhutan. Summary of national level contributions from protected areas in 2008.

S.I. No.	Cluster type	Valued contribution (Nu. in millions)	Valued contribution (US$ in millions)	Percentage of contribution
1.	Resource Use (royalties from resource use)	0.8833	0.0203	0.08%
2.	Ecosystem Services (hydro-power revenue)	1,110.08	25.52	96.52%
3.	Conservation (fines and penalties)	0.508	0.0116	0.04%
S.I. No.	**Cluster type**	**Valued contribution (Nu. in millions)**	**Valued contribution (US$ in millions)**	**Percentage of contribution**
4.	Tourism (royalty, TDF, hotel, food, transport, tour operator)	38.6760	0.8891	3.36%
	TOTAL	1,150.147	26.441	100%
	Contribution to the GDP in 2008	2%		

Source: Choden, Tashi & Dhendup, 2010

3. Case Studies

3.1 Bumdeling Wildlife Sanctuary (BWS).

The BWS is one of the three case study parks selected in Bhutan for the study on the "Systematization and analysis of the contributions of national parks and biological reserves to social and economic development in Bhutan, Costa Rica and Benin" funded by the Kingdom of the Netherlands under the South-South Cooperation Reciprocal Project.

a. Location.

The BWS is one of Bhutan's ten protected areas located in north-eastern Bhutan. It was gazetted in 1994 and managed since 1998 with the objective of conserving the pristine temperate and alpine ecosystems and the sacred cultural heritage found in the country. BWS has an area of 1,520.61 km^2 (MoA, 2009b) with three geogs (administrative blocks; Khoma geog under Lhuntse district, Sherimung geog under Mongar district and Bumdeling geog under Trashiyangtse district) falling inside the sanctuary administration.

[5] The GDP for 2008 was Nu. 54,149.9 million based on the 2009 NSB report.

The BWS is administratively divided into three Park Range Offices: Dungzam Range for Bumdeling geog; Shershong Range for Sherimung geog; and Khoma Range for Khoma geog. The Park Head Office is located at Trashiyangtse with total staff strength of 34.

b. Significance.

The BWS has recorded 650 species of vascular plants, 100 species of mammals, 296 species of birds, 45 species of reptiles and over 130 species of butterflies (BWS, 2001; Wangyal & Tenzin, 2009; BWS, n.d.). The sanctuary is also one of the two wintering habitats of the endangered black-necked cranes found in Bhutan. The altitude of the park ranges from 1,500 meters to 6,000 meters above sea level (BWS, 2001). The BWS is truly special and important for conservation because of all this biological wealth, along with renowned, sacred Buddhist cultural sites, such as Singye Dzong, Aja Ney, Rigsum Goenpa, Pemaling and several others.

Figure 8.2 Bhutan. *Tshokhar tso* (alpine lake) near the border with China in BWS.

Source: S.Tashi, FRDC.

Figure 8.3 Bhutan. Blood pheasants at Singye dzong BWS.

Source: S.Tashi, FRDC.

Like other protected areas in Bhutan, BWS also has local communities living in and around the sanctuary. There are 1,037 households under the three geogs of Khoma, Sherimung and Bumdeling. The total estimated population living full time in BWS is 5,094 from the three geogs and with an average household size of five. Although agricultural farming and livestock rearing are the two most common livelihood activities, the most important activities for generating cash income to the households are weaving; casual labor; remittances sent by working relatives; livestock products; and portering. Weaving is confined to Khoma geog, but because of its high value, weaving generated the highest income compared to all other socio-economic activities in BWS (Choden & Wangyal, 2010).

Figure 8.4 Bhutan. Beautiful alpine flowers adorn the landscape amid rugged mountain terrain in BWS.

Source: S.Tashi, FRDC.

Figure 8.5 Bhutan.Weaving of Bhutanese textile, an important source of cash income for Khoma geog communities.

Source: S.Tashi, FRDC.

Figure 8.6 Bhutan. Timber used for house construction by local communities in BWS.

Source: S.Tashi, FRDC.

Thus, the main goal of BWS is conservation of temperate and alpine ecosystems, cultural sites and sustainable use and management of natural resources in and around the sanctuary (BWS 2001).

Figure 8.7 Bhutan. Private agriculture land inside BWS.

Source: S.Tashi, FRDC.

Figure 8.8 Bhutan. Rivers, sources of life in BWS.

Source: S.Tashi, FRDC.

3.1.1 Socio-economic clusters linked to BWS.

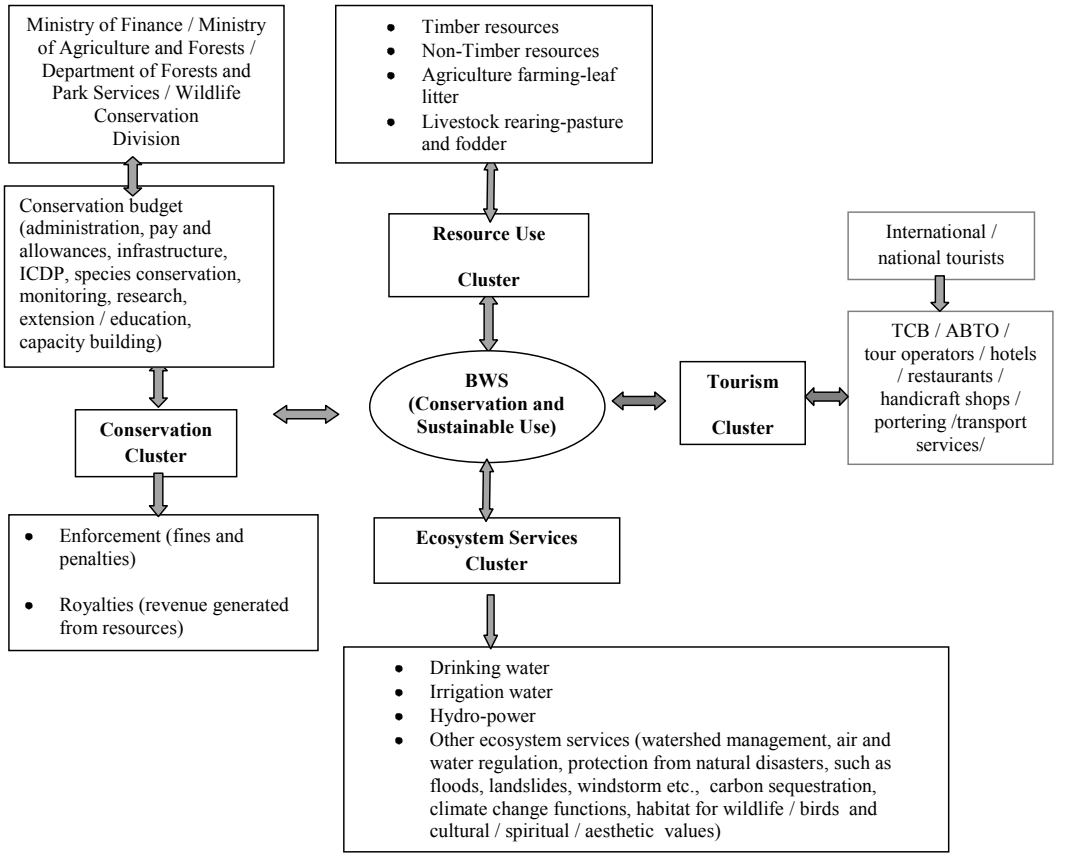
Based on the cluster analysis methodology adapted for Bhutan from Costa Rica, the systematization and estimation of the socio-economic contributions from BWS have been done at three levels: local, regional and national levels. Local level refers to benefits from BWS that remain inside BWS only; regional level refers to those benefits from BWS, which extend outside BWS but within the region; and national level refers to benefits from BWS, which go to the national/central level, specifically, the centre of the country's administration, which is Bhutan's capital city, Thimphu.

The four main socio-economic clusters linked to BWS have been identified. They are the Resource Use Cluster, Ecosystem Services Cluster, Conservation Cluster, and Tourism Cluster, as shown in Figure 8.9. The socio-economic contributions in monetary terms linked to these four clusters from BWS have been estimated for 2008 at local, regional and national levels. For the Resource Use Cluster, the beneficiaries at the local level include communities, enterprises, and institutions from Khoma, Sherimung and Bumdeling geogs within BWS while regional beneficiaries include regional communities, enterprises, and institutions in Tashiyangtse, Lhuntse and Mongar district centers. The national level beneficiary is the government as all royalties collected from BWS resource use are deposited as revenue into the government account.

The beneficiaries of the Ecosystem Services Cluster for quantifiable ecosystem services (drinking water, irrigation water) at the local level are the communities from Khoma, Sherimung and Bumdeling geogs, while there are no regional beneficiaries since regional communities living outside of BWS do not use BWS water resources for drinking and irrigation. The national beneficiaries in terms of hydro-power revenue generated annually through the sale of power are the Government–Ministry of Finance, Druk Green Power Corporation Limited and Bhutan Power Corporation.

The beneficiaries from the Conservation Cluster (includes only fines and penalties levied and rewarded) at the local level are communities from Khoma, Sherimung and Bumdeling geogs and BWS staff, while there are none at the regional level. National level beneficiaries include mainly the Royal Government of Bhutan–Ministry of Finance and also the Ministry of Agriculture and Forests.

Figure 8.9 Bhutan. Socio-economic clusters linked to BWS.



Source: Choden & Wangyal, 2010

The beneficiaries of the Tourism Cluster at the local level are communities involved in providing portering services and selling handicraft products to national visitors in Khoma, Sherimung and Bumdeling geogs. The regional level beneficiaries from international tourists include owners of hotels, restaurants, and handicraft shops in the towns of Trashiyangtse, Mongar, Trashigang and Bumthang districts. The national level beneficiaries are the Royal Government of Bhutan (Ministry of Finance), Tourism Council of Bhutan, tour operators and hotel/restaurant owners, handicraft shops and transport owners based in Thimphu.

3.1.2 Socio-economic contributions: Local level

This section presents estimated monetary socio-economic contributions at the local level from BWS for the year 2008 from the following four clusters: Resource Use, Ecosystem Services, Conservation and Tourism. The total value of contributions at the local level from these four clusters amounts to Nu. 33.92 million (US$ 0.77 million).

3.1.2.1 Resource Use Cluster.

The Resource Use Cluster is one of the main clusters in BWS making socio-economic contributions at the local level. The contributions from this cluster are further categorized into three components: timber resources (construction timber and other timber resources), non-timber resources and natural pasture. The total estimated value of contributions from the Resource Use Cluster in BWS at the local level in 2008 comes out to be Nu. 21.56 million (US$ 0.49 million), as shown in Table 8.8.

The resource use data are from 2008 BWS office record and also from 2009 BWS field work. The unit value used is based on the estimate worked out during the JDNP validation workshop, the 2008 market price reflected in the Interim Framework for Non-Wood Forest Products developed by the Social Forestry Division under the Department of Forests and Park Services in 2009, and other local rates from BWS, all of which can be found in Annex 8.1.

Table 8.8 Bhutan. Estimated value of contributions from the Resource Use Cluster at the local level in 2008.

Resource Use Cluster	**Nu. in millions**	**US$ in millions**
1. Timber resources (construction timber and other timber resources)	14.02	0.31
2. Non-timber resources	7.52	0.17
3. Natural pasture	0.023	0.0005
TOTAL	21.56	0.49

Source: Choden & Wangyal, 2010

The details regarding the estimated contributions from the Resource Use Cluster are presented below.

a. Timber resources.

Timber resources include timber allotted for house construction/renovation and other timber resources used, such as fire wood, flag poles, fencing posts. The construction timbers are called *drashing*, *cham*, *shingleb*, *tsim*, and *dangchung*. The total timber for

house construction/renovation allotted to local communities from Khoma, Sherimung and Bumdeling geogs under BWS for 2008 are presented in Table 8.9. Based on the timber data, the estimated value of contributions from construction timber resources of BWS used at the local level in 2008 was Nu. 9.44 million (US$0.217 million).

Table 8.9 Bhutan. Estimated value of contributions from house construction timber under BWS for 2008.

GEOG	Khoma	Sherimung	Bumdeling	Total	Remarks
Quantity (cft)					Timber data from BWS. Quantity conversion and unit value calculated based on standard rates fixed at JDNP validation workshop held on May 31, 2010.
Drashing	15,441.36	18,482.84	36,263.8	70,188.00	
Cham	3,616.07	302.6	0	3,918.67	
Shingleb	0	818.86	0	818.86	
Tsim	196.37	312.04	217.89	726.3	
Dangchung	14.28	75.6	0	89.88	
Total	19,268.08	19,991.94	36,481.69	75,741.71	
Unit value (Nu.)	124.69	124.69	124.69	124.69	
Total value (Nu.)	2,402,536.90	2,492,795.00	4,548,901.93	9,444,233.82 (9.44 million)	
Total value (US$)	55,230.73	57,305.63	104,572.46	217,108.82 (US$ 0.217 million)	

Source: Choden & Wangyal, 2010

The total value of contributions from other timber resources in BWS at the local level is estimated to be Nu. 4.58 million (US$ 0.11) for 2008, as shown in Table 8.10.

Table 8.10 Bhutan. Estimated value of contributions from other timber resources at the local level from BWS in 2008.

Geog	Firewood (HL)	Flag poles (nos)	Fencing poles (nos)	TOTAL	Source
Khoma	17,208	1,748	3,999		2009 BWS field work data and unit value based on 2010 JDNP validation workshop.
Bumdeling	59,220	1,414	6,096		
Sherimung	58,505	2,273	3,433		
Total	134,933	5,435	13,528		
Unit value (Nu.)	21	172	60		
Total value (Nu.)	2,833,593	934,820	811,680	4,580,093	
			Nu. in millions	4.58	
Total value (US$)	65,140.07	21,490.11	18,659.31	105,289.49	
			US$ in millions	0.11	

Source: Choden & Wangyal, 2010

The total estimated value of contributions from timber resources, which includes construction timber and other timber resources at the local level from BWS in 2008 was Nu. 14.02 million (US$ 0.32 million), as shown in Table 8.11 Among the timber resources used in BWS at the local level, construction timber and firewood were the ones used widely, putting lots of pressure on the park resources. In order to reduce pressure on the natural resources in the park, BWS under its Integrated Conservation and Development Program has issued Corrugated Iron Roofing (CGI) materials to 251 households from 2001 to 2005 on a cost sharing basis, which has drastically reduced the demand for shingles (BWS, 2009).

Table 8.11 Bhutan. Total estimated contribution from timber resources in BWS at the local level in 2008.

Timber resource	**Total value (Nu.)**	**Total value (US$)**
1. Construction timber	9,444,233.82 (9.44 million)	217,108.82 (0.217 million)
2. Other timber resources	4,580,093 (4.58 million)	105,289.49 (0.11 million)
Total	14,024,326.82	322,398.31
Total in millions	14.02	0.32

Source: Choden & Wangyal, 2010

b. Estimated value of contributions from non-timber resources.

Besides the above timber resources, the local communities of BWS also use a number of non-timber forest products (NTFP). The total estimated value of contributions from non-timber forest resources, such as *Cordyceps*, cane, mushroom billet, sand, stone, boulders, bamboo, fodder, leaf litter, ferns and mushrooms in BWS for 2008 is Nu. 7.52 million (US$ 0.17 million), as shown in Table 8.12. This is only a minimum estimate since there are many other non-timber resources used by communities, which have not been reflected here due to lack of quantifiable data. For example, around 108 non-timber resources are believed to be used for various purposes by local people in BWS (BWS, 2009).

c. Estimated value of contributions from natural pasture.

Since livestock rearing forms an important source of livelihoods for the communities living in BWS, pasture is an important resource. The total area under natural pasture constitutes only 2 percent of the total BWS area (BWS, 2001), which comes out to be 30.4122 km^2. As presented in Table 8.13, the estimated value of contributions from natural pasture at the local level is Nu. 22, 544.56 (US$ 518.27).

The value presented here is grossly underestimated since it's based on the annual tax paid per acre for private/community pasture, which is very low at Nu. 3 per acre. But it still gives an idea about the type of value of contributions from the natural pasture in BWS to local communities.

Table 8.12 Bhutan. Estimated value of contributions from non-timber resources at the local level from BWS in 2008.

GEOG	Khoma	Sherimung	Bumdeling	Total	Unit Value (Nu.)	Total Value (Nu.)	Remarks
QUANTITY							S.I. 1 to 6 quantities based on BWS record, and S.I. 7 to 11 are based on 2009 BWS field work. Unit value for *Cordyceps* is based on 2008auction rate, and unit value for the rest is based on JDNP rate and 2008 market rate is calculated based on NWFP interim framework. Unit value for bamboo is based on BWS community forest rate.
1.*Cordyceps* (kg)	1.9	0	27.443	29.343	97,632.55	2,864,832	
2.Cane (nos)	0	106	0	106	20	2,120	
3.Mushroom billet (nos)	0	0	200	200	10	2,000	
4.Sand (TL)	0	0	30	30	215	6,450	
5.Stone (TL)	0	0	6	6	601	3,606	
6.Boulders (TL)	0	0	56	56	601	33,656	
7.Bamboo (nos)	25,682	23,770	31,608	81,060	2	162,120	
8.Fodder (HL)	7,006	10,396	6,678	24,080	40	963,200	
9.Leaf litter (HL)	9,307	71,386	31,814	112,507	30	3,375,210	
10.Ferns (Roll)	2,243	2,217	7,442	11,902	5	59,510	
11.Mushroom (kg)	271	1,176	252	1,699	30	50,970	
					Total (Nu.)	7,523,674.00	
					Nu. in millions	7.52	
					Total(US$)	172,958.00	
					US$ in millions	0.17	

Source: Choden & Wangyal, 2010

Table 8.13 Bhutan. Estimated value of contributions from natural pasture at the local level from BWS in 2008.

Natural pasture area under BWS in km^2	Area in acres	Annual tax per acre (Nu.)	Total Value (Nu.)	Remarks
30.4122	7,514.855	3	22,544.56	Value per acre calculated based on annual pasture tax paid for private and community pasture.
			US $ 518.27	

Source: Choden & Wangyal, 2010

3.1.2.2 Ecosystem Services Cluster.

The other important contribution from BWS at the local level is the ecosystem services. BWS is the source of five major rivers: Khoma Chhu in the west; Womenang and Kulong Chhu in the east; and Nindari and Sheri Chhu in the south. Besides, there are many lakes and streams inside BWS, which provide water resources for drinking and irrigation to the local communities living in three geogs: Khoma, Bumdeling and Sherimung. The total estimated value of contributions from the Ecosystem Services Cluster at the local level is Nu. 0.7883 million (US$ 0.0181), as shown in Table 8.14.

Table 8.14 Bhutan. Estimated value of contributions from the Ecosystem Services Cluster from BWS at the local level in 2008.

Ecosystem services	**Nu. in millions**	**US$ in millions**
Drinking water	0.1046	0.0024
Irrigation water	0.6837	0.0157
TOTAL	0.7883	0.0181

Source: Choden & Wangyal, 2010

a. Drinking Water

The estimated contribution of drinking water from BWS in 2008 at the local level for the total population of 5,094 people (Choden & Wangyal, 2010) living full time is Nu. 0.1046 million (US$ 0.0024 million), as shown in Table 8.15. This value has been calculated based on the minimum daily water requirement of 45 liters of water per person (WHO estimate), and the existing Trashiyangtse town municipal water rate, which is Nu. 1.25 per unit.[6]

The majority of the villages and communities inside BWS have access to drinking water provided through a government-supported rural water supply scheme. Drinking water taps are located outside the house and, at times, shared by different households. There is no charge for the drinking water in rural areas, unlike in municipal areas.

b. Irrigation water.

Cultivation of wetlands is an important farming activity for the communities living in lower areas of Khoma, Bumdeling and Sherimung geogs. The total wetland area in BWS constitutes 126.31 acres (RNR Censes 2009) and has an irrigation water requirement of

[6] One unit equals a cubic meter (m3) or 1,000 litres of water.

4,330 m^3 per acre (based on RNRRC Bajo estimate). The total estimated value of contributions from irrigation water in BWS for 2008 comes out to be Nu. 0.6837 million (US$ 0.0157 million), as shown in Table 8.16. Irrigation channels have been constructed and renovated through support from the government and also by the BWS through project support in areas where wetland cultivation is important.

Table 8.15 Bhutan. Estimated value of contributions from drinking water at the local level from BWS in 2008.

Geog	**Population**	**HH water consumption per year in units**	**Cost per unit (Nu.)**	**Total Value (Nu.)**	**Remarks**
Khoma	1,476	24,243.30	1.25	30,304.13	Unit cost is based on the Trashiyangtse municipal rate
Bumdeling	2,086	34,262.55	1.25	42,828.19	Same as above
Sherimung	1,532	25,163.10	1.25	31,453.88	Same as above
Total	5,094	83,668.95	1.25	104,586.19	
			Nu. in millions	0.1046	
			US$ in millions	0.0024	

Source: Choden & Wangyal, 2010

Table 8.16 Bhutan. Estimated value of contributions from irrigation water at the local level from BWS in 2008.

Geog	**Wetland (acres)**	**Water required for irrigation per acre in m^3**	**Total value (Nu.)**	**Source**
Khoma	41.13	4,330.00	222,617.6	Value calculated based on water required per acre calculated by Renewable Natural Resources
Bumdeling	34.98	4,330.00	189,330.5	
Sherimung	50.2	4,330.00	271,709.3	
Geog	**Wetland (acres)**	**Water required for irrigation per acre in m^3**	**Total value (Nu.)**	
Total	126.31	4,330.00	683,657.4	Research Centre (RNRRC) Bajo in m^3 (after deduction of 30 percent rain water contribution) and Trashiyangtse municipal drinking water rate
		Nu. in millions	0.6837	
		US$ in millions	0.0157	

Source: Choden & Wangyal, 2010

3.1.2.3 Conservation Cluster.

The conservation cluster includes contributions related to royalties, fines and penalties. But at the local level, the contribution is only from fines and penalties collected for wildlife and forest produce offenses, which were rewarded to informers and amounted to Nu. 0.03326 million (US$ 0.0008 million), as shown in Table 8.17.

It is a government policy to reward the fines collected (100% from wildlife cases and 50% from forest produce cases) as an incentive, to the informer who reports such cases. This policy has motivated locals to report forestry offenses on many occasions and helped park management to catch the culprits. Since the fine collected is rewarded to the local informers, this contribution remains at the local level.

Table 8.17 Bhutan. Estimated value of contributions from fines rewarded to informers at the local level from BWS in 2008.

Geog/Range	Wildlife offenses rewarded (Nu.)	Forest produce offenses rewarded (Nu.)	Total (Nu.)
Khoma	0	0	0
Bumdeling	5,000	0	5,000.00
Sherimung	15,000	13,256	28,256.00
Total (Nu.)	20,000.00	13,256.00	33,256.00
		Nu. in millions	0.03326
		US$ in millions	0.0008

Source: Choden & Wangyal, 2010

3.1.2.4 Tourism Cluster.

In addition to tourists, which constituted only the small number of 22 tourists in 2008, the cultural significance of BWS attracts many Bhutanese visitors to the sanctuary annually (NCD, 2008).The local level contribution from tourism cluster in BWS is entirely from the Bhutanese visitors, availing local services, such as portering and purchase of handicraft items, especially textiles from Khoma.

The total local level contribution from the Tourism Cluster in BWS for 2008 is estimated to be Nu. 11.5428 million (US$ 0.2654 million). Out of that, the estimated sale of textiles from only the Khoma geog to Bhutanese is Nu. 10.83 million (US$ 0.2490 million), and sale of handicrafts, such as traditional paper and wooden products, from only Bumdeling geog is estimated to be Nu. 0.976 million (US$0.0022 million). Contributions from portering services provided by all three geogs are estimated to be Nu. 0.6120 million (US$ 0.0141million), as shown in Table 8.18.

Table 8.18 Bhutan. Estimated value of contributions from the Tourism Cluster at the local level from BWS in 2008.

Geog	Sale of textiles to Bhutanese (Nu.)	Sale of handicrafts to Bhutanese (Nu.)	Portering to Bhutanese (Nu.)	Grand Total
Khoma	10,833,299	0	363,769	
Bumdeling	0	97,573	248,199	
Sherimung	0	0	599,335	
Sub-total (Nu.)	10,833,299	97,573	611,968.00	
Nu. million	10.8333	0.976	0.6120	11.5428
US $ in million	0.2490	0.0022	0.0141	0.2654

Source: Choden & Wangyal, 2010

Currently, the benefit from international tourists at the local level in BWS is non-existent as they only make a day visit to the park area to visit black-necked crane habitat in Bumdeling and stay in Trashiyangtse, which is outside the park area. Thus, most of the benefits from international tourists remain at the regional and national levels only.

3.1.2.5 Summary of local level contributions.

The total local level contributions from all four clusters of BWS in 2008 amounted to Nu. 33.92 million (US$ 0.77 million), as shown in Table 8.19. Among the four clusters, the highest contribution was from the Resource Use Cluster (64%), followed by the Tourism Cluster (24%), the Ecosystem Services Cluster (2% percent), and the Conservation Cluster seemed insignificant.

Table 8.19 Bhutan. Summary of total local level contributions from BWS in 2008.

S.I. No.	Cluster type	Value of contributions (Nu. in millions)	Value of contributions (US$ in millions)	Percentage of contribution
1.	Resource Use (timber, non-timber and natural pasture)	21.56	0.49	64%
2.	Ecosystem Services (drinking water and irrigation water)	0.7883	0.0181	2%
3.	Conservation (fines rewarded)	0.03326	0.0008	0%
4.	Tourism (textile, handicrafts, portering to Bhutanese only)	11.5428	0.2654	24%
	TOTAL	33.92	0.77	

Source: Choden & Wangyal, 2010

3.1.3 Socio-economic contributions: Regional level.

The socio-economic contributions from BWS extend to areas outside the jurisdiction of BWS, such as Trashiyantse town, Lhuntse town and some areas in the Mongar district. There are many beneficiaries living in these areas that derive benefits from the use of natural resources and services from BWS.

These quantifiable socio-economic benefits from BWS have been classified as regional level contributions. They include contributions related to the Resource Use Cluster and the Tourism Cluster. The total estimated value of contributions from BWS at the regional level in 2008 was Nu. 1.06 million (US$ 0.02 million).

3.1.3.1 Resource Use Cluster.

Like in the case of local level contributions, at the regional level, both timber and non-timber resources are used from BWS by regional beneficiaries living in Trashiyangtse town, Lhuntse town and other areas, such as Yadi in Mongar. The total estimated value of contributions from the timber and non-timber resources of the Resource Use Cluster to regional level beneficiaries in 2008 from BWS was Nu. 0.63280 million (US$ 0.0112 million), as shown in Table 8.20.

Table 8.20 Bhutan. Estimated value of contributions from BWS Resource Use Cluster at the regional level in 2008.

Resource Use Cluster	**Nu. in millions**	**US$ in millions**
Timber	0.58	0.01
Non-timber	0.0528	0.0012
TOTAL	0.63280	0.0112

Source: Choden & Wangyal, 2010

- *Timber Resources*

The timber resources used include mostly construction timber, flag poles, fencing poles, firewood and timber for handicrafts used in making wooden products, which is confined to Bumdeling geog in Trashiyangtse district. There are about nine non-timber enterprises based in Trashiyangtse, which supply wooden products in bulk to handicraft enterprises in Thimphu and other places. Due to lack of enough raw materials, many of these enterprises get their resources from other districts in central and western Bhutan besides BWS.

The total value of contributions from timber resources at the regional level from BWS for 2008 is Nu. 0.58 million (US$0.01 million). All data used here is based on the 2008 BWS timber data, and the unit values are based or estimated based on JDNP validation workshop figures, as shown in Table 8.21.

Table 8.21 Bhutan. Estimated value of contributions from timber resources used at the regional level from BWS in 2008.

Geog/Resource type	Timber (cft)	Flag poles (cft)	Fencing poles (cft)	Firewood (TL)	Handicrafts (cft)	Remarks
Khoma	1,775	0	0	11	0	2008 BWS data and quantity conversion and unit value based on JDNP validation workshop.
Bumdeling	1,637.72	0	0	0	467.92	
Sherimung	0	171.12	374.88	0	0	
Total	3,412.72	171.12	374.88	11	467.92	
Unit value (Nu.)	124.69	124.69	124.69	3,000	124.69	
Total value (Nu.)	425,532.06	21,336.95	46,743.79	33,000.00	58,344.94	584,957.74
					Nu. in millions	0.58
Total value (US$)	9,782.35	490.50	1,074.57	758.62	1,341.2631	13,447.30
					US$ in millions	0.01

Source: Choden & Wangyal, 2010

- *Non-Timber Resources*

The non-timber resources used from BWS by regional beneficiaries include bamboo, daphne bark used for making traditional paper, sand, stone and boulders. The total value of contributions from non-timber resources in BWS at the regional level is Nu. 0.0528 million (US$ 0.0012 million), as shown in Table 8.22.The regional users pay commercial royalties for these resources; they have been quantified as national level contributions as they go into the government revenue account.

3.1.3.2 Ecosystem Services Cluster.

The value of contributions from ecosystem services, such as drinking water and irrigation water, from BWS to regional beneficiaries is nil since the water sources they use for drinking and irrigation do not come from BWS.

Table 8.22 Bhutan. Estimated value of contributions of non-timber resources used at regional level from BWS for 2008.

Geog	Bamboo (nos)	Daphne (kg)	Sand (TL)	Stone (TL)	Boulders (TL)	Source
Khoma	10	0	5	0	17	2008 BWS data and unit value based on JDNP & NWFP Interim Framework
Bumdeling	0	1,400	0	0	0	
Sherimung	0	0	5	18	26	
Total	10	1,400	10	18	43	
Unit value (Nu.)	2	10	215	601	601	
Total value (Nu.)	20.00	14,000.00	2,150.00	10,818.00	25,843.00	52,831.00
					Nu. in millions	0.0528
Total value (US$)						1,214.51
					US$ in millions	0.0012

Source: Choden & Wangyal, 2010.

However, they do benefit from the intangible ecosystem services provided by BWS: air; climate regulation; protection from flood, landslide, wind storm; and cultural, spiritual, educational, research and other conservation benefits. The BWS is a venue for research and education for the students and faculty of regional institutes, such as Sherubtse College and College of Natural Resources under the Royal University of Bhutan, Ugyen Wangchuck Institute for Conservation and Environment (UWICE) and RNRRC Wengkhar. Regional pilgrims from Mongar, Trashigang, Lhuntse, Bumthang and other places visit the many sacred pilgrimage sites found in BWS annually. All these benefits could not be quantified due to lack of reliable data for 2008.

In terms of hydro-power generation, the Kurichu hydro-power plant (KHP), located in Gyelposhing, Mongar district, is one of the beneficiaries of ecosystem services from BWS as part of the water resources used for the generation of hydro-power comes from the sanctuary. KHP has the installed capacity to generate 60 MW of power and was built at the cost of Nu. 5,600.00 million. The plant was commissioned in May 2002. KHP generates 380 million units of power and is the only source of electricity for the eastern and central districts of Bhutan. The surplus power generated mainly during summer is exported to India. The plant was built with financial support from the Government of India (DGPCL, 2009). Since the revenue generated from this hydro-power plant goes to the government, the value of the contribution from Kurichu hydro-power plant has been reflected as a national level contribution.

3.1.3.3 Tourism Cluster.

The cultural and natural significance of BWS attracts tourists to the park, especially since Bumdeling is one of the wintering habitats of endangered black-necked cranes. The other attractions in Trashiyantse include Chorten Kora (Buddhist stupa), Gom Kora temple, Rigsum Goenpa, Dechenpodrang temple and other cultural sites which are located nearby or within a distance of 2-4 hours from the town. Trashiyangtse is also famous for its traditional arts and crafts, such as traditional paper and wooden bowls, which are supplied to Thimphu and other places in the country. Khoma, Lhuntse district is famous for Bhutanese textiles in the country, most of which are bought by Bhutanese for personal use, but which are sold to tourists as well.

Despite these attractions, the tourist number is very low but increasing annually. There were only 22 tourists who visited BWS in 2008 as per the NCD tourist permit record. The problem of low tourist turnout to BWS is mainly due to the long distances required to travel from Thimphu in the west to the east, which takes two full days by road. Moreover, there are no other means of transportation. But there are future plans to address this problem by introducing helicopter services and opening new entry points in the east through Assam, India.

But despite the small number of tourists, and unlike local communities living inside BWS, who hardly benefit from tourism, regional communities do benefit from tourism through hotels, restaurants and handicraft sale. The total value of contributions from tourism at the regional level from the 22 tourists who visited BWS in 2008 is Nu. 0.4246 million (US$ 0.0098 million), as shown in Table 8.23. Of these contributions, Nu. 264,000.00 is from hotel accommodations, Nu. 105,600.00 from food and Nu. 55,000.00 from sale of local handicrafts, as shown in Table 8.24. The unit value is based on interviews with local hotel owners.

Table 8.23 Bhutan. Estimated value of contributions from the Tourism Cluster from BWS at the regional level in 2008.

Tourism cluster	**Nu. in millions**	**US$ in millions**
Hotels	0.2640	0.0061
Food	0.1056	0.0024
Handicrafts	0.0550	0.0013
TOTAL	0.4246	0.0098

Source: Choden & Wangyal, 2010.

Table 8.24 Bhutan. Estimated value of contributions from tourism at the regional level from BWS for 2008.

No. of tourists 2008	Bednights (Yangtse,Mongar,Bthang)	Unit value (Nu.)	Value (Nu.)
22	Hotel 2 x 2 x 2 = 6 nights	2,000	264,000
22	Food x 6 days	800	105,600
22	Handicrafts bought per tourist	2,500	55,000
		Total (Nu.)	424,600.00
		Nu. in millions	0.4246
		US$ in millions	0.0098

Source: Choden & Wangyal, 2010.

3.1.3.4 Summary of regional level contributions.

Total regional level contributions from the BWS for 2008 amounted to Nu. 1.06 million (US$ 0.02 million) from the Resource Use and Tourism Clusters, as shown in Table 8.25. Resource use accounted for 60% of the total regional contribution and tourism contributed to 40%.

Table 8.25 Bhutan. Summary of regional level contributions from BWS in 2008.

S.I. No.	Cluster type	Value of contribution (Nu. in millions)	Value of contribution (US$ in millions)	Percentage of contribution
1.	Resource Use (timber and non-timber)	0.6328	0.0112	60%
2.	Ecosystem Services (drinking water and irrigation)	0	0	0
3.	Conservation (fines)	0	0	0
4.	Tourism (hotels, food, handicrafts)	0.4246	0.0098	40%
	TOTAL	1.06	0.02	

Source: Choden & Wangyal, 2010.

3.1.4 Socio-economic contributions: National level.

The value of contributions from BWS at the national level includes royalties generated from timber and non-timber park resources, ecosystem services through hydro-power and tourism through tourism revenue, hotels, restaurants, transportation and tour operators. The total estimated value of contributions at the national level from BWS for 2008 was Nu. 15.34 million (US$ 0.35 million).The details of contributions from the three clusters are presented below.

3.1.4.1 Resource Use.

The royalties generated from timber and non-timber resources used from BWS in 2008 by local and regional beneficiaries amounted to Nu. 0.3278 million (US$ 0.0075 million). Out of that, 37% of the revenue was from timber resources (29% local and 8% regional) and 63% was from non-timber resources (62% local and 1% regional), as shown in Table 8.26. The royalty figures are based on the BWS revenue record for 2008.

Table 8.26 Bhutan. Value of contributions from royalty revenue generated from BWS for resource use in 2008.

Resource Type	Royalty 2008 (Nu.)	Contribution Level	Percentage of contribution
Timber	95,187	Local	29%
Timber	24,760	Regional	8%
Subtotal	119,947		37%
Non-timber	204,995	Local	62%
Non-timber	2840	Regional	1%
Subtotal	207,835		63%
Total	327,782		100%
Nu. (in millions)	0.3278		
US$ (in millions)	0.0075		

Source: Choden & Wangyal, 2010.

The revenue generated from the royalty is very low compared to the estimated value of contributions from resource use in BWS due to the highly subsidized royalty rates. The highest royalty was from *Cordyceps*, which generated Nu. 1,921,010.00 (US $ 44,161.15) in 2008 (BWS 2008).The royalty for *Cordyceps* is paid by the *Cordyceps* traders, who are mainly based in Thimphu and in the region. They buy from local communities at the annual *Cordyceps* auctions organized by the Ministry of Agriculture and Forests and export to Hongkong, Singapore and other countries in the region.

3.1.4.2 Ecosystem Services.

At the national level, the benefits of ecosystem services from BWS are related to the generation of hydro-power from the Kurichu hydro-power project. Some of the sources of water used for power generation come from BWS through Khoma Chhu, which originates in BWS.

Based on the water volume data from Druk Green Power Corporation Limited (DGPCL), the volume of water used to generate power from Khoma Chhu constitutes 26.6 %. Using this figure, along with the total revenue generated from power sales, which includes both domestic power and that exported to India, the revenue contribution from Khoma Chhu

was calculated to be Nu. 14.01 million (US$ 0.32million). Then 10 percent[7] of that revenue has been estimated as the value of the contribution from BWS, as shown in Table 8.27.

Table 8.27 Bhutan. Estimated value of contributions from hydro-power at the national level from BWS in 2008.

Hydro-power Plant	**Kurichu**	**Source/Remarks**
Capacity	60 MW	DGPCL 2008, 2009
Water flow from Khoma Chu, BWS	26.6%	
Revenue from power sale for 2008	Nu. 526.7 M	
Revenue contribution from Khoma Chu 2008 (26.6%)	Nu. 140.1022 M	Calculated based on water flow percentage
Estimated net contribution to hydro-power revenue from BWS in 2008	Nu. 14.01 M	Estimate based on 10% of the total revenue generated for 2008 using approach similar to that used for fixing royalty in 2009 NWFP framework.
US$ in millions	0.32	

Source: Choden & Wangyal, 2010.

Aside from those mentioned above, the other benefits associated with ecosystem services at the national level are intangible ecosystem services: regulation of air; water; climate; carbon sequestration; mitigation of climate change; natural disaster prevention; habitat for flora and fauna, including endangered species like black-necked cranes; pollination; and research, educational, spiritual , aesthetic and other conservation related benefits.

Besides conservation benefits, the cultural and spiritual benefits from BWS are immense nationally. BWS is an important pilgrimage site for many Bhutanese visitors from the capital and other areas of Bhutan. People go to BWS due to its national significance, especially to visit Singye Dzong, Aja Ney, Dechenphodrang, Rigsum Gonpa and Chorten Kora.

3.1.4.3 Conservation Cluster.

The national level contribution from BWS related to the Conservation Cluster, which includes fines and penalties deposited into the government account for 2008, is nil since they were rewarded to informers and thus reflected as local level contributions.

[7] Ten percent has been taken based on the similar approach used to fix royalty rates for Non-Wood Forest Products (NWFP) in the Interim Framework for NWFP, 2009 ,where 10% of the market rate was used to fix the royalty rate by the Social Forestry Division, Department of Forest and Park Services

The conservation budget of BWS for 2008 was Nu. 9.27 million (US$ 0.2098 million). Initially, this amount was reflected under the Conservation Cluster as value of contributions from BWS at the national level. However, because this contribution is not coming from the BWS, like in case of the Resource Use, Ecosystem Services and Tourism Clusters, but rather from the government/donors to BWS for carrying out conservation activities, it was taken out of here and reflected separately as a management cost.

3.1.4.4 *Tourism.*

For the 22 tourists that visited BWS in 2008, the total contributions from the Tourism Cluster, which includes royalties, Tourism Development Fund (TDF), hotels, food, transport and net income of tour operators, were Nu. 0.9991 million (US$ 0.0229 million), as shown in Table 8.28.

Table 8.28 Bhutan. Estimated value of contributions from the Tourism Cluster at the national level from BWS for 2008.

No. of tourists	**Average no. of days/nights**	**Rate/average income per day/night**	**Gross earnings**	**Value of contribution [8]**	**Percentage of contribution**
Royalty				Royalty (30%)	
22	8	US$ 200.00	US$ 35,200.00	US$ 10,560.00 Nu. 459,360.00	46%
TDF				TDF	
22		US$ 10.00	US$ 220	US$ 220.00 Nu. 9,570.00	1%
Hotel				Hotel	
22	2 (Thimphu)	Nu. 2,500		Nu. 110,000.00	11%
Food				Food	
22	2 (Thimphu)	Nu. 1,200		Nu. 52,800.00	5%
Transport				Transport	
22	8	Nu. 1,000		Nu. 176,000.00	18%
Tour operator				Tour operator	
22	8	US$ 25.00		US$ 4,400.00 Nu. 191,400	19%
			TOTAL	Nu. 0.9991 million US$ 0.0229 million	

Source: Choden & Wangyal, 2010.

[8] Unit value for value of contributions based on 2008 government rate for royalty and TDF while for others based on the estimate of Bhutan Tourism Corporation Limited, Thimphu

3.1.4.5 Summary of national level contributions.

The total contributions from BWS at the national level for 2008 were Nu. 15.34 million (US$ 0.35 million). Two percent were from royalties for resources used; 91% from eco-system services, i.e., hydro-power; and 7% from tourism, as shown in Table 8.29.

Table 8.29 Bhutan. Summary of national level contributions from BWS in 2008.

S.I. No.	Cluster type	Value of contribution (Nu. in millions)	Value of contribution (US$ in millions)	Percentage of contribution
1.	Resource Use (royalties from resource use)	0.3278	0.0075	2%
2.	Ecosystem Services (hydro-power revenue)	14.01	0.32	91%
S.I. No.	**Cluster type**	**Value of contribution (Nu. in millions)**	**Value of contribution (US$ in millions)**	**Percentage of contribution**
3.	Conservation (conservation budget)	0	0	0%
4.	Tourism (royalties, TDF, hotels, food, transport, tour operators)	0.9991	0.0229	7%
	TOTAL	15.34	0.35	100%

Source: Choden & Wangyal, 2010.

3.1.5 Total contributions from BWS in 2008: Matrix of local, regional and national levels.

The total contributions from BWS to the social and economic development of Bhutan at the local, regional and national levels in 2008 were Nu. 50.32 million (US$ 1.16 million). Out of that amount, 67% was contributions at the local level; 3% was at the regional level; and 30% was at the national level. Using the GDP figure of Nu. 54,149.9 million (US$ 1,244.8253 million) for 2008 (NSB, 2009a), the BWS contribution to the GDP in 2008 was 0.1% of the total GDP, as shown in Table 8.30.

3.2 Jigme Dorji National Park (JDNP).

The JDNP is the second case study park selected for the study on the "Systematization and analysis of the contributions of the national parks and biological reserves to the social and economic development in Bhutan, Costa Rica and Benin".

Table 8.30 Bhutan. Matrix of total value of contributions of BWS for 2008.

Scale	Cluster type	Value of contribution (Nu. in millions)	Value of contribution (US$ in millions)	Percentage of contribution
Local Level	Resource Use (timber, non-timber and pasture)	21.56	0.49	64%
	Ecosystem Services (drinking water and irrigation)	0.7883	0.0181	2%
	Conservation (fines)	0.03326	0.0008	0%
	Tourism (textile, handicrafts, portering to Bhutanese only)	11.5428	0.2654	34%
	Sub-total	33.92	0.77	100%
	Percent contribution to the total by the local level	67%		
Regional Level	Resource Use (timber and non-timber)	0.6328	0.0112	60%
	Ecosystem Services (drinking water and irrigation)	0	0	0%
	Conservation (fines)	0	0	0%
	Tourism (hotel, food, handicraft)	0.4246	0.0098	40%
	Sub-total	1.06	0.02	100%
	Percent contribution to the total by the regional level	**3%**		
National Level	Resource Use (royalties from resource use)	0.3278	0.0075	2%
	Ecosystem Services (hydro-power revenue)	14.01	0.32	91%
	Conservation (fines)	0	0	0%
	Tourism (royalties, TDF, hotels, food, transport, tour operators)	0.9991	0.0229	7%
	Sub-total	15.34	0.35	100%
	Percent contribution to the total by the national level	30%		
TOTAL	Nu./USD in millions	50.32	1.16	
GDP 2008[9]	Nu. /USD in millions	54,149.9	1,244.8253	
Percent contribution to GDP by		0.0929% (= 0.1 %)		

Source: Choden & Wangyal, 2010.

[9] Based on National Statistical Bureau 2008 GDP figure

a. Location

The JDNP is the second largest protected area in Bhutan with an area of 4,316 km^2. The park covers five districts (Gasa, Thimphu, Paro, Wangduephodrang and Punakha) and is administratively divided into four Park Range Offices located in Gasa, Soe (Misizam), Lingshi and Rimchu. Due to the wide altitudinal variation (from about 1,400 meters in the south to 7,000 meters above sea level in the north), JDNP is characterized by a range of vegetation and wildlife habitats, which conserve alpine, sub-alpine, and temperate ecosystems in Bhutan. The Park is located in the north-western part of Bhutan (27º35´to 28º.12´30´´N; 89º.16´ to 90º 17´E). The northern frontiers border Tibet and China. The park is connected by three road networks: 54 km Punakha-Damji road; 15 km Thimphu-Dodena road; and 25 km Paro- Misizam road. The rest of the area can be accessed by trails only from Paro, Thimphu, Punakha and Wangduephodrang districts (JDNP, 1996).

b. Significance

JDNP is one of the most important biodiversity reserves, even on a global level. This is due to its rich biodiversity: 1,434 species of plants, 33 species of mammals, 300 species of avifauna and 39 species of butterflies recorded so far (JDNP, n.d.). Other than Wangchuck Centennial Park, JDNP is the only other park in Bhutan where the four national symbols (national flower-blue poppy, national bird-raven, national animal-takin and national tree-cypress) are found together. The park is also the only place in the world, where the habitats of snow leopards overlap with those of Royal Bengal tigers.

Besides the rich biodiversity, JDNP has spectacular mountains, such as Mt. Jomolhari, Tsherimgang, Jichu Drakey and many glacial lakes and glaciers, which make the park an attractive destination for trekking. Three of the most popular trekking routes, i.e., Jomolhari trek, Laya-Lingshi trek and Snowmen trek, are found inside the park. JDNP is also rich in indigenous culture; unique communities, like Layaps and Lunaps, reside inside the park. JDNP is also the source of four major rivers in the country: the Pa Chu, Wang Chu, Pho Chu and Mo Chu. These rivers are the main income generators for Bhutan as the biggest hydro-power plants have been built in these river basins.

The main conservation goals of the park are:

- To maintain healthy alpine, sub-alpine, cool temperate and warm temperate ecosystems in Bhutan;
- To protect Bhutan's endemic and endangered alpine species;
- To encourage and promote the traditions, culture and customs of the people living in the park, and the practice of these traditions and customs; and
- To encourage the sustainable use of natural resources in the park by the local people (JDNP1996).

3.2.1 Socio-economic clusters linked to JDNP.

Like the clusters identified for BWS in Figure 8.2, the JDNP also has four clusters: Resource Use, Ecosystem Services, Conservation and Tourism Clusters.

The main mandate of park management is conservation and wise utilization of park resources. Besides, the park also provides alternative sources of income for local communities through Integrated Community Development Programs (ICDP) so that the park residents are not solely dependent upon the natural resources of the park for their livelihoods. Park management is also responsible for law enforcement inside the park, especially to curb poaching of wildlife, *Cordyceps* harvesting and illegal extraction of timber. Services like providing construction timber, flag posts, fencing posts and other resource use is also under park management.

The local communities are entirely dependent upon the park resources for their livelihoods and, in recent times, have taken advantage of developing avenues that diversify their income. In JDNP, the majority of households are semi nomadic and dependent upon livestock rearing in the alpine zones for their livelihood. Agriculture forms a minor supplement for the semi nomadic populations whereas, in the lower elevations of the park, agriculture is the main source of livelihood. Recently, with the approval to legalize the collection of *Cordyceps*, it has become another important component to supplement local income, apart from portering tourists and locals.

Approximately 6,500 people comprising 1,249 households live in and around the park boundary (Tashi, Lhaba & Choden, 2010). These local communities are directly or indirectly dependent upon the Park's biodiversity resources, such as timber, firewood, fodder, pasture and non-wood forest products.

They essentially rely on subsistence agriculture at lower elevations and livestock rearing, especially of yaks, at higher elevations. The yak herders are semi-nomadic; their economy is based on yak products, and more recently, on substantial income from the sale of *Cordyceps sinensis*, the caterpillar worm fungus.

Figure 8.10 Bhutan. Herd of yaks providing portering service.

Source: S.Tashi, FRDC.

The Renewable Natural Resource Research Development Centers carry out research within the park to further strengthen the knowledge base. Most research that is carried out is adaptive research and need based research to support better park management.

The Ecosystem Services Cluster is another important component as JDNP is blessed with vast water resources. JDNP even has the potential to provide other ecosystem services, like watershed management, clean air, carbon sequestration, and protection from wind storms and landslides.

The scenic beauty, the diverse flora and fauna coupled with rich indigenous culture of unique communities, like Layaps and Lunaps, who reside inside the park, make JDNP a haven for tourists to visit. Tour operators are another important stakeholder that uses the park to provide tourists with trekking packages that can range from 5 to 21 days. This, in turn, provides the local communities with opportunities to provide portering services and sell handicrafts to the tourists to earn some extra income. However, at the moment, the tour operators pay a royalty to the government and have free access to JDNP after obtaining a permit whereas the local residents benefit only from the opportunity to provide portering services to the tourist.

3.2.2 Systematization and estimation of contributions

The systematization and estimation of the value of contributions from JDNP to social and economic development of Bhutan at local, regional and national levels are presented in the following sections.

3.2.2.1 *Local level contributions.*

JDNP, with its bountiful resources and scenic beauty, has a lot to contribute to the socio-economic development of the park residents. At the local level, the contribution from the four clusters (Resource Use, Ecosystem Services, Conservation and Tourism Clusters) is estimated to be Nu. 81.54 million or USD 1.87 million, as shown in Table 8.31.

- *Use of Natural Resources*

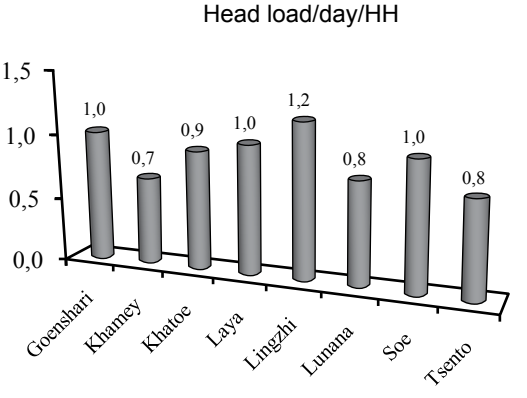
The fuel requirement, mainly for cooking and home heating, is met using wood, liquid petroleum gas and electricity. Wood is, however, the most popular and easily accessible fuel. On average, each household uses about one headload of firewood per day. In certain villages, like Soe and Lingzhi, dung is also used in equal proportion to firewood for cooking as well as space heating. In geogs like Khamey, where the households have access to electricity, the firewood consumption is relatively low, as shown in Figure 8.11.

Table 8.31 Bhutan. Matrix of all local level contributions from JDNP.

Scope-level of contribution	Benefited activities and classification		Type of contribution (good/service/externality) valued (income)		Source
	Cluster of Activity	**Type of Activity**	**Ngultrum**	**US$**	
LOCAL LEVEL CONTRIBUTION	Resource Use	Firewood	4,562,971	104,896	Field work
		Fencing	1,235,740	28,408	Field work
		Flag	869,492	19,988	Field work
		Timber	10,579,246	243,202	Field work
		Mushroom	75,996	1,747	Field work
		Edible fern	75,923	1,745	Field work
		Leaf	684,455	15,735	Park records
		Fodder	1,571,791	36,133	Park records
		Cordyceps	48,914,024	1,124,460	
		Sand	1,504	35	
		Stone	33,667	774	
		Total	68,604,809	1,577,123	
	Ecosystem Services	Drinking water	67,157	1,544	Field work
		Irrigation water	159,670	3,671	Geog records
		Total	226,827	5,215	
	Conservation	Fines	227,551	5,231	Park records
		Total	227,551	5,231	
	Tourism	Sale of handicrafts	228,886	5,262	Field work
		Portering-tourist	7,362,042	169,242	Field work
		Portering-Bhutanese	4,890,341	112,422	Field work
		Total	12,481,269	286,926	
	Total Local Level Contribution =		81,540,456	1,874,495	

Source: Tashi, Lhaba & Choden, 2010.

Figure 8.11 Bhutan. Headload of firewood used



Source: Tashi, Lhaba and Choden 2010.

The number of fencing posts required is relatively high in geogs where they are dependent upon agriculture for their livelihood. Basically, these are to fence their agricultural fields from livestock and wild animals. The number of timber issued by the different park ranges is mainly for construction and maintenance of houses and cattle sheds.

The main traditional source of income and also the most reliable is yak herding. Most of the residents have at least some number of yaks, anywhere from as few as 8 to more than 100. Though the yak herders lead a semi nomadic life, the entire migration pattern is inside the park itself.

Figure 8.12 Bhutan. Grass dried and stored to be used as winter feed.

Source: S.Tashi, FRDC.

During summer, they graze their yaks in the wide open valleys at the higher ridges of the Himalayas, and during winter, they are brought down to their villages, which are usually situated at lower elevations. During winter, they face an acute shortage of fodder as most of the pastures are covered with snow. Therefore, during late summer and autumn, the farmers have to collect and store enough grass and fodder to feed their yaks during the winter. Fodder and grasses are usually collected from their own fields or near their villages.

Leaf litter is usually collected at lower elevations, where the mainstay livelihood is mixed farming practices. The leaf litter is used as bedding for the cattle and eventually used as manure in the agricultural fields. The collection of wild vegetables is also popular to supplement the household diet. Wild edible mushrooms are usually collected in summer; different portions of them are consumed, sold and sometimes also dried to be used later. Wild edible fern (nakey) is another popular wild vegetable that is collected in the warmer regions of JDNP. It is mainly collected to be sold in the market. Unlike wild mushrooms, the wild ferns are not dried for later use.

With the legalization of collecting the high value fungus, *Cordyceps*, in 2005, the RGoB has issued permits for collection to the park residents. In Lingzhi Geog, the average income for the individual from the sale of *Cordyceps* is almost Nu. 100,000 whereas, for Soe Geog, the average income is only about Nu. 20,000. This is mainly due to the abundance and the quality of the *Cordyceps* at their respective geogs.

JDNP is even blessed with a wide variety of medicinal plants that has been collected and used in traditional medicines. With the establishment of the Institute of Traditional Medicine Services (ITMS) at Thimphu, and its branches throughout Bhutan, the collection is semi-commercialized. However, the community of Lingzhi seems to be the only one collecting medicinal plants as an income generating activity. From the sale of medicinal plants, about Nu. 86,400, equivalent to USD 1,986, are generated annually.

Apart from medicinal plants, the high altitude regions of JDNP are known for plants used for making incense. Incense collection and sale used to be more popular among the residents of JDNP; however, with the legalization of *Cordyceps* collection, the collection of incense has been neglected.

Figure 8.13 Bhutan. Medicinal plant collection.

Source: S.Tashi, FRDC.

The park residents, usually at the lower elevations, where there is motorized road access, collect sand and stone for house construction. Permits for collection of surface stone and sand are issued by the park.

- *Ecosystem Services*

Water, the source of all life forms, is plentiful in JDNP. Households have 24 hours running water at their door steps. The rural water supply (RWS) scheme project executed by the government seems to have covered most of the households. Some that have not been covered by the scheme have managed to either buy their own pipes or have canalized water to their homes. This is possible because there are plenty of water sources.

JDNP is blessed with numerous perennial rivers flowing through it which can be used for irrigation purposes. However, JDNP is almost entirely situated in the alpine region and not much rice farming is practiced.

Figure 8.14 Bhutan. Rural water supply scheme.

Source: S.Tashi, FRDC.

- *Conservation Cluster*

Park administrative units are in charge of all the resource allocation as well as looking after the resources within the park boundary. Intensive patrolling is conducted; nonetheless, there are always incidents of illegal activities that are being carried out by the park residents and outsiders. The illegal collection of *Cordyceps*, poaching of wildlife and illegal extraction of timber are some of the main threats that have to be confronted. To tackle the issues the government has come up with a scheme to fine the offenders and reward the apprehenders. Therefore, 100 percent of all fines from wildlife cases are rewarded to the informer or apprehender. In the case of forest produce, such as timber and NWFPs, only 50 percent is rewarded to the informer and the remaining money is deposited into the government revenue account.

- *Tourism Cluster*

Another major contribution to the livelihoods of park residents is portering for tourists and local government projects and officials. As the park is not accessible by road, most households own a few horses or mules to carry their food supplies from the lower valleys. These horses are also used to ferry the loads of tourists on treks through the park. They are also required to ferry all the construction materials for government development works within their geogs/ blocks.

Figure 8.15 Bhutan. Ferrying load for the project at Lunana.

Source: S.Tashi, FRDC.

The sale of handicrafts to tourists is another activity that few households have taken up. Those that have earn as much as Nu. 50,000 per year. Usually, the households that do not have any livestock to look after are involved in the making and sale of handicraft to tourists.

Figure 8.16 Bhutan. Handicrafts made from yak hair.

Source: S.Tashi, FRDC.

3.2.2.2 Regional level contributions.

The park also has both direct and indirect benefits on the residents in the periphery of the park boundries, that is, at the regional level. The ecosystem benefits from the park are especially important, for example, the clean air, the mitigation of floods in the lower valleys, the provision of habitat for wildlife and biodiversity conservation. However, most of them cannot be converted into monetary value at this point in time. The contribution from JDNP mainly from ecosystem services and business opportunities related to the Tourism Cluster at the regional level is estimated to be Nu. 19.86 million or USD 0.46 million, as shown in Table 8.32.

- *Ecosystem Services*

Some of Bhutan's major towns are located in the lower valleys bordering JDNP, like Thimphu, the capital city, Paro, Punakha and Wangduephodrang. Rivers initiating in JDNP flow through all these major towns and provide water, a basic necessity of all life

forms. The majority of these towns are entirely dependent upon the rivers and streams flowing from JDNP, except the town of Wangduephodrang,which has another river as its water source. Until recently, the supply of drinking water in all the towns was free, but the government has started billing consumers in the major towns.

Table 8.32 Bhutan. Matrix of regional level contributions from JDNP.

Scope-level of contribution	**Benefited activities and classification**		**Type of contribution (good/service/externality) valued (income)**		**Source**
	Cluster of Activity	**Type of Activity**	**Ngultrum**	**US$**	
Regional Level Contribution	Ecosystem Services	Drinking water	1,729,573	39,760	2005 population census and municipal water rate
		Irrigation water	14,530,494	334,034	Only 20 percent from JDNP based on validation workshop
		Total	16,260,067	373,794	
	Tourism	Bednights occupied & food	3,596,400	82,675.86	NCD,TCB, BTCL
		Total	3,596,400	82,675.86	
	Total Regional Level Contribution =		19,856,467	456,470.5	
	Total contribution (in millions)		19.86	0.46	

Source: Tashi, Lhaba and Choden 2010.

Table 8.33 Bhutan. Valuation of domestic water requirement.

Towns	**Population**	**Water requirement/year (units)**	**Value in Nu.**	**Value in USD**
Thimphu	79,185	1,300,614	1,625,767	37,374
Punakha	2,292	37,646	47,058	1,082
Gasa	402	6,603	8,254	190
Paro	2,362	38,796	48,495	1,115
Total	84,241	1,383,658	1,729,573	39,760

Source: Tashi, Lhaba and Choden 2010.

All the downstream Dzongkhag bordering JDNP are also major rice growing areas, and some of the irrigation water is from the rivers and streams initiating in JDNP. An accurate estimate of the quantity of irrigation water from JDNP was not possible. The validation workshop recommended that only 20 percent be used to estimate the value of irrigation water from JDNP.

Table 8.34 Bhutan. Acreage of wetland using irrigation water from JDNP and it's valuation.

Dzongkhag	Wet land (ac)	Value in Nu.	Value in USD
Thimphu	361	1,956,091	44,968
Paro	735	3,977,131	91,428
Punakha	891	4,822,570	110,864
Gasa	31	165,624	3,807
Wangdue	667	3,609,079	82,967
Total		14,530,494	334,034

Source: Tashi, Lhaba & Choden, 2010.

- *Tourism*

As stated above, JDNP is a popular tourist destination due to the awesome trekking routes, which are hardly paralleled anywhere else in the world. The number of tourists visiting the various trekking routes in JDNP brings tourists to the regional towns of Paro and Punakha and provides opportunities to the hotels to provide lodging and food services on the way to the park.

Table 8.35 Bhutan. Income of regional hotel owners from tourists visiting JDNP.

Type of contribution	Nos.	Nu.	Source
No. of tourists 2008	486		2008 NCD park permit database
Hotel (Nu.)		2,430,000	Nu. 2,500 per night per tourist for 2 nights BTCL
Food (Nu.)		1,166,400	Nu. 1,200 per day per tourist for 2 days BTCL
Total (Nu.)		3,596,400	
Total (US$)		82,675.86	

Source: Tashi, Lhaba & Choden, 2010.

3.2.2.3 National level contributions.

JDNP mainly contributes to the national coffers by way of the abundant water resources that are used to generate hydro-power downstream. The two mega hydro-power plants of Chhukha and Tala, situated along the Wang River, are the most important sources of revenue for the country. Another important contributor to the national coffer is from the royalty charged to the tourists that visit JDNP. Nominal contribution at the national level also comes from royalties collected for resources used and fines and penalties collected from forest produce offenders in JDNP, which are deposited into the national coffer as government revenue. The total contribution at the national level from JDNP is Nu. 1,125.19 million or USD 25.87 million, as shown in Table 8.36.

Table 8.36 Bhutan. Matrix of national level contributions from JDNP.

Scope-level of contribution	Benefited activities and classification		Type of contribution (good/service/ Externality) valued (income) Nu.	Us$	Source
National Level Contribution	Resource Use	Royalties	178,084	4,094	JDNP
		Total	178,084	4,094	
	Ecosystem Services	Hydro-power	1,096,070,000	25,197,011	RMA Annual Report
		Total	1,096,070,000	25,197,011	
	Tourism	Royalty	28,920,645	664,842	TCB Annual report
		Total	28,920,645	664,842	
	Conservation	Fines and penalty	17,181	395	Park Records
		Total	17,181	395	
	National Level Contribution =		1,125,185,910	25,866,342	
	Nu./USD in millions		1,125.19	25.87	

Source: Tashi, Lhaba & Choden, 2010.

- *Resource Use*

Nominal royalties are charged for resources used from JDNP by park residents. In 2008, royalties were collected for use of timber, which includes house construction timber, fencing poles, flag poles, sand and stone, as shown in Table 8.37. The total contribution from resources used was Nu. 178,084 (0.1781 million) or US dollars 4,094.00 (0.0041 million), as shown in Table 8.37.

Table 8.37 Bhutan. Royalties deposited in 2008 from resource use.

Geog	Royalty deposited in 2008					Total
	Timber	Fencing poles	Flag poles	Sand	Stone	
Soe	4,643	624	84	100	500	
Lingzhi	18,927	1,096	148	0	750	
Gasa	47,327	0	0	250	950	
Rimchu	1,430	0	0	0	600	
Goenshari	0	25,124	3,764	0	0	
Khamey	0	26,840	6,844	0	0	
Khatoe	0	9,000	960	0	0	
Laya	0	15,192	6,380	0	0	
Lunana	0	3,612	1,920	0	0	
Tsento	0	896	124	0	0	
Total (Nu.)	72,326	82,384	20,224	350	2,800	178,084
Total (USD)	1,663	1,894	465	8	64	4,094

Source: Tashi, Lhaba & Choden, 2010.

- *Ecosystem Services*

JDNP is an important watershed for major rivers, such as the Mo Chu, Pho Chu, Wang Chu, and Pa Chu. Some of the major revenue generators for the country, like the Tala Hydro-power Authority (THPA), the Chhukha Hydro-power Corporation Limited (CHP-CL) and the Puna-tsang Chu Hydro-power Project (under construction,) are located in the drainage basins of some of these rivers. The hydro-power generated from the two mega hydro-power plants (THPA with a peaking power capacity of 1020 MW and CHPCL with a peaking power capacity of 336 MW) is mostly exported to India after meeting some domestic power requirements (DGPCL, 2009). From the total revenue generated by the sale of power in 2008, only 10 percent has been considered a contribution from JDNP.

- *Tourism*

JDNP as a tourist destination is also of significant importance as a revenue generator for the country. It offers some of the most awesome views that are hardly paralleled by any others in the world. Every tourist visiting Bhutan, apart from the SAARC countries, are required to pay a minimum of US$ 200 to the organizing tour operator. The tour operator, in turn, pays a 30 percent royalty to the RGoB; takes care of all the basic facilities and arrangements, like transportation, food, and lodging; and also provides a guide for the entire stay in Bhutan.

Table 8.38 Bhutan. Sale of hydro-power from THPA and CHPCL(2008).

	Name of Power Plant	**Revenue from total power sales in 2008 (Nu. in millions)**	**Estimated contribution from JDNP (10% of total revenue) - Nu. in millions**
JDNP	Chukha	3,795.90	379.59
	Tala	7,164.80	716.48
		10,960.70	1,096.07
		US$ in millions	25.20

Source: Tashi, Lhaba & Choden, 2010.

Table 8.39 Bhutan. Tourism contribution from JDNP in 2008.

Type of contribution	**Nos/Nu.**	**Source**
No. of tourists in 2008	486	2008 NCD park permit database
Tourism Royalty (Nu.)	13,953,060	US$ 60 per day per tourist (average stay in JDNP 11 days) - TCB
TDF (Nu.)	211,410	US$ 10 per tourist - TCB
Hotel (Nu.)	2,430,000	Nu. 2,500 per night per tourist in Thimphu (2 nights) □ BTCL
Food (Nu.)	1,166,400	Nu. 1,200 per day per tourist in Thimphu (2 nights) - BTCL
Transport (Nu.)	5,346,000	Nu.1,200 per day per tourist
Tour Operator (Nu.)	5,813,775	US$ 25.00 per day per tourist - BTCL
Total (Nu.)	28,920,645	
Total (Nu. in millions)	28.9206	
Total (US$ in millions)	0.6648	

Source: Tashi, Lhaba &Choden, 2010.

- *Conservation*

In case of wildlife offenses, the fines imposed on the offenders are rewarded 100 percent to the apprehenders or the informers. In the case of illegal extraction of timber, half the fine is rewarded and the other half is deposited in the national coffer.

Table 8.40 Bhutan. Fines deposited to the National coffer from the different Park ranges

S.I. No.	**Nature of Offense**	**Gasa**		**Lingzhi**		**Soe**	
		Amt in Nu.	Amt in USD	Amt in Nu.	Amt in USD	Amt in Nu.	Amt in USD
1	Illegal extraction of timber	4,500	103	2,681	62	10,000	230

Source: Tashi, Lhaba & Choden, 2010.

3.2.2.4 Matrix of total contributions.

The contributions from JDNP to the socio-economic development at the local, regional and national levels are vastly different. At the local level, most of the contribution is in terms of the use of natural resources by the park residents. At the national and regional levels, most of the contribution is in terms of the ecosystem services provided, mainly the use of water for hydro- power, drinking and irrigation. In total, the contribution from JDNP was Nu. 1,226.5828 million or US$ 28.1973 million in 2008, as shown in Table 8.41. The contribution to the GDP in 2008 from JDNP was 2%.

Table 8.41 Bhutan. Matrix of total contribution: Local, regional, and national levels.

Scope-level of contribution	**Benefited activities and classification**		**Type of contribution (good/service/externality) valued (income)**		**Source**
	Cluster of Activity	**Type of Activity**	**Ngultrum**	**US$**	
	Resource Use	Firewood, fencing, flag poles, timber, mushrooms, ferns, leaf litter, fodder, *Cordyceps*, sand, stone	68,604,809	1,577,123	Field work and validation workshop
	Ecosystem Services	Drinking water	67,157	1,544	Field work
		Irrigation water	159,670	3,671	Geog records
		Total	226,827	5,215	
	Conservation	Fines	227,551	5,231	Park records
		Total	227,551	5,231	
	Tourism	Sale of handicrafts	228,886	5,262	Field work
		Portering-tourists	7,362,042	169,242	
		Portering-Bhutanese	4,890,341	112,422	
		Total	12,481,269	286,926	
	Total Local Level Contribution		81,540,456	1,874,495	
Regional Level Contribution	Eco-system Services	Drinking water	1,729,573	39,760	2005 population census and Trashiyangtse municipal water rate
		Irrigation water	14,530,494	334,034	
		Total	16,260,067	373,794	
	Tourism	Bed nights occupied & food	3,596,400	82,675.86	NCD,BTCL
		Total	3,596,400	82,675.86	
	Total Regional Level Contribution =		19,856,467	456,470.5	
National Level Contribution	Resource Use	Royalties	178,084	4,094	Park records
		Total	178,084	4,094	
	Ecosystem	Hydropower	1,096,070,000	25,197,011	RMA Annual Report
	Services	Total	1,096,070,000	25,197,011	

Scope-level of contribution	Benefited activities and classification		Type of contribution (good/service/externality) valued (income)		Source
	Cluster of Activity	Type of Activity	Ngultrum	US$	
	Tourism	Royalty, TDF, accommodations, food, transport, tour operators	28,920,645	664,842	NCD,BTCL, TCB
		Total	28,920,645	664,842	
	Conservation	Fines and penalty	17,181	395	Park Records
		Total	17,181	359	
	Total National Level Contribution =		1,125,185,910	25,866,342	
	Grand Total contribution (Nu.)		1,226,582,833	28,197,307	
			1,226.5828 M	28.1973 M	
	GDP 2008		54,149.9000 M	1,244.8253 M	NSB 2009
	Percent contribution to GDP from JDNP in 2008		2%		

Source: Tashi, Lhaba & Choden, 2010.

3.3 Jigme Singye Wangchuck National Park (JSWNP).

JSWNP is the third case study park selected for the study on the "Systematization and analysis of the contributions of the national parks and biological reserves to the social and economic development in Bhutan, Costa Rica and Benin."

a. Location

JSWNP is located in the central part of Bhutan within the following coordinates: 27 degrees 1' to 27 degrees 29' N and 90 degrees 12' to 90 degrees 38' E. JSWNP has an area of 1,730 km^2 (MoA, 2009b) and forms a contiguous belt linking Royal Manas National Park in the south to the temperate and alpine vegetation in the north, allowing altitudinal migration of wild animals. It falls mainly within the political jurisdiction of five districts: Tsirang, Sarpang, Wangdue, Zhemgang and Trongsa. The park is administratively divided into four Park Range Offices located at Taksha, Tongtongphey, Tingtibi and Nabji with the Park Head Office located at Tsangkha, Trongsa district.

b. Significance

JSWNP represents the best example of middle Himalayan ecosystems. It contains several ecological biomes ranging from sub-tropical forests at lower altitudes to alpine meadows and snows at its highest altitudes. It is the only park that contains a forest of sizeable chir pine (*Pinus roxburghii*). Because of its wide range in altitude and vegetation, and its central location, the park is vital for various migratory species of fauna, particularly birds.

Besides, the Park provides suitable habitats for many rare and endangered species, like the tiger, red panda, golden langur, Himalayan black bear, hornbill, tragopan pheasant, peacock pheasant and internationally significant breeding populations of bird species. The Park is considered unique as it has a combination of all different vegetation zones starting from sub-tropical in the south to alpine in the north.

Literature on JSWNP reveals that about 391 species of bird, 40 species of mammal and 5,000 species of vascular plant are available in JSWNP (JSWNP, 2003). The JSWNP-RMNP complex forms the best example of conservation, representative of a complete set of ecological biomes ranging from tropical forests and grasslands to alpine meadows and snow glaciers. It covers a wide range of habitat types from permanent ice at the peak of Dorshingla, popularly called Black Mountain (4,925 m), to alpine lakes and pastures, as well as conifer and broadleaf forests. The Park has the largest and richest temperate forest nature reserve in all of the Himalayas.

The management goals of JSWNP are:

- To conserve, protect and maintain the viability of specific ecosystems, as well as animal and plant communities, in a way that will allow natural processes of succession and evolution to continue with minimal human influence;
- To protect a natural wild animal corridor from the plains to the alpine region by protecting the ecosystem in different altitudinal ranges;
- To maintain and protect the ecological integrity of all species, especially the endemic and endangered species found in the Park; and
- To encourage sustainable use of natural resources by the local communities (JSWNP, 2003).

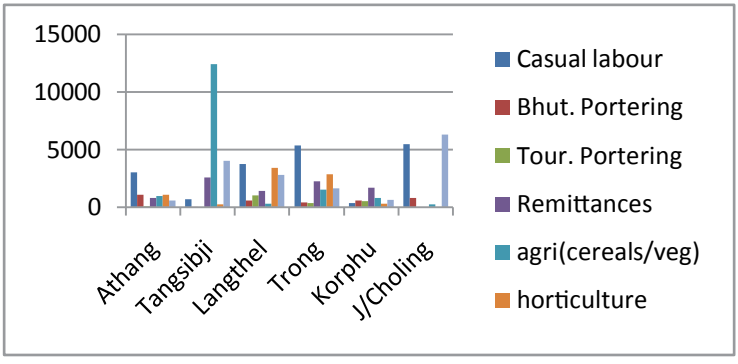
3.3.1 Socio-economic clusters linked to JSWNP.

There are around 571 households with a human population of nearly 5,000 inside the JSWNP. They are situated within the Athang, Tangsibji, Langthel, Trong, Korphu and Jigme Choling geogs. Agriculture remains the main livelihood, followed by livestock (2,734 cattle, 232 horses, piggeries and poultry) and some off-farm activities, such as casual labour (Dhendup, Wangchuk & Choden, 2010).

Agriculture is the main source of cash income in the park area, as shown in Figure 8.17. However, there are important differences between the geogs. Tangsibji geog has one major cash crop, potato. The parts of Langthel and Korphu geogs within a half day to 1 day walk from the road head are in a similar situation with vegetables and fruits as major cash crops. The more remote parts of these geogs, such as Reti village of Jigme Choling geog and Athang geog, have little cash income from agriculture as there is no cash crop suited to their remote location. Finally, Trong geog represents a particular case where despite its location near the road head and mandarin having good potential, no major cash crop has

emerged. Cash income comes from a variety of agricultural products, but each with few households involved (Dhendup, Wangchuk & Choden, 2010).

Figure 8.17 Bhutan. Annual income per household per year from different activities.



Source: Dhendup, Wangchuk & Choden, 2010.

Like in the BWS and JDNP case studies, JSWNP also has also four main clusters: Resource Use, Ecosystem Services, Conservation and Tourism Clusters, as shown in Figure 8.9.

The main function of park management is to conserve ecosystems and sustainable use and management of natural resources at local, regional and national levels. The JSWNP management has the mandate to protect and conserve the resources through enforcement of forestry rules and regulations by the park officials patrolling and monitoring the park area. Technically, the Park is being supported by the Wildlife Conservation Division and other functional divisions under the Department of Forests and Park Services.

Due to the presence of local communities living inside the Park, the park management involves local participation through Integrated Conservation and Development Programs (ICDP). ICDPs balance socio-economic development of park residents with conservation objectives by providing alternative sources of livelihood to reduce dependence upon the natural resources of the Park. The Park also provides basic resource requirements of the residents such as construction timber, flag posts, fencing posts and other resources as per the entitlements of forest rules and regulations.

A community based tourism management program called "Nabji Trail" has been initiated in JSWNP since 2006. This program has benefited stakeholders at different levels, including local communities earning some income through tourism services, such as portering, camping, sale of handicrafts, cultural programs, and has also benefited hotels and tour operators.

3.3.2 Systematization and estimation of contributions from JSWNP

The value of contributions from JSWNP has been broadly categorized into four clusters:

a. Resource Utilization Cluster (timber, non-timber and natural pasture);
b. Ecosystem Services Cluster (drinking water and irrigation water);
c. Conservation Cluster (fines and penalties); and
d. Tourism Cluster (royalties, Tourism Development Fund, hotels, tour operators and Community Development Fund).

The value of contributions has been estimated at three levels/scales: local, regional and national and presented in the following sections.

3.3.2.1 Local level contribution.

The maximum contribution from JSWNP is at the local level since the Park has to cater to the livelihood needs of local residents. The estimated local level contribution from JSWNP in 2008 was Nu. 25,747,485.83 (US$ 591,896.23), as shown in Table 8.42.

Table 8.42 Bhutan. Estimated local level contributions of JSWNP for 2008.

Level	**Benefited activities and classification of users**		**Type of contribution (good/service/externality) valued (income)**		**Source**
	Type of activity	**Type of user/ benefited "stakeholder"**	**Ngultrum (Nu.)**	**US$**	
LOCAL	**1. Resource Use Cluster**				
	1.1 Timber	Local communities	12,453,948.39	286,297.66	JSWNP park office
	1.2 Fencing posts	Local communities	708,700.82	16,291.97	Field work with local people
	1.3 Flag poles	Local communities	67,036.41	1,541.07	Field work with local people
	1.4 Firewood	Local communities	6,380,583.74	146,680.09	Field work with local people
	1.5 Mushroom	Local communities	66,080.40	1,519.09	Field work with local people
	1.6 Wild vegetables	Local communities	28,211.20	648.53	Field work with local people
	1.7 Bamboo	Local communities	19,932.00	458.21	Field work with local people
	1.8 Cane	Local communities	306,080.00	7,036.32	Field work with local people
	1.9 Fodder	Local communities	228,910.00	5,262.30	Field work with local people
	1.10 Leaf litter	Local communities	268,590.00	6,174.48	Field work with local people
	1.11 Pasture	Local communities	14,827.20	340.86	GIS, MoA

Level	Benefited activities and classification of users		Type of contribution (good/service/externality) valued (income)		Source
	Type of activity	Type of user/ benefited "stakeholder"	Ngultrum (Nu.)	US$	
	2. Ecosystem Cluster				
	2.1 Drinking water	Local communities	102,512.53	2,356.61	From Dzongkhag and City Corporation rate
	2.2 Irrigation Water	Local communities	4,359,568.14	100,219.96	From Dzongkhag and City Corporation rate
	3. Conservation Cluster				
	3.1 Rewards for informants	Local communities	31,000.00	712.64	JSWNP park office
	4. Tourism Cluster				
	4.1 Tourism	Local communities	711,505.00	16,356.44	Field work with local people + ABTO
	Total		25,747,485.83	591,896.23	

Source: Dhendup, Wangchuk & Choden, 2010

3.3.2.2 Regional level contributions

The total estimated regional level contribution of JSWNP for 2008 amounts to Nu. 7,661,576.10 (US$ 176,128.19), as shown in Table 8.43, from three clusters: Resource Use, Ecosystem Services and Tourism.

Table 8.43 Bhutan. Estimated regional level contributions of JSWNP for 2008.

Level of contribution	Benefited activities and classification of users		Type of contribution (good/service/externality) valued (income)		Source
	Type of Activity	Type of user/benefited "stakeholder"	Ngultrum	US$	
REGIONAL	1. Resource Use Cluster				
	1.1 Timber	NRDCL, contractors	569,507.86	13,092.13	JSWNP office
	1.2 Mushroom billets	Business	150.00	3.45	JSWNP office
	1.3 Sand	Contractor	4,515.00	103.79	JSWNP office
	1.4 Stone	Contractor	366,610.00	8,427.82	JSWNP office
	2. Ecosystem Services Cluster				
	2.1 Drinking water	Communities adjoining JSWNP	190,488.94	4,379.06	Geog RNR
	2.2 Irrigation Water	Communities adjoining JSWNP	5,833,304.30	134,098.95	Geog RNR

Level of contribution	Benefited activities and classification of users		Type of contribution (good/service/externality) valued (income)		Source
	Type of Activity	Type of user/benefited "stakeholder"	Ngultrum	US$	
	3. Conservation Cluster		0.00	0.00	
	4. Tourism Cluster	Hotels and handicraft shops	697,000.00	16,022.99	Interviews + ABTO
	Total		7,661,576.10	176,128.19	

Source: Dhendup, Wangchuk & Choden, 2010.

3.3.2.3 *National level contributions.*

JSWNP contribution to the national level includes mainly the revenue collected due to penalties, the revenue generated through trekking inside JSWNP, royalties deposited as a result of collecting various forest produce. The income earned by tour operators, hotels and other service providers related to tourism has also been estimated. The total national level contribution from JSWNP is estimated to be Nu. 5,164,338.00 (US$ 118,720.41), as shown in Table 8.44, from three clusters: Resource Use, Conservation and Tourism.

Table 8.44 Bhutan. Estimated national level contributions of JSWNP for 2008

Scope-level of the contribution	Benefited activities and classification of users		Type of contribution (good/service/externa-lity) valued (income)		Source
	Type of Activity	Type of user/benefited "stakeholder"	Ngultrum	US$	
NATIONAL	1. Resource Use Cluster				
	1.1 Royalties collected from timber and NTFPs	Ministry of Finance, RGOB	85,842.00	1,973.38	JSWNP office
	1.2 Royalties from sand and stone	Ministry of Finance, RGOB	3,520.00	80.92	JSWNP office
	2. Ecosystem Cluster				
	3. Conservation Cluster				
	3.1 Penalties imposed	Ministry of Finance, RGOB	25,401.00	583.93	JSWNP office
	4. Tourism Cluster				
	4.1 Tourism royalty collected from trekking inside the protected areas	Ministry of Finance, RGOB	2,192,400.00	50,400.00	ABTO
	4.2 Tourism Development Fund generated from trekking inside protected areas	Tourism Council of Bhutan	45,675.00	1,050.00	ABTO
	4.3 Income earned by tour operators, hotels, handicraft sales, service providers	Tour operators/ Hotels/Transport operators	2,811,500.00	64,632.18	ABTO
	Total		5,164,338.00	118,720.41	

Source: Dhendup, Wangchuk & Choden, 2010.

3.3.2.4 Matrix of total contributions from JSWNP.

The total contribution from JSWNP to the socio-economic development at the local, regional and national levels in 2008 is estimated to be Nu. 38.575 million (US$ 0.887 million), as shown in Table 8.45. At the local level, the contributions are from the Resource Use, Ecosystem Services, Conservation and Tourism Clusters. At the regional level, the contributions are from the Resource Use, Ecosystem Services and Tourism Clusters while the national level contributions are from the Resource Use, Conservation and Tourism Clusters. The contribution to the GDP in 2008 from JSWNP was about 0.1 percent.

Table 8.45 Bhutan. Total estimated contributions of JSWNP at local, regional, and national levels in 2008.

Scale	**Cluster/Activity**	**Value of contribution (Nu. in millions)**	**Value of contribution (US$ in millions)**
Local	Resource Use (timber, NTFPs, pasture)	20.543	0.472
	Ecosystem Services (drinking water and irrigation)	4.462	0.103
	Conservation (fines)	0.031	0.001
	Tourism (portering, camping, handicrafts, CBT, etc.)	0.712	0.016
	Sub total	25.748	0.592
Regional	Resource Use (timber, NTFPs)	0.941	0.022
	Ecosystem Services (drinking water and irrigation)	6.024	0.138
	Conservation	0.00	0.000
	Tourism (hotels and services)	0.697	0.016
	Sub total	7.662	0.176
National	Resource Use (royalty)	0.089	0.002
	Ecosystem Services	0.00	0.000
	Conservation (fines)	0.025	0.001
	Tourism (royalties, TDF, hotels, food, transportation, handicrafts)	5.05	0.116
	Sub total	5.165	0.119
Total contribution from JSWNP in 2008		38.575	0.887
Total GDP in 2008		54149.9	1,244.825
Percent GDP contribution from JSWNP in 2008		0.071 % (0.1%)	

Source: Dhendup, Wangchuk & Choden, 2010.

4. Conclusions.

The Protected Areas System of Bhutan has been established with the objective of conserving biodiversity and sustainably using natural resources so as to benefit both present and future Bhutanese. They are important not only for conservation of flora and fauna alone but are also equally important for the socio-economic development, cultural preservation and the well-being of Bhutanese people.

The findings of this research have helped to reinforce the valuable contributions from protected areas to the social and economic development of Bhutan at the national level and also the contributions at local, regional and national levels from the three case study parks. The findings highlight the importance of protected areas to the social and economic well-being of Bhutanese people besides conservation of biodiversity, which needs to be understood and appreciated at all levels by Bhutanese, including policy makers.

Although the estimated value of contributions from the three case study parks to the GDP in 2008 is very minimal, when these contributions are taken at the local, regional and national levels, they are quite significant. Moreover, the estimated value of contributions presented here is just from a few of the services and benefits derived from the protected areas. If all the ecosystem services are to be quantified, then the benefits would be substantial and almost infinite. Thus, only a modest and minimum contribution from protected areas to the social and economic development of Bhutan is presented here.

Therefore, the management of protected areas should not be regarded as a cost to the country and the people but rather as a valuable investment for the socio-economic development of the country and the people at local, regional and national levels. Thus, it becomes all the more important to conserve and wisely use the rich biological resources found in the protected areas so that both the present and future generations continue to benefit from protected areas. The threats faced by protected areas must be addressed holistically and jointly by all relevant agencies and stakeholders at the local, regional and national levels, including local communities.

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6. Annexes

Annex 8.1 Bhutan. Standardized units used for valuation of natural resources from case study parks.

Resource type	**Average girth in inches**	**Average height in feet**	**Volume in cubic feet(cft)**	**Unit value in Nu.**	**Source**
Flag post	10	25	1.38	172/ pole	JDNP validation workshop
Fencing post	12	6	0.48	60 / post	JDNP validation workshop and revised price of logs as per letter no. DOF/FMS/2010/3310 dated 19th Feb, 2010 of the Department of Forests and Park Services
Drashing (timber for house construction)	84	30	116.98	14586/ tree	
Shinglep (timber for roofing)	84	30	116.98	14586 / tree	
Cham size tree(timber for house construction)	37	20	15.13	1886/ tree	
Tsim (timber for house construction)	18	15	2.69	334 /tree	
Dangchung (timber for house construction)	8	12	0.42	53 /tree	
Sand				215/ truck load	JDNP validation workshop
Stone/boulder				601/ truck load	
Mushroom Billet				10/piece	Market rate NWFP Interim Framework 2009
Mushroom				30 / kg	
Leaf litter				30 / back load	
Fodder				40 / back load	
Firewood				21 / head load	JDNP/FAO
Bamboo				2 / piece	BWS validation workshop
Ferns				5 /bundle/rolls	BWS validation workshop
Water				1.25 / unit	Tashiyangtse municipal rate
USD				1 USD = Nu 43.5	National Statistical Bureau 2009

Chapter 9

Contributions of the Existence of National Parks and Biological Reserves in Costa Rica[1]

Mary Luz Moreno Díaz

1. Introduction

In Costa Rica, the main purpose of NPBRs is to promote conservation in favor of biodiversity. In a society committed to diverse ecosystems and natural resources, as is the case of Costa Rica, conservation can be considered inseparable from development processes. To analyze the way conservation and development interact dynamically at different spatial scales is the primary objective of this chapter.

The fundamental topic is the socio-economic significance of the NPBRs. However, what do these NPBRs mean and to whom? The hypothesis associated with the previous question is that the NPBRs produce additional benefits to their primary role, which is the conservation of natural and environmental resources. These additional benefits are used by different social actors.

In this sense, the total social value of NPBRs (whether expressed in the market or not) is mainly generated by the use and non-use values of environmental services provided by the ecological processes involved. These services, of diverse nature and scale, are attributable to the existence of these areas, which are useful as, for example, aquifer recharge areas. They contribute to the protection of biodiversity, and they generate scenic beauty (which attracts about 58.9% of the total number of tourists who visited Costa Rica via air in 2009; Muñoz Recalde, 2010).

The results presented in this chapter focus on the evaluation of the contribution of nature contained in the NPBRs to the socio-economic development in Costa Rica and not on the value of nature, as such, in monetary terms. Additionally, socio-economic contributions of NPBRs will be evaluated using, as a reference, market and real prices in relation to the activities developed through the use of resources and ecological services provided by the natural areas under protection.

An approximation of the contributions of all the NPs and BRs is presented in the second part of this chapter. The figures presented in this part were obtained based on a detailed bibliographic review and interviews with specialists in several public and private institutions of the country. Then some assumptions were made in order to calculate the economic benefits from the existence of these areas.

[1] The first version of this part was published on Moreno M, et al. 2010a.

The systematization of the contributions of the existence of "Rincón de la Vieja" National Park (RVNP), Corcovado National Park-Isla del Caño Biological Reserve (CNP-ICBR) and Palo Verde National Park (PVNP) are presented in section 3; the data are approximations of the real values. In the absence of specific data on income from certain related activities, the study designs innovative assumptions based on the information collected in field work, interviews, and consultation with experts, which as a whole are used to support the estimated contributions that are shown in this chapter.

In the last section, the conclusions are presented taking into account a comparative analysis and the main lessons generated by the research.

2. National Results

The results presented in this chapter focus on the evaluation of the contribution of nature contained in the NPBRs to the socio-economic development in Costa Rica using the methodological approach presented in Chapter 4. For the national analysis of the contributions, all the NPs and BRs were taken into account (see Figure 9.1). For the case studies analysis, three National Parks and one Biological Reserve were selected (see Figure 9.1).

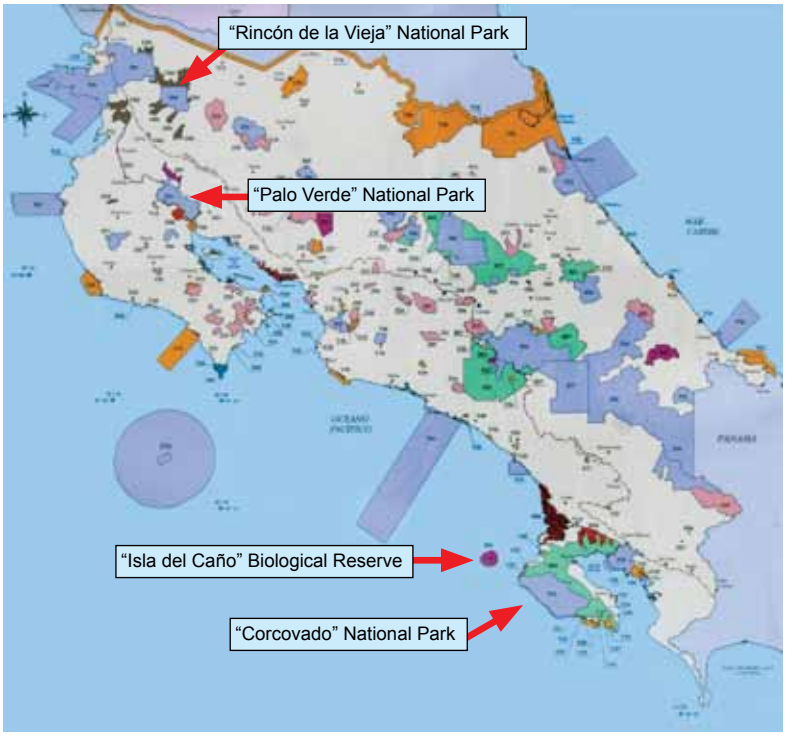
The information found at the national level and empirically aggregated to the main contributions from the existence of NPs and BRs shows that economic activities that obtained benefits from the existence of the NPBRs in 2009 were: (1) tourism aimed primarily at nature with its related services, (2) generation of electricity through the usage of water coming from the NPBRs for hydro-electric projects, (3) generation of employment and salaries, (4) income from MINAE for entrance fees, (5) conservation of protected wildlife areas from MINAE-SINAC in the form of fixed costs and investments in the administration and maintenance of the NPBRs, (6) purchase of lands for the expansion of existing NPBRs or the establishment of new ones, (7) payment for environmental services aimed at protected areas for their conservation and maintenance, and finally, (8) research on biodiversity and, corresponding to this, generation of profits by bioprospecting and basic research.

As is shown in Table 9.1, in 2009, the approximate total sum of the contributions of the NPBRs by the indicated activities is ¢778.191 million colons or $1.357 million dollars (according to 2009 prices). That amount represents an undeniably relevant contribution to the economic development. It must be seen as the lower limit of a much higher amount, which could be calculated in the cases of having a more solid statistical basis and including the actual amount of environmental services attributable to the NPBRs.

Always considering the restriction noted, the total calculated of the contributions to the national economy as income generation and investment attributable to the NPBRs was about 5 percent of the GDP in Costa Rica in 2009 (own calculation based on Edwards,

2009). This implies that for each hectare of NPBR (in total, 650,852 hectares) the unit contribution per hectare of the NPBRs represents the significant amount of $ 2,085. These two figures, a portion of the GDP and the amount per hectare, call the attention when they clearly indicate a significant contribution to the national development and socio-economic welfare of the country without receiving adequate compensation from society in general and the economic activities benefited in particular. In the latter case, tourism stands out as the clear winner with respect to its unpaid debt to the NPBRs.

Figure 9.1 Costa Rica. Map of Wildlife Protected Areas and selected case study.



Source: Translated from MINAE-SINAC, 2008

2.1 Tourism and eco-tourism related to the NPBRs at the national level.

The greatest contribution of the existence of Costa Rican NPs and BRs has to do, directly or indirectly, with tourism. There are a series of works regarding nature-linked tourism and its development in the form of clusters at local, regional and national levels (Acuña et al., 2000; Fürst & Hein, 2002; Inman et al., 1998; PNUD, 2005; MINAE-SINAC, 2004; Ambientico, 2006; MINAE-SINAC, 2006a; MINAE-SINAC, 2006b; CEDARENA, 2006; Programa Estado de la Nación, 2007). This was also confirmed by the results obtained in this study.

Table 9.1 Costa Rica. Summary of socio-economic contributions of NPBRs in 2009.

Type of activity	Specific activity and benefit of the interested people	Estimated benefit*		
		Colons	US$	%
(1) Tourism at national level	Socio-economic activities and interested people related to the NPBRs	546,136,991,997	952,530,800	70.18
Accommodation	Hoteliers, etc.	180,771,344,351	315,287,695	
Food	Owners of restaurants, etc. and their staff	152,372,220,767	265,756,093	
Transportation	Haulers, tour operators	84,105,096,768	146,689,743	
Entertainment	Diverse	44,783,233,344	78,107,526	
Others	Diverse	84,105,096,768	146,689,743	
(2) Availability of good quantity and quality of water for the generation of hydroelectric energy	ICE Hydroelectric Plants and some others	205,242,318,222	357,968,115	26.37
(3) Generation of direct and indirect employment	Payroll employees and their families	13,469,218,581	23,491,991	1.73
(4) Income from entrance fees (National Park Fund)	National Park Fund	7,246,810,438	12,639,338	0.93
(5) Resources for the conservation of Wildlife Protected Areas	MINAET-SINAC	4,885,377,844	8,520,706	0.63
(6) Purchasing of lands	Private owners: income	897,412,505	1,565,199	0.12
(7) Payment for Environmental Services	Private owners: income	182,279,669	317,918	0.02
(8) Contribution to the conservation of biodiversity	Funds for basic research and bioprospecting, universities and NGOs	131,583,340	229,498	0.02
TOTAL		778,191,992,596	1,357,187,632	100%

Source: Moreno et al, 2010a.

*Exchange rate: ¢573.35 = 1 USD in 2009

In general, foreign resources generated by tourism have been greater than those generated by other activities (electronic microstructures, coffee, agriculture, banana, meat, sugar). As of 1998, Intel Company operations positioned electronic microstructure exports as the primary source of Costa Rican income. This, therefore, relocated tourism as the second major export activity until 2000. In 2001, tourism again took up its leadership position in generating foreign exchange, electronic microstructures were moved into second place, and this trend continued until 2009 (Moreno, et al., 2010a).

According to official statistics (ICT, 2010a, 2010b), the estimated number of tourists who visited Costa Rican NPBRs and entered the country via air corresponds to 58.9% from the 1.3 million of people that ICT interviewed in the Costa Rican international airports in 2009. This implies that 765,700 foreign visitors reported having visited National Parks and Biological Reserves during their stay in the country. Following the same statistics, the estimated income due to tourism in NPBRs is calculated considering that the average expense per tourist (AET; GMP in Spanish) who visited Costa Rica was US$ 1,244 in 2009. So, it is assumed that the 765,700 visitors generated a total of US$ 952.53 million as a result of their trips to the country's NPBRs during that year.

A large part of tourism activities, though provided in a growing way by the private sector, have a strict relation with NPBRs. They are developed according to the image related specifically to Costa Rican protected areas. In this sense, tourism promoters and owners of private reserves in the surroundings of National Parks and Biological Reserves sell the image of wild nature when promoting and selling their packages.

Analyzing Table 9.2 in greater detail shows that, in 2009, most of the total expense made by foreign tourists visiting NPs and BRs was on accommodations, representing approximately US$ 315,287,695 equivalent to a third of the total (33.1%). The expense for transportation was US$ 146,689,743 (15.4%); food US$ 265,756,093 (27.9%); entertainment US$ 78,107,526 (8.2%), medical expenses US$ 30,480.986 (3.2%); and other expenses US$ 116,208,758 (12.2%). In this way, one can derive that accommodations took most of the income as ecotourism, followed by food and entertainment, medical expenses and other expenses.

The above mentioned data highlight the significant impact of the country's protected areas on most, but not strictly on, tourism activities, such as transportation, entertainment, etc. This fact could justify mechanisms as compensation for environmental services, like the PES that Costa Rica has been implementing since 1997, from these activities to the maintenance and expansion of protected areas. This would require more detailed information about the tourism contribution of each one of the NPBRs at the national level. In this case, the tourists' expenses are used as an indicator here in relation to their visits to protected areas.[2]

[2] Currently, the generation of this type of information is part of the BCCR projects to complete the macroeconomic statistics. So, for 2009, Bank officials worked with ICT staff to advance in the quantification of a satellite account for tourism, which allows having more specific data about such activity (personal communi-

Table 9.2 Costa Rica. Structure of the average expenditure per tourist, arriving via air, to Costa Rica by activity or demanded service in 2009 (in US$).

Item	AET	Total expenditure on tourism	Total expenditure attributed to NPBRs	% of total
ACCOMMODATION	411.8	535,293,200	315,287,695	33.1
Hotels	355.8	462,519,200	272,423,809	28.6
Time share hotels	5.0	6,468,800	3,810,123	0.4
Cabins	6.2	8,086,000	4,762,654	0.5
Rented house or condominium	44.8	58,219,200	34,291,109	3.6
Camping areas	0.0	0	0	0.0
TRANSPORTATION	191.6	249,048,800	146,689,743	15.4
Owned transportation	17.4	22,640,800	13,335,431	1.4
Airlines	6.2	8,086,000	4,762,654	0.5
Buses, taxis	54.7	71,156,800	41,911,355	4.4
Ferries, motorboats, boats	3.7	4,851,600	2,857,592	0.3
Car rentals	105.7	137,462,000	80,965,118	8.5
Maintenance/repair of vehicles	3.7	4,851,600	2,857,592	0.3
FOOD	347.1	451,198,800	265,756,093	27.9
Purchase of groceries	114.4	148,782,400	87,632,834	9.2
Restaurants, coffee shops, etc.	232.6	302,416,400	178,123,260	18.7
ENTERTAINMENT	102.0	132,610,400	78,107,526	8.2
MEDICAL EXPENSES	39.8	51,750,400	30,480,986	3.2
OTHER EXPENSES	151.8	197,298,400	116,208,758	12.2
TOTAL	1,244.0	1,617,200,000	952,530,801	100

Source: Moreno et al, 2010a with data from ICT, 2010a, 2010b.

2.2 Estimation of the socio-economic contribution of NPBRs by electric generation.

Several studies recognize the relationship between the forest and the hydrological services that they support, mainly by preserving the quality and quantity of water. Among the environmental services provided by forest systems to the basins are: 1) Regulation

cation with: Brizuela, J., 2009; Chaves, A., 2009; Díaz, A., 2009; Edwards, K., 2009; Solano, M., 2009; and Umaña, A.M., 2009).

of the hydrologic cycle (maintenance of the flow in dry seasons and flood control); 2) Conservation of water quality; 3) Control of soil erosion and sedimentation; and 4) Maintenance of aquatic habitats (Bishop & Landell-Mills, 2001). As an example, Costanza et al. (1997)) estimated the value of environmental services that forests provide in terms of water regulation and supply at US$ 2.3 trillion worldwide.

By preserving the quality of water, forests contribute significantly to enhancing the hydrologic properties of basin ecosystems, and this is achieved by minimizing soil erosion on the site, reducing the siltation of water bodies and trapping or filtering pollutants (Calder et al, 2007). The above argument is also present in several investigations where the relationship between forest and water is evident (Chomitz & Kumari, 1998; Segura & Johnson, 1998; Sheil and Murdiyarso, 2009). The quantity and quality of water available are conditions for the production of electricity. Thus, estimating the importance of wildlife protected areas becomes relevant for the production of hydroelectric power because of the service that these areas offer in terms of conservation and protection of water resources.

For the purposes of this document, those hydroelectric generating projects that use water from basins near ASPs are considered and identified, in collaboration with the Electricity Costa Rican Institute (ICE), as they play a vital environmental role in energy production. It is remarkable then that nearly 100% of the energy generated in the country comes from clean energy or renewable resources using natural resources, many of which are within or near the ASPs (MINAE-SINAC, 2007).

Through the conservation of ASPs, taking advantage of the richness of Costa Rican water resources is achieved. This result in more than 78% of the electricity provided to the Costa Rican population being hydroelectric whereas 13% of the energy consumed in the country is geothermal, 4% is produced with wind, and 5% is from thermal energy. In order to estimate the total income by sales of energy, only hydroelectric generation in projects located near ASPs were taken into account. In addition to NPs, seven protected zones and two forest reserves were included, as shown in Table 9.3.

Market prices of the energy were used to calculate the total contribution. Given that the average price of ICE electricity was ¢46.33 kWh for 2007, ¢56.58 kWh for 2008, and ¢75.22 kWh for 2009, respectively, the additional benefit that ASPs provide in terms of preservation and protection of sources of water for their exploitation in the hydroelectric sector and measured in monetary terms due to the income generated by the energy sector is estimated to be a total amount of approximately US$ 220.6 million for 20a07, US$ 294.4 million for 2008, and US$ 357.9 million for 2009, as shown in Table 9.4. When using the price of the electricity as an indicator of real income, the chaining that the sector produces in terms of transmission, distribution and marketing of the electricity is being considered indirectly.

Table 9.3 Costa Rica. Hydroelectric plants that use waters from Wildlife Protected Areas.

Basin/River where it is located	Installed Capacity	Hydroelectric Plant	Protected Areas
San Carlos River	157,399 kW	Arenal	Tenorio PZ
San Carlos River and Bebedero River	174,012 kW	Jorge Manuel Dengo	Tenorio NP
San Carlos River and Bebedero River	31,977 kW	Sandillal	Arenal-Monteverde PZ Arenal NP
San Carlos River	38,172 kW	Peñas Blancas	Arenal-Monteverde PZ
Sarapiquí River Basin	23,205 kW	Toro 1	Toro River PZ
Sarapiquí River Basin	65,736 kW	Toro 2	Juan Castro Blanco NP Poás Volcano NP
Tárcoles River	37,360 kW	La Garita	Central Volcanic Range FR
Tárcoles River	97,380 kW	Ventanas Garita	
Reventazón River Basin	120,000 kW	Macho River	Tapantí-Macizo Cerro de la Muerte NP
Reventazón River Basin	108,800 kW	Cachí	Navarro River and Sombrero River NP
Reventazón River Basin	172,202 kW	Angostura	Tuis River Basin PZ
Sarapiquí River Basin	87,941 kW	Cariblanco	Central Volcanic Range FR
			Poás Volcano NP
Barranca River	4,696 kW	Alberto Echandí	El Chayote PZ

Source: ICE, 2010

Table 9.4 Costa Rica. Estimation of the total income by sales of energy from hydroelectric generating projects near NPBRs from 2007-2009.

	2007	2008	2009
Average price of electricity	46.33 kWh	56.58 kWh	75.22 kWh
Hydroelectric generation (kWh) **	2,459,809,587.60	2,738,217,667.80	2,728,560,465.6
Total Income in Costa Rican Colons	113,962,978,193.51	154,928,355,644.12	205,242,318,222.43
Total Income in US Dollars*	220,593,430.75	294,411,864.86	357,968,115.02

Source: Moreno et al, 2010a. Based on data provided by Segura, W., 2009 & DSE, 2010a

*Exchange rate: ¢ 516.62 in 2007; ¢ 526.23 in 2008; and ¢ 573.35 in 2009

**Estimation based on the information sent by Pérez, J., 2010 & DSE, 2010b

2.3 Generation of direct and indirect employment.

2.3.1 Direct employment.

In 2009, there were 587 people directly related to ASP management working for the SINAC. Of these 587, there were 317 (54%) officials occupying the others category; they include cleaners, security guards, office workers and others, who work in the whole System. The Osa Conservation Area had the largest number of people in the others category (23.97%), which also reflects a greater amount of personnel (17.72%) than any other ASP. On the other hand, the Central Pacific Conservation Area is the one that presents the lowest percentage of others category people (0.31%). The Guanacaste Conservation Area registers the largest amount of professionals (24.32%). Marine Coco's Island Conservation Area has the lowest amount of personnel (3.75%) compared to the other ASPs, as can be seen in Table 9.5.

The total amount paid to the personnel of the Conservation Areas in 2009 was US$ 20.6 million. From this total, 76.3% was paid by SINAC through the state budget (Ordinary budget), and another 23.7% was paid by means of the National Park Foundation.

2.3.2 Indirect employment.

This information is very difficult to calculate and is not available in Costa Rica but rather based on the results obtained from fieldwork (case studies developed for the project that generated this book). The amount paid for salaries in the activities related to the existence of "Rincón de la Vieja", Palo Verde and Corcovado-ICBR National Parks was approximately US$ 3 million in 2009. All the people, who work in travel agencies, restaurants, rental car agencies, hotels and other activities that are developed thanks to the existence of the national parks mentioned above, and who were interviewed in the fieldwork, are included in this amount.

Clearly, this is an underestimation of the real value that could be obtained if the figure were calculated taking in account the employment generated by all the socio-economic activities that are developed around all the NPs and BRs in Costa Rica. Despite the underestimation of this item, it is very important to highlight that the existence of NPBRs is very important for local employment. In the Corcovado NP-ICBR case study, for example, there are a lot of local people working in activities like hotels, restaurants and others related to the existence of the NP.

Table 9.5 Costa Rica. Distribution of the staff located in Conservation Areas* in 2009.

Conservation Area	Others **		Technicians		Professionals		Total	
	Number	%	Number	%	Number	%	Number	%
La Amistad Pacífico	20	6.31	7	4.40	4	3.60	31	5.28
Tortuguero	19	5.99	10	6.29	4	3.60	33	5.62
Central Volcanic Range	54	17.03	7	4.40	9	8.11	70	11.93
Central Pacific	1	0.32	49	30.82	14	12.61	64	10.90
La Amistad Caribe	8	2.52	16	10.06	5	4.50	29	4.94
Huetar Norte	10	3.15	4	2.52	11	9.91	25	4.26
Guanacaste	57	17.98	11	6.92	27	24.32	95	16.18
Marine Cocos Island	18	5.68	0	0.00	4	3.60	22	3.75
Osa	76	23.97	21	13.21	7	6.31	104	17.72
Tempisque	30	9.46	10	6.29	13	11.71	53	9.03
Arenal - Tempisque	24	7.57	24	15.09	13	11.71	61	10.39
Total	317		159		111		587	

*The data correspond to state official staff distinguished in the ASP.
**Cleaners, security guards, office workers and others

Source: National Report MINAE-SINAC, 2010a

2.4 Visitation of Protected Areas.

According to data provided by the National Report on Costa Rican Protected Areas (MINAE-SINAC, 2007), PAs had approximately 1.2 million visitors in 2009, 54.18% of which were foreigners and 45.82% of which were nationals.

Table 9.6 shows the number of visits received to NPBRs from 2000 to 2009. It shows an increasing trend of between 6% and 8% from 2001 to 2004; then, 2005 was a year of poor growth in the number of visitors with only 0.3%; and 2006 brought recovery with a higher growth rate compared to the previous years (12.6%).

The total income generated by the entrance fees to the NPBRs in 2009 was approximately US$ 12.6 million. This amount is gathered by the National Park Foundation and then spent to cover the necessities of Costa Rican ASPs.

Table 9.6 Costa Rica. Visitation to the NPBRs from 2000-2009.

Year	National Visitors	Foreign Visitors	Total of Visitors	
			Number	Growth Rate
2000	471,528	340,574	812,102	-6.23
2001	479,853	381,373	861,226	6.05
2002	507,801	411,831	919,632	6.78
2003	463,602	530,777	994,379	8.13
2004	476,633	586,959	1,063,592	6.96
2005	455,487	611,334	1,066,821	0.30
2006	556,141	645,056	1,201,197	12.60
2007	598,812	708,018	1,306,830	8.79
2008	632,462	745,668	1,378,130	5.46
2009	580,942	686,937	1,267,897*	-8.00

Source: Own elaboration based on SINAC, 2009a, 2010a.
*Own calculations based on information from Arce, 2010a, 2010b.

2.5 Resources for the conservation of Wildlife Protected Areas.

According to the stipulations of the 2007 National Report on the System of Wildlife Protected Areas, the SINAC income includes the following sources:

a. Central Government;
b. Generation of own resources;
c. International cooperation; and
d. Private financial contributions from non-governmental organizations and foundations.

Different mechanisms are used in the management of such income. Among them, the Ordinary Budget of the Republic, the National Park Foundation (through fiscal stamps, admission fees to the ASPs and fees of services provided in such areas), the Forest Fund and the Wildlife Fund (collectively with the Special Funds), foundations and allied organizations (MINAE-SINAC, 2007).

Table 9.7 specifies actual SINAC income from 2007-2009 both in Costa Rican colons and US dollars. Actual income is all income received by SINAC and is subject to budget approval processes. That is, it is the total income previous to the budget process and approval of public funds by the competent authorities (MINAE-SINAC, 2006a).

In 2009, the SINAC received US$ 42 million to manage Costa Rican ASPs.

Table 9.7 Costa Rica. Actual total SINAC income from 2007-2009 (in colons).

Sources of Income	2007	2008	2009
	Dollars	Dollars	Dollars
Ordinary Budget*	13,341,152	17,404,285**	21,715,912
National Park Foundation	10,771,343	16,100,469***	17,651,370
Forest Fund	1,840,656	3,505,402	2,056,407
Wildlife Fund	433,848	738,846	576,311
TOTAL	26,386,999	37,749,001	42,000,000

*The amount that is specified in the Ordinary Budget does not consider the money for the payment of the land that is also financed with this item.
** The sum of 8,944,512,321.90 of this amount is registered in Table 9.1 as contributions for generation of direct employment.
***Amount considered in Table 9.1 as contributions from tickets to the NPBRs. The sum of 2,779,071,677.97 is subtracted from it as contributions as generation of direct employment.
Source: Own elaboration with information from MINAE-SINAC (2007) and SINAC, 2009a, 2010b.

*2.6 Natural heritage of the State (*PNE*) - Purchasing of Lands.*

The Costa Rican Government owns 88.55% of the land covered by NPs and BRs (MINAE-SINAC, 2010a). Year by year, the State makes the effort to obtain resources from different ways in order to continue to purchase land. For 2008 and 2009, US$ 1,818,665 were allocated for each year; US$ 1,809,118 were executed for 2008 and US$ 1,632,093 for 2009 (SINAC, 2010b). This shows a deduction of 14.68% in the resources executed from 2007 to 2009 (see Table 9.8).

Table 9.8 Costa Rica. Purchasing of lands from 2007-2009.

Year	Amount executed in US$	Growth Rate
2007	1,912,931	
2008	1,809,119	-5.43
2009	1,632,093	-9.79
From 2007 to 2009		-14.68

Source: Own elaboration based on SINAC, 2010a, 2010b

2.7 Payment for Environmental Services (PSA).

Costa Rica has a constantly evolving, innovative program called Payment for Environmental Services (PSA). It began in 1997, and it established contracts for about 600,000 hectares in the modalities of protection, reforestation and agro-forestry systems throughout the country from 1997-2008. PSA has played an important role in the consolidation and

protection of Costa Rican Wildlife Protected Areas. Even though about 88.55% of the NPs and BRs are State owned, the remaining 11.45% remain in the hands of private owners. PSA gives priority to private landowners who own lands within National Parks, in their buffer zones or in biological corridors.

The total amount paid to owners that have lands in NPBRs in 2009 was US$ 317,918.4, as can be seen in Table 9.9.

Table 9.9 Costa Rica. PSA in National Parks.

Year	Protection (ha)		Reforestation (ha)		Regeneration (ha)	
	Hectare	Total US $	Hectare	Total US $	Hectare	Total US $
2007	480,40	30.745,6	0.00	0,00	12,50	512,5
2008	4.625,20	296.000	153,00	7.497	0,00	0,00
2009	4.949,10	316.742.4	24,00	1.176	0,00	0,00

Source: Gutierrez, R., 2007; MINAE-SINAC, 2010; FONAFIFO, 2010

2.8 Biodiversity, bioprospection and scientific research in NPBRs.

Costa Rica has unquestionable leadership in the issue of bioprospection. This consists of a systematic search for direct uses of biodiversity through the use of tools of modern science and high technology. Thus, bioprospecting seeks microorganisms, chemicals, molecules, genes and other components of the species with potential to be used in the manufacturing of products with economic interest (Obando et al, 2008).

The National Commission for Biodiversity Management (CONAGEBIO) was created within the framework of the Convention on Biological Diversity, and based on Article 14 of the Biodiversity Law (Law No. 7788 from April 30, 1998), as a decentralized body of the Ministry of Environment and Energy, with instrumental lawful duties. CONAGEBIO works with the aim of technically consolidating a national authority to rule policies for the conservation, ecologically sustainable use and restoration of biodiversity. It serves as an advisory body for technical and independent institutions in biodiversity matters. Therefore, consultations should be presented to the committee in advance to provide authorization for national or international agreements and to establish or endorse actions or policies that affect the conservation and use of biodiversity (CONAGEBIO, 2009). CONAGEBIO must approve all projects in basic research or prospection of the biodiversity that are conducted in Costa Rica.

According to the statistics generated by both the SINAC and CONAGEBIO, INBio is the only institution that has deposited funds, as contracts of Prior Informed Consensus

(CPI), which are created through the Convention on Biological Diversity (CBD), which is specifically contained in the Biodiversity Law (Law No. 7788) and in the Access Rules (Induni, 2007).

From 2004-2010, projects have been developed using US$ 1,364,807.99 in funds for Conservation Area projects. A total of US$ 57,275.51 have been deposited to the MINAET and correspond to the percentage agreed as access to the elements and resources of biodiversity on basic research and prospection of biodiversity that some projects provide the MINAET. Taking into consideration the amounts from basic research and bioprospection during these 7 years, the year of greatest generation of income was 2007 with 25.39%, and the year of lowest generation was 2008 with 5.33%. A relatively constant behavior in the generation of flows of direct economic benefits associated with this type of researchers is evident.

In 2009, a total amount of US$ 241,985 was generated by bioprospecting and basic research.

2.9 Other contributions.

This section shows an estimation of the environmental service of carbon dioxide (CO_2) storage that is reported due to the existence of NPBRs. In this regard, the calculation includes the storage of CO_2 both on the ground and biomass for the case of the existing forests in NPBRs. Table 9.10 shows that a total of 143,316,338 tons of CO_2 are stored by the grounds and forests located in NPBRs, which is the total from 76,435,380 tons of CO_2 stored in National Parks and 66,880,958 tons stored in Biological Reserves.

Table 9.10 Costa Rica. Storage of CO_2 on the ground and as biomass in the NPBRs in 2009.

Type of CO_2 Storage	National Parks		Biological Reserves	
	(t C/ha)	Equivalent in US$	(t C/ha)	Equivalent in US$
Average storage in NPBR tropical forest	47,461,680	201,712,140	41,528,970	176,498,123
Average storage in the ground of NPBR tropical forest	28,973,700	123,138,225	25,351,988	107,745,947
TOTAL STORAGE	76,435,380	324,850,365	66,880,958	284,244,069
GRAND TOTAL OF NPBR STORAGE	143,316,338			US$ 609,094,434

Source: Moreno et al, 2010a, with information from INBio, 2004; ENCC, 2008; Russo, 2002

This estimation is aimed at contributing to the establishment of both the C-Neutral Regulation and the Process of C-Neutral Certification in Costa Rica. It seems that these tons of CO_2 stored in NPBRs are translated into monetary terms following the range of prices established in the National Strategy of Climate Change (ENCC; 2008). Given that the service of CO_2 storage provided by NPBRs represents US$ 609,094,434, the contributions of NPs are US$ 324,850,365 and those of BRs are US$ 284,244,069. This figure would become important in the case that an emissions market worked in practice since this would imply a valuable source of income for the SINAC. They could be invested in the management ASPs.

The estimated figure, though very valuable, is subject to the establishment of a CO_2 emissions market that allows those who pollute to offset their emissions to the ecosystems that store such gas. Unfortunately, the current conditions are presented as gloomy for the establishment of a CO_2 emissions market. As for diverse topics related to the adaptation of climate change, many are still pending solutions.[3]

3. Case Study Results

3.1 Corcovado National Park (CNP) and Isla del Caño Biological Reserve (ICBR)[4] .

a. Geographical location of CNP.

Corcovado National Park (CNP) was created in 1975 by Executive Decree # 5357-A 31-Oct-1975 (SINAC, 1997). Later it was expanded by Executive Decree No. 11148-A 15-Feb-1980, as both decrees were ratified bylaws (Bylaw No. 6794[5]; ACOSA-TNC-UCI-ELAP, 2007). CNP belongs to the Osa Conservation Area in the province of Puntarenas (Golfito and Osa cantons), located in the southwestern corner of Costa Rica with an extension of 42,571 terrestrial hectares and 1,913 marine hectares.

There are several versions about the origin of the name Corcovado. One is the shape of a rock located on the beach, which has a curve similar to a hump while the other version is about the shape that Corcovado River has, which makes several curves, similar to a horse when it bucks (PROESA-SINAC, 2009).

[3] Among them is financing, which could represent between US$ 140,000 and US$ 175,000,000 annually to help developing countries reduce their emissions at the level required to avoid the global temperature rising more than 2°C (ICTSD, 2009a, 2009 b).

[4] The first version of this part was published on Otoya, M., et al. 2010.

[5] According to Hurtado de Mendoza (1988) cited by Sierra C., Castillo E. & Arguedas, S. (2006), the creation of the Park is the result of national and international campaigns that occurred during the 70s to preserve the biological resources of the Corcovado Basin as a result of threats from agriculture, cutting of trees and development of Osa Forest Products.

b. Geographical location of ICBR.

Isla del Caño Biological Reserve (ICBR) is located inside Osa Conservation Area (ACOSA); it was established by Executive Decree Nº 20790-MIRENEM in November, 1991. It belongs to Osa canton, province of Puntarenas and is approximately 15 km from the coast in front of Drake Bay (Government of Costa Rica, 2003). Initially, it was created as an extension of the Corcovado National Park by Executive Decree Nº 6385-A 30-sept-1976, and it was legally established as a Biological Reserve by Law Nº 6215 on March 9, 1978 (Sierra, C. et al., 2007). The administration of the island was under the protection of Corcovado National Park when, in October, 2006, it separated from the administration of the Park to manage it with all administrative components (Acuña Hidalgo, 2006 in ACOSA-TNC- UCI-ELAP, 2007).

c. Importance of CNP.

CNP hosts one third of the tree species and half of the threatened plants in Costa Rica. CNP has at least 13 plant associations defined in less than 50,000 hectares; around 169 species of vascular plants can be found in one hectare (Sierra, C. et al., 2006). In the Park, it is estimated that there are about 140 species of mammals, 370 species of birds, 120 species of amphibians and reptiles, 40 species of freshwater fish and some 6,000 species of insects (ELAP-TNC-ACOSA-UCI, 2005). Many of these are threatened species and endangered species (tapir, anteater, gibnut, different species of felines, such as puma, ocelot, jaguar and Margay cat, reptiles, amphibians, etc.).

A particularity of CNP is that the beaches are spawning sites for turtles (see figure 9.2.) and a habitat for red crabs and snails. Also, in the depths of the waters, there are a lot of reef, octocorals (sea fans and allies), which serve as habitat for marine animals and as a means of protection for animals, such as conches and lobsters. Even the Salsipuedes reef protects one of the most extensive populations of conches that has been able to survive despite being exploited. Likewise, Punta La Chancha has the ability to sustain many marine species. Coral reefs also inhabit the deep pools that are formed between the rocks. These individuals are easy to remove so it must be under constant surveillance in order to preserve the resource (ACOSA-MINAE-SINAC, 2005-2006).

d. Importance of ICBR.

Most vegetative species are perennial, which is typical of tropical wet forest. It is estimated that there are around 158 species of vascular plants and ferns (MINAE-SINAC, 1999 in Sierra, C. et al., 2007). There are 69 known animal species on the island, 31 species of bird (heron of cattle, the crab hawk, the osprey, the brown booby, etc.), four species of amphibian, nine species of reptile and five species of mammal. Referring to insects, it is possible to identify beetles, butterflies, moths and bees (MINAE-SINAC, 1999 in Sierra

C. et al., 2007). The island has one of the richest areas of coral reefs and the best preserved reefs on the Costa Rican Pacific coast. Sixty species of mollusk and several fish species have been identified there (Guzmán & Cortés, 1989 in ACOSA-TNC-ELAP-UCI, 2007).

Figure 9.2 Costa Rica. Biodiversity and Landscapes in Corcovado National Park.

Another point of interest that is unique about the island is its cultural resources. Seventeen archaeological sites have been revealed in areas where stone spheres and ceramic pieces are found. It is assumed that the ancient indigenous civilizations used the island for burial purposes (Finch & Honetschlager, 1982 in ACOSA-TNC-ELAP-UCI, 2007).

3.1.1 Cluster analysis around CNP-ICBR.

In particular, the creation of CNP and the ICBR has encouraged tourism by developing a series of social and productive activities including lodging, meals, transportation, tour operators and trade in general. The establishment of these activities has promoted the creation of jobs in Drake Bay and Puerto Jiménez, which are populations that directly benefited from being in the zones of influence of both protected areas. However, tourism developed in the zone has also indirectly benefited other communities in Osa canton, such as Sierpe, Dominical, La Palma and Palmar.

The commercial activity linked to tourism is relatively incipient in the area; it is concentrated in a few areas and even without explicit local empowerment. This implies that most of the medium and large businesses are held by foreigners, and nationals carry out smaller-scale activities. The population benefits from tourism activity since it is the main source of income. It is linked to low-paying activities even though there are few cases of local empowerment.

Two nuclei or poles are clearly identified where the development of various tourist activities has been focused. They support activities that are performed according to CNP and the ICBR; these are the communities of Drake and Puerto Jimenez. Both places have very different characteristics, depending mainly on social and cultural elements, but that impact the economic dynamics of each area. This, for example, is reflected to some extent

in the way that each community has been taking advantage of the benefits of tourism development and its ownership of this process.

In general terms, there are no major tourism establishments. The Osa region is not characterized by mass tourism; for example, lodging is directed toward cabins and small or medium sized hotels, most of which have an ecotourism focus and are relatively far apart. Most hotels are in foreign hands, which is not the same as the case of the cabins. Ecotourism and nature tourism are features that distinguish lodging in Drake, Carate and Puerto Jimenez. Most establishments are clear about what tourists are looking for: a resting place where they can share with the biodiversity of the area without luxury or attractive materials. Additionally, in one form or another, the sector has been linked to protection and conservation activities, in some cases, even maintaining private reserves under protection around their establishments to help improve the vegetation cover and maintain plant and animal diversity that tourists can observe without necessarily traveling long distances.

The sector of Jimenez can be characterized as a place with overnight accommodation for those wishing to enjoy Corcovado National Park and, to a lesser extent, the ICBR. In this sense, most visitors are groups of young people and young adults (students and backpackers), who are adventurous and whose objective is to reach Sirena Station, where they will stay several days. This kind of tourist regularly arrives by land, in organized groups (tours), or directly by bus from San Jose; a few cases arrive by rental car. The remoteness of CNP, in relation to San Jose, forces visitors to stay at least two nights in Puerto Jimenez.

In addition, there is a segment of tourists who come to Jimenez by air. This last group tends to stay mainly in hotels that are between Jimenez and Carate; they have previously acquired some all-inclusive package. Regarding CNP, they can decide to visit the La Leona Station because of its proximity. In some cases, they take water tours where they can do diving, snorkeling, sport fishing, or visit the ICBR or CNP, without staying in the latter. The offer of terrestrial transportation to Carate is extremely rudimentary: a cattle truck transports tourists who wish to enter the Park in the early hours of the morning, just as at four in the afternoon, it carries out the return trip, offering the service to those who leave CNP that day. Additionally, there is a taxi service from Jimenez, but it quite is expensive.

In the case of Puerto Jimenez, it is important to note that many of its villagers, originally locals or people from Panama, Nicaragua and the Central Valley who settled there, lived in a culture and economy dependent on gold and hunting; some of them still live on these activities. Once CNP and the Golfo Dulce Forest Reserve were declared protected areas,

their inhabitants watched their primary source of income be mined. Some of them were expropriated from their lands and assigned to live illegally on the above activities, or to engage in field activities with little chance of improving their conditions and quality of life. The previous context has probably served as a barrier to home-grown tourism development with real social and productive value chains. In Drake, tourists practically enter by air, and their lodging is mainly in the hotels located in the Terrestrial Maritime Zone that runs from Drake to the entrance of CNP (San Pedrillo Station), in which case the tourists are transported by sea. To a lesser extent, those who come by land have CNP as a direct objective and stay at Drake to continue the next day with their trip.

Although Drake does not present major local commercial development, virtually all of its villagers live on tourism, unlike Puerto Jimenez. In one way or another, they work as wage-earners in hotels, are cabin owners, offer terrestrial and water transportation with agreements among the different hotels or are operator-tours. It is important to mention that, in this case, the social organization has the possibility of greater involvement and use of the benefits of tourism, as well as better preparation to provide various services.

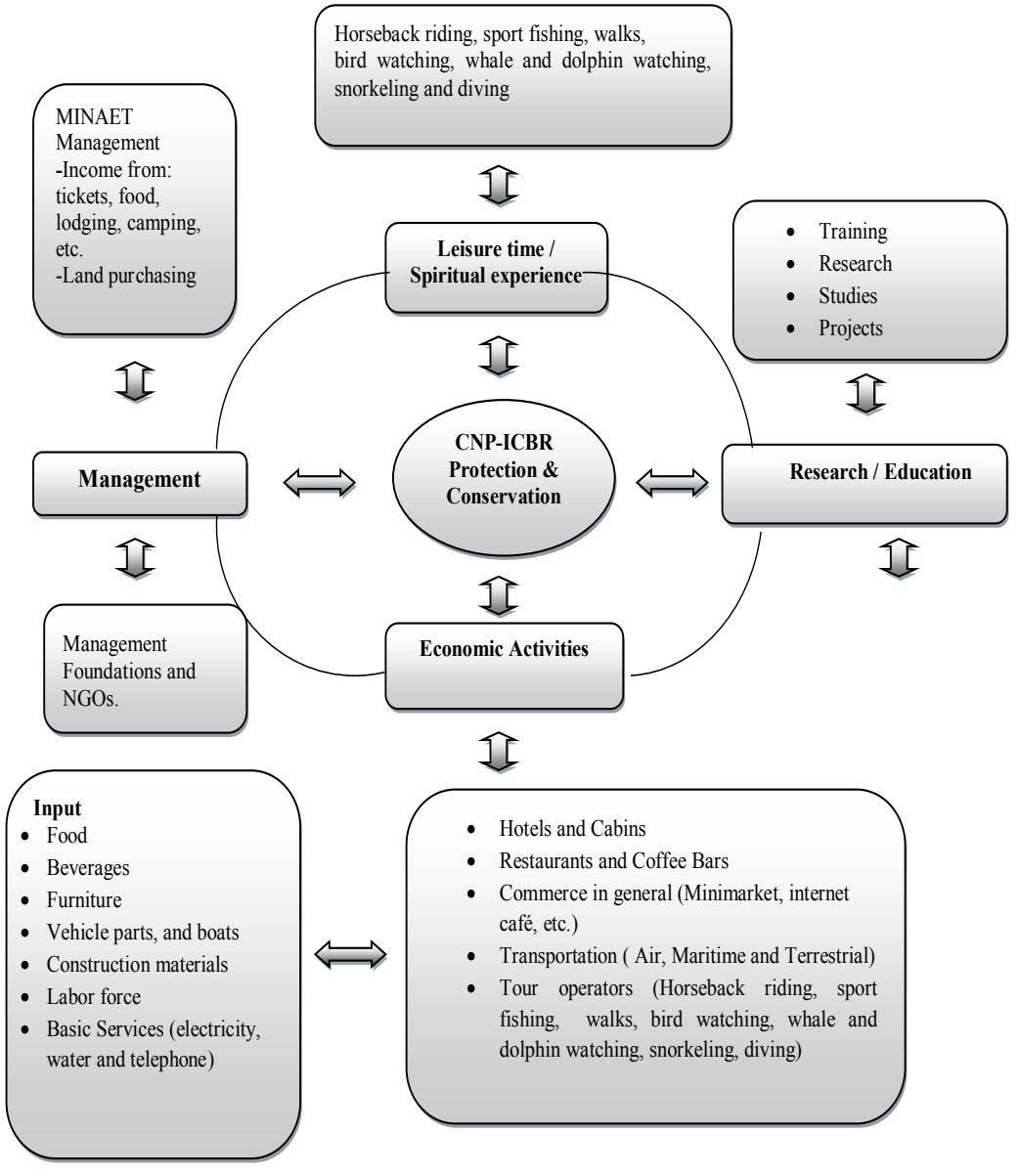
Considering the aspects mentioned above, and based on the CNP-ICBR cluster methodology, various productive, commercial and institutional activities are identified and related. Their central goal is the protection and conservation in both ASPs since they were created for such purpose. Figure 9.3 shows the CNP-ICBR cluster.

3.1.2 Systematization and estimation of CNP-ICBR contributions.

a. Local level.

Local contributions of the economic activities that are developed because of the existence of CNP-ICBR amounted to ¢21,644,942,352 (US$ 41million) in 2008, which represented 44.41% from the total contributions. As developed previously, local contributions generated by productive activities located in the communities of Puerto Jimenez and Drake Bay have been consolidated by the existence of the Park, as shown in Table 9.11. One of the economic activities that provides the greatest contribution at the local level is air transportation (48.34%) due to most tourists arriving directly to the Puerto Jimenez airport because of the region's remoteness.

Figure 9.3. Costa Rica. Development cluster around Corcovado National Park – Isla del Caño Biological Reserve.



Source: Otoya et al, 2010.

Table 9.11 Costa Rica. Systematization of Corcovado National Park local contributions for 2008.

Scope-scale of the contribution or benefit	Benefited activities and classification of users		Type of contribution (goods/service/externality) valued according to sources		% of contribution
	Type of activity	Type of user / benefited	Income		
			Colons	US$	
LOCAL LEVEL	Air transportation	Business Owners	¢10,463,809,910	$19,884,480	48.34
	Projects-Organizations	Local Organizations	¢6,691,277,565	$12,715,500	30.91
	Hotels and cabins	In Puerto Jimenez	¢2,485,061,766	$4,722,387	11.48
		In Drake	¢538,278,934	$1,022,897	2.49
	Restaurants and Coffee Bars	Business Owners	¢452,633,519	$860,144	2.09
	Related Activities	Other activities (supermarkets, souvenir shops, internet cafes, etc.)	¢442,471,192	$840,832	2.04
	Water	OSA Municipality	¢143,741,261	$273,153	0.66
	Tour Operators	Business Owners	¢142,726,679	$271,225	0.66
	Food	MINAET-SINAC	¢89,330,153	$169,755	0.41
	Maritime and terrestrial	Transportation	¢88,492,805	$168,164	0.41
	PES	RFGD	¢74,947,782	$142,424	0.35
	Volunteering	MINAET-SINAC	¢32,170,787	$61,134	0.15
Total of Local Level Contributions			¢21,644,942,352	$41,132,095	100
Percentage of participation in total income generated					44.91%

Source: Otoya et al, 2010.

b. Regional level.

The specific contributions to regional development are difficult to determine for this case study. Firstly, the regional scale refers to the geographic region known as the Southern Zone. It excludes Puerto Jimenez and Drake because they are considered local action areas around CNP and ICBR, and includes places such as San Vito, Palmar, Perez Zeledon and Golfito. Secondly, there is a multiplicity of widely dispersed small chains at the regional level, some of which are not clearly or well defined by the businesses at the national level. In this sense, specific regional activities that support tourism activities are few. Among the most visible ones are the generation of income from municipal patents and the sale of fuel and provision of agricultural inputs.

The regional contributions of the economic activities that are developed from the existence of CNP-ICBR amounted to ¢4,677,818,673 (US$ 8 million) in 2008, which represented 9.71% of the total contributions. As developed previously, the regional level represents

the productive activities that are benefited directly from the activities that are related to CNP. According to Table 9.12, the activities that generated the greatest income at the regional level in 2008 were hotels in Puerto Jimenez and Drake (67.94%).

Table 9.12 Costa Rica. Systematization of Corcovado National Park regional contributions for 2008.

Scope-scale of the contribution or benefit	**Benefited activities and classification of users**		**Type of contribution (goods/service/externality) valued according to sources**		**% of contribution**
	Type of activity	**Type of user / benefited**	**Income**		
			Colons	US$	
REGIONAL LEVEL	Hotels and cabins	Drake Hotel	¢2,556,824,938	$4,858,759	54.66
		Puerto Jimenez Hotel	¢621,265,441	$1,180,597	13.28
	Related Activities	Other Activities (supermarkets, souvenir shops, internet cafe, etc.)	¢497,780,091	$945,936	10.64
	Sale of fuel	Gas Stations	¢406,013,935	$771,552	8.68
	Tour Operators	Regional enterprises whose sales remain in Costa Rica by marketing CNP	¢356,816,698	$678,062	7.63
	Restaurant	Suppliers	¢199,465,619	$379,046	4.26
	Regional Input	Suppliers (Food and Beverages, souvenir shops, other equipment)	¢30,521,340	$58,000	0.65
	Patents	OSA Municipality	¢9,130,611	$17,351	0.20
Total Regional Level Contribution			¢4,677,818,673	$8,889,304	100
Percentage of participation in total income generated					9.71%

Source: Otoya et al, 2010.

c. National level.

The national contributions of the economic activities that are developed from the existence of CNP-ICBR amounted to ¢21,875,011,704 (US$ 41millon) in 2008, which represented 45.39% of the total contributions. As developed previously, the national contributions make reference to all those income that reflect economic activities that receive regional contributions, like air transportation, which makes the greatest national level contribution (90.48%).

Table 9.13 Costa Rica. Systematization of Corcovado National Park national contributions for 2008.

Scope-scale of the contribution or benefit	Benefited activities and classification of users		Type of contribution (goods/service/externality) valued according to sources		% of contribution
	Type of Activity	Type of user / benefited	Income		
			Colons	US$	
NATIONAL LEVEL	Air transportation	Air tickets	¢19,792,408,348	$37,611,707	90.48
	Hotels and cabins	Puerto Jimenez Hotel	¢776,581,802	$1,475,746	3.55
		Drake Hotel	¢269,139,467	$511,448	1.23
	Related Activities	Other activities (supermarkets, souvenir shops, internet cafe, etc.)	¢442,471,192	$840,832	2.02
	Tour Operators	San José enterprises whose sales remain in Costa Rica by marketing CNP	¢293,382,618	$557,518	1.34
	Tickets	Income for MINAE-SINACT by admission to CNP	¢146,020,016	$277,483	0.67
	Restaurant		¢115,076,318	$218,681	0.53
	Sale of Rights	MINAET-SINAC	¢25,723,733	$48,883	0.12
	Agricultural input	Suppliers	¢14,208,210	$27,000	0.06
Total National Level Contribution			¢21,875,011,704	$41,569,298	100
Percentage of participation in total income generated					45.39%

Source: Otoya, et al, 2010.

3.2 Rincón de la Vieja National Park [6].

3.2.1 Geographic location.

Rincón de la Vieja National Park (RVNP) comprises a total of 14,160.63 hectares. They are located: in both Dos Ríos and Aguas Claras districts (both in Upala canton, in the province of Alajuela); and in Mayorga, Cañas Dulces, Curubandé and Liberia districts (all in Liberia canton, in the province of Guanacaste). The surrounding communities include Parcelas de Santa María, San Jorge, Santa María Colonia Libertad, Buenos Aires, Las Delicias, Mundo Nuevo and Colonia Blanca.

[6] The first version of this part was published on Salas, F. et al, 2010.

3.2.2 Importance of Rincón de la Vieja National Park.

At national and international levels, this park is widely known for its scenic beauty, the volcanoes and the presence of a dry forest climate. Besides, its characteristic name comes from an indigenous Costa Rican legend, which is retold every time visitors ask the villagers about the origin of the volcano's name.[7] This National Park offers several natural attractions for tourists. They are mainly scenic attractions, including fumaroles, mud pots, and waterfalls, and they constitute the fundamental basis for the productive activities of the tourist cluster developed in the communities surrounding the Park (see figure 9.4).

Figure 9.4 Costa Rica. Natural Attractions in the RVNP.

a. Waterfalls b. Mud Pots

In addition to the conservation of ecosystems and scenic beauty, the Park also provides environmental services for the protection of valuable water sources. The Rincón de la Vieja massif is part of the watershed, in the northwestern part of the country, between the Caribbean Sea and the Pacific Ocean. Thirty-two rivers have headwaters there: among them are the El Colorado, Blanco and Ahogados Rivers. This water richness is used by the Costa Rican Institute of Aqueducts and Sewer Systems of Liberia to supply its users.

3.2.3 Cluster analysis around RVNP.

Following the cluster methodology, the RVNP case study carries out an analysis of socio-economic contributions on different scales. At the local level, the quantification of contributions focuses on socio-economic activities that take place in Curubandé district, which is located in Liberia canton, in the province of Guanacaste.

[7] Thus, the tradition retells the story of an impossible love and the leading role of its heroine. After suffering a major disappointment, she leaves the town and goes into a cave. There she turns from a princess into a shaman and starts practicing magic to help those who request it. All this happens from her hideout: Rincón de la Vieja.

When considering the regional level, the count includes a total of 5 districts, distributed in two provinces. In this regard, the districts include: Dos Ríos and Aguas Claras (both located in the Upala canton, in the province of Alajuela); and Mayorga, Cañas Dulces and Liberia districts (all located in Liberia canton, in the province of Guanacaste). The contributions that are made outside the regional level are recorded as contributions at the national level. Additionally, the socio-economic dynamics of the tourism cluster generated around RVNP implies accounting for contributions that are located on the international sphere, that is, outside the boundaries of Costa Rica.

Based on this approach, different productive activities in the conglomerate and related to RVNP are identified. Tourism emerges as the most important one, both in terms of income creation and in the dynamics of generating various related activities that give support to the cluster associated with the park. Visitation is totally dependent on the environmental services coming from the park and its surroundings, for example, scenic beauty and biodiversity protection.

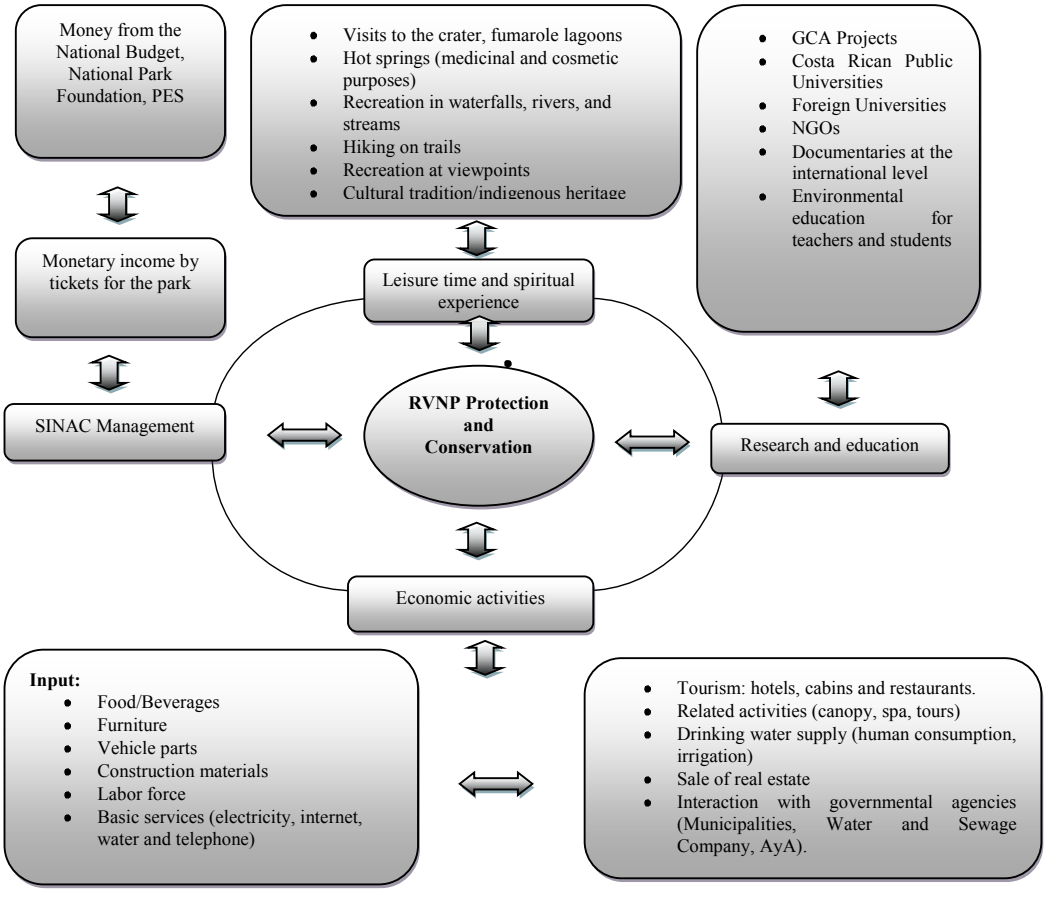
The second most important is drinking water supply for both human consumption and for productive activities, which constitutes a determining factor in the prosperity of Liberia canton. This water resource is dependent on environmental services coming from the park or its surroundings, for example, scenic beauty and protection of water resources. Other service activities and recreation are also identified as part of the socio-economic conglomerate around the park. This category includes research, education, leisure time and spiritual experience. All these activities are directly related to conservation management of RVNP under SINAC administration.

Figure 9.5 presents a graphical illustration of the cluster and sub-conglomerate activities and sources of income identified around RVNP. The core activity upon which all others are based is governmental conservation and natural protection carried out in the Park. This activity is related to the positive *externality* provided by the natural heritage of RVNP and its ecological services, which allow the existence of other effects chained on the development, for example, economic activities, research and education, as well as leisure time and spiritual experience.

The interactions among the different productive, commercial and recreational activities represent interesting feedback with the central axis of the cluster conformation (e.g., RVNP conservation and protection activity). Thus, research and education, and the SINAC management of the Park, as well as the tourist related activities, are largely determined by the existence of the Park. These activities directly provide resources in the form of income by entrance fees and transfers to SINAC, such is the case of the management of the park and research activities, for which a kind of fee is paid, mainly through INBio (Induni, 2007). Indirectly, such activities generate contributions to local development through investments in infrastructure and services that enable greater visitation to the Park and, hence, the area of influence.

Various interactions take place internally in the cluster. The existence of this National Park makes the protection of ecosystems and natural resources possible. They constitute the material basis for the development of various socio-economic activities.

Figure 9.5 Costa Rica. Development cluster around RVNP.



Source: Salas et al, 2010.

The socio-economic activities involve productive input flows, which in turn result in the movement of money measured in monetary units. Additionally, the existence of the Park makes the generation of more qualitative services possible. They are related to the welfare of human populations and are not measurable in monetary measures. Examples include education, leisure time and information, which both the surrounding communities and national and foreign tourists receive. This implies an improvement in the welfare of these people because it involves a higher quality of life.

3.2.4 Systematization and estimation of RVNP contributions.

a. Local level.

According to data obtained through surveys, the total income generated by tourists who visit RVNP at the local level was about 281.8 million colons in 2009 (see Table 9.14). This income is distributed among the following groups of social actors: 13 families who own hotels and cabins, the family that owns the farm where the toll is collected, 32 families of workers hired in related activities, and owners of 60 hectares of forests in the RVNP buffer area.

Table 9.14 Costa Rica. Systematization of RVNP local level contributions.

Scope-scale of the contribution	Benefited activities and users classification		Type of contribution (good/service/externality) valued according to sources		% of contribution
	Type of activity	Type of user/benefited "stakeholder"	Income		
			Colons	US$	
LOCAL LEVEL	Hotels and cabins	Families who own the 13 hotels and cabins	182,224,276	328,332	64.7
	Salaries and employment in hotels and cabins	Workers of hotels and cabins, salary expenses.	44,827,001	80,769	15.9
	Payment of tolls	Family who owns the farm where the toll is collected	32,753,700	59,016	11.6
	Payment for Environmental Services	Owners of forests in the buffering area.	10,656,000	19,200	3.8
	RELATED ACTIVITIES				
	Coffee Bar, Grocery Store, Bazaar and Souvenir Shop	4 families from Curubandé district	1,650,372	2,974	0.6
	Salaries of the coffee bar, grocery store, bazaar and souvenir shop	Workers of the 4 related activities (salary expenses)	2,391,519	4,309	0.8
	Salaries of the employees of the tour operator	3 people from Curubandé district o	3,194,580	5,756	1.1
	Salaries and employment in restaurant	2 people from Curubandé district	4,137,035	7,454	1.5
Total Local Level Contribution			281,834,483	507,810	100.00

Source: Salas et al, 2010.

b. Regional level.

The total sum of these regional contributions from the Park amounts to approximately 2.3 billion colons or 4.2 million dollars (see Table 9.15). RVNP contains important water richness.[8] This production of water in the area is another of the main benefits offered by RVNP, both locally and regionally.

The water intake of the AyA Plant is located in the Liberia River (Zeledón, 2010). The so-called Channels of Santa Maria have their sources inside RVNP and feed the Liberia River (personal communications with Arias, Brenes, Carrillo and Chacón E, 2009). In this sense, the park provides an important environmental service by protecting water resources supplied for human consumption and irrigation (see Figure 9.6). This represents a positive impact at the regional level, which includes the canton's five districts: Liberia, Cañas Dulces, Mayorga, Nacascolo, and Curubandé, and its total population, which amounts to 46,703 people (INEC, 2002).

In 2009, the supply of water for Liberia canton is estimated to be approximately 7,015,614 cubic meters of water supplied to customers in residential, business and governmental sectors.[9] In monetary terms, this corresponds roughly to ¢2,852,206,477 billed to different users of the water provided by AyA Liberia.

Approximately 70% of the water supplied by AyA Liberia has a direct relationship with the existence and conservation of RVNP.[10] The remaining 30% comes from water intakes located outside the Park's area of direct influence.

Figure 9.6 Costa Rica. Water in the Channels of Santa María.

Source: Salas, F. 2010.

[8] It includes six rivers: Colorado, Negro, Aguas Verdes, Blanco, Tizate and Jala Piedras Rivers; and 9 streams: Martínez, Gutiérrez, Zopilote, Leiva, Argentina, Rancho Grande, Loquat, Mora, and Provision Streams.

[9] Calculation based on real data for the first semester, and figures projected for the second one. In this regard, the projection uses the Consumer Price Index (IPC) and inter-annual inflation of 4% as references. This is according to http://indicadoreseconomicos.bccr.fi.cr/indicadoreseconomicos.

[10] Figure that is estimated through own calculations based on Zeledón, 2010. In this regard, it is important to note the valuable contributions made by Masís during personal communication (2010) in terms of the quantification of the contribution of the Park for the supply of water. On the other hand, the Regional AyA Office in Liberia estimates such relationship at 25% (personal communication with Chacón, 2009). However, for the purposes of this report, the own calculation is used.

Table 9.15 Costa Rica. Systematization of RVNP regional contributions.

Scope-Scale of contribution	Benefited activities and classification of users		Type of contribution (Good/Service/Externality) Valued According to Sources		% of contribution
	Type of activity	Type of user / "Stakeholder" benefited	Income		
			Colons	US$	
REGIONAL LEVEL	Provision of drinking water by the regional AyA office in Liberia	70% of total drinking water users in the home, managerial, preferential and governmental categories	1,996,544,534	3,597,378	86.5
	Sales of goods and services related to tourism	Commercial business in Liberia and Upala	143,316,702	258,228	6.2
	GCA Biological Education Program	Primary and secondary school students from communities inside the GCA area of influence	80,000,000	144,144	3.5
	GCA Trusteeship	2 GCA officials and 1 ranger hired in the sector of Las Pailas	54,000,000	97,297	2.3
	Transportation of RVNP tourists from hotels	Families who own hotels and independent transportation	17,316,000	31,200	0.7
	Buying of fuel for transport	Fuel vending stations distributed in Liberia	12,000,000	21,622	0.5
	Pays for patents / licenses for hotels / restaurants	Municipality of Liberia	6,056,132	10,912	0.3
	Tour operators in Liberia	Business that sells tours of RVNP	4,628,905	8,340	0.2
TOTAL Regional Level Contributions			2,309,233,368	4,160,781	100

Source: Salas et al, 2010.

c. National level.

The total sum of these national contributions of the Park amounts approximately to 2.4 billion colons or US$ 4.3 million. The most important contribution at this level was that of the Tour operators and travel agencies (68.43% of the total).

Table 9.16 Costa Rica. Systematization of RVNP national contributions.

Scope-Scale of contribution	**Benefited activities and classification of users**		**Type of contribution (Good/Service/Externality) Valued According to Sources**		**% of contribution**
	Type of activity	**Type of user / "Stakeholder" benefited**	**Income**		
			Colons	**US$**	
NATIONAL LEVEL	Tour-operators and travel agencies	Companies in San José whose sales remain in Costa Rica by marketing RVNP	1,616,959,646	2,913,441	68.43
	Buying of fuel by tourists	In San José	524,573,901	945,178	22.20
	Income from tickets to the Park. NPF	MINAET to carry out management in other ASPs	199,843,050	360,078	8.46
	Payment for the service of electricity and internet	ICE	20,143,273	36,294	0.85
	Car rental	Companies from San José	1,546,785	2,787	0.07
	Transport of tourists (excursions)	Companies from San José	477,296	860	0.02
TOTAL National Level Contribution			2,363,066,655	4,257,778	100

Source: Salas et al, 2010.

d. International level.

The tourism cluster around the RVNP depends strongly on foreign visitors. In this sense, their movement from Europe and North America is made by air. This is the reason why every tourist must purchase an airline ticket to get to Costa Rica and then be transported to the Park. According to fieldwork, the average price of each airline ticket purchased was $2,000 in 2009. So, this study assumes that 100% of foreign tourists paid this ticket price, and that only a fifth of it (20%) can be related to RVNP because all-inclusive packages consist of an average of five tourist destinations, one of which is RVNP.

Taking into account these adjustments, the income generated by RVNP at the international level amounts to ¢7,811,476,815 (US$ 14,074,733). This figure represents the largest contribution reported by the Park in 2009, that is, 68% of the total contributions.

3.3 Palo Verde National Park[11].

3.3.1 Geographic location.

Palo Verde National Park became part of Rancho Colmeco in 1923. The Palo Verde lagoon and its surrounding areas were declared a Wildlife Refuge in 1977, and it was called Dr. Rafael Lucas Rodríguez. In 1978, a sector known as Catalina was declared Palo Verde National Park, and this one merged with the Dr. Rafael Lucas Rodríguez Refuge, resulting in what is now Palo Verde National Park. PVNP was created according to decree number 20082-MIRENEM from December 10, 1990 (ACAT, 2009).

Figure 9.7 Costa Rica. Palo Verde National Park in Dry Season.

Source: U. Chavarría. 2009

[11] The first version of this part was published on Moreno, et al, 2010b.

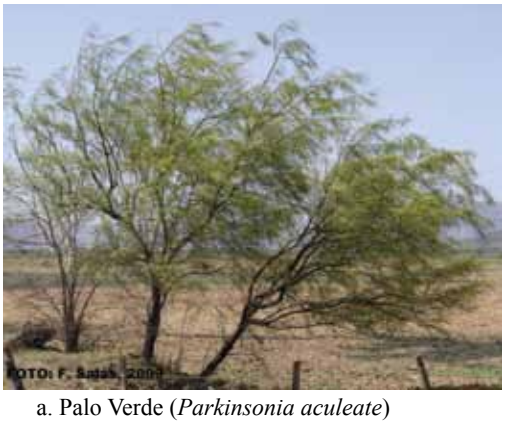
This Park has an extension of 19,800 hectares (198 km^2), [12] and its maximum elevation is 268 m.a.s.l. at Pelón Hill, located in the Catalina sector (ACAT, 2009). Approximately 60% of this area (11,050 hectares) corresponds to wetlands (Castillo & Guzmán, 2004).

3.3.2 Importance of PVNP.

This National Park is one of the places of greatest ecological diversity in the country with more than 12 different habitats. Among them are brackish and fresh water lagoons and swamps, grassy areas with black mangrove trees, mangroves, grasslands, stocky lowland forests, mixed deciduous forests on the plains, mixed forests on limestone hills, riverside or gallery forests, wooded savannas, waterlogged forests and evergreen forests. Besides, it has large concentrations of aquatic and wading birds (ICT, 2009) (See Figure 9.8). There are 6 species of mangrove found in Costa Rica; 5 of them can be found in Palo Verde National Park (ACAT, 2009).

The main life zone in PVNP is dry tropical forest. It is one of the last three dry tropical forests that remain in Middle America (SINAC, 2009b). The dry tropical forest presents a dry season with an average duration from 5 to 6 months, usually from mid-December to mid-May (ACAT, 2009). During this season, many trees lose their leaves and PVNP lagoons dry up and only some bodies of water remain.

Figure 9.8 Costa Rica. Biodiversity PNPV.



a. Palo Verde (*Parkinsonia aculeate*)

b. Jabirú (*Jabirú Micteria)*

[12] In terms of the extension of PNPV, several amounts of hectares are available. In this regard, the introduction mentioned the figure provided by SINAC, that is, 18,418 hectares.

3.3.3 Cluster analysis around PVNP.

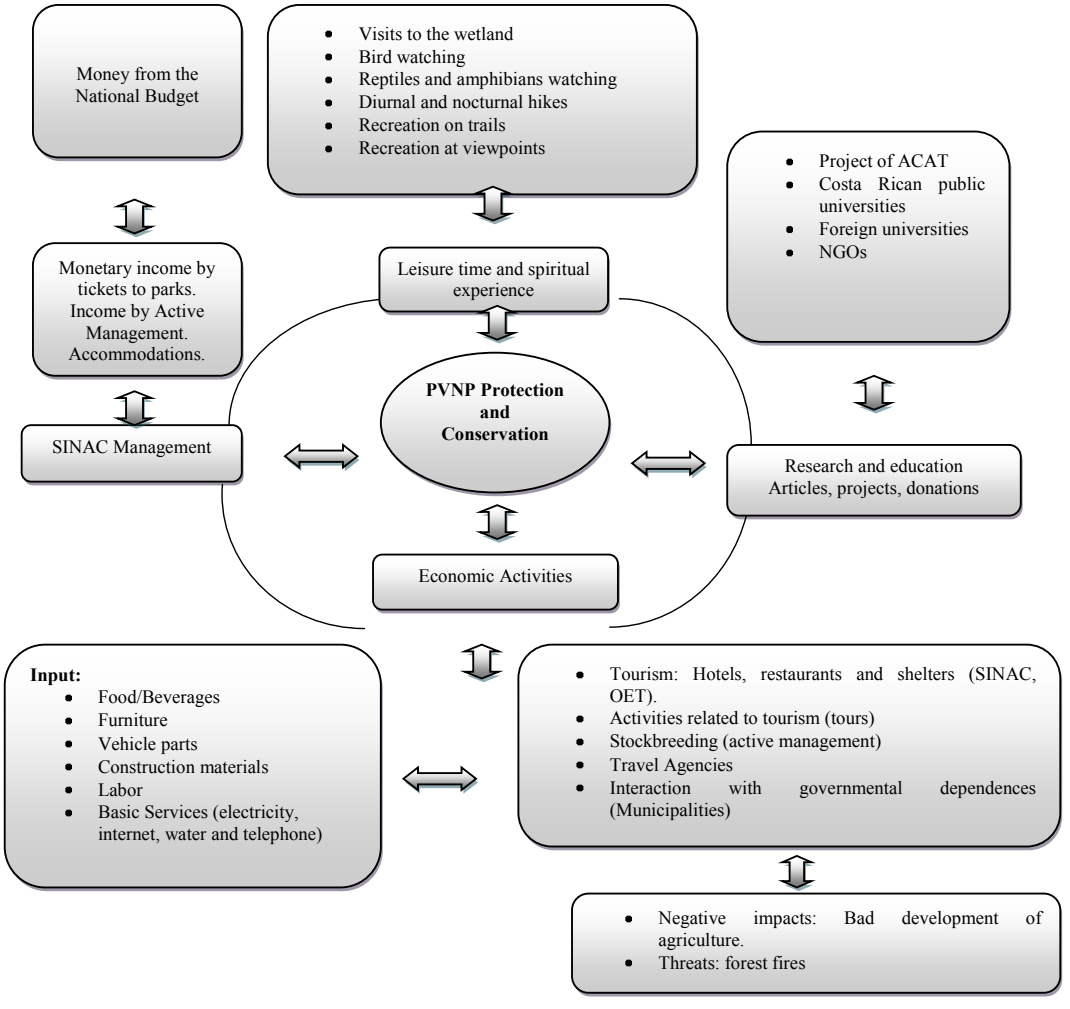
Following the cluster methodology, the PVNP case study provides an analysis of socio-economic contributions based on this methodology at the local (communities of Falconiana, Bagatzi, Bagaces, Bolsón and Puerto Humo), regional (Cañas and Liberia), national, and international levels. Based on this approach, different productive activities in the conglomerate and related to PVNP are identified. In particular are research, which includes its related activities, and tourism, which, in turn, is dependent on the environmental services that come from the Park or its surroundings (i.e., scenic beauty and the existence of wetlands).

The existence of a Biological Station of the Organization for Tropical Studies (OET) inside the PVNP sets out important chains identified as part of the socio-economic conglomerate associated with the Park. This category includes research, education, leisure time and spiritual experience. All these activities are directly related to conservation and management of PVNP under SINAC administration. The core activity upon which all the activities developed around the Park are based is governmental conservation and natural protection. This activity is related to the positive *externality* provided by the natural heritage of PVNP and its ecological services, allowing the existence of other chained effects on development (e.g., research and education, economic activities, leisure time and spiritual experience).

The interactions among the various productive, commercial and recreational activities have interesting feedback with the central axis of the cluster formation, that is, the activity of conservation and protection of PVNP. Thus, research and education, park management by SINAC, as well as related activities, are largely determined by the existence of the Park. At the same time, these activities provide resources in the form of income from funds for research, accommodation, entrance fees or transfers to the SINAC and the OET. Indirectly, these activities generate contributions to local development through investments in infrastructure and services that enable greater visitation to the park and, hence, the zone of influence.

Figure 9.9 shows the development cluster around PVNP. In this regard, protection and conservation of ecosystems and natural resources from the Park constitute the center or dynamic pole of the cluster.

Figure 9.9 Costa Rica. Development cluster around PVNP.



Source: Moreno, et al, 2010b.

3.3.4 Systematization and estimation of PVNP contributions.

a. Local level.

The local contributions of economic activities that are developed due to the existence of PVNP in 2009 amounted to 326 million colons (US$ 567,344), which represented 29.53% of the total contributions. As mentioned above, the local level refers to all those income

from activities that are developed in PVNP, or in the communities of Bolsón and Bagaces, which were described and classified in the previous section. According to Table 9.17, the largest contribution to the local level in 2009 was produced by the recruitment of labor force from the area, and it represented 53.64% of the local contributions.

Table 9.17 Systematization of PVNP local contributions for 2009.

Scope-scale of the contribution or benefit	**Benefited activities and classification of users**		**Type of contribution (good/service/externality) valued according to sources**		**Observations**	**% of Contribution**
	Type of activity	**Type of user/benefited**	**Income**			
			Colons	***US$***		
LOCAL LEVEL	Donation by Tempisque River Tour visitors	SINAC	¢26,410,708	$46,461	In 2008 15,487 visitors were received who did the Tempisque River Tour	8.09
		Owner of the land	¢26,410,708	$46,461		8.09
	Hotels, cabins and shelters	Business owners	¢31,289,511	$55,044	Correspond to income generated that are distributed at the local level for the smooth running of shelters	9.58
	Stockbreeding	Local stockbreeders	¢14,192,773	$24,544	Correspond to the payment of the stockbreeding concession	4.35
	Tours by boat	Local boatmen	¢3,417,544	$5,910	Few are the expenses on salaries, cleaning and operations.	1.05
	Veterinary Surgeries	Business owners	¢7,217,986	$12,482	Few are the expenses on salaries and public services.	2.21
	Restaurants and Coffee Bars	Business owners	¢0	$0	Fieldwork	0.00
	Other activities (supermarkets, butcher's shops, gas stations.)	Business owners	¢3,330,432	$5,759	Fieldwork	1.02
	Purchases from suppliers	Suppliers (Food and Beverages, souvenir shops, other implements)	¢39,155,239	$67,712	From the expense on purchases from suppliers made annually	11.99
	Generation of employment in the area and payments for salaries	Around 200 people who work in hotels, cabins and related activities	¢175,195,216	$302,971	In all the surveyed activities	53.64
Total Local Level Contribution			¢326,620,118	$567,344	Total Percentage of Contribution	100
Percentage of participation in total income generated						29.53%

Source: Moreno et al. 2010b.

b. Regional level.

The regional contributions of economic activities that are developed due to the existence of PVNP in 2009 amounted to about 17 million colons (US$ 31,313), which represented 1.58% of the total contributions. As mentioned before, the regional level refers to all those income that are reflected in economic activities in Cañas and Liberia and that are related to the existence of PVNP. According to Table 9.18, the largest contribution to the regional level in 2009 was produced by the purchase from suppliers of food, beverages, souvenirs and others, and it represented 64.73% of the regional contributions.

Table 9.18 Costa Rica. Systematization of the Regional contributions of PVNP 2009.

Scope-scale of the contribution or benefit	Benefited activities and classification of users		Type of contribution (good/service/externality) valued according to sources		Observations	% of contribution
	Type of activity	Type of user/benefited	Income			
			Colons	US$		
REGIONAL LEVEL	Transportation Taxi	Operator of the service in Guanacaste	¢3,044,235	$5,355	Calculation of transportation according to tourists and researchers	17.42
	Purchases from suppliers	Suppliers (Food and Beverages, souvenir shops, other tools)	¢11,311,933	$19,562	Purchases from suppliers from Cañas, Liberia and other regions near the area	64.73
	Policies and permits for navigation	From 10 boatmen	¢3,120,000	$5,396	300,000 for policy and 12,000 for annual permit	17.85
Total Regional Level Contribution			¢17.476.168	$30.313	Total Percentage of Contribution	100
Percentage of participation in total income generated						1.58%

Source: Moreno et al, 2010b.

c. National level.

The contributions at the national level of the economic activities developed due to the existence of PVNP in 2009 amounted to 679 million colons (US$ 1,193,217), which represented 61.41% of the total contributions. As mentioned previously, the national level refers to all those income that are reflected in economic activities in San Jose or in other cities far from the regional level and that were described and classified in the previous section.

According to Table 9.19, the largest contribution to the national level was received by car rentals (48.71%) because visitors rent cars in San Jose to then go to PVNP. This represents the biggest amount due to 53% of the tourists interviewed renting cars to visit the park, as did 9% of researchers. However, given that car rental agencies do not have information about where their customers go, it was not possible to investigate with these entities.

Table 9.19 Costa Rica. Systematization of PVNP national contributions for 2009.

Scope-scale of the contribution or benefit	Benefited activities and classification of users		Type of contribution (good/service/externality) valued according to sources		Observations	% of contribution
	Type of activity	Type of user/benefited	Income			
			Colons	*US$*		
NATIONAL LEVEL	Payment for electricity	ICE and other services	¢1,835,496	$3,174	It corresponds to the percentage of payment of hotels, restaurants, related activities associated with the park	0.27
	Purchases from suppliers	Suppliers (Food and Beverages, souvenir shops, other tools)	¢43,238,754	$74,774	From the expense in purchases from suppliers, the total was divided into 50% who buy in SJ and 50% in the area of Limón.	6.36
	Tickets for the Park.	Income for MINAE-SINAC by admission to PVNP.	¢16,407,267	$28,374	Tourists, 2009. SINAC regional.	2.42
	Transportation by renting cars	Rent-a-car	¢330,938,011	$582,177	*Calculation based on the* information obtained from tourists, researchers and professors who came by these means, on average 12 days/car and 6 days/bus.	48.71
		Rent-a-Bus	¢68,811,476	$121,051		10.13
	Transportation by bus	Enterprise in San José	¢2,632,094	$4,552	Calculation based on tourists, researchers and students who answered	0.39
	Sale of gasoline	Gas Stations	¢5,480,859	$9,642	11% of tourists and 6% of the interviewed researchers said the amount they spent on gasoline was $41.50 approximately	0.81
	Tour-operators and travel agencies	Enterprises in San José whose sales remain in Costa Rica by marketing PVNP	¢210,026,693	$369,473	From the applied surveys, only 20% of tourists and 2% of students traveled through a travel agency or tour operator, with a cost of the package being approximately $3,144 and $1,333, respectively, combined with the income of the agencies coming from the tour to the park	30.91
Total National Level Contribution			¢679,370,650	$1,193,217	Total Percentage of Contribution	100
Percentage of participation in total income generated						61.41%

Source: Moreno et al, 2010b.

4. Conclusions

4.1 Regarding the national level.

The relevant contributions of NPBRs to the national economy, systematized in the previous sections, have been the result of both a comprehensive bibliographical review (approximately 241 documents consulted for this purpose that are systematized in a project database) and consultations with experts (about 30 people from different institutions, such as the SINAC, Keto Foundation, General Directorate of Civil Aviation, JASEC, ICT, ICE, CATIE INCOPESCA NEOTROPICA, TNC, AyA, CORCOVADO Foundation, FONAFIFO, International Conservation, CNFL, MINAET-COOPEGUANACASTE, COOPELESCA, COPESANTOS, COOPEALFARO RUIZ, and so forth.

In this review, supplemented by a consultation of secondary sources of statistical information, it appears that most of these references have, in one way or another, socio-economic data at various levels (institutional, local, regional, national). However, it should be noted that such information is relatively small and widely dispersed, making it difficult to systematize and measure the main contributions identified at the national level in this chapter. However, its analysis has allowed the following conclusions to be reached as an empirical synopsis and with an agenda to follow up on.

a. Scale of the study.

Although it has tried to identify and systematize the most important contributions of NPs and BRs to the socio-economic development in the perspective that it differentiates among the spatial-territorial scales of the place (NP), area or region (CA) and country (institutionalism), the scale that has prevailed with respect to data and results found is the national level. This, undoubtedly, implies a certain bias toward the general and little precision regarding the activities and contributions identified and systematized.

b. Socio-economic contributions of NPBRs.

The contributions of NPBRs to the socio-economic development at local, regional and national levels are difficult to identify as belonging to the parks and reserves since the information found is spatially located at the geographic and territorial fields of the CA. Then, the real contributions of these to the national development are primarily given indirectly. This is because the protected areas studied as a whole so far have complex ecological functions and environmental services that generate multiple benefits (e.g., biodiversity), but this is very difficult to attribute to a particular NPBR within the CAs.

c. Quantification.

The synopsis shown in Table 9.1 presents the numerical information found at the national level and empirically aggregated about the main activities or contributions identified in

this study and listed in the chart according to its relative economic importance, namely: (1) tourism aimed primarily at nature with their related services; (2) generation of electricity through the use of water coming from NPBRs for hydroelectric projects; (3) employment generation, the corresponding wages paid to SINAC officials and wages paid for some economic activities developed around the existence of some NPBRs; (4) MINAE income as tickets charged; (5) conservation of MINAE-SINAC wildlife protected areas as fixed costs and investments in the administration and maintenance of the NPBRs; (6) purchasing of lands for the expansion of existing NPBRs or the establishment of new ones; (7) payment for environmental services (PSA) aimed at protected areas for their conservation and maintenance; and (8) research on biodiversity and, as such, generation of profit through bioprospecting.

d. State of knowledge.

In any case, the systematized information in the previous sections has enabled showing the accumulated knowledge on how the SINAC has been innovated regarding institutional and organizational conservation and development matters. While measuring the socio-economic contributions of the NPBRs at the national level has been relatively short, the information found and evaluated so far is valuable and has the merit of having generated new knowledge. An example of the added value of knowledge leading to improvements in the future is the obvious need for a realignment of the existing national accounts, constructing *satellite accounts* specifically aimed at the income generation in productive and reproductive activities that are linked to NPBRs through development clusters. Thus, one could proceed to identify, assess and account more adequately for the contributions of the corresponding NPBRs, for example, for the environmental services related to water, carbon sequestration, scenic beauty, the benefits provided by biodiversity & biosprospecting, and so forth, without implying that these, so difficult to quantify contributions, must be quantified (in monetary terms) through the economic valuation of resources.

e. Perspectives.

As part of the efforts still pending and outlined in the previous points, it is considered that the most concrete application of *cluster analysis* approach in combination with the *evaluation of chain*, as mentioned in Chapter 4, can be very useful to face the problems of information and estimation made evident in this chapter. In particular, with respect to the case studies below, it can be seen that this approach allows identifying and understanding the network of induced socio-economic activities and chained around the Corcovado, Rincon de la Vieja and Palo Verde National Parks in two ways. One concerns the productive and socio-economic cluster, as such, in its context of innovations already under way and unresolved as potential for further development. The other one corresponds to the existing or even emerging social, organizational and institutional networks at the community level of the NP. In these terms, the cluster is not only socio-economic but also

social-communal, which will be very important for a co-venture management between the state and civil society that could overcome many of the irrationalities and inefficiencies still evident in the administrative and financial management of NPBRs.

4.2 Case studies.

4.2.1 Corcovado National Park and "Isla del Caño" Biological Reserve (CNP-ICBR)

Both ASPs exist with very clear objectives of conservation and protection of biodiversity and natural richness in the area, with the possibility of being visited and appreciated with recreational purposes under certain rules and restrictions. However, there have been a series of activities that provide support to visitation, particularly commercial activities that have direct and indirect relationships with tourism.

Among the most important **qualitative contributions** of CNP-ICBR are leisure time, experience and spirituality. These reflect the satisfaction and welfare derived from a non-use value that is not quantifiable in monetary terms but that is the motivation and purpose of the tourist visit to these areas (scenic beauty, cultural value and biodiversity).

With regards to the approximate **quantitative contributions** in terms of monetary income based on the primary and secondary information collected in this case, it was estimated that CNP-ICBR generated a total income of almost 48.1 billion colons or US$ 91.5 millon. This total contribution has been influence differently at the socio-geographical levels also considered for a study, namely, local (45%), regional (10%), and national (45%) levels.

It should be noted that despite the large amount of economic resources that result from the existence of CNP-ICBR, the impact on the communities of Puerto Jiménez and Drake are not reflected in greater development and better quality of life for their inhabitants. This income is distributed in a few hands; the wealth has been concentrated in mainly foreign hands. Wealth distribution mechanisms should be improved so that entrepreneurs invest more in the development of both communities and their inhabitants, who then can improve the availability of better services for tourists and more skilled labor forces for their businesses.

However, the process of income distribution is only the tip of the iceberg in terms of to what the state and local governments should pay attention. Additionally, the generation of local capacities to develop entrepreneurship businesses with financing programs available should be invested in. Just to cite some examples: related to tourism, neither of the communities use knowledge of local artisans for the production and sale of indigenous crafts, which clearly is a market niche; with regard to traditional Costa Rican cuisine, there are no quality options for visitors (the marine diversity of the region is not exploited); organic agriculture at local and regional levels could be another important source of income for their inhabitants, becoming suppliers for hotels and mainly restaurants; lastly,

a number of other personal services not directly linked to tourism but necessary can be developed locally if villagers are provided technical advice and financial support.

Social organization is one of the weaknesses in both communities. An accompaniment to the education of social groups, either through associations or other different groups, is necessary so as to enable the implementation of community projects with mutual benefits, even involving protection and conservation of the environment given the region's characteristics. There are people interested in leading different processes, but support and assistance by the State and various NGOs that have influence in the area are needed. Social organization is vital to the protection of the rights of these communities in economic, social and environmental terms while it may also enable the exploitation of new opportunities for development.

4.2.2 "Rincón de la Vieja" National Park (RVNP)

Among the most important **qualitative contributions** of RVPN, the spiritual experience, recreation and leisure time, represented by the scenic beauty of craters, lagoons and fumaroles, are highlighted. It is also important to mention the protection of biodiversity and water sources as the most important environmental services in the area and the natural heritage value that tourists and the communities near the Park give them. Moreover, the provision of water represents one of the main contributions of the Park to local, regional and national development. Clearly, water valuation approaches, as part of various income generated at present, will undoubtedly be of vital importance for the future to be exploited for human consumption purposes (including tourism).

As regards the approximate **quantitative contributions** in terms of monetary income based on the primary and secondary information collected in this case, it was estimated that RVNP generated a total income of almost 12.8 billion colons or US$ 23 million in 2009. This total contribution has had different influences on socio-geographical levels considered for a study, namely, local (2.2%), regional (18.1%), national (18.5%) and international (61.2%) levels.

The development of economic activities related to RVNP has increasingly been becoming an almost forced way, as there are no other options for employment and income to people in the area. On the other hand, tourism dynamics in Curubandé district have the potential to expand more and diversify in the future (in favor of other entrepreneurships that generate more income at the local level). This depends on the local capacity to take advantage of public, community and entrepreneurial opportunities to promote ecotourism and generate infrastructure and greater linkages with the hotels established locally.

Regarding the future of local and regional development, the weakness in the capacity of inhabitants of Curubandé district to insert themselves more actively in the tourism cluster generated around RVNP should be addressed properly. As the presented charts show, the

related activities represent only 4% of the contributions at the local level, as higher income remain concentrated in productive activities that provide attractive goods and services to tourists (65% associated with hotels and cabins). In this regard, it is important to facilitate processes of creation of capacities, entrepreneurship and synergies for local communities to receive a greater proportion of income associated with the Park.[13]

Thus, the cluster of tourism and related activities around the RVNP could contribute even more than it has up to now to the interactive dynamics between biological conservation and local development.

4.2.3 Palo Verde National Park (PVNP)

The effects of conservation and visitation of PVNP on the national economy are indisputable. Such contributions would have been much larger at present and even more sp in the future if adequately considering and counting the contributions that PNPV provides in terms of environmental services at the national level were possible. In particular, the social value of conservation of wetlands and biodiversity that inhabits them and whose scenic beauty is highly appreciated by their visitors.

Among the most important **qualitative contributions** of PNPV, the spiritual experience, recreation and leisure time represented by the scenic beauty of wetlands and specific ecosystems of the area, are highlighted. Also, it is important to mention the protection of biodiversity as one of the most relevant environmental services in the area, as well as the value of natural heritage that tourists and surrounding communities give the Park.

With respect to approximate **quantitative contributions** in terms of monetary income based on primary and secondary information gathered in this case, PVNP generated a total approximate income of ¢1,106,217,230 (US$ 1,936,446.4) in 2009. This total contribution has had different representations in the socio-geographic field considered in the study, namely, local (29.53%), regional (1.58%), national (61.41%) and international (7.48%) levels.

With respect to the future of the local and regional development, the weakness in the capacities of inhabitants from the towns of Bagatzi and Falconiana to insert themselves more actively in the cluster of economic activities generated around PVNP should be addressed properly.

Another important aspect is the coordination that must be carried out with agricultural companies and public and private institutions that work in the area to mitigate the effects the usage of fertilizers and floods caused by the irrigation system are having in PVNP.

[13] For example, tour guides say that they transport tourists to a fast food restaurant located in Liberia because in the surroundings of the Park there is no a business that meets quality standards demanded by visitors. In this sense, the suggestion involves establishing a typical food restaurant with conditions regarding hygiene, quality and price that allow these tourists to stay in Curubandé district for lunch after visiting RVNP. Moreover, at least one of the people who work in the restaurant must have English language skills.

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Chapter 10

Contributions of the Existence of Protected Areas in Benin

Anne Floquet

1. Introduction

Public funds and many public and private efforts have been put into conservation over the last decade in Benin and still are. They may be seen as investments into natural stands, basic infrastructures and institutions, which now yield benefits. In Benin, benefits from conservation are manifold (see Table 10.1), as already featured when discussing methodological adjustments.

Benefits are derived from harvests within protected areas, which may be more or less sustainable when concerning, respectively, non wood forest products (NWFP) on one hand, and timber and fuel wood on the other hand, the latter becoming a possible cause of destruction of the whole habitat. Local hunting and fishing also concern many rural dwellers. As for logging and charcoal processing, such activities can easily reach a non sustainability threshold. The effects of NWFP on conservation, as suggested earlier in the text, may be negative; however, in many cases, user rights on valuable products are incentives to their protection. The case studies presented here provide elements for further reflection on this issue.

State owned protected areas under co-management dispose of transition or buffer areas, where local users may negotiate rights, including farming and grazing rights. Only those activities which have been promoted by protected area management or co-management authorities have been taken into account. Such activities might have existed without any conservation but not to the same extent. Consequently, organic farming actively promoted in the Pendjari Reserve transition area is taken into account but not the usual farming activities that would have been conducted anyway. Cashew plantations, which have been actively promoted around some gazetted forest and the benefits derived from processing and trading their harvests, have also been attributed to the areas under conservation although the activity is also expanding in other areas.

Protected areas also yield benefits outside of their borders. This is especially the case for fishing, where benefits from keeping parts of gallery forests, swamp forests or mangroves under conservation upstream benefits fishermen located downstream. In two case studies, these externalities were taken into consideration in surveying fishers near the protected area.

Table 10.1 Benin. Main activities developed in and around protected areas.

Activities	Importance			Taken into account in this work
	Gazetted forests and areas nearby	Biosphere reserve and areas nearby	Community forests and wetlands	
Timber logging	xxx		(x)	X
Fuel wood and charcoal	xxx	x (only for consumption)	x	X
Poles	X		x	
NWFP harvesting				
- Shea nut	xx			X
- Locust bean	X			X
- Oil palm	x (riparian forest)		x	
- Raffia and rattan palms			xx	X
- Other fruits and edible products	X	x	x	
- Medicinal plants	X	x	xx	
- Grasses and other plants for wrapping, weaving, etc.			x	
- Honey harvesting from wild bees	X			x
- Chewing sticks	X			
- Snail gathering			x	x
- Other plants and animals used for food, religious purpose, etc.	X	x	x	
Apiculture	(x)	x		x
Farming	X	(x) in transition areas	x	
Grazing and tree fodder	X	(x)		
Biological farming		x		x
Cashew plantation as buffer	xx			x
Fishing	X	xx	xx	x
Hunting for food and trade	xx	xx	(x)	x
Trophy hunting		xxx		x
Vision tourism		xxx	x	x
Ecotourism and eco-volunteers		x	x	x
Research	X	xx	x	x
PA management	xxx	xxx	(x)	x
PA co-management (Control and monitoring, forest rehabilitation, guiding, etc.)	X	xx	(x)	x

Source: Own elaboration

Benefits are derived from the amenities created by conservation. Tourism has developed over the last decade and has been yielding increasing benefits. It has not been (and could not be) designed as mass tourism but has been gradually including ecotourism elements. This study attempts to analyse how the benefits profit local, regional and national stakeholders.

Benefits might be derived from environmental externalities of the areas under conservation, but these externalities are not valued directly. Global benefits, such as the reduction of GHG emissions by better conservation of protected areas, might become a source of funding, for example, but are not currently valued as such. The valuation of such benefits may be seen as included in public funding and donors' contributions to public management of protected areas, but this does not constitute a real incentive to conserve because there are no differences in benefit allocation according to performance.

A share of the revenues generated by protected areas is then allocated to local stakeholders in charge of co-management and maintenance activities.

Researchers are interested in protected areas and also get funds to perform research on specific topics. Many of these topics are related to issues park managers have to deal with and some with inventories of biodiversity, which give arguments for more formalized and intense conservation (i.e., discovery of new endemic species, assessment of threats on some others). Educational activities are also conducted in protected areas for local people, and protected areas also attract young people from abroad as ecovolunteers.

Protected areas concern many stakeholders for a very large range of uses. Indeed, in each area, local people use around 70 different species, which differ from one ecological area to another. At the local level, activities surveyed had to be selected according to monographic survey results and focused on traded products. Some minor activities were not taken into account, which may contribute significantly to home consumption. Also, transhumance and local livestock husbandry using grazing, water and fodder in protected areas on a seasonal basis were not appropriately tackled. People in irregular situations, such as Nigerian fishermen settled in Benin also first escaped the attention of the team, and they were not keen on being surveyed.

At the national level, no synthetic data were available on the main clusters and chains developed, and a broad literature review was performed first on a large set of non wood forest products as well as on timber, charcoal, game, etc. There were very few data on the contribution of such activities at the national level, and even less on the specific contribution of protected areas. Statistics are scanty, and if available, express results in all kinds of units, which make their use difficult and sometimes diverging. A recent attempt to construct an account of the forestry sector reflects this difficulty (Bertrand & Agbahungba, 2009).

Many of the benefits at the national level are, therefore, derived from extrapolating the results from the case studies after an assessment of the overall state of the considered

activity. Some benefits could not be measured at all, and national accounts are, therefore, under-evaluated. But, even then, the general picture is striking and can be used as a source of reflection on future strategies in favour of conservation and poverty alleviation. It should also be used for new assessments based on additional surveys and systematic mobilization of key informants using Delphi methods.

Another concern for aggregation at the national level has been the listing of *community protected areas*, which should be taken into consideration at the national level. Community protected areas, as a new emerging concept, has no standard definition in Benin and may range from any natural stand, where some locally agreed management rules apply to areas soon formally recognized by Law. In this field, many pilot experiences are still on-going and the Wildlife Management Centre (CENAGREF) has made one of its objectives to develop a procedure for the promotion of such areas, including formal recognition. A few community protected areas are also recognized by communal authorities and some have been actively promoted by the Beninese Environmental Agency (ABE). Regarding this, efforts were concentrated on community protected areas where specific actions are undertaken with the purpose of conservation. At the national level, few data have been collected on the actual and potential benefits derived from such conservation efforts (i.e., public investments in these areas and a few ecotourism accounts (UICN Comité Français (2009)).

In this chapter, the three contrasted study cases will be presented first, followed by the national account based on national data and tentative aggregation of collected data. Results have been cross checked as much as possible with results from other research and inventories and with existing statistics.

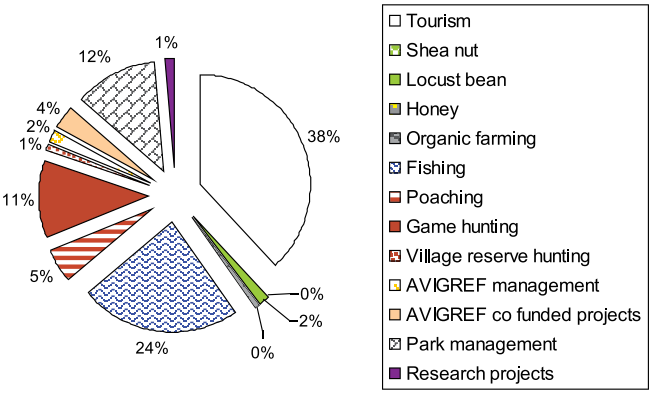
The three case studies display very different profiles of resource use and benefits reflecting their respective specific status and locations (see Figure 10.1).

The Pendjari Reserve generates income in four sectors. Amenities created by the conservation of the exceptional fauna combined with some improving infrastructure attract tourists and trophy hunters; thus, tourism generates more than half of the value added by conservation. Non timber forest products generate around one third of the value added, with a large contribution of fishing in the Pendjari River. The remaining share of the value added is created by park management and park co-management by the riparian village associations (18%). At large, benefits are generated by activities which are compatible with resource conservation and under control of the co-management authorities (except 5% value added by poaching chain).

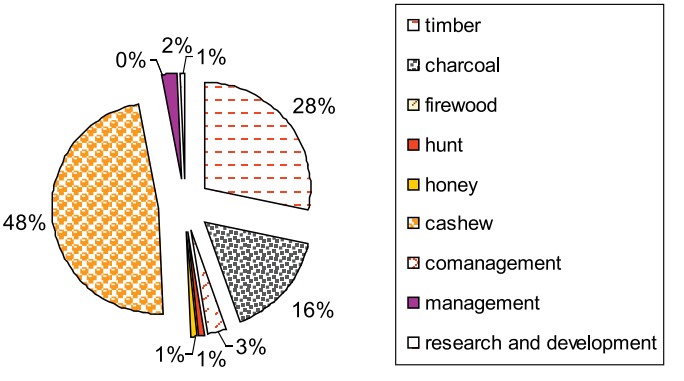
In the TTK gazetted forests, value is added by two sectors. Timber logging (largely illegal), charcoal and fuelwood account for 49% of the value added by the area, and cashew plantations encouraged in the transition zone near the forest or within the forest amount to 48%. Nearly no activities relying on conservation and encouraging it can be found.

Figure 10.1 Benin. Comparative structure of the value added generated by three protected areas.

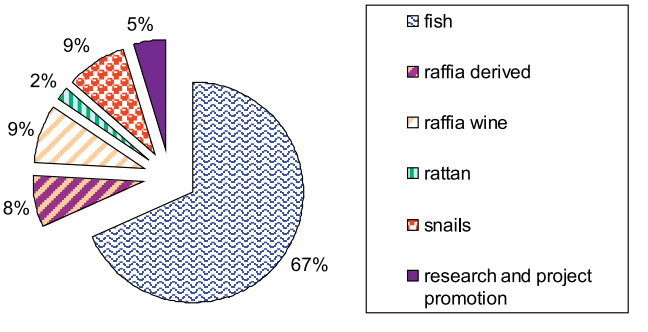
Structure of the added value generated by the Pendjari National Park and its adjacent lands



Structure of the added value generated by the TTK gazetted forest and its adjacent lands



Structure of the added value generated by the Hlanzoun and its adjacent lands



Source: Floquet et Alladatin, 2010 ; Floquet et Lawani, 2010 ; Floquet etal. 2010.

In the community protected Hlanzoun swamp forest and its adjacent lands, the next lake located downstream was considered to draw profit from the conservation upstream. Nearly all benefits are driven out of the Non Wood Forest Products and from fishing. Research and development activities, which are conducted in preparation for the formalization of the status of the community reserve and for tourism promotion, account for 5% of the value added.

2. Pendjari Biosphere Reserve

2.1 General information about the Pendjari Reserve.

The Pendjari Biosphere Reserve is part of the largest group of protected areas in West Africa (W-Arli-Pendjari) that cover about 50,000 km² in 3 countries (Niger, Burkina Faso and Benin). It was first delimited as a fauna reserve in 1954, and then upgraded to a national park in 1961. Designated Pendjari Biosphere Reserve (PBR) in 1986 by UNESCO, it was officially recognized in 1994 by the Benin Republic. Biosphere Reserves are constituted of areas under total conservation and areas where activities are developed for the livelihoods of riparian populations.

It is located at the extreme North-West of Benin Republic (11° - 12° North and 0°30 - 2° East). Its northern limit is represented by the Pendjari River, which gives its name to the Park and attracts rich and varied fauna. The Biosphere Reserve covers an area of 480,000 ha, including the National Park (PNP; 275,000 ha) and two hunting areas (ZCPs; respectively, 180,000 ha and 25,000 ha). The National Park itself contains three areas under total protection (102,800 ha) and areas open to visitors. Cynegetic areas build a first protection belt or *buffer zone*, where limited trophy hunting activities are conducted and even more limited gathering activities can be authorized. At the southern borders of the reserve, a five km wide transition zone has been delimited for controlled uses (ZOC), including farming and animal grazing. The area was demarcated in 2002 in order to prevent further encroachment of farmers and pastoralists in the cynegetic area. Activities in the transition zone and the cynegetic areas are conditioned to contracting with park administration.

The Pendjari River and its tributaries and ponds, as well as diversified vegetation spots, attract rich fauna. The density of the wildlife, the diversity of the vegetation and the concentration of animals around and in the ponds in the dry season makes the Park very attractive to visitors and important for biodiversity conservation in the whole WAPOK regional complex.

Figure 10.2 Benin. Pendjari Biosphere Reserve. Wild Fauna and surrounding communities.

a. Main Entrance Pendjari Biosphere Reserve (PBR).

b. Elephants in PBR.

c. Roan antelope (*Hippotragus equinus*) in PBR

d. Confiscated poachers bikes in front of the U-AVIGREF office in Tanguiéta near PBR.

e. Smoking fish – a women processing activity near PBR

f. Protection of the Pendjari River banks yields high externalities in term of fish near PBR

Source: Floquet, A. 2010.

Pendjari National Park is a refuge for cheetahs (*Acinonyx jubatus*), lions (*Panthera leo*), side-striped jackals (*Canis adustus*), elephants (*Loxodonta africana*), hippopotamuses (*Hippopotamus amphibius*), leopards (*Panthera pardus*), ten antelope species, four monkey species, many reptile species, about 470 bird species and other species. Stable populations of buffalos, roan antelopes (*Hippotragus equinus*) and even lions make it possible to set up yearly small, but attractive, shooting quotas in the cynegetic areas. (Figure 10.2).

Thirty thousand people are living in 20 villages at the southern fringes of the Reserve. They depend on the transition areas and on further income derived from the Park. Some of them were displaced when the transition area was delimited and encroachment stopped. Others had to change their shifting cultivation practices because their progression is now hemmed on one side by the transition area and on the other side by the Atacora Mountains. Grazing land availability has also suffered from these restrictions.

Riparian people are related to local markets in both the Municipalities of Tanguieta and Materi, where basic infrastructures can also be found. These two Municipalities build the local economy of the area.

Local people mainly live on farming or semi sedentary livestock-keeping. Fishing may be an additional income generating activity. Gathering concerns nearly every household, in most cases, for home consumption or very local trade. Considerable seasonal migration movements of pastoralists and fishers are observed. Cattle are supposed to stay on the Burkinabe side of the River and enter Benin in Porga in the transition area. Fishers have to obtain permits in order to establish their seasonal camp on the Pendjari River for 4 months. (Figure 10.2).

The Park is an administrative entity of the National Centre for Wildlife Management (CENAGREF), but it disposes of some management autonomy. Its main activities are to control that regulations are observed (i.e., anti-poaching units, fire control), to monitor wildlife, to facilitate the co-management of riparian village associations, and to promote tourism. It gets 30-35% of its financing from visitors' entrance fees and from trophy hunters.

The reorganization of the cynegetic areas was the first step of a new strategy in the Biosphere Reserve. On one side, areas are leased to private operators, who can organize the venue of income rich trophy hunters (around sixty per year); these operators also have to control their areas and contribute to its management for their own sake and the sake of the reserve. On the other side, village associations obtain 30% of the gross revenues from the hunters (shooting fees are rather high), the game meat and all jobs as guides, beaters, cooks, etc. This benefit sharing and the recognition of village associations as partners in co-management were made mandatory in 2004 by the decrees of the 2002 Wildlife Law.

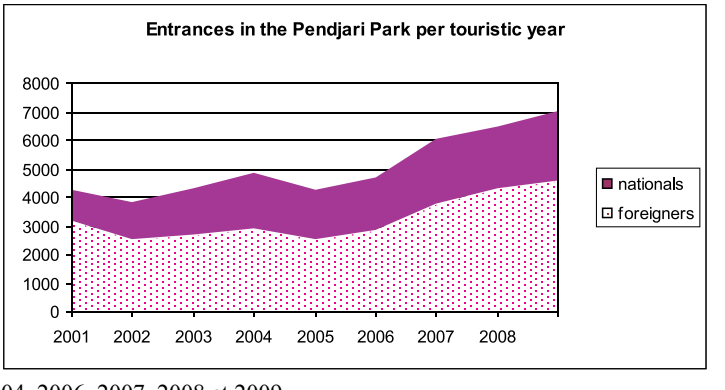
Co-management was extended to overall control activities in the Reserve. Anti-poaching units are jointly built by park rangers named *eco-guards* and village auxiliaries, who were

first paid by the Park but are now under the responsibilities of the Village Associations reinvesting parts of the revenues from the Reserve in its management. These arrangements contributed to a considerable reduction in poaching activities but not to their elimination, as shown below.

Gradually, village associations and their union became an efficient park negotiation partner, as well as the most efficient defender of the Reserve. They also use parts of their benefits for social infrastructures and co-finance various economic projects. Three village fauna reserves have been delimited in the transition areas, where small game hunting activities are proposed to medium income hunters. Organic farming is currently being promoted in the transition area, especially as a substitute to the conventional, pesticide rich and low income cotton crop. Ecotourism initiatives in one village also received some external support and already yield tangible benefits. The village associations are now able to attract external funding on their own, which is a great achievement and secures their ownership (http://avigref-pendjari.org). Park administration plays a supportive function in this strategy.

During the last decade, this Park administration made a major shift from the sole promotion of hunting activities to the promotion of vision tourism (DPNP, 2004 & 2007; Lange, 2009). Basic infrastructures were created or improved, and at the same time, the improvement of the wildlife stand makes it more and more probable for visitors to see quite a large range of animals, including lions, elephants, hippos, and buffalos. At first, most of the tour operators drawing profit from such activities were located at regional (accommodation, guides with vehicle hire) and national levels (tour operators). The Park trained and organized professional guides among the local population, who can take visitors to interesting sites and explain about them. Private operators also began to invest locally in lodges, which also create employment and a demand for local products and services.

Figure 10.3 Benin. Entrances to Pendjari Park over the last ten years.



Source: DPNP, 2004, 2006, 2007, 2008 et 2009

It is not expected that the number of tourists should increase much over the achieved level because the Park has no vocation for mass tourism (distances to airport, competition of more famous parks in Eastern and Southern Africa) but rather that people will stay for a longer period of time within the Park and near it. Also, nationals begin to get interested in visiting the Park, even though the costs of the whole trip (travel, accommodation, catering costs and entrance fees) still make it unaffordable to the majority. (Figure 10.3.).

Last but not least, Pendjari has attracted researchers. Some have been working on questions derived from the Park's management difficulties (such as conflicts between human beings and elephants or carnivores (Sogbohossou, 2003) while others are engaged on more basic research, such as inventories of the fauna and flora (Bundesministerium für Forschung and Bildung, 2008). Since 2003, at least ten researchers per year can be recorded, who have also reported to their peers in seminars on protected areas in Benin (Sinsin et al., 2005; 2007; Gbangboche et al. 2008). Research creates immediate economic benefits because researchers employ enumerators, translators and need local and regional transport, food and accommodation. Research also yields benefits in terms of innovation and cost effective interventions, which could not be valued in this study.

In all, the general picture of the clusters developed around the Pendjari Reserve is balanced with a tourism cluster, a NWFP gathering cluster and a farming cluster; these clusters are actively promoted and regulated by management and co-management institutions.

2.2 Value added by vision tourism in Pendjari Park.

In contrast with the site's importance to the tourism sector, little information and studies were found so mainly the tourism survey conducted was relied on heavily (Floquet et Lawani, 2010).

Seven thousand visitors came to the Park in 2009. Among them, some foreigners coming to Benin visit relatives or friends and then travel to the Park (17%), others are in Benin for professional purposes and take the opportunity to visit it (17%). Sixty-five percent of the Park visitors from abroad came to Benin for tourism purposes, and most tourists coming only for tourism purposes have Pendjari as one of their destinations or even their main one. Nationals now constitute 34% of the visitors, which is an encouraging trend, but most of them come along with foreigners. On their way to Pendjari, travelers visit other sites (on average, 3 places). Total travel costs were taken into account; the visits to the other sites were seen as an additional benefit of the Park. An average visitor spends US$ 475 within the country for its 8.7 days trip to Pendjari and further destinations. Thirty percent of these expenditures are made at the local level and 17% at the regional level, in the city of Natitingou or in Sombaland, which is a well visited amenity (see Table 10.2).

Table 10.2 Benin. Tourists expenditures related to the Park in 2009.

Local Park	Number of operators	Expenditure per tourist US$/person
Park Amenities		
Local Park Entrance	1	18.20
Park Purchases (tee shirts, etc.)	1	4.30
Local Guides	24	0.90
Local Accommodations		
Local Hotel	11	47.10
Local Restaurant	11	30.70
B&B	4	0.20
Local Food		
Street Food	na	0.10
Grocery, Picnic	2	1.30
Local Transport		
Rented Transport	3	36.50
Local Craft		
Handicrafts	6	1.10
Clothes	5	0.50
TOTAL LOCAL LEVEL	63	140.90
Regional Accommodations and Food		
Hotel	22	23.10
Restaurant	17	20.10
Other Accommodation	1	0.20
Street Food	2	0.10
Grocery, Picnic	10	0.80
Regional Transport		
Rented Transport & Driver-Guide	55	32.50
Regional Amenities		
Entrances, Guides	na	2.20
Handicraft and other purchases	na	0.20
TOTAL REGIONAL LEVEL		79.10
National Accommodations and Food		
Accommodations		70.80
Food		60.90
NationalTransport		
Tour Operator	10	23.30
Car Hire		59.20
National Transport (other forms)	na	25.90
National Amenities		
Entrances, Guides		1.10
National Craft and Marketware		5.60
TOTAL NATIONAL LEVEL		246.80
TOTAL TOURISM	*243*	466.70

Source: Floquet et Lawani, 2010

Visiting the Park requires: accommodation within it or at least at the local level in order to be in the right places at dawn and sunset; appropriate transport (most people hire a car); and the payment of park entrance fees. Many visitors also use the services of a local guide. People tend to travel in small groups in order to cut the costs.

At the local level, tourists spend more money on accommodation, transport and catering than on park entrances. Local guides and handicraft purchases only constitute a small share of their budget. Some visitors prefer to rent a car and a driver in the next regional city, not knowing whether they will find a vehicle in Tanguiéta at the local level. At large, tourism supply has been evolving at the local level, but there is still room for improving the value added and the amount of employment generated. New hotels and lodges are running, but the hotel within the Park attracts most of the clients because of its location. Less expensive accommodations and additional activities would encourage people to stay for another night in the Park or its vicinity and attract nationals as well.

Eighty-nine percent of the 3 million dollars spent for the trips to Pendjari were able to be redistributed among specific service providers either because these providers are operating: at the local level (within the Park, at Park entrances, in Tanguiéta); at the regional level (most people make a stop-over in the next regional town, Natitingou); or at the national level because they provide dedicated services (tour operators, car hire). Unspecific services provided by public transport and the use of own cars were no longer considered in the operators' account. Park entrances enter park management accounts and are not taken into consideration in the operators' account. After aggregating the value added by all these service providers, tourism in Pendjari and derived tourism activities developed during the journey generate a value added of US$ 1.81 million (see Table 10.3).

Table 10.3 Benin. Total value added (in thousands of US$) and employment created by service providers in tourism related to Pendjari Reserve.

	Local	**Regional**	**National**	**Total**
Expenditures	695.8	515.0	1,346.3	2,557.0
Costs	136.5	140.1	471.1	747.7
Value added	559.3	374.9	875.2	1,809.4
Taxes	4.2	3.6	7.0	14.7
Income (businesses and workers)	555.1	371.3	868.2	1,794.6
Employment (number)				
- Businesses	70	61	110	241
- Wage labor	41	19	24	84

Source: Floquet et Lawani, 2010

At least 241 operators are specialized in businesses related to tourism in Pendjari Reserve. Some of these are large operators (hotels from the Tata Somba group) but most are small to medium-sized businesses. Tourism in the area is a seasonal activity concentrated during 4 months so it is a part-time activity for quite a large number of stakeholders, such as guides. The Park is now open all year round, but attendance in the rainy season is low.

Table 10.4 Benin. Total value added (in thousands of US$ and percentages) by service providers in tourism related to Pendjari Reserve by service.

(Thousands of US$)	Local	Regional	National	Total
Local guides	5.0	0.0	0.0	5.0
Accommodation and catering	377.1	183.8	550.7	1,111.6
Transport & tour operators	172.0	190.5	305.6	668.1
Handicraft sales	5.2	0.5	18.9	24.6
Total	559.3	374.9	875.2	1,809.4
(%)				
Local guides	0.3	0.0	0.0	0.3
Accommodation and catering	20.8	10.2	30.4	61.4
Transport & tour operators	9.5	10.5	16.9	36.9
Handicraft sales	0.3	0.0	1.0	1.4
Total	30.9	20.7	48.4	100.0

Source: Floquet et Lawani, 2010

Table 10.5 Benin. Employment generated by tourism activities according to the service.

Numbers	Local	Regional	National	Total
Local guides	30	0	0	30
Accommodation and catering	69	61	87	217
Transport & tour operators	1	15	7	23
Handicraft sales	11	1	40	52
Total	111	77	134	322

Source: Floquet et Lawani, 2010

Value added is mainly added in accommodation and catering activities (see Table 10.4), and these activities also create most of the employment (see Table 10.5). The share of the local level is relatively high so that it cannot be said that all the value generated has been captured at national or higher levels. But most people from adjacent villages are excluded from activities requiring some assets (car, hotel infrastructure) and specific skills. They are mainly guides, or work in the hunting areas (see below) or as wage laborers for jobs requiring low qualification. Efforts to train local guides are valuable but the share of the activity to the value added and then to the income remain modest. Handicrafts which could benefit local people hardly appear in the account. The opportunity to sell specific products to passers-by is hardly taken. Tourism is a sector where efforts have to be made so that local rural stakeholders gradually enter higher income generating service provisions. The ecotourism initiative recently developed in one of the riparian villages is a particularly interesting pilot experience in this context.

2.3 *Game hunting in Pendjari.*

Game hunting has been a recreational activity, which was the mightiest in colonial times. In recent decades, it was reorganized as trophy hunting. Trophy hunting is oriented towards the specific public of sport and prestige hunters ready to pay large amounts of cash for the exclusive experience of hunting rare animals that are difficult to trace, and of bringing their trophy back home after its preparation by taxidermists.

Each of the three game reserve zones is leased out for a period of five years and has a camp (Porga, Tanongou and Konkombri hunting camps).

The hunting season starts in December and ends in May. Every year quotas of animals which can be hunted are set up by the Park administration (lion, buffalo, roan antelope, hartebeest, Bohor reedbuck, waterbuck, bushbuck, warthog, ourebi, duiker, baboon, etc.) based on information generated by ecological reserve monitoring. Only elder male adults can be hunted. Each reserve gets quotas. Presently, quotas are higher than the hunters' demand. For example, for the 2008-2009 season, quotas included 295 animals (30 buffalos, 36 roan antelopes, 30 bushbucks, 3 lions, etc.) but 140 were shot. The destination is not as well known as those from eastern and southern Africa, but attendance varies around 60 hunters in Pendjari. There are nearly as many hunters around the second National Park, W.

The three game hunting areas are managed by three private operators. These operators organize game hunting tour packages, including international, national and local transport, taxes and permits, local game rangers, beaters and (often expatriate) hunting guides, full accommodations and catering in lodges, first preparation of the trophies, etc. Costs for taking part in such a hunting event are fairly high (around 6,000-7,000 Euros per safari, international travel costs not included).

The hunting guide is responsible for a relevant choice of the animal which can be shot according to the permits obtained and in consideration of safety, animal type, etc. Game rangers have the task of monitoring the reserve and facilitating the localization of the animals to be hunted. They are also in charge of preventing poaching outside the hunting season. A driver and a car accompany the hunting party during the daily tour and help bring the game back to the camp. Game meat is given to village associations concerned by the game area and sold at a low price to villagers (US$ 0.75/kg).

The total amount of the hunting fees (permits and shooting fees) was higher than visitors' entrance fees in 2009 (respectively, $ 132,000 and $ 147,000). Moreover, 30% of the hunting fees are reallocated to riparian village associations. Operators also have to pay renting costs for the cynegetic area so large game hunting is a valuable source of funds for the Reserve, contributing to its self financing rate (entrance fees and hunting fees finance 30-35% of the Park expenditures). The overall contribution of the activity is US$ 546,000 with parts of the value added by expatriate hunting guides and managers, which were allocated at the national level as they would not live all year round and spend all their income at the local level.

Table 10.6 Benin. Income and taxes (in thousands of US$) generated by large game hunting in Pendjari cynegetic areas.

	Local	Regional	National	Total
Value added	220.4	0.0	325.6	546.0
Income (businesses and workers)	13.0	0.0	325.6	338.7
Park taxes	207.3	0.0	0.0	207.3

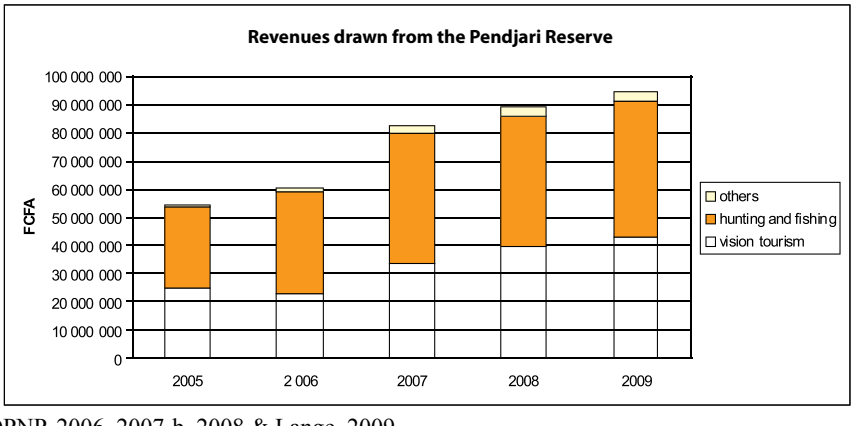
Source: Floquet et Lawani, 2010

At least 24 local employments and 3 national positions are maintained by the 3 businesses. Most of the hunters fly in and fly out so there are few externalities on other sites and even outside of the camp. The activity can still be expanded according to the shooting quotas, but this expansion is limited by the specificity of the clients targeted.

2.4 Park management in the Reserve.

The Park Direction is able to attract funds directly from its users and indirectly from the State and from some donors willing to invest in conservation. It develops a mid-term business plan and publishes yearly accounts.

Figure 10.4 Benin. Park Administration own revenues out of entrance fees and permits from 2005-2009.

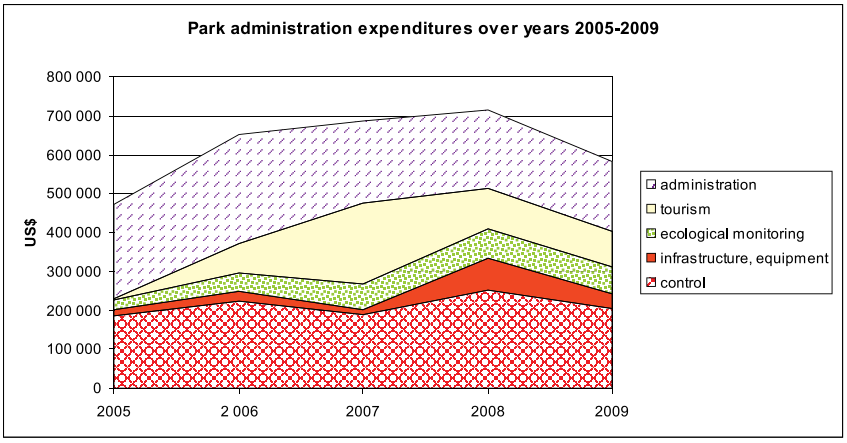


Source: DPNP, 2006, 2007-b, 2008 & Lange, 2009

The Pendjari National Park administration is financed by the State (17% in 2007; 23% in 2008; 18% in 2009), by its own revenues obtained from tourism entrance fees, as well as hunting and fishing permits and fines, etc. (20% in 2007; 28% in 2008; 35% in 2009 – Figure 10.3) and by donors, especially the German technical and financial cooperation (59% in 2007; 46% in 2008; 38% in 2009). In 2009, 3% was allocated by the World Heritage Fund, 5% by a French NGO called *Planete Urgence*, and 1% by MAB-UNESCO. Funds available may vary according to external funding cycles and to State budget fluctuations.

The Park's own revenues have been increasing over the last five years (see Figure 10.4). Hunting revenues have tended first to increase and then to stabilize. However, 2005 was a bad year because international hunters did not come, but there was a subsequent recovery. Hunters contribute to 47% of the revenues and fishers to 3%. Visitors fees have been increasing since 2007 and this can be put in relation with the investments and efforts put on tourism promotion in 2007.

Figure 10.5 Benin. Park administration revenues and expenditures from 2005-2009.



Source: Adapted from DPNP (2004), (2007) et Lange (2009).

As it appears from its expenditures (see Figure 10.5), the Park administration (DPNP) is in charge of infrastructure maintenance, ecological monitoring and since 2006 tourism promotion. It organizes permit delivery to resource users and organizes the tourists' fee perception. It also prevents and fines illegal activities. Most activities, especially control activities, are conducted in co-management with the union of village associations (U-AVIGREF).

Therefore, the Park plays a key function in maintaining the natural and institutional resource, providing ecological and economic services, and generating the economic benefits under review. But aside from these main contributions, it is also a source of immediate benefits as a job provider and service user, which impacts the local economy. The Park Direction employs 37 people, who are located at the local level, in the Park office in Tanguiéta. A large part of the budget is related to control and patrolling costs, which means vehicle maintenance and fuel. In 2009, it was estimated that 77% of the US$ 582,600 budget had been spent at the local level (Lange, 2009).

Because of the existence of both parks in Benin and their positive contribution to protection, the National Wildlife Management Centre (CENAGREF) is also enabled to request and obtain public funds from the State and international funds from the donor community. This can be seen as a positive externality of the Park management, as well as

an expression of national political will. No method was available to calculate the share of the funds, which should be allocated to Pendjari Park as its specific contribution; therefore, such funds will only be taken into account at the national level in the overall account. They are also mainly spent at that level.

Parks are threatened by their dependency on external project funding, which is not sufficiently buffered by their own revenues and State allocations. A trust fund is being implemented, which should allow for smooth and secure financing of the conservation activities in the future.

2.5 Park co-management by riparian populations.

With the democratization era, the population which had been denied rights and benefits over the protected areas began to take domains in use, which had sometimes been used by their ancestors. Hunting also increased, and in the nineties, the first interventions for future co-management were to promote hunters' associations and invite them to better control their activities in order not to deplete the stands. Hunters' associations and further users' associations constitute the basis of actual village management associations, which exist in 23 villages, have nearly 2,000 members, and are now major players in the management of the Reserve. Their human involvement consists of their participation in trophy hunting activities (paid by hunters), in anti poaching units with the Park administration (paid by their own funds as a contribution to Reserve maintenance) and in tourism activities (paid by visitors).

The share of the hunting fees reallocated to the village associations allowed them to invest in social infrastructure but also in economic projects. For the present time the AVIGREFs agreed on a local development strategy in 2008 with various activities (small animal rearing, organic farming, horticultural activities, ecotourism initiatives). Their union uses parts of their funds to co-finance initiatives with diversified partners.

Three economic projects are important in 2009: village game reserves, ecotourism and organic cotton promotion.

Table 10.7 Benin. Value added and employment created (in thousands of US$) by the village game reserves in 2009.

	Local	**Regional**	**National**	**Total**
Value added	8.3	0.0	33.7	42.0
Income (businesses and workers)	4.1	0.0	33.0	37.1
Taxes	4.2	0.0	0.7	4.9
People				
Employment (part time)	36.0		1	37

Source: Floquet et Lawani, 2010

AVIGREFs have delimited three village game reserves, where medium income hunters are invited to hunt small mammals and birds. The Park gave authorization to delimit these areas within the transition areas and gave technical support. The actual organization is similar to cynegetic areas of the Reserve with a private operator taking the area under management contract and organizing the hunters' venue. It should become entirely managed by village associations, but the hunting business is based on relationships with specific clientele. Even if all hunters' fees are for the village associations, the value added generated remains modest in comparison to cynegetic areas (8%), and it seems difficult to maintain these areas in order to make them really attractive (see Table 10.7).

Another initiative concerns the promotion of ecotourism in adjacent villages. In Tanongou, a waterfall attracts visitors. A village association organizes the supply of good quality services for recreational events (hiking, swimming, village tour, etc.). Revenue collected from common goods is distributed according to an allocation key. The initiative also encouraged the creation of riparian people's micro-enterprises providing accommodation services and catering (B&B). In 2008, training and small scale on-site investments were funded by the Global Environment Foundation, the German Cooperation (GTZ/KFW) with co-funding from the U-AVIGREF. After one year, 3,000 visitors had enjoyed at least one of the local amenities and generated US$ 12,500 gross revenue, financing several jobs for the guides and income to a few bed and breakfasts initiated by local women.

A third initiative is the promotion of organic cotton. It is a public-private partnership funded not only by German cooperation, Swiss and Dutch NGOs and U-AVIGREF but also by a consortium of three of Benin's main cotton ginners. Funding contributed to training 310 farmers, organizing marketing, and ginning, as well as the certification of the production as organic.

Altogether, the funds collected by the U-AVIGREF and AVIGREFs in 2009 have been estimated at US$ 252,700, 30% coming from hunting areas in cash and kind (meat), 3% from memberships, and the rest from project funds. There was no recent data on the reallocation to village associations and the overall use of funds for reserve maintenance, co-financing and investments in project and function costs. The most recent data available mentioned in 2006 the employment of 200 village auxiliaries (part time), especially for control and maintenance in the Park and the cynegetic areas (The World Bank, 2006).

The Union of the village association (U-AVIGREF) now has a solid social and financial basis and can obtain external funding. It mobilized, in 2009, an amount equivalent to half of the Park budget (http://avigref-pendjari.org, retrieved on 2010 December 26th). It takes over parts of the maintenance tasks within the cynegetic areas and in their own village reserves. A significant share of the riparian households has at least one member deriving a direct income from conservation; most of them are French speaking men able to overtake guiding tasks. A recent survey stated that 89% of the riparian household heads are in favor of conservation (Vodouhê, 2011).

Somehow part of the resources of the Reserve are now club goods, which can be used by a specific community of the riparian transition areas who, therefore, have a strong interest in protecting their common goods and preventing people from outside from using them. People located further from the transition area are said to now be the ones engaging in poaching activities. A ring of relative better-being in a context of high poverty incidence may be a source of conflicts. U-AVIGREF anticipated it, to some extent, in allocating 20% of the hunting fees they receive to the municipalities concerned by the Reserve.

2.6 Poaching as an illicit resisting chain in the Reserve.

Unlike other chains, game poaching is a negative activity because it indiscriminately destroys wildlife. Hunting is, therefore, strictly prohibited within the Reserve, and no hunting license is delivered in the Reserve aside from the large and small game hunting activities described above. Methods used by illicit hunters and their lack of commitment to long term benefits make them use firearms and traps where old and young, male and female animals are killed. They also cause economic damages to the legal hunting and tourism activities. There is a large mobilization of village associations together with the Park administration against such practices.

Hunting on the Reserve is practiced fraudulently by riparian community members and by professionals. During field work, information about professional poaching could only be obtained from observers.

Community hunting is widely practiced in the dry season and mainly concerns small animals for consumption. A household income survey among farmers in 2005 evaluated its contribution to total cash and non cash income at 6%, and it is probably underestimated (Floquet & Mongbo, 2005). It may be contradictory to conservation and economic objectives, and one of the three village game reserves is hunted by the Tanguieta town population to such extent that it cannot attract fee paying hunters. There are also retaliation and preventive acts against animals that attack cattle (hyena and lions) or damage fields (elephants). Currently, this is leading the Park to set up a fund to compensate major losses caused by wild animals to farmers and pastoralists. The spiritual strength of some animal species also causes some losses when their parts are used in rituals and amulets. The economic value of these activities had to be neglected in the present account and efforts focused on commercial activities.

Professionals are said to come from non riparian places. Professional poaching is practiced in all seasons, on a large scale, and concerns large animals, such as buffalos, hartebeests, kobs and even elephants. Professionals mainly work in teams. Teams are contracted by sponsors, who are in charge of transporting and selling the meat in urban markets (Tanguieta, Natitingou) or even to restaurateurs. Sponsors also pay for ammunition and weapons and for the costs of the team's stay within the Reserve; they are said to be able to bribe police if poachers are caught outside the Reserve with bush meat. If anti-poaching

units find people hunting in the Park, their weapons and bikes are confiscated, poachers are fined and their story is made public on the local radio. In spite of this, the relatively high value of the animals hunted still makes it worth taking all these risks for politically influential people.

Table 10.8 Benin. Value added (in thousands of US$) and employment created by poaching in 2009.

	Local	**Regional**	**National**	**Total**
Value added	196.0	41.9	0.0	237.9
Income (businesses and workers)	196.0	41.2	0.0	237.2
Taxes	0.0	0.7	0.0	0.7
Employment				
Number	150	30		180

Source: Floquet et Lawani, 2010

Indeed, according to our informants, the number of poachers could be estimated at 150 with 10 sponsors. At least 20 restaurants would purchase and process the meat into food. So the total value added by the chain would be 237,900 US$, which competes with co-management.

In a first period, the way to restrict poaching by adjacent people was to have them interested in benefits from activities requiring conservation, and it seems to have been a successful strategy because the number of poaching cases declared went down. However, the threat may also come from people who are not interested in protecting the resources.

2.7 Fishing up to the sustainability threshold on the Pendjari River.

Fishing is a subsistence activity for autochthonous populations in all villages along the Pendjari River. Moreover, seasonal fishers have been coming over the past decade and establishing temporary camps for their professional activities. They introduced more efficient fishing techniques, and nowadays, there are also professionals among local people. *Lates niloticus*, the highly demanded captain fish, and *Clarias* sp. are the most frequently fished species among the 73 species found in nets.

Fishers come from various countries of the sub-region, such as Ghana, Togo, Mali, Burkina-Faso, and Niger, as well as some of them being from the south of Benin. Their number has been increasing during recent years. In the nineties, wholesalers from Burkina-Faso began with the marketing of fish from the River, and the activity boomed. The Pendjari River flows over 200 km within the Park. Some of these camps are located within the cynegetic area, where the fishing period is longer and some in the Park, where the fishing period is restricted to 4 months on the Beninese side of the River. Fishers have to ask for a license from the Park administration (US$ 68). Two hundred Beninese license holders operate,

but there are also fishers obtaining licenses from the Burkinabe side of the River. License holders work with canoes, nets and up to three apprentices.

Part of the fish is smoked by fishers themselves if they are in remote places or by local women, and part is purchased by wholesalers equipped with ice tanks. Fresh fish is mainly sold in income-rich consumer markets (Ouagadougou in Burkina Faso, Parakou in Benin). Smoked fish is partly marketed at local and regional levels by petty wholesalers who sell it in markets to consumers and retailers; it is partly sold to wholesalers who smoke it again, repackage it and transport it to distant consumer markets (up to Nigeria). The survey of this chain was a demanding activity.

Table 10.9 Benin. Value added (in thousands of US$) and employment created by fishing and its derived activities in 2009

	Local	**Regional**	**National**	**Total**
Value added	874.5	62.1	182.4	1,119.1
Income (businesses and workers)	850.6	61.7	161.8	1,074.1
Taxes	23.9	0.4	20.6	45.0
Employment				
People	608.0	20.0	21.0	628.0

Source: Floquet et Lawani, 2010

Fishing is the activity relying on natural resource harvest that generates the highest value added, mostly at the local level. It also creates a fairly high number of seasonal but not poorly paid employments. The consequence is that it attracts an increasing number of people, also from outside the adjacent lands of the Reserve, and has to be regulated to prevent overharvesting.

2.8 Fruit gathering within the transition buffer zone and the cynegetic area.

Gathering activities in the Reserve are important and have long been neglected. Recent surveys have revealed that riparian populations use more than 72 species: grasses for fencing and roofing, firewood, medicinal plants, chewing sticks, edible leaves and fruits (Vodouhê et al., 2009). This survey focused on two species which are marketed at local, regional, national and international levels (*Vitellaria paradoxa* et *Parkia biglobosa*). Shea and locust trees are systematically protected during field clearing for their fatty nuts and their protein rich beans, respectively. Shea nuts are processed into butter for food and cosmetics, and locust beans are fermented into a tasteful condiment appreciated in all West Africa.

Gathering is performed in the transition area and even in parts of the cynegetic area. It concerns a large number of women earning each a low income but altogether the value added by gathering, processing and trade activities is not insignificant.

Table 10.10 Benin. Value added (in thousands of US$) and employment created by gathering and their derived activities in 2009.

	Local	Regional	National	Total
Value added	332.8	24.2	0.0	356.6
Income (businesses and workers)	332.2	23.7	0.0	355.9
Taxes	0.5	0.2	0.0	0.7
Employment				
People (part-time)	5,195	10	0	5,205

Source: Floquet et Lawani, 2010

2.9 Beekeeping as an alternative to wild harvest.

Honey harvesting is a traditional activity around the Pendjari Park. Wild honey harvest is a destructive activity: bee swarms are smoked and killed in the process of the harvest. Therefore, wild honey harvest is prohibited in the transition zone at the fringe of the Park (but might still be performed). Since 2002, the Park administration has promoted the conversion of wild bee harvesters into beekeepers. Beekeeper groups were initiated in the buffer area and obtained support in the form of training and equipment. Their average production is still low. Wild honey harvesters are still more numerous than beekeepers (173 and 57), but they only harvest 30% of the honey and capture only 17% of the value added. Value added by production or gathering and trading has been assessed at US$ 10,000. The chain concerns 230 persons.

2.10 Organic farming as an alternative to traditional farming.

Organic cotton farming around the Reserve began in 2008 and is a project initiated by the village union (U-AVIGREF) with financial support from Helvetas and GTZ. There is a demand for quality cotton, cultivated more respectfully of the environment, equity and health. Organic farming has been introduced by AVIGREF around Pendjari in order to replace conventional cotton, which is a potential source of pollution of the Reserve. Indeed, cotton production is associated with the use of pesticides, health hazards, pollution of soils and waters, food contamination due to the misuse of pesticides on food crops and stores and the inadequate recycling of pesticides packaging materials for beverage. High input costs also cause farmer indebtedness, especially in marginal locations.

In 2009, 310 producers cultivated organic cotton on 87 ha yielding 37,125 tons. Cotton was ginned in a factory at the regional level and certified organic. Sale price was subsequently higher than that of conventional cotton. The promising initiative is at its beginning and the value added reaches US$ 22.5 thousand.

2.11 Conclusion.

The Reserve generates at least 7,000 employments. Many involve the 30,000 inhabitants of the transition area (farming, gathering, co-management) or the local level and its inhabitants (tourism).

Table 10.11 Benin. Pendjari main value chains from a comparative perspective.

Chain	Employment	Thousands of US$	
		Income per person	Total income
Tourism	244	7.4	1,795
Game hunting	36	9.4	339
Park management	37	15.7	1,074
AVIGREF co-management	200	1.3	84
Village reserve hunting	37	1.0	37
Poaching	180	1.3	237
Fishing	628	1.7	282
Shea nut	4,482	0.1	169
Locust bean	723	0.1	74
Honey	230	0.0	10
Organic farming	310	0.1	22
Research projects	50	1.2	583
All	7,157	0.7	61

Source: Floquet et Lawani, 2010

There are three types of chains: those giving low income to large numbers of stakeholders at the local level, such as gathering activities and activities related to co-management of the Reserve; high pay-off chains for a few, such as game hunting and park management; and in between activities, such as fishing and poaching. Tourism activities show that it is possible to escape this vicious circle. They are relatively high paying (at least for some operators) and numerous.

Tourism has a strong multiplying effect: a person enjoying the Park's amenities will also enjoy other amenities locally and elsewhere, with consequences on the value added in other places at local, regional and national levels. Most of the businesses require some capital, but there is still a market niche for small restaurants, street food and food sales, especially fruits, as well as for handicrafts, for example, at the Park gates. At the local level, municipalities could encourage the tourism sector, for example, in promoting the training of young girls and women so that they can develop successful small to medium sized businesses or can be employed in larger hotels. It would also contribute to a more gender equitable development around the Reserve since nearly all co-management activities are restricted to men.

Further tourism amenities and activities have to be developed in order to keep tourists in the area a little longer. Boat tours, bird watching, sport fishing, escorted photo safari in the cynegetic area, mountain biking in the hills and also cultural tourism for small and interested groups of people may all be tried out as pilot experiences. A better endowed ecological centre with posters, films, quizzes, and so forth might also attract visitors.

Low paying chains are short product chains bringing low quality products to the local market and not able to reach higher paying consumers at regional, national and international levels. Combined with consequent regulation of gathering activities in order to prevent overharvesting and user rights conflicts, it should be possible to make more income out of the valuable natural resources in the Park and contribute to the full domestication of the most demanded or threatened species into agro-forestry systems. Low-paying chains are also related to seasonal activities, such as guiding in the Reserve. They have to be seen as additional activities.

As displayed in Figure 10.1, destructive chains contribute little to the value added of the Park, except for the poaching chain. Fishing is the only chain which might lead to overuse of the River. It is a positive achievement.

Co-management is economically successful: it allows the village associations to attract resources from the Reserve and from external sources and convert them into meaningful activities, contributing to the maintenance of the Reserve and to the promotion of promising new initiatives. The pace of income improvement has to be kept because land users still try to negotiate an extension of their farming and grazing rights in the cynegetic area. Also, while adjacent populations tend to manage the Reserve as their common goods and to draw increasing income out of it, it may become a source of conflicts with those in the same area not enjoying the privilege. In spite of these threats, the institutional model and the economic cluster model seem worth being adapted elsewhere.

3. The Tchaourou Toui Kilibo Gazetted Forest

3.1 General information about the TTK forest.

The Tchaourou Toui Kilibo forest is located at the edge of the Okpara River (8°25 - 8°53 North, 2°36 -°47 East). The River constitutes a border with Nigeria. The railway and the main South-North road towards Niger stretch across the other side of the forest.

The 48,000 ha domains were classified as State domains in 1942 and 1943. Originally, the forest was a dry forest of the guineo-sudanian formation, rich in tree species, such as *Isoberlinia doka, Anogeissus leiocarpus, Pterocarpus erinaceus, Daniella oliveri,* and *Afzelia africana*. It is not far from other larger State forests located near the border with Togo (Agoua, Monts Kouffé and Wari-Maro).

According to the last inventory, performed in 2008, the domain has been considerably degraded with 17% of the area taken as farmland, 47% degraded to woody savannah and

only 34% under forest. Teak and cashew have also been planted within the domain on 2% of the area. Much of the timber and charcoal harvested in natural stands in Benin is being harvested between the 8° and 9° parallels, nothing valuable being left in southern fallows, so that the forest remains are under strong pressure.

Thirty-eight thousand inhabitants live around or within the classified domain. First settlers came long before gazettement by the State. They were hunters using their trek to find fertile land to settle down. During that century, the railways also brought in new waves of migrants. In the sixties, settlers were even given permission by the government to found a village within the forest. Later on, in the eighties, new groups came from exhausted and overpopulated areas. Beninese and Nigerian fishers also installed camps on the riverbanks. Some of the pastoralists settled down while others are still on the move. Because of these successive migrations from different regions, the area is a mosaic of ethnic groups, even if in most cases, villages or hamlets are monoethnic. Farming systems rely on yam, which requires new forest clearing, and then on a range of diverse seasonal crops. More and more, cashew trees (*Anacardium occidentale*) are planted in older fields.

All these rural users compete for resources from the forest and its adjacent lands. The next city is Tchaourou, which is located at the upper fringe of the forest and is the main market town in the periphery. Ouessé, at the regional level, is the administrative centre for most of the population concerned by the forest, but it is more remote than Tchaourou and even Kilibo on the main road. Since 2 years ago, a plant has started processing cashew nuts in Tchaourou, bringing an important factor of change in the rural economy.

Tchaourou-Toui-Kilibo (TTK) State Forest is the first gazetted forest which experienced participatory management. The pilot process was initiated by a natural resource management project (PGRN) in 1992. Villagers and all specific forest users were organized (hunters as a professional group and a socio-cultural organization, pastoralists, loggers, charcoal producers, etc.). The organizational pattern relied on village committees, where professionals were represented, on their federation at the management unit level (CGUA) and on coordination at the forest level of the four management units. They interacted strongly with an NGO commissioned to facilitate the organization process. The NGO began to promote alternative income generating activities outside of the forest. The whole process is under the responsibility of the Forestry Division. Four forestry outposts give permits, technical advice and should control the respect of regulations in the forest.

In 1996, the first participatory management plan was established for 16 years (Republic of Benin, 1996). The forest was divided in four management units. The plan intended to promote sustainable use of the timber, fuelwood, fodder, game and fish within the State forest. It also intended to control land clearing and restrict it to one area and to control bush fires. Three types of areas were delimited within the forest: forest areas for sylvicultural uses (22,000 ha); farmland areas (17% of the area, 8,120 ha); and buffer areas between both other types, which can be used as grazing land for livestock (17,000 ha).

Initially, according to the management plan, the sylvicultural areas were divided in plots for 25 years based timber rotation. Logging of timber and service wood or firewood was supposed to be conducted in the yearly plot, to be restricted to trees which had received a print from the forestry officer, and the logger had to pay taxes to the forestry administration and fees to co-management units. Therefore, selective extraction should not have exceeded the quota which had been assessed as sustainable. It was set at a maximum of 1,122 m^3 of timber and 1,000-2,000 tons of charcoal per year in the first plan.

Reforestation plots are planned yearly in the buffer area. Village committee members are getting paid mostly in kind (seedlings) for their contribution to plantation and maintenance of the areas (firebreaks, early fire, etc.). Grazing is conditioned to the payment of yearly fees per head of cattle and restricted to the grazing areas; transit is restricted to corridors along the rivers.

Land clearing in the specific farmland areas is also subject to the payment of clearing fees and was restricted to initial registered settlers or their descendents, who should maintain at least 25 trees per hectare in the fields; land use rights were temporary, excluding the plantation of perennial crops, such as cashew trees.

Product-specific taxes and fees are supposed to be reallocated between a forest management fund, a national fund, management units, municipality since decentralization and local tax collectors. In each of the four management units of the domain, management committees are in charge of controlling all users' activities, nurseries, rehabilitation activities and conflict resolution.

In the first years of the implementation of the plan, the forest area put under protection is said to have undergone a regeneration process; the reduction of hunting activities also allowed for higher fauna stands. Year after year, trees were planted to enrich the forest and in exchange, committee members were granted seedlings for their private plantations. According to a study performed in 2008 (Ministère de l'Environnement et de la protection de la Nature, 2008), from 1993 to 2006, 7,930 ha have been enriched in local timber species *(Khaya senegalensis*, *Afzelia africana, Pseudocedrela kotschyi* and *Ceiba pentandra)* up to a stand of 70 plants/ha. Rehabilitation activities constituted an income generating activity for some people of the riparian population, especially those active in the management committee who coped with the forest maintenance activities.

After a while, regulations were no longer respected, especially in a period where no external funding was injected by projects. Farmland expanded far over the area previously foreseen, and settlers did not respect land use rules. Timber, wood and game extraction were much higher than quotas.

In 2008, a new project started concerning 10 forests of the classified domain and one of its objectives was to readjust the initial plans. An inventory in the TTK assessed that most of the valuable timber species had been systematically logged, fauna had been strongly depleted and the potential of the forest was seriously affected. The conclusion was an

immediate moratorium on timber harvest and hunting. The new management plan for 2008 foresaw a reduced yearly harvest of 500 beams and about 600 tons of charcoal.

This team's survey in 2009 assesses that the moratorium is not at all respected. Large scale corruption has been set up, for example, in order to transform timber logged in the TTK forest into timber in transit from Nigeria, which obtains import permits. In joint assessment situations, every stakeholder group tends to make the other groups responsible for the non enforcement of the management rules (CEBEDES, 2009). The moratorium may have further reduced the sense of accountability local committees had developed towards their local constituency and put them in an awkward social situation, showing that they have little voice in forest management (Mongbo, 2007). Forestry officers complained that they are challenged by local authorities so that repression of offenders is useless and even dangerous. Local authorities see the State domain as a potential communal resource the benefits of which they are excluded.

Figure 10.6. Benin. Economic Activities around Tchaourou Toui Kilibo Gazetted Forest (TTK).

a. Rudimentary charcoal production heap near TTK.

b. Charcoal sale along the tarmac road near TTK.

c. Yam mounds within the forest – first clearing step.

d. Lumbermen in the TTK – officially chainsaws are forbidden.

Source: Floquet, A, 2010.

Therefore, it was not surprising that the main income generating activities in 2009 concerned timber, charcoal and firewood, game, farming and cashew plantations (Figure 10.6). Activities implying no destruction of the stands and encouraging conservation, such as tourism and education, or the initially planned game farming and apiculture, did not yield benefits. Even gathering activities were not registered as significant.

3.2 Timber value chain.

Only authorized operators are supposed to log timber in the forest, and they should operate in accordance with the management plan of the forest. The fees collected would contribute to the parallel rehabilitation of degraded parts of the forest. Actual logging activities bypass local institutions, they are not at all sustainable, and the fact is locally acknowledged by all stakeholders involved.

Table 10.12 Benin.Value added (in thousands of US$) and employment created by the TTK timber chain in 2009.

	Level			
	Local	**Regional**	**National**	**Total**
Value added	1,088.3	0.0	563.5	1651.7
Income	1,028.1	0.0	342.2	1370.3
Taxes	60.1	0.0	221.3	281.4
Employment				
People	670		123	793

Source: Floquet et Alladatin (2010)

Urban traders obtained permits for logging in the forest and now rely on permits for importing timber from Nigeria. Timber harvested in the forest is marketed as imported timber. A parallel economy has been set up providing income to 21 traders and 53 local lumbermen: lumbermen are helped by hunters in identifying harvestable trees; they commit chain sawyers as mobile service providers; they, in turn, employ *jackboys* to help them fell the trees and process them roughly into beams. Haulers transport the beams into hidden stores near roads with the help of porters and vehicles. Traders may sell the wood to wholesalers for storage or sawmills and carpenters for processing. A significant part of the timber harvested in natural stands is also exported to India and China. Nearly 800 men have employment (permanent or temporary) in the TTK timber chain, and timber generates US$ 1.37 million of income, US$ 1.03 million of which are at the local level.

The chain also generates taxes. Apart from the import permits paid by urban traders, taxes are paid by lumbermen to traditional village authorities who reassert their traditional

rights. Forestry rangers may also perceive motivation (US$ 0.5 per plank or beam). For their own safety, forestry officers are not in a position where they could enact the legal rules and counteract the illegal chain. Communal authorities charge truck loads (US$ 500 per truck). Seventeen percent of the value added is redistributed in the form of taxes, informal ones (bribes) being higher than formal ones.

Table 10.13 Benin.Timber price disaggregation (in US$).

Chain segment	Stakeholders	Per beam	Total price
Logging	Lumbermen	4.3	
	Hunters	0.2	
	Porters	0.5	
	Sawyers	2.5	
	Jackboys	0.3	
	Local transporters	3.5	
	Other costs	1.7	13.8
	Taxes paid by lumberman	0.9	
Trade	Wholesalers	4.9	
	Laborers	0.6	
	National transporters	6.4	
	Taxes paid by wholesalers	3.6	29.3
Processing	Carpenter and sawmills	21.5	
	Transport	1.0	
	Laborers	0.1	
	Other costs	0.5	52.3

Source: Floquet et Alladatin (2010)

Income generated is redistributed among a large number of stakeholders (see Table 10.13), even if unequally. A large number of people have a share of the timber price. Together with legal and illegal taxes, it constitutes an efficient system of incentives in favor of further logging, which might lead to the total destruction of the harvestable stand. The quantity of beams extracted in 2009 has been evaluated at 62,500 in our survey instead of the 500 really authorized according to the plan.

Our survey followed the timber harvested up to processors at the regional level (planks and simple furniture) and national traders. Most of the value in the chain is added by processing activities and part of it, generated in processing and trading segments downstream, was not captured.

3.3 Charcoal and firewood value chain.

Firewood as a cash production was tied to the railways. While the railway decreased its activity, charcoal production has been expanding because it can be transported by trucks

towards the southern consumer markets. According to our survey, at least 58% of the charcoal produced at the local level was processed within the classified forest in 2009.

The charcoal chain also provides quite a large number of jobs, most of which are low paying. However, they are accessible to anyone, even to people with low assets. Part of the charcoal is processed after woodlands have been cleared into farmland within and outside the State domain. Charcoal producers are also sent into the sylvicultural areas of the forest by wholesalers. Wholesalers prepay for the charcoal production and market it. They contract producers or workers, as well as sawyers, for the production, women for the packaging and local motorbikes for transport to villages. Two types of traders are engaged in the charcoal business. Petty wholesalers are not registered traders and cannot transport charcoal so they distribute the product locally, expose bags along the road or are commissioned by wholesalers for the collection of charcoal at the village level. Wholesalers are registered and granted permits from the forest administration, which allow them to transport the coal to urban centers. They use the service of transporters or own a vehicle. In addition, retailers can be found who sell charcoal in small quantities to poor users who cannot afford a whole bag at local, regional and national levels.

Table 10.14 Benin.Value added (in thousands of US$) and employment created by TTK charcoal and firewood chains in 2009.

	Local	**Regional**	**National**	**Total**
Value added	410.9	0.0	528.4	939.3
Income	379.5	0.0	469.7	849.2
Taxes	410.9	0.0	528.4	939.3
Employment				
People	390	0	90	480

Source: Floquet et Alladatin (2010)

The charcoal chain generates a value added of US$ 953 thousand (see Table 10.14). It provides jobs to a large number of people without any assets: 490 people in total and 380 at the local level. Altogether, the total amount of laborers' wages is higher than the total amount of operators' income, which indicates a large redistribution of the value added among poor stakeholders.

The firewood chain has a similar organization but is not as dependant as charcoal on forest resources (12% of the wood has been harvested within the forest). Two hundred and twenty people get their income out of this chain at the local level and 17 at the national level. The value added is much lower (US$ 14.1 thousand).

The charcoal chain holds an important share in the villages' economy. Many very poor stakeholders make their living off of it. Alternative income generating activities have to be created in order to reduce it.

3.4 Hunting value chain.

Many species already disappeared and only a few small game species are regularly hunted in the TTK, such as grasscutters (*Tryonomis swinderianus*), wild rabbits (*Lepus crawshayi*) or Ebian's palm squirrels (*Epixerus ebii*).

Mostly women purchasing the products were surveyed and their supply was traced back. Their number around the TTK has been estimated at 45. Because of insufficient local supply, women now have to buy meat from other areas, such as the Mont Kouffè State forest. The local supply is coming from about 315 hunters operating in the forests (74% of the quantities) or nearby areas (26%); at least one hundred of them regularly walk for days in the forest with guns. Hunters were mainly surveyed in group interviews.

Table 10.15 Benin.Value added (in thousands of US$) and employment created by TTK hunting chain in 2009.

	Local	**Regional**	**National**	**Total**
Value added	38.4	0.0	0.0	38.4
Income	38.4	0.0	0.0	38.4
Taxes	0.0	0.0	0.0	0.0
Employment				
People	360	0	0	355

Source: Floquet et Alladatin (2010)

The chain does not go any further than the local level. However, it remains a significant income generating activity for the poor. On its scale, it cannot (any longer) be compared to organized large game trade.

3.5 Cashew nut value chain.

Cashew nut cultivation holds an important place within the production system in all villages visited. Nowadays, it covers significant farmland areas. Most of the male farmers have a cashew nut plantation. Farmers were not supposed to plant cashew in the gazetted domain but they did and do. Plantations had also been set up within the forest by the forestry administration decades ago; they are managed by the co-management committees.

Cashew is mostly exported as raw nuts by Indian traders, processed in India and re-exported to Europe. This is a loss of opportunities for the national economy. Local processing plants have, therefore, been promoted in order to shell and package nuts for direct export to Europe. The main plant has just begun its activities in Tchaourou and is supplied partly from the TTK and its adjacent land.

Exporters of raw nuts compete for supply. Their marketing sub-chain is pyramidal, composed of commissioned local collectors working for regional brokers who supply either wholesalers or national brokers, who supply exporters.

In terms of value added at the local level, it is the main TTK chain contributing to 60% of the value added and to two thirds of local employment.

Table 10.16 Benin. Value added (in thousands of US$) and employment created by TTK cashew chain in 2009.

	Local	**Regional**	**National**	**Total**
Value added	2,355.4	126.0	302.7	2784.2
Income	2,355.4	126.0	279.0	2760.5
Taxes	0.0	0.0	23.7	23.7
Employment				
People	2,882	100	125	3,107

Source: Floquet et Allada

Nearly 20% of the adults at the local level draw an income from the cashew chain (2,500 planters, 300 workers in the plant and the rest in trade); 8,300 people seasonally engaged in harvest have to be added.

3.6 Beekeeping and gathering activities.

Beekeeping had been proposed as an alternative activity promoting forest protection as a non destructive activity and an incentive to fire protection in the nineties. Among those who had been trained at that time, only a few still perform this activity today. But new producers are entering the activity because of the demand on Benin and Nigerian markets. Altogether, according to the survey conducted, 12.5 tons of honey are being harvested in the area, 60% from the forest and 40% within the riparian areas. Seventy-three percent of the honey comes from beekeepers and 27% from the wild hives.

Shea trees can be found in the forest. Farm households harvest on average an amount of nuts valued at US$ 68, still used to a large extent for home consumption and vicinal trade. Efforts still have to be made to develop quality nuts and trade a share of the products at higher value markets.

Further important gathering activities are fishing and grazing; their benefits could not be assessed. Fishing activities concern both Beninese and Nigerian fishing communities, and regulation is difficult because of the lack of coordination between the two States. Both activities would deserve detailed investigations.

Table 10.17 Benin.Value added (in thousands of US$) and employment created by TTK honey chain in 2009.

	Local	Regional	National	Total
Value added	53.7	0.0	0.0	53.7
Income	53.7	0.0	0.0	53.7
Taxes	0.0	0.0	0.0	0.0
Employment				
People	161	0	0	161

Source: Floquet et Alladatin (2010)

3.7 Management and co-management.

Parts of the forest management activities are performed by forestry officers, and parts are delegated to a NGO working with co-management committees and in charge of promoting alternative income generating activities.

Forest management is under the responsibility of the Forestry and Natural Resources Division (DGFRN) supported by the large Forests and Adjacent Lands Management Project (PGFTR). It is more centralized than in the case of parks so the allocation of expenditures to a specific forest of the classified domain is difficult and would require access to detailed accounts. In 2008-2009, consultation work was performed prior to the revision of the management plan in the forest, such as the inventory which has lead to the moratorium on logging and poaching, and there was no investment. The contribution of management activities to the local economy was not important in 2009 (estimated at 1% of the value added, 6 people employed for 2009 by the NGO). It may change according to project cycles.

The contribution of co-management is now insignificant. Revenue from the forest collected by the co-management committees only amounted to US$ 1,700, 14% of the planned revenue. Committees performed some of their tasks through subventions for US$ 2,700 (nurseries and forest enrichment or plantations). They would have earned US$ 21,300 if they had charged the performed timber logging at its normal rate. They now have very little legitimacy to collect taxes among poor users, such as local livestock keepers and charcoal producers while the timber chain is developing illicitly. The only stakeholders paying full taxes are the pastoralists as outsiders.

Three research projects were performed in the forest; one of them is presented in this work. No educational activity could be found.

3.8 Conclusion.

Table 10.18 Benin.TTK main value chains from a comparative perspective.

Chain	Employment	Thousands of US$		
		Income per person	Total income	Value added
Timber	793.0	1.7	1,370.3	1,651.7
Charcoal	480	1.8	849.2	939.3
Firewood	237	0.1	14.1	14.1
Honey	161	0.3	53.7	53.7
Cashew	3,107.0	0.9	2,760.5	2,784.2
Hunting	355	0.1	38.4	38.4
Co-management	Na		4.5	4.5
Management	6	22.9	137.6	137.6
Research	5	10.8	54.2	54.2
Total	5,144.0	1.0	5,282.4	5,677.7

Source: Floquet et Alladatin (2010)

In terms of employment and income, the contribution of the forest based economy is very valuable, generating 5,144 employments (plus 8,300 harvesters). The main chains (timber, charcoal and cashew) provide an average income of US$ 1,700, 1,800 and 900, respectively, per operator engaged in the chains. Unfortunately, this relies on unsustainable and partly illicit activities.

In terms of multiplying effects, timber and cashew have more impact on economic development than charcoal because of the processing of more elaborate products. For each US$ 1 of raw product harvested from the forest or adjacent land, the chain activities will add US$ 1.75, 1.55 and 1.06, respectively.

4. Hlanzoun Community Protected Area

4.1 General information about Hlanzoun.

The Hlan River is a tributary of the Ouémé River. The headwaters of the River are nestled in a forest which has been put under total protection by the population. The Hlan River is a permanent river, feeding the 3,000 ha Hlanzoun swamp forest. It then flows into the Kpomé Lake before reaching the Ouémé River twenty kilometres further downstream. The whole area is seasonally affected by high water of the Ouemé Stream and the lake area rises in this period over a vast inundation plain with floating grasses, connecting the water of the River to the Ouémé flow. It is the Hlanzoun swamp forest (07 ° 02'N and 02 ° 15'E) which recently made the area famous because of its scenic beauty and its ecological biodiversity.

The swamp forest has been recently characterized and mapped (Adomou et al., 2009). It is composed of: large spots of undisturbed forest (31%) with *Alstonia congensis* and *Xylopia rubescens*; 48% slightly degraded forest; 21% degraded forest; and 0.4% cleared fields and fallows. Raffia stands (*Raphia hookeri* and *Anthocleista vogelii)* can be found at higher density where the primary forest has been disturbed to degraded forest.

The swamp forest hosts a large number of plants species (at least 241; see Dan, 2009), at least thirty of which are under threat (i.e., *Hallea ledermannii, Nauclea xanthoxylon*). Some are endemic, and a large number are also used by the population. Many mammals under threat can find a refuge there. At least seven monkey species can be found in the forest. Among these, the red belly monkey species (*Cercopithecus erythrogaster erythrogaster*) is endemic and very rare. The otter species (*Lutra maculicollis*) finds shelter as well as food on different sites along the river in spite of its competition with fishers. Further animals of great interest are mongooses (*Atilax paludinosus),* bush bucks (*Tragelaphus spekeii)* and red hogs *(Potamochoerus porcus*), etc. More than 69 bird species have been observed, among which are calaos, touracos and migratory species.

In all, the area constitutes one of the last relicts of forest vegetation in the southern part of Benin. It also has unique characteristics as a swamp forest. It plays a key role in the continuity of ecosystems, connecting the Lama primary forest and the forests and woodlands of the Ouémé wetlands complex.

Riparian populations say that they have the same mythical ancestors; they recognize the Hlan as a deity who gave them a forest and a lake, both providing them abundant resources. Religious institutions have, therefore, regulated access and use of resources, which have multidimensional meanings. The forest is still under both administrative authority and traditional authority. The administrative authority is represented by the village and district chiefs, who are elected and serve to relay to the communal and central governments while traditional authorities supervise cults of local deities and take care of ecological and social disorders. Traditional institutions are in full crisis of legitimacy that undermines their contribution to the management of the forest. Prohibitions are challenged, and traditional leaders cannot punish anymore as they no longer enjoy the same respect and social acceptance as they did in the past. The annual ritual for the forest deity that involved the entire Hlanzoun population is no longer carried out today (Egboou, 2001).

The riparian population is composed of 10,000 people; two thirds depend on the lake downstream and one third on the swamp forest. Nowadays, access to various Hlan resources is free for the autochthonous population without conditions: a user right is recognized as implicit of people living in immediate contact with the stream as long as they respect a set of common rules.

The Ministry of Environment and Nature Protection asked the Wildlife Management Centre to develop a more formalized protection of this unique swamp forest. Ecologists have been mapping the site and designed zoning which could lead to 4 managements

units. At least one should be put under complete conservation, and some uses in the other parts should be prohibited (hunting and timber logging). The plan was in discussion at the time when this research survey was performed.

Among the economic activities, gathering activities that rely on some resources of the swamp forests have been found as particularly important in terms of value added and employment: raffia and rattan palms, as well as giant snails, were the main ones. Their products are processed and brought into urban markets. The development of income generating activities, such as fish ponds and animal raising alternative to forest use, has not yielded many positive results yet, but the experiences are fairly new. Lowland cropping is performed on a small scale but implies the clearing of the forest. In terms of ecotourism promotion, an increasing number of people come to enjoy boat tours on a water trail within the forest, and guides have been trained for this activity. Entrance fees and their allocation key have only been defined since the survey and an ecotouristic centre was being built at that time so benefits from ecotourism have not been surveyed (Figure 10.7).

Fishing is not an important activity in the swamp forest but is most important downstream. The productivity of the lake can be seen as a positive externality of the forest where some species find shelter. The forest also plays a regulating role on water table movements. People feel they belong to the same cultural area so the lake was taken into account in calculations.

In all, many riparian people are rather dependent on gathering activities. Only a few were surveyed in a comprehensive manner as the most important for income, but according to Dan (2009), people are using more than 75 species for food, wrapping, weaving, medicine, etc.

4.2 Raffia wine chain

Raffia is the main income generating activity in the forest. The main species in the Hlan swamp forest is *Raphia hookeri*. Its density in natural stands increases under human influence and decreases again when overharvested. Palms are sapped daily when they have reached a certain developmental stage. Raffia stands in the Hlan seem to be fairly productive (up to 500 liters of wine over 2 months). Small basic outdoor factories composed of oil drums and copper pipes process the wine into alcohol as soon as harvested; they are installed within the swamp.

Owners of a processing unit organize teams of wine sappers and process around 15,000 palms a year. Collectors purchase the alcohol locally, transport it to larger villages at the local level and sell it to petty-wholesalers, who supply urban wholesalers at regional and national levels. In cities, retailers may sell it to consumers by liter or in small bottles on the street. There is also some local retail and sale to local consumers.

Table 10.19 Benin.Value added (in thousands of US$) and employment created by Hlanzoun raffia wine chain in 2009.

	Local	Regional	National	Total
Value added	203.4	50.4	50.4	304.2
Income	203.4	50.4	50.4	304.2
Taxes	0	0	0	0
Employment				
People	479	83	83	645

Source: Floquet et al., 2010

The value added out of a few hundred hectares is around US$ 300,000, most of which is distributed at the local level. The chain employs 645 people, small businesses and laborers. The value added is distributed half to harvesters and processors and half to traders. Producers are not plain price takers and agree on a minimum price, which is possible because demand is high.

4.3 Raffia derived product chain.

The raffia palm has multiple uses. These include whole leaves of raffia used for roofing houses, petioles of the leaves used as poles, and raffia fiber extracted from young leaflets. Harvest is seasonal because transport is easier in time of low water.

After harvest and preparation to obtain the pole bundles, fibers, etc., some of the products are locally transformed into handicrafts (mats), and others are sold to people demanding them for building. Much of the harvest is performed when petty wholesalers contract harvesters.

Table 10.20 Benin.Value added (in thousands of US$) and employment created by Hlanzoun raffia poles and fibers in 2009.

	Local	Regional	National	Total
Value added	73.0	66.7	0	139.7
Incomes	73.0	66.7	0	139.7
Taxes	0	0	0	0
Employment				
People	479	83	83	645

Source: Floquet et al., 2010

Here again the chain generates a fair number of jobs. No high value handicraft is made out of the products so the value added is relatively low.

Hlanzoun people are indigenous specialists in raffia management. They have to be encouraged to respect and enforce the management rules they have worked out over time. Efforts to promote the raffia products in higher paying markets could compensate local conservation efforts. There are some valuable fibers, which are not at all harvested (piassava), and the long raffia fibers harvested can be processed into fashion items. Entering higher paying markets may also mean some quality control and labeling on the alcohol. As far as we know, no agronomic work has been done in Benin on the raffia so there may be a scope for genetic improvement, domestication and more intensive management.

4.4 Rattan chain.

Rattan is a thorny aquatic palm with creeping stems extending over several meters. It grows naturally in marshy places. In her forest inventory, Dan (2009) identifies three species of them in the Hlan: *Eremospatha macrocarpa, Laccosperma secundiflorum* and *Calamus deeratus*. The first one is usually in the most demanded.

Access to this natural resource is free for all residents. The harvest and preparation of the spiny stems is difficult; however, the income it generates is not negligible. The raw material is sold directly to craftsmen in the major urban centers, where it is used to make mostly good quality furniture for higher income consumers.

Table 10.21 Benin.Value added (in thousands of US$) and employment created by Hlanzoun rattan stems in 2009.

	Local	**Regional**	**National**	**Total**
Value added	18.8	0	37.1	55.9
Income	18.8	0	37.1	55.9
Taxes	0	0	0	0
Employment				
People	30	0	30	60

Source: 2009-2010 CEBEDES survey

This chain only concerns a few people but feeds urban markets.

As for rattan and raffia, users have sound knowledge on how to use the species in a profitable and sustainable way, which means at an appropriate age. In order to limit competition, which leads to premature use, raffia palm users identify potential palms they would like to harvest soon and mark them. This does not always sufficiently prevent overharvesting and poor management. For rattan, some users would have cut young stems instead of only collecting mature ones and it would have caused the disappearance of the

species in many spots. Asian experiences could help in managing the stands in sustainable and more productive ways and reintroduce the species in areas where it previously grew.

4.5 Giant snail chain.

In Benin, some species of Achatinidae are very popular food (*Acharchatina* and *Achatina* sp.). Snails do well in wetlands and can be found in the Hlan forest.

Gathering in the Hlan is done by both men and women while marketing activities are only performed by women. Competition for supply is strong among semi-wholesalers, who purchase snails from the gatherers so as to pre-finance the gatherers' activities. They sell the snails in regional markets either to wholesalers for urban markets or to food processors who sell it cooked to roadside passers-by. Traders in large urban markets take a high share of the value added in the chain.

Table 10.22 Benin. Value added (in thousands of US$) and employment created by Hlanzoun giant snails in 2009.

	Local	**Regional**	**National**	**Total**
Value added	144.8	43.3	0.2	187.6
Income	144.8	42.6	0.2	187.6
Taxes	0	0.7	0	0
Employment				
People	150	40	2	192

Source: Floquet et al., 2010

It is interesting to see how a nearly invisible activity can generate such high income. The activity locally employs around 150 people, but it is seasonal in the Hlan. The pressure on the stand is relatively high so gatherers have to bait animals. Snails are easy to raise at home, and this could constitute an additional source of supply.

4.6 Fishing chain.

Fishing is an activity that is practiced in all villages bordering the Hlan. However, it is only in the villages of Hon and Kpomè by the lake that this activity has a commercial scale. Flood plains are productive habitats for fish.

Fishing is only practiced by men and restricted to local residents. Fisher migrants are not welcome. Women, fishmongers, buy fish from fishermen and then smoke them before they put it on the market. The fish can also be delivered fresh. Fish purchase is sometimes performed on the river, where women will meet fishermen. There is high competition for the product, and collectors try to contract fishermen by prepaying for the product or for the equipment (nets, hooks, canoes). Some wholesalers come directly and buy from

fishmongers (as they would not be allowed to purchase directly by fishers), and local petty wholesalers travel up to urban markets and sell their products to wholesalers. Most of the product is smoked, but there is also a part transported fresh on ice to Nigeria.

Figure 10.7. Benin. Hlanzoun Community Protected Area

a. Ecoturistic centre in Hlanzoun

b. Visitors on the water trail in Hlanzoun.

c. Raffia palm wine harvest in Hlanzoun

d. Raffia wine distillery

e. Ecotouristic centre in Hlanzoun.

f. Market survey by giant snails petty traders.

Source: Floquet, A. 2010.

Table 10.23 Benin. Value added (in thousands of US$) and employment created by fishing from the Hlan River and lake downstream the Hlanzoun in 2009.

	Local	Regional	National	Total
Value added	1,229.7	62.0	548.8	1,840.6
Income	1,229.7	62.0	543.8	1, 835.6
Taxes	0	0	4.9	4.9
Employment				
People	461	70	132	663

Source: Floquet et al., 2010

It is the most profitable chain, and if it could be demonstrated that the forest is a major factor in the productivity of the lake, conservation would have strong supporters in this professional group.

4.7 Research and development project chain.

Several community protected areas have been the focus of attention of researchers and environmental NGOs during recent decades. Hlanzoun has been a major attraction with many inventories and ecological studies, as well as some socio-economic investigations. Research teams were based at the local level for months. In 2009, one ecological project performed an inventory of insects in a participatory way, with involvement from the population, primary school children, and their teachers on one hand, and from eco-volunteers from abroad on the other hand. Budget impacts were low. Mapping and zoning of the forest were in progress with several general assemblies discussing the topic. A small ecotourism center has been built near the place where visitors embark on their boat tour. Local people travelled on study tours to the eco-tourism initiative near Pendjari and came back with new ideas on how to develop their own eco-tourism initiative. Value added by these activities is presented in Table 10.23.

Table 10.24 Benin.Value added (in thousands of US$) and employment created by Hlan River research and development activities in 2009.

	Local	Regional	National	Total
Value added	64.6	9.7	36.8	111.2
Income	64.6	9.7	36.8	111.2
Taxes	0	0	0	0
Employment				
People	0	0	4	4

Source: Floquet et al., 2010

The value added is modest (5% of the total), but infrastructure and knowledge gained are investments for the future.

4.8 Conclusions.

Hlanzoun economy relies almost exclusively on gathering clusters (see Table 10.24).

Table 10.25 Benin. Hlanzoun main chains from a comparative perspective.

Value chain	N	Value added	%	Average income	Multiplicative effect
Fish	663	809,854,080	69.2	1,221,499	2.3
Raffia derived	425	65,558,213	5.6	154,255	2.6
Raffia wine	645	133,857,777	11.4	207,531	2.3
Rattan	60	24,609,250	2.1	410,154	2.7
Snails	192	82,831,246	7.1	431,413	2.3
Medicinal plants	37	4,556,775	0.4	123,156	na
Research	4	48,942,029	4.2		na

Source: Floquet et al., 2010

Gathering activities are concentrated at the local level and mostly combined with local processing so all these small businesses build emerging, if not strongly differentiated, clusters. These clusters are in relation with various urban consumption markets. For US$ 100 product harvested the value added at the end of the chain is US$ 240, representing the multiplicative effect of the natural resource based chain on the economy at local, regional and national levels. Income improvement can be searched for by improving harvest or better yet by improving the multiplicative effect of the chain in adding more value in processing and trade.

In this situation, raffia palms, rattan palms, bamboo and many other species are the resources of the future transition areas around the zone under total protection. In order to keep local users championing protection, their rights over the resources have to be recognized, and they have to be further protected from local or external opportunists. Local users fear, with sound reasons that their resources might be sold out as soon as they loose local control over them. Such fears have to be taken into consideration in order to prevent situations similar to those presented above in the TTK forest, where a few have destroyed the common pool of the whole for their sole short-sighted benefits.

The second cluster which might make conservation attractive is ecotourism and educational activities bringing new types of income for men working as guides and for women engaged in accommodation, catering and product sales to the visitors. Here again, such groups will become active in protecting the forest if the forest brings significant income. Investments have to bring tourism activities to a significant level soon enough to keep people enthusiastic.

5. Tentative national account.

In constructing the national account, the four types of income generating activities generated out of the protected areas (tourism, extraction, gathering and management) can be found, but some sets of activities are specific of types of protected areas (see Table 10.25).

Table 10.26 Benin. Main chains deriving from protected areas at the national level.

	Thousands of US$	%	Type of PA concerned
Protected Area Management			
Management	11,539.8	28.1	A
Co-management	407.5	1.0	R&F
Research	120.0	0.3	A
Tourism, sport hunting and ecotourism			
Tourism	1,938.3	4.7	R&C
Ecotourism	30.6	0.1	R&C
Sport hunting	819.0	2.0	R
Gathering activities			
Shea nuts	845.5	2.1	A
Locust bean	891.8	2.2	A
Cashew nuts	3,254.5	7.9	A
Raffia palms	411.1	1.0	A
Honey	533.0	1.3	A
Snails	759.1	1.8	A
Fishing	4,075.0	9.9	A
Wood and fauna uptake			
Poaching	1,337.2	3.3	F
Timber	3,844.3	9.4	F
Charcoal	9,386.4	22.9	F
Firewood	693.4	1.7	F
TOTAL estimate	**41,039.3**	**100**	
A: all; R: Reserve; F: classified forest; C: community forest			

Source: Own elaboration

Relying on available data and extrapolating results from surveys carried out, the national account was built.

a. Tourism clusters.

Tourism towards protected areas is mainly focused on the Pendjari, and the other destinations that people visit on their way have already been taken into account in the case study. Cynegetic areas are similar in both Pendjari and W Reserves in terms of area; however, the number of hunters is a little lower in the W. The value added by cynegetic

tourism in the W was estimated at half its value in Pendjari, a probable underestimation. Indeed, promising ecotourism initiatives have been identified in and around several protected areas: near the W biosphere reserve; in the 3 community reserves which are being taken into consideration by CENAGREF (Zinvié Marschbuck protected area, Adjamey Hippopotamus site, Hlanzoun site here under study); in the Lama State forest; in the classified forest of Monts Kouffé & Wari-Maro; and in wetlands of the RAMSAR sites, such as the Aheme lake. The list is not exhaustive, but these initiatives are new and still yield low benefits. For this first round of global accounting, it was assumed that ecotourism around the W and in the Tobe site of the classified Monts Kouffé adds similar values as the ecotourism Tanougou waterfall site near the Pendjari.

b. Destructive clusters.

Timber was expected to be a very important value adding activity. Most of the non teak timber is extracted out of the gazetted domain, especially out of forests of the mid belt near the TTK (Monts Kouffé, Wari-Maro, Agoua, etc.), where the same laundering mechanisms of *importing* wood are well developed (Siebert et Elwert, 2004; Tchiwanou, 2003). According to the 2007 National Forest Inventory (Sepulchre et al., 2008), potential sustainable timber supply from wild stands is 82,800 m^3, much lower than the potential supply evaluated ten years earlier. Teak extraction is around 46,000 m^3, mainly out of the State plantation. National consumption is estimated at over 130,000 m^3, increasing quickly because of a booming housing sector. The total could be nearly balanced if all the harvested timber was locally consumed. But 11,000 m^3 of teak is legally exported in a semi processed form (planks), and in 2008, 35,000 m^3 of wood from wild stands was said to be exported illicitly to China and India (Blackett & Gardette, 2008). Consequently, 40,000 m^3 of unsustainable harvest would then be performed from wild stands, mainly from the classified domain. Local processing units still lack timber, and the national market is not sufficiently supplied or is but by low quality products.

For the valuation of the timber sector, the estimation performed by Bertrand & Agbahungba (2009) is taken over. These authors took into consideration timber extraction from natural stands and obtained results similar to those of the present survey in the TTK. They also more systematically assessed timber processing and handicrafts up to the national level. In addition, they found out that most of the trade from wild stands concerns timber which is said to have been imported from Nigeria and Togo escaping control and regulations and generating illicit taxes instead of licit ones.

Charcoal consumption has increased over the last decade. The supply front is moving north while the wild stands in the south have been impoverished or turned to farmland, making the shift from firewood to charcoal profitable. Wood harvest at the national level is around 14.5 million tons while the sustainable yearly production, according to the forest inventory, is 4.8 million tons. This is true in spite of the efforts made over the last two

decades to develop fuelwood plantations of fast growing species (over 10,000 ha with support of a large firewood PBF II project planted by private producers and on State domains), especially in the South, and to rehabilitate and manage natural stands. Gazetted forests also produce charcoal and fuelwood from species, which are not appropriate for timber. Logging and fuelwood harvest are supposed to be performed according to the forest management plans, but these plans are hardly respected, as was shown in the TTK field study. Extrapolating case study results in proportion to the mid belt forest areas, it was assumed that the charcoal production from classified forests will be ten times the production surveyed in the TTK. This means (at least) 15% of the charcoal quantities and 10% of the firewood produced in the country come from the classified domain and their adjacent lands.

Concerning game hunting outside of cynegetic areas, neither data on game harvest nor on its consumption could be found at the national level. Bertrand & Agbahungba (2009) extrapolated consumption data collected by street restaurants proposing bush meats to consumers and came to a national consumption of 70,000 tons per year, 10 kg per inhabitant, which was determined to have been overestimated. In the present account, only quantities traded are taken into consideration and home consumption is not considered. Value added in Pendjari was extrapolated to the W according to the respective size and the values added in the TTK according to the total areas of classified forests. Total value added amounts to US$ 1.33 million.

c. Gathering clusters.

Fishing is the main gathering activity in terms of value added. The fishing benefits in the W were estimated at the value of the Pendjari. However, no extrapolation was performed out of the relatively high value from the Hlan because of a lack of data and there was no data either about fishing from rivers and ponds in the forests of the classified domain.

According to Bertrand & Agbahungba (2009), the total production of shea nuts at the national level is 85,000 tons. It was assumed that the value added in the W would be twice the Pendjari and that the classified domain would bring three times the harvest of the Reserve (according to their total areas), altogether around 9,200 tons. The same approximation was performed for the locust bean. National accounts were then built extrapolating the Pendjari site accounts.

Honey consumption has been assessed at 680 tons by Bertrand & Agbahunga at the national level. The production from beekeeping from the TTK was extrapolated as 10% of the production of the classified domain (Bassila and Bante being important places of production). The harvest of wild honey was extrapolated from Pendjari to W and from TTK to the rest of the classified domain according to their respective areas.

Giant snail quantities harvested in the Hlan were doubled in order to take into account other wet areas under community protection.

d. Alternative income generating activities.

The production of cashew nuts has been encouraged around forests of the classified domain so it is kept in the account as a major alternative income generating activity, even if it could have taken place without protected areas. The TTK is a production area for cashew nuts, but using the results from the inventory of cashew plantations in the Northern West (Tandjiekpon et al., 2008), the amount of cashew grown in adjacent lands of the Wari Maro and Monts Kouffé forests or within them could also be calculated.

e. Management cluster.

This is the cluster where the national account gives a very different view because many program and project funds could not be allocated at the local level and are also spent mainly at the national level. In addition to funds allocated to park management, main project funds (PGFTR and PAMF for the classified domain, Conservation and Management Project of National Parks, CENAGREF funds dedicated to new protected areas) were summed up.

Community based areas up to now have no formal (co-) management arrangement; some have village based organizations directly manage the tourism services delivered out of their common goods and may develop dispositions with the commune for benefit sharing and investments.

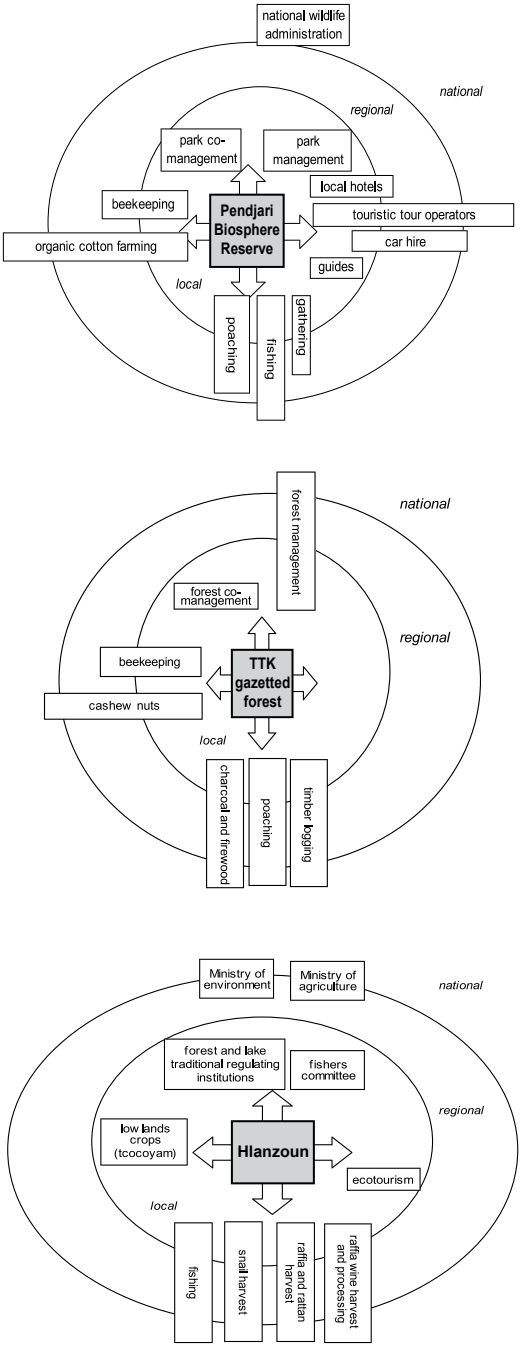
f. Summary.

In total, the contribution of protected areas at national level may be estimated at US $ 41 millions, circa 0.8% of the GDP, mainly derived from public funds and charcoal, with significant contribution of timber and fishing. Tourism only accounts for 7%. Benefits nowadays obtained from conservation are rather unsustainable, with a high dependency on donors' subventions and credits and a trend to depletion of the stocks of natural resources.

The three sites surveyed show very different patterns of benefits (Figure 10.8) so that seeds for changes in the benefit structure have already been sown and experiences can be valued, provided policies support them for up scaling.

As already mentioned above, the benefit structure in the Pendjari case is encouraging conservation; a large share of local and non local stakeholders draws benefits out of it through tourism, because of the image of the protected area and of environmental externalities (fishers). The protected area has been successfully turned into common goods, which riparian population is interested in protecting.

Figure 10.8 Benin. Clusters of activities derived from protected areas from comparative perspectives.



Source: Own elaboration

The pattern in the community forest is different from those in other protected areas. Community protection relies on economic benefits from gathering activities which are feeding local clusters and value adding chains up to regional and national levels. No formalized co-management organization exist at the time being, but there are some stakeholders interested in championing conservation to some extent for different reasons: religious leaders would see their legitimacy improved in a context where it is battered by new modern anti animistic religions; fishers are organized in order to protect a common pool against the greediness of a few; there is also a traditional organization of raffia users managing access to the common pool; a few people are taking advantage of the presence of external visitors (researchers, eco-volunteers and tourists). All these stakeholders could draw higher sustainable benefits with some investment and support.

The pattern of benefits from the gazetted forest is unfavorable to conservation. Most incentives are in the contrary encouraging deregulated overharvest of the stand. Policy changes are needed in order to reverse these trends.

When aggregated at the national level, among the main income sources generated by the protected areas, only a few constitute incentives for conservation.

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PART IV

Policy Considerations for the Management of National Parks and Biological Reserves in Bhutan, Costa Rica and Benin

Introduction

The policies respond to processes and action that bring together all the actions taken by individuals (or groups), public and private, in order to perform pre-defined objectives. Given that policies are not the product of spontaneity, these actions correspond to both transitory efforts to become decisions on operational proposals, such as the efforts developed to make big and small changes.[1] For this reason, the phase of implementation of these policies is initiated when the previous decisions have correctly set the goals and objectives.

Several phases are distinguished in a policy. The first one is its elaboration or definition, which is the conceptualization of the long term vision. The second one is the implementation, execution or performance, which represents the implementation of that policy. The third one is the impact of the policy, which refers to the consequences derived from its implementation and execution.

In practice, policies should not be considered formulas. This is because different processes correspond to different dynamics, structures and relationships among the factors that influence the development and implementation of the policy. This implies that in each particular case policies should be defined according to their goals and specific objectives. There are different means of achieving the objectives of the policy; these can include plans, actions or structured strategies to make the objectives operational. Similarly, there are several instruments for its implementation.

In general terms, policies refer to instruments that can use the government to change the behavior or economic, social and environmental behaviors. In this regard, policy recommendations that arise as a result of the analysis of the studies developed in Bhutan, Costa Rica and Benin are presented below.

[1] Van Meter, D.S & van Horta, C.E. (1993). *La implementación de las políticas*. Mexico.

Chapter 11

Policy Considerations for Bhutan

Sonam Choden

1. Introduction

This chapter presents an overview of some of the important conservation legislation in place for the management of protected areas in Bhutan. They are mainly the Constitution of the Kingdom of Bhutan passed in 2008, the 1995 Forest and Nature Conservation Act, and the 2006 Forest and Nature Conservation Rules. Conservation issues and threats faced by protected areas at the national level and for the three case studies have been discussed with policy recommendations proposed for all of them.

The conservation issues and threats faced by protected areas at the national level include unsustainable use of natural resources, land use change and conversion, human wildlife conflicts, poaching and wildlife trade, forest fires, over-grazing and loss of biodiversity and climate change. Policy recommendations proposed to address these national level issues are: development of protected area policies; management framework and guidelines; co-management of protected areas; protected areas and sustainable livelihoods; payment for ecosystem services; linking protected areas to climate change mitigation; trans-boundary collaboration and networking; planning, monitoring and evaluation of protected areas; sustainable financing mechanism for protected areas; and human resource development.

In the cases of the three case study parks, the conservation issues and threats for Bumdeling Wildlife Sanctuary (BWS) include over-exploitation of timber and non-timber resources, over-grazing, human-wildlife conflicts, poaching, habitat loss and degradation, pest and disease, and other issues related to capacity building, management and funding. In order to address these issues, specific policy recommendations have been made related to sustainable use and management of natural resources, active grazing management, mitigation of human-wildlife conflicts, anti-poaching, conservation of biodiversity, habitat management, implementation of zonation, capacity building and management recommendations.

The conservation issues and threats for Jigme Dorji National Park (JDNP) are: poaching of *Cordyceps* by both international and local poachers; pressure from livestock grazing and human-wildlife conflicts; lack of a management plan and zonation; pressure from increasing tourist numbers and developmental activities; over-exploitation of forest resources, especially fuel wood; and lack of research. The policy recommendations proposed are trans-boundary collaboration, grazing and livestock management, development of a management plan, zonation of park areas, implementation of EIA guidelines, management of tourism facilities and services, use of alternative fuels, and research.

The conservation issues and policy recommendations for Jigme Singye Wangchuck National Park (JSWNP) are related to: management of *Sokshing* (land used for leaf litter collection); grazing land; conversion of *tseri land* (land used for shifting cultivation) to dry land; human-wildlife conflict management; land swapping; monitoring and management of road infrastructure and tourism; conservation of local culture and traditions of ethnic communities; park zonation; resource monitoring and management by local communities; and integrated conservation and development programs.

These issues and policy recommendations are also applicable to other protected areas in Bhutan.

2. Conservation Policies

The Constitution of the Kingdom of Bhutan passed in 2008 provides the overall legal basis for conservation in the country, including protected areas. Article 5 of the Constitution of Bhutan mandates the government to ensure a minimum forest cover of 60 percent for all times to come in order to conserve the country's natural resources and prevent degradation of fragile mountain ecosystems (RGoB, 2008). Additionally, the Constitution also states that every Bhutanese is a custodian of the country's natural resources and environment, and it is the fundamental duty of every citizen to contribute to the conservation and protection of natural environment and biodiversity and prevent all forms of ecological degradation (RGoB, 2008).

In addition to the Constitution of Bhutan, the management of protected areas is guided by a legal framework, which includes a number of acts, rules, notifications and orders tabulated in Table 10.1 below. These legal instruments were enacted prior to the Constitution but complement the provisions of the Constitution.

Among all these legal instruments in place, the 1995 Forest and Nature Conservation Act (FNCA) and the 2006 Forest and Nature Conservation Rules (FNCR) are the two main legal instruments used in the management of protected areas in Bhutan. Chapters VI, VII and IX of the 1995 FNCA and the 2006 FNCR deal with protected areas, conservation of wildlife, enforcement and penalties, including list of totally protected wildlife and plants under Schedule-I and are directly applicable to protected areas management.

Currently, the Department of Forests and Park Services is also developing a comprehensive National Forest Policy of Bhutan based on the Forest Policy of 1974 and revised policy of 1991. Once the new policy is approved by the government, the 1995 FNCA and the 2006 FNCR are also expected to undergo subsequent revisions.

Furthermore, work on the drafting of a separate Protected Areas and Wildlife Bill of Bhutan is also currently underway based on instruction from the government. This new bill is expected to strengthen the overall management of protected areas and wildlife conservation in the country and address existing policy gaps in the 1995 FNCA, the 2006 FNCR and other related legislation.

Table 11.1 Bhutan. Summary of Acts, Regulations and Orders.

S.I. No.	Relevant Acts, Regulations and Orders pertaining to Natural Resource Management	Subjects dealt with
1	Application for Notification of a revised 1993 Protected Area System of Bhutan	Notification for a revised Protected Area System
2	1995 Forest and Nature Conservation Act	Protected areas, conservation of wildlife, soil and water conservation matters, enforcement and penalties
3	1995 Gazettement Notification of Protected Areas	Gazettement of four priority Protected Areas
4	2006 Forest and Nature Conservation Rules	Government reserved forest, protected area management, wildlife conservation, fire prevention, deforestation, soil and water conservation, community forest, private forest, enforcement and penalties
5	2000 Environmental Assessment Act	Environmental assessment procedures for policies, programs and projects
6	2007 Land Act of Bhutan	Land ownership and use, regularization of different land use, such as grazing and *tseri* land
7	2007 National Environment Protection Act	Environmental quality, protection and management
8	1995 Mines and Minerals Management Act	Protection of environment from commercial mining operation
9	1979 Pastureland Act of Bhutan	Grazing
10	2003 Biodiversity Act of Bhutan	Access to genetic resources and benefits sharing and protection
11	2001 Livestock Act of Bhutan	Livestock breeding, health and production aimed at enhancing their productivity and preventing diseases so as to enhance rural income and livelihood
12	2001 Co-operative Act of Bhutan	Legal framework for the formation of co-operatives in order to facilitate economic development of Bhutanese societies, especially the poor
13	Decentralized Forestry Framework for implementation	Private and community plantations, forest fire, allocation of dry firewood, encroachment of pasture land and *sokshing*

Source: Adapted from BWS, 2001; MoA, 2009

3. Policy Recommendations

In order to address conservation issues and threats facing protected areas, the following policy recommendations are proposed for the effective management of protected areas in Bhutan. The recommendations proposed here are at the national level only with specific policy recommendations for three case study parks proposed separately.

3.1 National level policy recommendations.

3.1.1 Development of protected area policies, management frameworks and guidelines.

With almost over 50 percent of the country's areas under the protected area system, a separate legal framework for the management of protected areas has become necessary. In this regard, the drafting of the Protected Areas and Wildlife Bill of Bhutan was initiated recently by the Wildlife Conservation Division (WCD) on the instructions of the Honorable Minister, Ministry of Agriculture and Forests and the Cabinet. The Bill, once enacted, is expected to address the current gaps and inconsistencies in the policies related to protected areas and wildlife conservation in Bhutan. Based on this legal framework, protected area management framework and guidelines need to be developed.

3.1.2 Co-management of protected areas.

The current system for protected area management in Bhutan has been run centrally by the Department of Forests and Park Services. Building on the current initiatives of the government-NGO partnership model, like in the case of Wangchuck Centennial Park, there is a need to involve and collaborate with relevant stakeholders in protected area management. A management board or a committee consisting of relevant stakeholders needs to be established at each park's level to discuss issues of concern, plan collaborative programs and update policies and initiatives. Such a forum would help to strengthen collaboration and communication with relevant stakeholders and facilitate smooth implementation of park programs and activities in the field.

3.1.3 Protected areas and sustainable rural livelihoods.

All protected areas in Bhutan have people living in and around them, who are dependent on the natural resources for their livelihoods. As such protected area management in Bhutan must continue with the current policy of integrating conservation with sustainable rural livelihoods that would help to reduce and manage threats and issues faced by protected areas. Unlike in the past, when activities undertaken under Integrated Conservation and Development Programs (ICDP) were too many with too little impact, the approach needs to build around core objectives and initiatives linked to addressing human-wildlife conflicts and generating economic benefits to local communities through ecotourism in the protected areas.

3.1.4 Payment for ecosystem services from protected areas.

Protected areas are the source of water for the majority of currently installed hydro-power plants in the country, as well as for the ones planned in the future. Conservation of these

water sources and watersheds in the protected areas is important for the continuous flow of water and power generation, upon which the country's economy depends. As such, part of the revenue generated through ecosystem services from protected areas needs to be ploughed back into protected area management for the conservation and protection of watersheds and local communities that depend on these areas for livelihoods. Bhutan Power Corporation Limited has already taken such an initiative since two years ago. It needs to be scaled up and implemented by other hydro-power agencies as well.

Besides hydro-power, tourism is another sector that could also contribute to payment for environmental services. Most of the trekking routes used by tourists and other natural and cultural highlights for tourists are found in and around the protected areas. There is a need to pour some of the revenue generated from tourism back into protected area management. Such mechanisms from the hydro-power and tourism sectors would help in the conservation and effective management of protected areas in Bhutan and reduce dependence on donor funding. Currently, many of the protected areas do not have any funding sources except from the Royal Government of Bhutan, which are insufficient. This has created a vacuum and stalled many programs in protected areas like BWS, JSWNP, JDNP, Royal Manas National Park (RMNP), Thrumshingla National Park (TNP), and Sakteng Wildlife Sanctuary linked to providing sustainable livelihoods to local communities and addressing human-wildlife conflicts and other species conservation programs.

3.1.5 Linking protected areas to climate change.

The ecosystem services from protected areas help in carbon sequestration and act as carbon sinks to reduce the impacts of global warming and climate change. Conservation of biodiversity in the protected areas is very important to maintain the quality of ecosystem services on which human lives and well being and the well being of the planet depends. Thus, it is important to recognize and value the important role of protected areas in mitigating climate change and accordingly ploughing global climate funds back into addressing threats/issues related to protected areas and biodiversity conservation in the protected areas. Carbon trading and carbon credits from protected areas need to be explored at regional and international levels.

3.1.6 Trans-boundary collaboration and networking.

Some of the threats like poaching, human-wildlife conflicts, and climate change are trans-boundary in nature and need close collaboration and networking with neighboring countries. The current trans-boundary collaboration and networking initiatives need to be strengthened at the level of not only the policy makers but also at the field level. Bhutan's participation and representation in the regional and international networks related to wildlife conservation and enforcement need to be strengthened both at the policy and field

levels. With the recent establishment of the International Conventions Section under the Wildlife Conservation Division, some of the existing gaps and weaknesses are expected to be addressed to strengthen regional, national, and international collaboration and networking efforts.

3.1.7 Planning, monitoring and evaluation of protected areas.

Planning, monitoring and evaluation are important for any organization and program. Similarly, planning, monitoring and evaluation are important for effective management of protected areas. There is a system of conservation management planning in place in the protected areas with Conservation Management Plans developed for JDNP, JSWNP, RMNP, TNP, BWS and SWS. However, monitoring and evaluation on the implementation of these plans has been quite weak. Most of the conservation plans developed earlier have already expired, except for that of SWS and plans revised for TNP and RMNP. Conservation Management Plans for PWS and TSNR are currently being prepared by the WCD. The revised plan for TNP was prepared by TNP management only.

There is no clear direction on who is responsible or who should take the lead role for the revision of plans, whether parks themselves or the WCD. Moreover, there is no standard guideline for Conservation Management Planning to guide the protected areas.

Thus, there is a need to first develop standard guidelines on conservation management planning for protected areas in Bhutan along with clear roles and responsibilities. A macro plan for protected areas in Bhutan (10 year duration) needs to be developed to guide the overall management of protected areas in the country. Guided by the overall macro plan, each protected area should develop specific Conservation Management Plans, which need to be revised every five years. As far as possible the Conservation Management Plans must be developed for the same time as the Five Year Plan of the government. Participatory planning processes must be followed for conservation management planning in the protected areas involving all relevant stakeholders.

Monitoring, evaluation and proper documentation of annual activities implemented in the protected areas must be strengthened. All protected areas should come up with annual progress reports on the programs/activities implemented with both financial and technical achievements. Based on these reports, the WCD should prepare annual consolidated progress reports for all protected areas, including activities/programs implemented by the WCD. The annual progress reports can be used to monitor and evaluate the progress in the achievement of five year Conservation Management Plans. Lessons learnt and experiences from the implementation of the plans must go in to the revised plans.

Besides, there is a need to strengthen linkage and coordination between programs in protected areas with central programs in the functional divisions under the Department of Forests and Park Services and improve annual reporting and monitoring systems.

3.1.8 Sustainable financing mechanism for protected areas.

Protected area management in Bhutan has been made possible largely through the generous funding support from donors, such as United Nations Development Program, Bhutan Trust Fund for Environmental Conservation, World Wildlife Fund, Government of Netherlands, Government of Denmark and other donors. The annual contribution from the government towards management of protected areas is very limited and covers only personnel emoluments and office management costs. For all other conservation programs and activities, including capacity development, the support so far has been from donors. Currently, most of the protected areas do not have any donor funding to implement programs and activities as most of the earlier projects have been completed. This has resulted in funding gaps to implement the planned activities.

There is a need to develop a sustainable financing mechanism for protected area management in Bhutan so that parks do not have to rely only on donor funding. This could be in the form of a creation of an endowment fund specifically for protected area conservation and management in Bhutan. It could be a separate entity or managed as a component under the Bhutan Trust Fund for Environmental Conservation.

In the meantime, until the establishment of such an endowment, fund mobilization for protected area management needs to taken up by protected areas themselves and the WCD by developing specific project proposals. Some of the potential donors to explore for funding would be the Bhutan Trust Fund, Bhutan Foundation, WWF Bhutan, US Fish and Wildlife Service, UNDP, World Bank and other donors. The project proposals in protected areas should be linked to mitigation of impacts from climate change, in order to access climate funds. Besides, government funding should also be explored to implement some of the priority programs in the next financial year. In the long run, payment for environmental services from protected areas must be explored, especially from hydro-power and tourism sectors for the management of protected areas. This could go into the endowment fund.

3.1.9 Human resource development.

Human resource development in the protected areas needs to be on a continuous basis since there are new staff joining the conservation field every year and others being transferred from the Territorial Division Forest Offices and Dzongkhags (districts). Most of these staff lack wildlife conservation and protected area management background. Thus, a well planned in-country training program on wildlife conservation and protected area management needs to be developed at the Ugyen Wangchuck Institute for Conservation and Environment, especially for the staff of protected areas.

The course should have both theory and practical modules covering subjects related to conservation biology, wildlife conservation and monitoring, wildlife rescue and rehab, human-wildlife conflict management and mitigation, participatory management of natural resources, sustainable natural resource management, socio-economic and biodiversity surveys, conservation management planning, ecotourism, environmental education, environmental interpretation, participatory planning, monitoring and evaluation, conservation grant writing, GPS and GIS mapping, Environment Impact Assessment, wildlife and social research design, planning, data management, analysis and publication of scientific reports. In addition, capacity building opportunities for protected area staff and stakeholders must be explored through projects/scholarships/exchange programs for professional development.

3.2 Bumdeling Wildlife Sanctuary (BWS) case study policy recommendations.

The main objective of BWS management is to conserve and protect the rich natural resources and cultural resources of the sanctuary and at the same time meet the basic resource needs of the local communities living in and around the sanctuary. Since the sanctuary management has to fulfill the dual role of conservation versus sustainable utilization due to the dependence of local communities on the sanctuary resources for their livelihoods, BWS management faces many conservation issues, threats and challenges.

Some of the main threats and issues facing BWS are: over-exploitation and unsustainable use of both timber and non-timber natural resources; over-grazing by livestock (yak and cattle) in alpine pastures and forest areas; habitat loss, fragmentation and degradation due to pressure from developmental activities; human-wildlife conflicts as a result of livestock depredation and crop damage by wildlife; forest fires mostly due to uncontrolled burning of pastures and *tseri* land (land used for shifting cultivation); poaching of wildlife; littering, especially by *Cordyceps* collectors during the *Cordyceps* harvesting season in June/July; pests and diseases affecting large areas and species of plants, such as large scale die back of bamboo and fir species.

Besides, there is lack of knowledge and poor management on sustainable resource use and management both at the community and park level along with weak monitoring due to limited staff and lack of capacity and mobility.

In order to address the above issues and threats in BWS, the following set of policy recommendations are presented in Section 3.2.1. This is based on output from the BWS validation workshop organized on May 26, 2010, 2009 BWS field work, and other secondary documents and sources related to BWS and other protected areas. Since the issues and threats faced by BWS are also faced by other protected areas in Bhutan, these policy recommendations will be applicable to other protected areas as well.

3.2.1 Policy recommendations. Source: Choden and Wangyal 2010.

S.I. No.	Issue	Policy recommendations[2]
1	Over-exploitation of timber and non-timber resources	1.1 Strict implementation of zoning system and regulations already developed in BWS with resource use strictly confined to only multiple/buffer zone areas. 1.2 The issue of permits for those resources, which are already over-exploited, to be stopped immediately. 1.3 Plantation program for those species that are over-harvested and are locally extinct or on the verge of local extinctions. 1.4 All future both timber and non-timber resource use in BWS to be guided by resource management plans with annual harvestable quotas fixed based on zoning system in place. 1.5 Promotion of community based natural resource management schemes/programs for both timber and non-timber resources based on the existing guidelines (e.g., community forestry, NWFP, etc.) developed by the DoFS. 1.6 Promote domestic cultivation of high value timber and non-timber resources on private land/community land/community forest and other degraded areas in collaboration with research centers. 1.7 Support and re-institute traditional resource management practices, such as *Ridham* and *Ladam.* 1.8 Strict enforcement of rules, regulations and penalties for illegal offenders. 1.9 Mass awareness and education on forest rules, regulations, penalties, conservation benefits and ecosystem services. 1.10 Capacity building trainings for BWS staff and communities/stakeholders related to sustainable resource management, sustainable harvesting technologies, pest and disease control, post-harvest techniques for both timber and non-timber resources, especially for *Cordyceps*. 1.11 Promotion of alternative resources and technologies to reduce the use of timber for construction and firewood. 1.12 Development of appropriate pest and disease control measures and technologies in place. 1.13 Conduct annual monitoring of resource status in BWS and maintain proper record of all resources used annually geog wise/range wise in a database which could be retrieved as and when required. These information should be maintained properly both at the Park Range offices and Park Head office as well as linked to Forest Information Management Section in DoFPS. 1.14 Clarity and coherence between policies, acts, rules and regulations related to land use/resource use, such as *sokshing*, *tsamdro*, *tseri*, rural timber, NWFPs, community forest and other developmental activities in the protected areas.
2	Over-grazing	2.1 Mapping of all grazing areas in BWS based on intensity of use and status. 2.2 Grazing in over-grazed areas prone to landslides, soil erosion and showing signs of environmental degradation should be stopped immediately. 2.3 Active grazing management should be introduced through regulated rotational grazing, enrichment fodder plantation and annual monitoring of grazing areas, as is done in Palo Verde National Park in Costa Rica. 2.4 Community/user based management of grazing areas based on scientific management prescriptions.

[2] The policy recommendations mentioned here are not in any order of priority but could be applied immediately or in the future when resources become available by BWS management or in collaboration with relevant agencies, NGOs and conservation partners.

S.I. No.	Issue	Policy recommendations[2]
		2.5 Pilot prescribed burning of grazing areas to improve pasture regeneration and growth and to minimize dominance by unpalatable species. 2.6 Piloting of bio-gas technology, especially in lower and mid-lower temperate areas in BWS to reduce grazing and enhance local income and livelihoods. 2.6 Promotion of improved breed, stall feeding and tax incentives to reduce free ranging livestock. 2.7 Promote fodder development and use of improved fodder management technologies to address fodder shortage and reduce dependence on forest. 2.8 Propose for introduction of annual grazing tax based on livestock type and number, as is done in Palo Verde National Park of Costa Rica, instead of current tax based on grazing area, which is very low. More tax should be charged for free ranging livestock and tax exemption for improved breed.
3	Human-Wildlife Conflicts	3.1 Mapping of human-wildlife conflict hot spot areas and creation of HWC database and baseline data for BWS. 3.2 Piloting of community based crop insurance and livestock insurance schemes in conflict hot spot areas. 3.3 Education on importance of wildlife conservation, human-wildlife co-existence and ways and means of living/dealing with conflict species. 3.4 Development of community based ecotourism packages using black-necked cranes and other flag ship species and cultural highlights in collaboration with NRED, TCB and ABTO based on the ecotourism experiences from Phobjikha Conservation Area, Nabji Community Based Tourism Program in JSWNP, Annual Mushroom Festival in TNP and other experiences. 3.5 Development/re-instatement of community based crop guarding and surveillance system. 3.6 Promotion/implementation of improved livestock herd management practices. 3.7 Fodder enrichment plantations for wildlife. 3.8 Land swapping/exchange/relocation for those communities in conflict hot spot areas located in the middle of the forest to multiple use zones near the settlements. 3.9 Develop educational materials and publications, such as brochures, fact sheets, pamphlets, posters, etc. to disseminate information about conservation activities in BWS. Submission of news postings on interesting findings/happenings in the park to DoFS website and MoA website on a regular basis.
4	Poaching	4.1 Strict enforcement of forestry rules, regulations and penalties for offenders of both wildlife and forest produce cases. 4.1 Mapping of poaching hot spot areas in BWS and regular monitoring with improved surveillance and networking system in collaboration with local communities and other stakeholders. 4.2 Create awareness and educate targeted communities/groups on forest rules, regulations, penalties, conservation benefits and ecosystem services. 4.3 Maintain proper record on poaching and other illegal offenses in BWS at geog/range levels and at the BWS Head office on an annual basis for management and monitoring purposes. 4.4 Improved networking and intelligence sharing within Bhutan and in the region.

S.I. No.	Issue	Policy recommendations[2]
		4.5 Improved trans-boundary collaboration and communication with Indian and Chinese authorities across the border, as well as through diplomatic channels. 4.6 Study the socio-economic background of poachers and offenders in BWS to identify the root causes and provide alternative livelihood options (change from poachers to conservationists, for example, from India and other places).
5	Habitat loss and degradation	5.1 Enforce strict compliance with and monitoring of environmental impact assessment processes and procedures for all developmental activities in BWS as per the EIA guidelines and 2006 Forest and Nature Conservation Rules. 5.2 Issue of forestry clearances must be subjected to thorough field investigation as per forest rules and regulations and strict compliance with and monitoring of activities to minimize negative impacts. 5.3 All development activities must be based on the zoning system in BWS with no development activities allowed in the core zone and critical habitats in the sanctuary. In all other zones it should be subjected to strict EIA guidelines. 5.4 Mapping of degraded areas in the sanctuary and habitat management through plantation, restoration and re-introduction of locally extinct plant species. 5.5 Mitigation of natural disasters, such as floods, landslides, soil erosion, etc. through proper preventive measures and bio-engineering/soil conservation technologies. 5.6 Protection of watersheds/water resources in BWS through community based approaches/schemes linked to climate change. 5.7 Link habitat conservation and management in BWS with climate change mitigation/prevention measures to access climate change funds.
6	Pests and diseases	6.1 Monitoring of pests and diseases and proper reporting to appropriate agencies/research centers for timely investigation and remedial measures. 6.2 Proper record of pest and disease information at geog/range levels and at BWS Head office. 6.3 Dissemination/implementation of available pest management technologies /prescriptions, including local indigenous knowledge and practices.
7	Capacity development	7.1 Planned capacity building for BWS and other PA/Division/Dzongkhag forestry staff in the fields of sustainable natural resource management, wildlife conservation and monitoring, rescue and rehab, environmental education, human-wildlife conflict management and mitigation, ecotourism, basic wildlife research and documentation, GPS and GIS mapping, Environment Impact Assessment procedures/monitoring and compliance, biodiversity and socio-economic surveys, participatory planning, report writing/publication/grant writing skills, wildlife/socio-economic data management and analysis and other related fields. 7.2 Planned in-country training for BWS and other protected areas staff to be organized by Ugyen Wangchuck Institute for Conservation and Environment and other relevant agencies on the above topics. 7.3 Explore ex-country training opportunities/fellowships/exchanges for professional development of BWS staff and staff from other protected areas offered by Institutes/Universities/donors. 7.4 Explore capacity building opportunities both in-country and in the region for communities and stakeholders of BWS in relevant areas related to sustainable resource use, post harvest techniques and sustainable alternative income generating livelihoods.

S.I. No.	Issue	Policy recommendations[2]
8	Management planning	8.1 Revise the conservation management plan of BWS, which expired in 2007. The policy recommendations reflected here could be incorporated into the revised plan. The newly developed conservation management plan for Thrumshingla National Park could be used as a guide since it is the best available conservation plan in Bhutan and simple to understand and implement by the field staff. 8.2 Evaluation/documentation of management plan goals/objectives/outcomes/impacts from the implementation of first conservation management in BWS. 8.3 Evaluation/documentation of Integrated Conservation and Development Programs implemented in BWS and assessment of outcomes/impacts/experiences/lessons learnt. 8.4 Institute Park Management Committee in all PAs with representatives from relevant stakeholders including community leaders and district administration for collaborative management approaches. 8.5 Development of participatory conservation management planning guidelines by NCD. 8.6 Joint Monitoring of Management Plan implementation by PAs and NCD. 8.7 Strengthen linkage and coordination between central programs and field programs and strengthen annual reporting and monitoring mechanisms. 8.8 Publication of annual progress reports by all PAs with activities implemented, budget spent, beneficiaries/stakeholders, resource use information, poaching and offenses, developmental activities/clearances issued, etc.
9	Funding	9.1 Develop specific project proposals with co-funding by RGoB (salaries and personnel allowances) based on these policy recommendations linked with climate change to explore funds from national/bilateral/international donors, such as Bhutan Trust Fund, Bhutan Foundation, WWF Bhutan/US, US Fish and Wildlife Service, UNDP, UNEP, UNCCED, World Bank and other potential donors. 9.2 Develop project proposals based on the policy recommendations for BWS climate change mitigation measures. 9.3 Explore RGoB funding in the next financial year to implement some of the policy recommendations mentioned here. 9.4 Explore payment for environmental services, especially from hydro-power corporations (Kurichu project and other projects in the pipeline, which depend on water resources from BWS) to fund some of the policy recommendations related to protection of watersheds and water sources in BWS. 9.5 Liaise with relevant agencies, functional divisions of DoFPS, Dzongkhags, NGOs and other partners to implement some of the policy recommendations through collaborative/integrated approaches by building into their programs and activities. For any ecotourism projects, collaboration with TCB and ABTO is recommended.

Source: Choden and Wangyal 2010.

3.3 Jigme Dorji National Park (JDNP) case study policy recommendations.

JDNP, by virtue of being a national park, is not free of conservation issues and challenges. In fact, the challenges are greater because JDNP has residents living in the Park. The residents are dependent on the Park's resources for their sustenance and livelihoods.

At the local level, the conservation issues are mainly pressure from livestock grazing, especially yaks and horses in the pasture areas. This is coupled with poor livestock management, which leads to human-wildlife conflicts resulting from predation of livestock by wildlife. Poaching of *Cordyceps* by international poachers across the border and also local poachers from other regions could threaten the commercial sustainability of *Cordyceps* as the poachers harvest irrespective of season and do not follow any harvesting guidelines.

JDNP, although in close proximity to the major towns of Bhutan, has hardly any access to motorable roads, electricity, proper health facilities and good schools. Therefore, sometimes in the need to develop and provide opportunities to park residents, many developmental activities are taking place within the Park. These developmental activities are sometimes a concern as large chunks of forest have to give way to roads and power lines. Moreover, the benefits incurred may be only for a few households.

The tourism industry is also growing at a quick pace, and consequently, more and more tourists visit JDNP each year. With increasing numbers of tourists visiting JDNP, there is lack of adequate tourism facilities and services for them. Coupled with increasing tourist numbers and no proper management plan, it could have an impact on the tradition, culture and religious values of the local people.

Another concern for JDNP is that proper zonation of the park into functional areas is lacking at the moment. This sometimes causes confusion, especially while enforcing rules and regulations because there are different clauses for different zones, but there is no proper zonation done on the ground.

At the national level, some of the conservation issues are the poaching of high value *Cordyceps* and medicinal plants across the northern border. Although the park staff is involved with monitoring and patrolling the Park, due to its vastness, it is virtually impossible to be effective, and foreign poachers enter Bhutan by the hundreds and collect the *Cordyceps* every year.

JDNP, although one of the first parks to be declared in Bhutan, still does not have a proper management plan. Thus, sometimes it is difficult to get enough funding for some of the conservation activities. Without a proper management plan, conservation development initiatives are also hampered. JDNP, by virtue of being the headwaters for some of the most important rivers used downstream for generation of hydro-power, needs to be more intensively managed as there is opportunity to benefit from Payment for Environmental Services (PES).

3.3.1 Policy recommendations.

In order to address the conservation issues mentioned earlier, the following policy recommendations are proposed.

- *Grazing and Livestock Management:* The main reason for over grazing is the unequal proportion of livestock numbers and the grazing rights to the pasture, especially in the alpine region, where livestock rearing is the main form of livelihood. To equitably distribute the grazing rights to the relevant people who own livestock, RGoB has actually nationalized all pastures as per the Land Act of 2007. However, most of the households are not aware and are still following the age old traditional practices. Of those who are aware, a good number of them are happy with the new policy since they will get equal opportunity to the grazing rights after completion of the Government formalities. The Government needs to further educate the people on the nationalization of pastureland and also implement the policy strictly if the common people are to benefit from such a benevolent policy.

  To reduce livestock predation, management practices need to be improved. At the moment, the most common management of yaks and cattle are to allow them to graze freely in the vast pasturelands and forest without any herder. Only the milk cows are rounded up in the evening and tied near the shed.

- *Poaching of Cordyceps:* The poaching and commercial sustainability of *Cordyceps* is a concern for both the government and the local communities. At the moment, the communities are hardly involved in the management of high value *Cordyceps* aside from harvesting and selling them. The government should facilitate the mobilization of the communities into user groups so that they are empowered and entrusted with the responsibility to ensure the sustainability of *Cordyceps*, as well as contribute to policing the resources for their own gains.

  To curb poaching activities across the border, it is suggested that bilateral talks with the international partners be initiated to sign a memorandum of understanding and make arrangements to set up intelligence networks and information sharing to minimize the poaching of high value *Cordyceps*, medicinal plants and wildlife. To curb the poachers within the country, more stringent rules and regulations need to be put in place by the government. Integrated Conservation and Development Programs (ICDP) would be another strategy to encourage and empower local people in conservation initiatives.

- *Fuel Wood Extraction:* The extraction and supply of fuel wood in the high alpine regions to institutes and projects needs to be reviewed. The regeneration of the forest at the tree lines is very poor, and the forest itself grows very slowly. Therefore, it would be worthwhile to seek alternative fuels, like bio-gas, briquette, etc., that could reduce the pressure on the fragile ecosystem.

- *Developmental Activities:* With developmental works coming into JDNP to provide facilities to the park residents, especially the construction of roads, large forested areas have to give way to infrastructure development. As JDNP is a critical habitat for many important flora and fauna with rugged terrain and a fragile mountain ecosystem, a strict Environment Impact Assessment must be made mandatory for any developmental works in the Park.
- *Zonation:* For the smooth functioning and also proper planning, JDNP has to be zoned according to the land use functions and habitat types. This could solve some of the field issues on the ambiguity arising from differences in regulation for protected areas and outside protected areas. Furthermore, to develop more precise forestry rules and regulations, more forestry personnel from the field should be involved.
- *Management Planning:* With increasing numbers of tourists visiting JDNP, it is imperative to have a tourism management plan with the involvement of the local communities for benefit sharing, as well as resource and infrastructure management. Community based ecotourism, group formation and framework of local rules and regulations based on the local culture and traditional beliefs could be strategies for local people to benefit from increasing tourists visiting JDNP. For proper management of JDNP, a detailed conservation management plan needs to be drawn up so that there is continuity with the conservation programs and work implemented at JDNP.
- *Research:* For JDNP to benefit from Payment for Environmental Services (PES), intensive research on watershed management and climate change needs to be carried out to generate enough supporting scenarios to claim for the PES. This could be initiated with the Renewable Natural Resource Research Development Centre (RNR-RDC) and Watershed Management Division (WMD) under the Ministry of Agriculture and Forests.

Source: Tashi, Lhaba & Choden 2010.

3.4 *Jigme Singye Wangchuck National Park (JSWNP) case study policy recommendations.*

- *Sokshing Management:* With the 2007 Land Act of Bhutan, *sokshing* use has been unclear since it specifies that all such land use rights shall be forfeited to the Government. Actually, the community has inherited it from their forefathers and has been using it for collecting leaf litter used for cattle bedding. Such directive from the Government has put the land in question in jeopardy since it has become unmanaged land. A quicker and clearer direction on its management is sought from the Government.

- *Grazing Land Management:* The 2007 Land Act of Bhutan also no longer allows the community to hold grazing rights over their grazing land. In fact, the communities are continuously paying grazing tax to the Government, and if it is to be followed as per the Land Act, they should not be paying. Moreover, some people are still holding the same rights as before. Clarity on its stance is needed. Most of the grazing land owners are from neighboring *geogs* and *dzongkhags*. Those owners need to be informed and made aware of the provisions of the 2007 Land Act of Bhutan.
- *Conversion of* Tseri *Land to Dry Land:* While the 2006 Forest and Nature Conservation Rules do not allow the conversion of *tseri* land to dry land, the 2007 Land Act of Bhutan states that *tseri* should be converted to dry land. Clear direction on applying the conflicting legislation is needed from the Government.
- *Human-Wildlife Conflict Management:* A Human-Wildlife Conflict Management strategy needs to be implemented based on the priority areas and socio-economic conditions of local communities in collaboration with the Wildlife Conservation Division, Department of Forests and Park Services.
- *Land Swapping:* The interruption of major animal habitat by small villages, such as Reti under Jigmecholing *geog*, Sarpang *dzongkhag*, could be avoided by undertaking land swapping. Moreover, Reti village with just 16 households takes a minimum 3 days to reach from the nearest major village centers, and the area has rich biodiversity. It could lead to villages receiving proper service facilities.
- *Haphazard Road Construction:* Clarity on following strict environmental guidelines needs to be followed inside protected areas, especially on farm road constructions as they fragment wildlife habitat and cause environmental degradation and destruction.
- *Illegal Possession of Weapons for Crop Guarding:* Farmers are allowed to hunt down crop raiding animals within 100m of their agricultural fields, except Schedule I species, which are totally protected to bring down crop loss. In the process, farmers have started possessing and setting traditional traps around the agricultural fields. Should such practice be allowed inside the protected areas of Bhutan? More awareness needs to be created through proper media.
- *Under-utilization of Tourism Infrastructure*: Although Community Based Tourism (CBT) in Nabji Trail has tourism infrastructure developed in Korphu village under Korphu *geog* for overnight tourist stays, the facilities are still seldom used. The village receives just day visitors, simultaneously making the people reap lower benefits than other CBTs. Discussions among park management, TCB, ABTO and tour operators are needed to sort out the issue.

- *Conservation of Local Culture and Traditions of Ethnic Communities:* Proper documentation on culture and traditions of some of the ethnic communities may be initiated involving relevant agencies. JSWNP is home to *Monpa* and *Olep* communities, the earliest settlers of Bhutan. Cultural dilution has pushed the *Olep* language to the verge of extinction, and it is now spoken only by one old lady. The park management should initiate documentation of such tradition and culture before it is too late.
- *Zonation*: The zonation of the Park, which is crucial for the Park's survival, has to be initiated as soon as possible. Without it, the Park is just like any other territorial forest division. Through zonation, parks can clearly delineate and allow different activities in designated zones. Most importantly, the needs of the community and the wildlife can be spelt out differently, if not clearly.
- *Resource Use Monitoring and Management:* The community inside the park has been enjoying the privileges of using various both timber and non-timber natural resources from the Park like in any other area. Park management has not carried out any inventory/studies on the sustainability of such resources until now and how long the Park can continue to provide such resources is questionable. Thus, proper monitoring and management of such resources are required for long term sustainability through community participation and management of such resources rather than by the Park alone. In addition to the pressure on natural resources in the Park by local communities, there is also huge pressure from outsiders on park resources. Therefore, there is a need for community management of resources inside the Park with restrictions imposed on outsiders.
- *Integrated Conservation and Development Program (ICDP)*: ICDPs have been one of the main strategies of JSWNP to provide socio-economic benefits to local communities while conserving the Park's biodiversity. ICDPs have been in question since they involve budget and the Park's donor financing has not been secured. In fact, the principle of ICDP is that it should lead to the sustainability of the program, but it has seldom been followed with most of the community made to rely upon external assistance. Such sudden and abrupt stoppage of the ICDP could create imbalance in interventions from the Park. In the future, ICDPs need to be continued but with proper micro-plans and a good exit strategy, emphasizing the sustainability of the program.

Source: Dhendup, Wangchuk & Choden 2010

4. Conclusions

Bhutan has sound conservation policies and legislation in place for conservation of biological resources in the country, including protected area management. But with changing times and a democratic system of government in place, there will be increasing pressure on the natural resources of the country, both outside and inside the protected areas, to meet the socio-economic development needs of the country and the people. As such, a clear legal framework needs to be put in place for protected area management and wildlife conservation in Bhutan for the long term sustainability and conservation of biological resources in the country. The drafting of the Protected Areas and Wildlife Bill of Bhutan currently underway would help in providing that strong legal framework required for the effective management of protected areas in Bhutan.

The evidence of the valuable contributions made by protected areas to the social and economic development of Bhutan was presented in Chapter 8, Part III. As a result of these socio-economic activities, protected areas are also faced with many threats and challenges. Thus, long term sustainability and conservation of protected areas will depend on addressing these threats and challenges in a holistic manner in collaboration with local communities, stakeholders, partners and donors. A set of policy recommendations have been made at the national level, as well as for the three case studies, to address some of the threats and challenges faced by Bhutan's protected areas. These policy recommendations are expected to be incorporated into the protected area plans and programs and implemented accordingly. For this, the support of the Wildlife Conservation Division and other relevant functional divisions under the Department of Forests and Park Services would be important and essential. Some of the policy recommendations could also be incorporated into the Protected Areas and Wildlife Bill of Bhutan.

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Chapter 12

Policy Considerations for Costa Rica

Mary Luz Moreno Díaz

1. Introduction

Some initiatives, like Costa Rica's 1995 Strategic Plan of Sustainable Tourism Development and the 1998 Biodiversity Law, have helped show the great importance of natural resources and improve their management and preservation. The historical institutional framework allowed the creation of the Ministry of Environment and Energy (MINAE), through which the SINAC is in charge of the management of Costa Rican Protected Areas.

Despite the abovementioned aspects, there are several others that MINAE-SINAC has to improve regarding the management of the protected areas in Costa Rica in order to make it sustainable over time. Some suggestions are made in the following sections.

This chapter is divided in two more sections. The second section presents an overview of the National Policies for Management of Protected Areas and, the third section is focused on the recommendations for national and case study policies in protected areas.

2. National Policies for the Management of Protected Areas

Since its creation, the SINAC has designed and implemented several policies to guide the management of protected areas in Costa Rica. This process has shown a constant evolution that implies the make-up of a regulating legal framework. This shows a certain level of dispersion (Ovares Jaén, 2010). A summary of such historical evolution, which constitutes the background for the policy recommendations that this document proposes, is shown below.

2.1 Legal and institutional framework for the management of SINAC.

2.1.1 Rules for the performance of SINAC.

The National System of Conservation Areas as a State institution and part of the MINAET, on the legal framework, responds primarily to the Political Constitution of the Republic of Costa Rica, of which Article 50 makes special reference to the environmental issue.[1]

[1] Taken from the Political Constitution of the Republic of Costa Rica, available at http://www.tramites.go.cr/manual/espanol/legislacion/ConstitucionPolitica.pdf

> *"The State will seek the greatest welfare for all the inhabitants of the country, organizing and stimulating the production and the fairest distribution of wealth; everyone has the right to a healthy ecologically balanced environment. Therefore, it is legalized to denounce any acts that violate that right and to claim redress for the harm caused. The State will guarantee, defend and preserve that right. The law will determine the responsibilities and corresponding sanctions."*

Therefore, Costa Rica still lacks a law in particular that meets all the current laws that show linkage to the wildlife protected areas. In this sense, the legal framework shows a certain degree of dispersion, with some redundancies and still with several conceptual gaps. This is the result of the large number of existing laws that have been sanctioned over three decades as responses to particular problems and in diverse contexts (SINAC-MINAE, 2007).

Figure 12.1 Main entrance of Rincón de la Vieja National Park.

Source: Salas, F. 2009.

Costa Rica has had a number of laws related to the protected area during the last 54 years. They establish a framework to regulate various aspects of these areas as a way of protecting the natural areas. The Constitution and derogations of older laws by more recent ones also provide strength to the faithful fulfillment of each objective pursued in the rules.

Table 12.1 cites the national laws that support protected areas. They mention different aspects of the use and protection of resources contained in the protected areas (SINAC-MINAE, 2007).

Table 12.1 Laws that support the SINAC.

Year	Law
1942 & 1953	Water Law No. 276 and General Drinking Water Law No. 1634
1955	Law No. 1917 regarding Costa Rican Tourism Institute (ICT)
1977	Law No. 6084 regarding National Park Service (SPN)
1977	Law No. 6043 regarding Maritime Terrestrial Zone
1983	Law No. 4551 regarding Conservation of Wild Fauna
1992	Law No. 7317 regarding Conservation of Wildlife
1996	Organic Environment Law No. 7554
1996	Forest Law No. 7575
1998	Biodiversity Law No. 7788
1998	Law No. 7779 regarding Soil Use, Management and Conservation
2005	Law No. 8436 regarding Fishing and Aquaculture

Source: CINPE, 2009

In 2008, the country's degree of institutional development, in terms of conservation, had allowed Costa Rica to have 28 National Parks and 8 Biological Reserves. They cover a total area of 650,852 hectares within the System of Conservation Areas dedicated to NPBRs, which is equivalent to approximately 12.74% of the total area of national territory.

3. Policy Recommendations [2]

3.1 Policy recommendations at the national level.

The National System of Conservation Areas is the ruling entity for the administration of public protected areas in Costa Rica. Since its creation, the SINAC has formulated both general and specific policies focused on different management aspects. The policies include social, administrative, economic, financial, natural resource management, cultural, political, and legal aspects.

As mentioned above, the SINAC is implementing several processes for the formulation of both the "Management Plan of the System of Protected Areas of Costa Rica" and of the "Policy of Protected Areas of Costa Rica." They will serve as guiding frameworks for management in the coming years.

With the aim of contributing to the elaboration of such policies, several reflections that arise as result of the study that generate this book are offered below. These suggestions respond to two important challenges that the conservation of protected areas faces in

[2] The first version of this part was published on Moreno M, et al. 2010a.

Costa Rica. First, addressing the main bottleneck that persists in the management of protected areas is an urgent necessity. It could be addressed by innovating regarding the institutionalism of the national system of conservation, in terms of sustainable financing, local development, social change and organizational culture at communal and national levels. Second, the SINAC keeps facing limitations that arise as important challenges to the conservation of ASPs (i.e., lack of regular budget resources for staff, logistics, etc.).

This new approach points out how to strengthen the linkages between socio-economic development and conservation in the NPBRs. The reforms and actions proposed start in the political-institutional field, with the SINAC as the entity responsible for its articulation. The changes at the political-institutional level would generate the policy actions corresponding to the economic development, strategic management, ecosystem and environmental management, social empowerment and local development. Therefore, the change in the local development would be the final effect of such policy models.

3.1.1 Management policies at the level of economic development.

Some general suggestions for re-orienting the development around the NPBRs are: (1) To define a strategy to consolidate and re-orient the encouragement of the *clusters* around NPBR; (2) To design and implement concrete measures that support the formation and consolidation of MIPYMES with favorable impacts on the local and regional economy. Such a specific policy to encourage MIPYMES must have differentiated incentives regarding credit, logistics, training type, etc.; (3) To search for and establish mechanisms complementary to the current Certificate in Sustainable Tourism (*CST*) for the businesses in the tourism sector; and (4) To formulate policies that provide adequate conditions for the development of a systemic competitiveness in the sectors related to NPBRs, in particular, tourism.

3.1.2 Strategic NPBR management policies.

Some suggestions to further strengthen modern PA management are: (1) To present a satellite account and quantify the net income generated by the activities favored by NPBRs; (2) To ensure that activities and social actors benefited from the preserved nature contribute to their maintenance, both through the Program of Payment for Environmental Services *(PSA*) and through funds coming from the benefits generated by the existence of the PA (i.e. contributions from tourism activities that are reinvested directly in the conservation of nature); (3) To establish a **payment for the use of environmental services of PAs** that has to be collected in different sources near the origin of their use; (4) To present a fiscal reform in favor of conservation with development so as to substitute a tax charge (tax, commission or other fiscal imposition) with a tax aimed at keeping NPBRs under the SINAC regime.

3.1.3 Management policies at the level of conservation and environmental protection.

Prioritizing the following central aspects of preventive NPBR conservation management is suggested: (1) Environmental management in the communities surrounding NPBRs must be aimed at reducing wastes at their sources and destinations so as to adequately manage solid wastes and sewage for the environment and for human health; and (2) The best way to involve entrepreneurs, villagers and other NPBR users in the conservation and protection of the natural heritage is to promote environmental self-management (in the form of voluntary agreements, etc.) and co-management between the private and public sector, ensuring transparency, monitoring and control of accounts presented to the civil local society.

3.1.4 Management policies at the level of social empowerment.

Four areas of social management have been identified for a successful comprehensive NPBR management policy: (1) To republish strategies and actions for the local social actors in matters of training, remuneration, adjudication/concession of services and payment of taxes; (2) To pay more attention to policies of incentive and institutional renewal to encourage or strengthen the innovative and enterprising spirit at all levels of local development (from the managerial field to the community); (3) To strengthen micro-enterprise initiatives, which are based on the needs of families and communities; and (4) To strengthen and study, in depth, decentralization, disconcert and democratization, which are all already present in the PA management implemented by the SINAC.

3.1.5 Management policies at the level of local development.

At the local and micro-regional levels, the following suggestions are included: (1) A co-management regime constitutes the central axis in favor of integrating the local community in comprehensive conservation and development management; (2) Planning and zoning must be made effective through the regulating plans and other regulations (like those corresponding to the Maritime-Terrestrial Zones) in the communities and surrounding areas; (3) Strengthen the local and regional councils of the Conservation Areas; (4) Renew and strengthen conflict resolution mechanisms through even more institutional innovation, such as, for example, an ombudsman's office at the local level; (5) Training of the social actors involved in these essential local development arguments.

3.1.6 Political-institutional change management policies at the national level.

The following changes are necessary to induce adequate political-institutional governance: (1) Intensification of the network and coordination between the ruling PA entity in the country and other sectors and national policies; (2) Work on the legislative and appropriate re-edition of compensation programs for the benefits generated by NPBRs to different activities and actors; (3) Expand the existing ASP system and/or build new voluntary or non-positive modalities under the leadership of the SINAC.

Figure 12.2 Entrance fees to Rincón de la Vieja National Park.

Source: Salas, F. 2009.

In summary, a modern approach on public-private responsibility re-regulation of the sectors and actors socially benefited by biodiversity and its proactive conservation must guide the NPBR management in Costa Rica. This is through compensation of such beneficiaries to the financing of NPBRs under the tutelage of the SINAC. Such re-regulation includes, among other things, the institutionalized implementation of a system of contribution forces from the sectors and actors favored by NPBRs. This may be due to lack of concern regarding collection and reinvestment of the income from charged visitation, thus exceeding the obsolete single account principle that operates nowadays.

3.2 Policy recommendations for the three case studies selected.

The management of NPBRs in Costa Rica is structured in a general framework, and in each one of these areas selected (CNP-ICBR, RVNP, and PVNP), the administrators apply the general structure according to the specific conditions. For the three case studies analyzed, some suggestions in order to improve their management are presented below.

3.2.1 Corcovado National Park and Isla del Caño Biological Reserve (CNP-ICBR)[3].

a. *Biodiversity.*

CNP-ICBR policies should take into account the following aspects regarding biodiversity:

- In the areas surrounding CNP-ICBR, the development of tourism must guarantee the conservation and protection of biodiversity through ecological tourism or ecotourism.
- Apply management plans according to their guidelines and recommendations for CNP and ICBR.
- All tourism development must mitigate the negative effects of its activity on the environment.

b. *Energy.*

Tourism development projects, given the difficulties of access and having electrical infrastructure, should incorporate renewable technologies on a small scale to supply their demand of electrical energy, such as small scale water, solar, or biogas sources.

c. *Institutional capacities.*

The following suggestions in this area are focused on improving the institutional and administrative capacities of the SINAC in order to achieve better CNP-ICBR management:

- Provide more technical, financial and human resources to CNP-ICBR.
- Improve infrastructure and availability of information (trails, signs) and related services (facilities, communications, energy) inside CNP-ICBR.
- Increase CNP-ICBR staff training processes in environmental management matters and attention to tourists.
- The relationships between the SINAC and tourism entrepreneurs must be transparent under cooperative and collaborative outlines.
- Boost programs of environmental education at the level of formal education.
- Promote the participation of Non Governmental Organizations (NGOs) in decision-making and activities that improve the environmental management inside and around CNP.

[3] The first version of this part was published on Otoya, et al. 2010

d. *Water resources.*

In this important aspect, there are two suggestions in order to improve water resource management in the communities surrounding CNP:

- To provide the ASADAS and aqueducts better technical tools for water resource management.
- To train and monitor the processes of water management carried out by these organizations.

e. *Territory management.*

The following suggestions seek adequate legislation regarding the use of the territory and the prohibition of unsustainable activities with high impacts on the environment, such as gold mining.

- Implement plans for participative legislation on the use of territory, in which biodiversity protection and conservation reign over economic usages.
- Legal security of RFGD owners must be clarified. In the cases where property rights are assigned legally in RFGD, the only activities that can be developed are the ones established by law: ecotourism, education and research.
- Identify and prohibit all those activities with social and environmental impacts that threaten the sustainability of the area, such as gold mining and hunting.

f. *Solid wastes.*

Given the lack of municipal collection, the comprehensive solid waste management should be the ultimate objective of this area's policies.

- Develop a comprehensive solid waste management system.
- Promote the separation, classification and recycling of wastes.
- Improve the social capacities for the setting up of a community recycling center.

g. *Productive activities.*

The suggestions in this area are focused on promoting the development of environmentally friendly productive activities and national capital, such as:

- Strengthening national entrepreneurship activities through training.
- Creating financial programs that promote environmentally friendly investments in the region and national capital.
- Promoting diversification of the services offered.

h. *Environmental education.*

The education directly or indirectly linked to tourism activity must be fundamental to the creation of capacities in the region.

3.2.2 Rincón de la Vieja National Park (RVNP)[4].

a. *Biodiversity.*

The suggestions in this area are focused on contributing to the protection and conservation of RVNP biodiversity, as well as improving the environmental management of productive activities.

- In the areas surrounding RVNP, tourism development must grant the conservation and protection of biodiversity through ecological tourism or ecotourism.
- Apply the Sustainable Tourism Plan according to RVNP guidelines and recommendations.
- All tourism developments must mitigate their negative environmental impacts.

b. *Productive activities.*

In order to promote the development of productive local level activities that have positive environmental impacts and generate synergies that allow Curubandé district communities to be more actively inserted in the tourism cluster around RVNP, the suggestions are:

- To strengthen local entrepreneurship activities through training.
- To create financial programs that promotes local investments.
- To promote the diversification of the tourism services offered.
- To facilitate synergies/alliances among established tourism entrepreneurs and local villagers to favor a more equitable distribution of the income generated by RVNP and guarantee the long-term sustainability of the local development associated with the Park.

c. *Institutional capacities.*

The suggestions in this area are focused on improving the institutional and administrative capacities of the SINAC-MINAET for better RVNP management.

- Provide more technical, financial and human resources to RVNP.
- Improve infrastructure and information available (trails, signs) and related services (facilities, communications, energy) inside RVNP.

[4] The first version of this part was published on Salas, et al. 2010

- Increase the park staff training processes on topics about environmental management and attention to tourists.
- The relationships between the SINAC and tourism entrepreneurs must be clear under cooperative and collaborative outlines.
- Boost to environmental education programs at the level of formal education.
- Promote the participation of NGOs in decision-making and activities that improve the environmental management inside and around RVNP.

d. *Territory management.*

The following suggestions seek adequate legislation on the use of territory and the prohibition of non sustainable activities with high environmental impacts.

- Implement plans for participative legislation on the use of territory, in which biodiversity protection and conservation reign over economic usages.
- Identify and prohibit all those activities with social and environmental impacts that threaten the sustainability of the area, such as gold mining and hunting.

3.2.3 Palo Verde National Park (PVNP)[5].

a. *Biodiversity.*

The suggestions in this area are focused on contributing to the protection and conservation of PVNP biodiversity.

- Carry out a tourism activity plan, and create an ecotourism plan.
- Establish a plan for prioritized weed control (fangueo in Spanish*)* according to the critical areas, in which *Typha dominguensis* is controlled and the opening of the water's surface is carried out. It is prioritized to wetlands inside ASPs and in their buffering areas.

b. *Productive activities.*

In order to promote local level development of productive activities that have positive environmental impacts and generate synergies that allow the communities of Falconiana, Bagatzi, "Puerto Humo", Bolsón and Bagaces to be more actively inserted in the tourism cluster around PVNP, the following suggestions are made. Also, another objective is to create alliances with the enterprises that have crops in the surroundings of PVNP to minimize the impact of their activities.

[5] The first version of this part was published on Moreno, et al. 2010b

- Strengthen local entrepreneurship activities through training.
- Create financial programs that promote local investments.
- Promote the diversification of the tourism services provided.
- Coordinate sustainable production methods with surrounding private enterprises according to the park conservation objectives.

c. *Institutional capacities.*

The suggestions in this area are focused on improving the institutional and administrative capacities of the SINAC-MINAET for better PVNP management.

- Provide more technical, financial and human resources to PVNP.
- Improve infrastructure and information available (trails, signs) and related services (facilities, communications) inside PVNP.
- Increase park staff training processes on topics of environmental management and attention to tourists.
- The relationships between MINAET-SINAC and agricultural entrepreneurs and the organizations of national and international research must be transparent under cooperative and collaborative outlines.

d. *Territory management.*

The following suggestions seek adequate legislation on the use of territory and the prohibition of non sustainable activities with high environmental impacts:

- Implement plans for participative legislation on the use of territory, in which biodiversity protection and conservation reign over economic usages.
- Identify and prohibit all those activities with social and environmental impacts that threaten the sustainability of the area such as gold mining and hunting.

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Chapter 13

Policy Considerations for Benin

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1. Introduction

In this last part, first, the empirical assessment of the benefits structure at the national level and its implication for conservation are reflected upon. Then the case studies and their main results are returned to, and some improvements that can be derived from the situation analysis of a biosphere reserve, a forest from the classified domain and a community protected area are proposed. The importance of institutional changes is concluded and major shifts that might be induced in the incentive structures in all three types of protected areas and lessons to be learnt from our partner countries Bhutan and Costa Rica on this matter are mentioned.

Overall, the pattern of socio-economic benefits driven from protected areas in Benin does not encourage conservation.

a. An unfavourable structure of benefits.

A large part of the protected areas is managed as productive areas, but they are not all managed in a sustainable way. Game, timber and charcoal as mining activities depleting the stocks of natural resources constitute 38% of the benefits obtained at the national level from protected areas as a whole. There is a strong contrast in the control still kept over game in the cynegetic areas in the Biosphere Reserves compared to the loss of control in forests of the classified domains over timber, charcoal and game extraction that threatens these natural stands. Productive plantations, such as cashew nuts or teak, have been promoted around some of the forests of the classified domains and are an efficient diversion. However, they do not per se constitute an incitation to conservation because, for better or worse, they could exist without protected areas. They only contribute to protection in addition to other measures.

Non-wood forest products have been little promoted in protected areas, except beekeeping in a few places. Higher revenues from NWFP could constitute an incitation to conservation provided natural stands are managed as common goods; regulation without any exception would then be needed to prevent opportunism of a few and overharvesting.

Tourism and recreational and educational activities are underdeveloped. They are the main arguments for local stakeholders and communal authorities to legitimate total protection

on parts of the protected areas in spite of the high pressure on natural resources. Protected areas of the classified domains have not been valued for their amenities.

Environmental services from protected areas are neither identified nor valued; therefore, they are not paid for by their beneficiaries, except by fishers, in the form of permits in areas where such services are under control (Biosphere Reserves especially). Substantial income is drawn from fishing, where (without external interventions) long value chains bring this essential commodity in the livelihoods of most consumers up to distant urban markets. Fishing communities are often composed of migrants, sometimes even seasonal settlers, who may not consider the surrounding protected area as their fish provider and not be ready nor able to pay for the conservation services. At least fishers should be gained as lobbyists because they are potential losers if common water and forest resources are poorly protected. But there are other environmental services which deserve better valuation so that a user-payer taxation system can be implemented. Especially in the present times of intensive lowland management and small scale irrigation schemes, the regulation function of protected areas on water and flood prevention has to be ascertained.

Direct payment of the riparian populations for their contributions to the maintenance and control of protected areas of the State domain, co-management, is substantial in the Biosphere Reserve where high income trophy hunters contribute largely, low in the classified forests and no payment exists for their contribution to the maintenance of community protected areas. In the classified domain, such payment is performed by a share of the taxes paid by resource users according to the management plan and in addition by project subventions. Considerable amounts of taxes are lost because of the illicit timber and charcoal chains which have been tolerated, and most of the taxes collected are directed into private pockets. Revenues which could be invested at the local level into the forest maintenance and at communal and national levels in public investments and in the control of the whole system are lost. The actual investments and maintenance efforts in these areas is brought by the support of the donors' community, which finances large projects, and it is rather unsustainable in the long run. At the end of the external financing, a more intense rush than ever on the natural stands should be feared. In community managed areas, no disposition has been taken so far to pay for ecological services and biodiversity maintenance. NGOs and local associations get funds from GEF and other donors for investments so that conservation generates income through ecotourism.

In such a configuration, who are the stakeholders benefiting from conservation and ready to promote it in investing their labor force in maintenance activities, defend it in the form of political and practical support and face other groups whose interests are to consume immoderately natural resources for their own profit or to encourage illicit chains as sources for briberies?

b. Stakeholders in favour of conservation.

If the general strategy of the first natural resource management project in developing participatory forest management was defined, it would be said that it intended to transform the State domains into common goods which should be used and, therefore, protected by the riparian populations according to jointly agreed rules and under the regulation and the control of the State. The wildlife law made such benefit sharing mandatory, and these arrangements have been implemented in the Biological Reserves where a significant part of the benefits is shared with the population in the form of wages and cash to their associations. Nowadays, riparian populations and their associations seem to be the best rampart against aggressions from internal and external stakeholders intending to develop destructive activities, such as farm settlements and commercial game poaching.

In the State classified domain, such arrangements were less clarified, and revenues are collected among a large range of users as taxes per log, charcoal bags, heads of cattle and cleared hectares. The task is, indeed, much more difficult than getting entrance fees from visitors and hunting fees from rich trophy hunters; the concerned stakeholders will try to bribe in order to reduce the amount which has to be paid and bypass restrictions on quantities as well as on techniques to be used (e.g., chain saws are strictly forbidden but no more hand sawing is practised). The pressure put on local committees and on the forestry administration for by-passing restrictions had been underestimated, and the benefits from co-management over-evaluated. Communal authorities see the classified domain as mines they do not get any revenues from, in spite of the large areas forests cover, and they will not engage in supporting control. Worse yet, they sometimes encourage illicit logging and charcoal trade as a source of taxes.

At the onset of participatory management of forests in the classified domain, all professional groups were taking part in the process and rules have been jointly elaborated, but now the people concerned by co-management are de facto people engaged in tree nurseries and rehabilitation work within the forest and earning a complementary income from such jobs. It is a thin basis for support. Incentives encouraging illicit extraction are much stronger and concern stakeholders with a higher social status and influence.

On the other hand, at the national level, there are influential economic groups whose activities are disturbed by these illicit chains, especially when valuable timber badly needed on the national markets by the processing sector is exported raw; some timber professionals are now claiming for more transparency and conformity to the rules. Licit taxes on charcoal and timber are also much more predictable and maybe less expensive to the traders than a system relying on racket and bribery.

Around the Reserve, as well as around the classified forest, municipalities considered the protected areas sources of fiscal revenue they were largely excluded from. They were not

committed to conservation and around the classified forest, sometimes even encourage actively illegal timber logging and charcoal trade as a source of taxes. They rather try to develop their own pool of forests and plantations from which they can draw revenue.

The situation in community protected areas is different. Up to now, they rely on their own natural resources for their livelihoods. Incentives to protection of common goods are the economic benefits from gathering intertwined with the spiritual values of the resources. Local traditional management institutions rely on locally accepted rules and on locally recognized authority holders. Threats may come from a decrease of the benefits from NWFP, which in turn make the resources no longer worth being protected, and from reduction of legitimacy of institutions ruling the common goods, making it possible for some to get open access to the resources for their depletion or destruction.

Apart from adjacent populations, who draw benefits either from the resources themselves or from their contribution to the maintenance, there are institutions actively promoting conservation: at the national level, the Ministry of Environment and Protection of Nature, its divisions (DFRN) and agencies (CENAGREF and ABE especially), park administrations, and a range of NGOs. NGOs develop a few networking activities for a common approach on ecotourism and reflection of community protection.

Our three protected areas are contrasted in both socio-economic and institutional dimensions, and some of their successes can be used for reflection and recommendation.

2. Policy Recommendations regarding the Case Studies

2.1 Biosphere Reserves.

Main socio-economic benefits derived from the Biosphere Reserve are, at large, incentives for conservation. Tourism and management both contribute to the benefits. Benefits still can be improved, and there are still threats on the reserves to consider.

a. Benefits from tourism.

The early development of trophy hunting has been complemented over the last decade by the development of vision tourism. Their benefits still can be improved in both Reserves and nearby. Tourism in the Pendjari has been expanding over recent years, reaching around 7,000 visitors, and several new hotels and other businesses were set up near the Park. This number still constitutes a small share of the international visitors (185,000 in 2009), which are increasing yearly, and an even smaller amount of the potential among nationals. The development of new natural and cultural based amenities combined with the development of additional accommodations affordable to lower income visitors will improve the revenues generated by the sector in attracting new visitors and having them

stay for one more day. Ecotourism also can be further promoted. It has two advantages: the types of visitors are more prone to respecting local values and willing to share local ways of life; and amenities ecotourism relies on are mainly common goods so parts of the benefits generated also have to be shared among the community of *owners*. Regulation should make this benefit sharing mandatory in order to prevent appropriation by a few people of the resources from the common pool, without preventing private businesses from making private benefits.

b. Benefits from gathering.

It would also be possible to improve the income drawn from gathering activities in promoting quality products for higher income consumer markets. Shea nut is the chain where prospects are good in the short term because export and national processing of cosmetics are booming. A new chain recently developed in Benin and its neighboring countries concerning quality shea nuts for export (as soon as shea butter could be added in industrial chocolate in Europe and became a must in cosmetics). Shea nuts from the Reserve are undoubtedly organic and their fat could even been labelled as conservation shea butter. The demand for locust (*Parkia biglobosa*) and tamarind (*Tamarindus indica)* is also substantial in southern urban markets and in Sahel countries. Vodouhê (2011) also stated that far from all trees in the cynegetic areas are harvested so that there are fruits, edible leaves and medicinal plants which still could be valued by people living nearby. But is it a meaningful strategy? Is it that the more gathering there is, the greater the conservation, the more value added per unit, the greater the conservation? Or, on the contrary, as suggested by other authors, should gathering be restricted in the wild because of the risks of depletion of the natural stands and because scarcity encourages people to increase the density of the trees on farmland and develop agro-forestry systems. There might be a median way where natural stands are managed in order to improve local women's income while fields are in the process of being enriched and transformed into productive agro-forestry systems, gathering rights in the cynegetic areas being tied to the development of agro-forestry. The other aspects would be how to control illegal uses if licit movements become too numerous within the cynegetic areas, but it is a matter of organization.

There are other valuable products, especially among the medicinal plants, which could most probably be gathered up to a point where a commodity chain including high value adding processing segments can develop; at that stage, there would be internal incentives to a progressive domestication of the species on farmland. The emergence of such specific chains requires concerted and focused efforts of ecologists and indigenous users for the sustainable management of the natural base; it also requires a focused involvement of many stakeholders in the development of a new cluster of enterprises, including R&D on processes, equipment and quality control, training and information in all segments of the

chain, assistance to new micro, small or medium sized processing businesses and traders, promotion of the products, clarification of property rights and development of trademarks, etc. It should be in the interest of local municipalities to attract such businesses in their communes instead of exporting raw plant parts towards other regions or countries. Local expertise may be mobilized; for example, the Tanguieta "Saint Jean de Dieu" Hospital already processes and packages medicinal plants in small quantities for the specific markets of confessional hospitals. The development of NWFP and agricultural product value chains up to urban and international markets with a conservation label has already been discussed.

c. Riparian population as stakeholders in favor of conservation.

Co-management is an economic reality which means a share of the benefits for riparian populations, but it is also becoming a socio-political reality with the village associations and their union able to promote economic initiatives for their constituencies and to discuss the Reserve's maintenance and management in terms other than negotiating for getting ancient rights back. These are among the most positive benefits from protected areas, even if the projects developed with the association for organic farming promotion and ecotourism remain modest.

d. Turning communal authorities into stakeholders in favor of conservation.

The transparency in the accounts of the Park and of the village association unions makes it clear that there is no fiscal mine waiting to be exploited but a conservation area where consistent efforts are performed for its maintenance and for the generation of income targeting municipal citizens and voters. The relationships with communal authorities can be further improved in several ways. The development of tourism amenities in non riparian areas is an option; their promoters will piggyback the Park marketing efforts in attracting some of its visitors to their sites. A strong cluster of enterprises in the tourism sector for riparian communes up to the regional level is an economic and political asset in favor of conservation, and it is attractive to communal authorities. Such attractiveness could be improved with a taxation system more oriented towards municipalities. Parts of the hotel taxes paid by tourists could be targeted at the communal level for improving public infrastructures, promoting the tourism clusters (training centers), and developing new amenities. Tourism is also attractive to communes in creating employment and generating taxes.

e. Those against conservation.

Time and again there are assaults on protected areas. Illegal commercial chains are being rebuilt by politically influential people, who think they can protect their hunting teams if ever found operating in the Reserves. Sensitization should not target local populations

only but decision makers and politicians that in a dam no breach can be tolerated without endangering the whole. As soon as open access is tolerated for one, then it is for anybody.

f. Broadening the constituency in favor of conservation.

It is perfectly right that the first reasons for an adhesion to conservation by resource users are of economic nature. However, non resource users may also have good reasons to find biodiversity valuable and be ready to lobby for its conservation, especially when biodiversity takes the shape of emblematic species, such as lions or hippos. Developing this lobbying capacity is a great challenge. There is still a long way to go because most people consider animals food rather than living beings that need to be protected from extinction. The WNP disposed of funds for organizing visits from nationals, but the Pendjari has not. A plea is made for the set up of educational programs for diverse constituencies from primary school kids up to directors in the administration. Large private and public enterprises could be invited to organize special events, such as reflection seminars in Tanguieta or Kandi near both Parks and combine them with a visit tour. The tourism season could be extended in proposing tours at lower costs in the rainy season combined with educational activities. Visitors should not only enjoy themselves, they should become defenders of the Reserves and their resources. Educational textbooks should be revised for adapted content.

2.2 Community reserves.

Community protected areas develop around a pool of common resources, which cannot easily nor meaningfully be privatized. Economic benefits are mostly based on gathering or fishing and resource users do have sound indigenous knowledge and common rules on how to gather without depleting. Such rules can turn to be insufficiently enforced when the traditional arrangements are challenged, and the pressure is getting high. The challenge is whether to keep them or to develop new rules in new economic and enforcement contexts.

a. Increase benefits for users of the common pool.

In the cae of the Hlanzoun, several groups of users (of the raffia palms, fish etc.) would certainly become the champions of their protected areas if they obtained additional benefits from their clusters of gathering and processing activities through improved yields and value adding activities and if they have legitimacy to further protect their resources against the access of non riparian users. People engaged in ecotourism promotion will also support conservation.

Community areas are being taken into consideration by public institutions. Which institutions are going to take charge of the community protected areas when they are taken under public order and how benefits are going to be generated and shared is still pending

clarification in order to make riparian populations and communes feel at ease with the prospect of a State intervention. A set of measures for successful community management is proposed.

b. Guarantee the status of the common goods.

A condition for success would be that by Law no one (not even a public stakeholder) could have a right of individual appropriation on any resource from the common pool. Only temporary user rights should be granted on areas (for example, for tourism purposes in buffer areas by people interested in constructing a restaurant or a cafe) by leasing or renting in spaces and benefits earned on such businesses would be subject to taxation in order to finance maintenance activities in the common pool of resources (trails and water trails, rehabilitation of degraded spots, etc.). No land sale within the border of the common pool should ever be authorized, and this prohibition has to be stated by the Law.

c. Prevention of opportunism.

Rules of access and use on raffia, rattan, fishing, etc. will have to be formalized in the area management plan so that in case of transgressions where the social pressure of the user group is not sufficient, public authorities can be asked for intervention. At the moment, opportunism is not a high threat on raffia or snails, but as soon as some resources of the common pool will generate higher added value, it will grow. Formalized rules protect the rights of local users before they restrict them for keeping a sustainable level.

d. Conditional cash & kind transfer scheme.

The moratorium on timber logging and hunting within the community protected area is ecologically sound, but some users still plea for keeping the right to build their canoes out of large logs from the forest. Some payment for environmental services could be proposed in kind (canoe) or cash to people planting and protecting specific amounts of trees on their private land. This way, timber and fuel wood can, in the future, be found outside the protected areas by these planters and on the local market in response to specific local needs. Such payments would allow those who need a canoe or a beam to purchase it outside the forest, provided they allocate time and land to plantations. For those without any land to freeze under plantation, a *canoe for work* scheme could be developed (maintenance in the forest). Such a scheme should also be used for rehabilitating parts of the buffer areas in raffia, rattan and tree species (rules concerning access to these stands have to be set up before planting). Public funds are actually available for communal forestry promotion but not in the form of conditional cash/kind transfer as a payment for environmental services. Building such a scheme does not require large amounts of money, just a sustainable amount. A transparent allocation procedure according to results and a light but credible monitoring over a long period are also necessary.

e. Joint monitoring and control.

Community protected area does not mean community management. Community members do not have homogeneous interests and equal voices so it would not be wise to let a community management institution alone take charge of conflict resolution and enforcement of regulations. Opportunistic behavior may well come from within the community, and the voiceless may not be able to protest. According to the decentralization law, the municipality has to play a major but rather unspecific role in the management of natural areas. It is expected from the Wildlife Management Centre (CENAGREF), which is pilot-testing the process of formal recognition of Community Protected Areas that it will develop operational arrangements between local users, communal authorities and the CENAGREF itself as a representative of the State for light but efficient control and rule enforcement procedures. Local NGOs might play a major function in facilitating regular result evaluation by the stakeholders of their management and corrective adjustments.

f. Public-private partnership.

As already stated for the biosphere reserve, adding more value from NWFP chains requires some investments in knowledge, agro-ecological research and R&D activity for improving and sustaining the productivity of the stands, for quality control (alcohol, medicinal plants), technological R&D on fibres (i.e. raffia fibre piassava harvest and preparation), market assessment for new products, practical training on new handicraft products, credit for small businesses, etc. Such activities have to be developed in parallel and coordinated in order to yield quickly convincing results sustaining the interests of poor local stakeholders. Public-private partnerships with medium sized enterprises from the formal sector (from the agri-food, furniture or fashion sectors) might be of interest. Communal authorities could play a leading role for a consortium which can apply for seed money.

g. Tourism and educational activities.

The best argument for keeping the heart of the forest under strong conservation would be to have visitors who come and pay to enjoy it (cautiously). A minimal set of investments has to be made so that visitors come in large numbers, stay overnight to see animals at sunset and dawn and are incited to eat locally, advertise the site and come again with new relatives and friends. Educational programs should finance the study tours of many different types of potential visitors, such as students and teachers, communal authorities, etc. Marketing is now performed mouth to mouth and by enthusiastic bloggers, but more organized promotion campaigns would invite tour operators to include the site on their circuits and urban migrants coming back home for social events to visit the site on their way.

The ecological value of a protected community, such as Hlanzoun, is very high so there is a large potential for research, tourism and educational activities in and around these areas. Several NGOs are currently supporting initiatives in other forests of the southern wetlands. Sustained public support is expected, at least as high as on the other types of protected areas, in order to reach a critical threshold of public and community investment, making tourism activities on a small scale sustainable, promoting research up to operational results, which can help develop profitable chains, and proposing tourism amenities, which do not endanger the survival of the species sheltered on site.

Several initiatives have been taken for the promotion of community based areas. In most cases, national NGOs have been the precursors and have taken the initiative, with a good back up from university support and IUCN. State institutions now come into play, giving national legitimacy for interventions. The three main institutions in the Ministry of Environment, the Beninese Agency for Environment (wetlands, coast and marine areas), the Wildlife Management Centre and the National Forestry Division, are taking initiatives with a range of approaches so that soon lessons learnt will have to be shared and legislation adapted to cope with the new reality of formal community protected areas.

2.3 Classified forests as protected areas.

Concerning protection of natural stands in the forests of the classified domain, arguments will focus on the regulation of the demand which put such stands under strong pressure and on the development of income generating activities conditioned by the conservation of the natural stands. Last, institutional arrangements after decentralization will be discussed again.

At the time of this study's survey in the TTK in 2009, this forest of the classified domain was more or less managed in open access conditioned by a toll. Anybody who could bribe could enter anywhere and send teams of loggers or of charcoal producers. No regulation was effective, but money was. The situation is not new, and it is not restricted to the TTK. Ten years ago, a similar review had been performed of fake import permits laundering massive timber logging at the Togolese border although everybody knows no such timber can be logged in Togo (Siebert et Elwert, 2004). In 2008, an EU expert team also depicted such practices in the classified domains (Agoua, Wari Maro and Monts Kouffe). It became only worse in recent years because of massive timber exports to China and India, which create higher than ever pressure on natural stands.

a. Stop export of timber from natural stands.

Positive changes can be expected from an effective application of the existing texts on the prohibition of raw timber export. But they should be reinforced by a prohibition of

exports of any (non red) wood from natural stands, even of so called imported timber (or especially of those). In keeping the balance between teak supply and timber internal and external demand, the pressure on timber from natural stands could be reduced so that logging would only supply, if ever, the nearby local and regional markets. The support of regular professionals specialized in national trade and processing (carpenters, sawmills) can be obtained because they now cannot run their business in a secure way.

b. Private and communal domains for fuel wood.

Bush fallows in the south are now shorter and depleted and cannot provide fuel wood to growing coastal cities. The fuel wood front is now at the level where large forests from the classified domain are located and in these areas charcoal is being massively processed. However, positive changes can be expected from the development of a concerted management of fuel wood resources in the private and communal domains and, therefore, outside the classified domain, which will induce better distribution all over the space of the fuel wood harvest and more sustainable management of the natural stands with enrichment or plantation of lots after harvest. Communes of the Collines department for example are currently developing communal fuel wood plantations and harvest schemes.

c. Back to local control on fuel wood resources and benefits.

The second expected change reducing the pressure on natural stands of the classified domain is the on going development of community *fuel wood rural markets*. Taking stock of the institutional reforms implemented in several African countries, especially in Niger, the fuel wood rural market innovation grants control rights on fuel wood resources in a specific area to the local community of this area (Bertrand et al., 2006; Bertrand et Montagne, 2008). Such rights are expressed through the control of charcoal and firewood market transactions. Traders have to go through the *rural market* to pay their taxes according to quantities to trade and obtain travel coupons they will give at every checkpoint on the road. Forestry officers do not perceive anymore taxes. Taxes are reallocated to local communities for their control and maintenance, to the commune where the rural market controls have to be performed and to the National Treasury. Setting up a fuel wood market is conditioned to the elaboration of a simplified management plan. If such a plan has been effectively developed, approved and is implemented so that yearly quotas of extraction are known and enrichment or plantations planned, most of the taxes are allocated at the local level while if no management plan exists, most of the taxes go to the Treasury (MEPN et MEF, (2009); MEPN et MDGLAAT, (2009)). This differential taxation is an incentive to operate according to a management plan at the local level, and also to prevent fuel wood from by-passing the rural market. Fuel wood quantities received on consumer markets can be aggregated via their coupons and compared with the quotas in order to control their enforcement. The procedures have been developed and set up

progressively since 2007. Committees managing forests from the classified domain could have a foot forward in already having a management plan and a lot of local expertise in forest maintenance.

For forests of the classified domain, the positive consequences are that: the supply of charcoal from other areas will increase; a new control instrument on fuel wood extraction quotas within protected forests that is more efficient and less dangerous than patrolling the forest is available to co-management committees; and last but not least, taxes on wood and charcoal have been increasing in order to incorporate the costs of replanting or maintaining the stands.

d. Natural stands under conservation, degraded fallows and farmland for productive uses.

In protected areas of the classified domain, the focus has been put on productive use. But soon there won't be any remains of the initial vegetation. Even if the secondary vegetation was to be managed in a sustainable way, some species are disappearing from the natural stands, and the most reasonable timber extraction constitutes a perturbation in natural ecological dynamics. At least parts of the remaining forests within the classified domain deserve to be put under conservation and exempt of commercially oriented (wood) extraction. The principles of a biosphere reserve with the graduation of less to more intensive protection could be adapted to the classified domain. Farmland areas can be further managed as agro-sylvicultural systems in transition areas, but encroachment in other areas should be strictly prohibited. In buffer areas, degraded woodlands can be further enriched and managed as sylvicultural or as sylvo-pastoral systems; timber as well as charcoal extraction would be restricted to these areas and performed according to the plan with control in situ and through the local fuel wood market.

The remaining forest would then be managed for NWFP harvest, research and recreational activities. As already stated, gathering activities within the forest are underdeveloped in spite of the richness of its flora. Few efforts have been put on research concerning these areas in order to identify medicinal, edible and other usable species and promote them so that there is an opportunity to explore. Forests in the mid belt are well adapted to trekking, with less dangerous animals than in the Biosphere Reserve and a low density of plants on the ground layer making progression easy. Within the forest, the parts disposing of specific amenities such as scenic beauty, panoramic view, watercourse and diversity of the vegetation units should be put under stricter protection and be granted a few investments in trekking trails, watchtowers, canopy trails, lodges, etc. They could then be open for recreational, educational and research purposes while other parts would be open for gathering activities (fruits, leaves, and with caution, barks) not affecting the stand or to

specific cultural or sport hunting and fishing events. The needs of several groups can be addressed by such amenities: nature lovers among foreign tourists, nationals and people from the region; sportsmen and urban people who want to do something for their health; students who need training in botanic and ecological sciences; and the growing groups of (mostly urban) kids in need of summer camps. Some of the forest users, such as hunters, may find new income generating activities in recreational and educational activities.

The unified legislation on fuel wood and charcoal taxation now gives an incentive to municipalities for encouraging locally controlled management over the fuel wood transactions. Similar legislation could then be adapted to other forest products.

e. Specific revenue for conservation.

Revenues from such activities may constitute incentives to local populations to contribute to the maintenance and to the control over the natural stands. Protection in the classified domain should not only depend on these. As soon as decisions are being taken on areas to be put under conservation, a sustainable flow of resources has to create a stable incentive to their protection by local people. Project subventions would be turned into a sustainable and clear system of environmental payment. People should not be paid for planting trees or clearing fire breaks; they should have rights on payments for efficiently conserving public stands and preventing illegal uses.

Illegal uses of fuel wood and timber would be contained by two mechanisms: local fuel wood market committee members would not accept to be deprived of the taxes on fuel wood and local forest management committees of their environmental payments by loggers and charcoal producers operating in illicit areas.

Co-management committees of local users have to be reinforced in their rights over the resources and their benefits. Resource users who had been taken into account at the onset of the participatory process but then stopped more or less participating (herd keepers, fishers, gatherers, etc.) should have an incentive to join back the co-management committee in order to gain access to the resources they use and be able to claim their rights in the case of conflicting interests during management plan revision. Especially local livestock keepers and fishers have to integrate such committees. In parallel, forests of the classified domains have to be reintegrated into communal management and planning, under specific conditions related to their status. They are assets for communal development through the activities developed and the taxes perceived, and the commune should also have strong incentives in contributing to their efficient management and protection.

3. National policies on protected areas

In this book, the term "protected area" has been used for the Benin case instead of "national parks and biological reserves". It is a consequence of the legislation in use in the country. Laws and their application texts on protected areas have been evolving over time but the dichotomous status of gazetted forests on one side, fauna reserves on the other side still pertain while Commons lack formal recognition (table 13.1). Concerning fauna protection, the Law 2002-16 differentiates 5 types of protected areas (among which national parks and game areas) while the forestry Law 1993- 009 differentiates two types (protected and gazetted domains, and within the latter, among others the national parks and gazetted forests).

Table 13.1. Benin. Some important Laws, Decrees and Orders related to protection of natural resources.

Acts	**Some important contents**
Frame Law on Environnement 98-030	Assesses citizens rights and the necessity of environmental protection
Acts	**Some important contents**
Forestry Law 93-009 and its decree 96-27	Defines the types of forest domains (State gazetted domains and protected domains); their respective managements; list of protected tree species; permits and taxes on harvests; prohibition of the chainsaw in the forests;
Decree 2005-708 and inter-ministerial order 2007 -0053	Prohibition of raw timber and charcoal exports
Finance Laws 2007 et 2008 (2006-24 et 2007-33)	Revision of taxes on wood and timber
Interministerial orders 2009-036, -040 et -041	New organisation of fuelwood trade rights granted to local communities to control wood and charcoal trade and manage the stands against a share of the taxes
Loi N°97-028 du 15 janvier 1999 portant organisation de l administration territoriale de la République du Bénin	Decentralisation law ; municipalities are granted rights and responsibilities to manage their area according to a plan, create communal forests and manage them
Law 87-014 and related decrees (90-366) & Law 93-011	Hunting rights and duties, taxation, leasing of game areas ; tourism in reserves ;
Law 87-013	Legislation on livestock grazing and transhumance
Fauna Law 2002-016 du 18-10-2004, portant régime de la faune en république du Bénin	Definition of biosphere reserves, nearby population rights, representation and participation in the benefits of the reserves; protected species ; hunting conditions in the fauna reserves
Decree 94 64	Pendjari National Park gazetted into Biosphere Reserve
Decree 96-73 and 98-487	Creation of the Wildlife Reserve Management Centre(CENAGREF) as an autonomous entity ruled by a multi-stakeholders board within the MEPN and definition of its attributions

Source: Authors

The fauna law recognizes the rights of population nearby to have a share of the benefits from their protected area "as far as possible" (Guedegbe, (2008)). But implementations of local organisations able to claim for such rights differed from one protected area to another.

The customary land rights issue has not been properly addressed for areas within the "protected domain" or in an unrealistic way; even in forests of the gazetted domain "traditional landowners" still claim for their rights over the resources and are de facto recognized by other users (such as the immigrants).

Fragmentation of the texts and incomplete compatibility also makes it difficult for citizens to comply regulations. And many regulations are openly bypassed so that their legitimacy is questioned.

4. Conclusions

From these parallel studies in Bhutan, Costa Rica and Benin, some important lessons have been learnt. Bhutan managed to develop an ecologically sound system of protected areas in setting areas under conservation in each agroecological area and linking them by corridors ensuring the movement of species. Expertise has also been developed in the management of the coexistence between human settlements and the wild and in the maintenance of a high income value chain out of a gathering product, the *Cordyceps* fungus. Tourism is a major economic sector with a relatively small number of visitors enjoying mountain trekking and cultural amenities. The principle there is *high value low volume* tourism, which can be compared with the trophy hunting strategy in Benin.

Out of a situation of deforestation and scattered protected areas, Costa Rica developed a system of protected areas covering the whole country and under the responsibility of one administration. A large range of protected area statuses exist, also accounting for private land, but they all are under the management of the same entity. Tourism is the main economic sector; many of the tourists come because of the protected areas, and many producers around the national parks also have a tourism activity, such as lodges, restaurants, direct fruit sales, etc. The country has also developed major legal and financial instruments in favor of reforestation and conservation. Environmental payments have been especially applied in areas near or within protected areas to encourage private owners to contribute to conservation of protected areas. Use of natural genetic resources is also well monitored and controlled so that royalties are being paid by researchers and enterprises from foreign countries who take samples of them. Research is being performed in order to take advantage at the national level of the rich biodiversity. In both cases, one of the benefits from protected areas is hydro-power, which hardly exists in Benin.

In Benin, protection should also concern the whole territory of the country. Taking stock on initiatives to protect resources and develop non destructive activities under the

responsibility of communities and municipalities in wetlands in the south, an efficient net of new protected areas should be recognized at the national level with differential intensities of conservation versus resource use. Also, the best remains of the flora and fauna in the forests of the classified domain should be protected on a larger scale and under a more ambitious ecological concept, making good use of other natural resources that still may have been preserved under private or community management.

The institutional design also has to be unified so that most community protected areas, forests of the classified domain and biosphere reserves can all be ruled under similar principles. Those of the biosphere reserves can be used as positive examples in terms of well defined spatial organization of areas where the riparian populations draw income from the resource use and areas which are under stricter conservation dedicated to recreational activities only. Rights of the riparian (local and communal) populations over common goods they use and rights over shares of benefits obtained by public and private entrepreneurs out of the resources (tourism, sport hunting, use of biodiversity, etc.) have to be further ascertained by Law; protection against opportunists should also become more efficient and easier for forestry officers and ecoguards to enforce (and not for non compliers to escape from) so that equity can be guaranteed. The legal status of riparian populations should also be clarified (acquisition and transmission, rights and duties according to localization and professional status).

Value chains allowing gaining significant income out of the resources of protected areas should be promoted with specific attention and in such a way that income is as far as possible generated at the local level. It means that the communes should play an important function in coordinating efforts for strong clusters of micro to medium sized enterprises. In some cases, the development of such chains depends on good training and networking so that the existing processing sector is supplied by good quality raw products (such as shea nuts), but in other cases, research and development activities will be needed together with the design of new products out of the natural resource base (handicrafts, use of medicinal and biogenetics substances, more elaborate food processing and packaging and tourism amenities) and the involvement of enterprises from the more formal sector.

Tourism is given an important role to play in the growth and development strategy in Benin. Stakeholders involved in ecotourism, which are also engaged in protection, have to further lobby for support in favor of this option, which may not look as spectacular as building large tourism complexes along the coast but may generate many revenues at different places in favor of conservation as well as positive externalities.

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PART V
CROSS ANALYSIS

Chapter 14

National Parks, Biological Reserves, Biosphere Reserves and Community Forests in Economic and Social Development in Bhutan, Costa Rica and Benin: Conclusions and Learning

Anne Floquet and Roch L. Mongbo

As already mentioned at the beginning of this book, it may seem challenging to compare protected areas in such diverse environmental conditions (Himalayan, Meso-American and West African) as well as living standards (life expectancy 62.5 in Benin, 66 in Bhutan and 78.5 in Costa Rica). In fact, comparisons generate interesting learning from the different ways in which regulations on protected areas are set and operated in the three countries on the one hand, and, on the other hand, the assets thus constituted and the incomes and wellbeing generated. Investigations revealed that the three countries, each in its ways, are embarked in a comprehensive protection of valuable ecosystems, with subsequent financing and administrative schemes, that suggest questions on potentials, missed opportunities and strategies adopted for enhancing and financing conservation.

1. Comprehensive protection of valuable ecosystems and species.

Both Costa-Rica and Bhutan have developed a comprehensive protection of valuable ecosystems and species and designed coherent nationwide conservation systems. In spite of its population density and high level of private land appropriation, Costa-Rica succeeded in having protected areas in all regions and ecosystems and designed mechanisms to reduce fragmentation including a range of protection statuses, land purchase, payment for environmental services (especially for leaving land under conservation), etc. Bhutan has more than half of its total area under conservation with an impressive connectedness of the parks through corridors. Benin records its contribution to the largest West African protected area through both its northern biosphere reserves and the cross border coordination efforts with the other Sahel countries concerned. But here, the conservation system is far from being comprehensive and coherent. Biosphere Reserves only concern the upper North and therefore a subset of the country ecosystems. Management of the gazetted domain (classified forests) suffers serious shortcomings in terms of natural resource conservation and of protection of the riparian communities and other stakeholders' rights. Southern community protected areas are still in the process of acquiring formal status and protection of resources as well as of riparian communities' rights. They are now small sized, fragmented and put under strong anthropogenic pressure. Lessons can be learnt from Costa-Rica reforestation efforts and Payment for Environmental Services (US$ 65 per hectare paid to a landowner keeping its land under conservation) as well as from its efforts in turning fragmented areas into a more coherent ecosystem.

A more systematic assessment of tangible benefits from areas under conservation as well as better informed efforts for their enhancements will contribute to strengthening conservation and obtaining a larger social consensus.

2. ***Regulation and participatory management***

Bhutan has granted inhabitants the right of making their livelihoods within protected areas. These demanding principles are compatible with conservation because of a low density of population and a deep-rooting culture of respect of nature. Major steps have also been taken in the form of integrated conservation and development programs for making both objectives compatible through irrigation of arable lands and electrification which both reduce pressure on natural resources (shifting cultivation area and fuel-wood). However, democratisation of the society might yield contests on restrictions and claims of rights over resources. Negotiations will be required on operational rules and agreements, which combine farmers' well being and conservation. Most of the Parks now have a management plan but participation of a scattered semi-nomadic population in participatory planning is indeed a challenging endeavour.

With a much higher population density and a former eviction of local population from protected areas since colonial times, Benin tried its way in rebuilding trust between local people and state administration about protected area, which they should at least partly manage and value as their common goods. In situations where this arrangement has been consistently enforced and supported by the administration in charge of the protected area, the strategy seems to be quite successful. Management of the Biosphere reserves is ensured with low staff endowment (134 km²/staff) and strong co-management of local holders. In the Pendjari Biosphere Reserve (PBR), co-management brings tangible benefits to riparian populations and has promoted a local organisation of "Commons owners" able to take decision and acquire funding on local economic development. But deregulations quickly transform commons into open access with nasty consequences on natural resources, as observed in classified forests.

In Costa-Rica, income diversification around the national parks does not make it necessary to grant local people many rights on natural resources within protected areas (even if in a few cases of grazing rights exist) and the tourist flows provide ample opportunities of combining farming with touristic services (restaurants, bed and breakfast, food sales, etc.). But in restricting management to areas under conservation, the Parks have little influence on transition or buffer areas, where private operators draw benefits from park externalities without being influenced in their choices nor paying fees to the Park. Sometimes large tourism enterprises develop at the expense of small petty businesses and farming practices (i.e irrigation) negatively impact nearby parks. Overall, relationships between the Parks and their "constituencies" seem loose, and in contradiction with the importance of the economic advantages gained out of the protected areas.

3. Assets.

Both Costa Rica and Bhutan as mountainous countries have a major asset out of conservation, which they value. Water from mountains supplies hydroelectric plants. Water and soil conservation in areas under conservation are major benefits from protected areas including reducing the impacts of climate change and protection from natural disasters. Production of electricity using water from protected areas has been assessed at $ 358 million and 26 million in Costa Rica and Bhutan. Costa Rica takes advantage of the richness of its water resources through the conservation of ASPs. This result in more than 78% of the electricity provided to the Costa Rican population being hydroelectric whereas 13% of the energy consumed in the country is geothermal, 4% is produced using the wind, and 5% from thermal energy. Hydroelectric generation is expected to increase in Bhutan where investments are planned in order to export energy to India. Aside from energy, conservation has positive effects on irrigation in both countries, but such effects are of major importance in Bhutan, where only 8% of the country area is arable land. In Benin, which is a flat coastal country, energy generation opportunities using river dams are less important but should also be valued. Moreover, protected areas have valuable impacts on water and soil conservation in terms of lowlands floods regulation, prevention of siltation and fish productivity, which would need further systematic assessment and exploration of possible payment for the service and externalities. Our results in this study already indicate quite high impact of conservation on fishing.

As far as tourism is concerned, the three countries went different ways to reap benefits from diverse potentials. In total, 70% of the benefits from protected areas come from tourism in Costa Rica, while this is only 3.4% in Bhutan and 6.8% in Benin.

Costa Rica experiences mass tourism as 765.700 foreign people visited its national parks in 2009. A large part of tourism activities is provided in a growing way by the private sector and has a strict relation with National Parks and Biological Reserves (NPBRs): they are developed according to the image related specifically to Costa Rican protected areas. In this sense, tourism promoters and owners of private reserves in the surroundings of National Parks and Biological Reserves sell the image of wild nature when promoting and selling their packages. But not only the activities directly accommodating tourists (hotels) obtained benefits from the existence of NPBR, other activities such as public transport, restaurants, and entertainment also have a share in the benefits generated.

Bhutan has the opposite strategy of low volume but high value with regulated tourism tariff of US$ 200 per person per day (30 % of which goes to the government as tax and the rest of which is spent on food, accommodation, transport, guide and other services). All tourists are required to come through a registered Bhutanese tour operator. Twenty-seven thousand tourists came from abroad in 2008. Bhutanese people also travel inland for religious and cultural purposes. Indeed, a minority travel to the national parks with only a few activities in the national Parks for visitors. Local people mainly sell handicrafts and offer portering services, but ecotourism is still underdeveloped with only one national

park offering community based nature tourism. National Parks in Bhutan are still a largely untapped asset for touristic, cultural exchange and educational purposes.

In Benin only a small part of the one hundred thousand (100,000) visitors from foreign countries do visit protected areas: visits to national Parks concern around ten thousands (10,000) people and visits to other types of protected areas are at their very beginning. Nationals and African people from neighbouring countries only begin now to visit protected areas. With their low revenue and usual expenses, not many of these people can meet the costs of such trips On the other hand, nationals have the social obligation to spend a lot of money for social and religious events, mostly taking place over weekends. With little additional funds they could also add touristic visits to their trip if they were aware of it and encouraged to do so. Here also, tourism in protected areas and educational visits can still be much more encouraged, so that visitors extend their stay, and nationals also visit, enjoy amenities and get educated in the protected areas.

In Benin and Bhutan, people depend on the natural resources from the protected areas for their living. There are significant parts of the local population depending on the resources of the protected areas for their living (farmers, fishers and herd keepers) and especially from wood and non wood forest products. It contributes to 63.5% of the benefits at national level in Benin, where uptake is high and is in some situations unsustainable. New regulation on timber and fuelwood trade are currently put into practice but the more general problem is that conservation is not the main objective of the gazetted domain so that no area can be really put securely under protection and remain in its pristine state for the generations to come.

The NPBR in Costa Rica are very important for small businesses that have been developing around these areas. However, Moreno et al. (2010), Salas et al. (2010) found that this kind of contributions was smaller in two of the three national parks selected as case studies in 2009 study as compared to those obtained at regional, national or international level. Otoya et al. (2010) found that the local contributions in CNP-ICBR were as high as the National ones. In general this situation can be shown in several National Parks in Costa Rica, due to the low training of staff and low financial resources of local companies in face of the high quality of service demanded by foreign tourists. Therefore, medium and large regional, national and international companies obtained more benefits than local ones.

4. Incomes.

In all case studies, valuable benefits are being generated out of the resources and amenities under protection.

Table 14.1 Incomes generated by case study parks and protected areas and their spatial distribution in the three countries.

Country	Protected Area	Income (US$ millions)				
		Local	Regional	National	International	Total
	BWS	0,77	0,02	0,35		1,16
Bhutan	JDNP	1,87	0,45	25,87		28,19
	JSWNP	0,59	0,18	0,12		0,89
	BRP	2,59	0,49	1,59		4,66
Benin	TTK	3,84	0,13	1,25		5,22
	Hlan	1,7	0,23	0,65		2,58
	CNP-ICBR	41,13	8,89	41,57		91,59
Costa Rica	RVNP	0,51	4,16	4,26	14,07	23
	PVNP	0,57	0,03	1,19		1,79

Source: Own elaboration, based on chapters 8,9,10 of this book.

Variability among case studies reveals that the types of dominating clusters influence the amount of benefits as well as their spatial distribution (see table 14.1). Hydro-plants and some types of tourism distort benefit distribution towards national level and have little impact at local level (JDNP in Bhutan) but tourism can also yield substantial benefits at local level (CNP-ICBR in Costa-Rica and to a lesser extent BRP in Benin).

Natural resource use generates benefits at local level but may also feed value chains up to national levels and further (TTK and Hlanzoun in Benin). In Costa Rica the case of RNVP was outstanding not only because the local contributions were the smallest but also because the international contributions were almost 60%. This international benefit goes to the international companies that sell the packages to the tourists that come to Costa Rica.

Table 14 .2 Total incomes per sq.km and local incomes per person per year in the riparian population generated by case study parks and protected areas.

Country	Protected area	km²	Total Revenue/km²	Persons Living at Local Level	Local Revenue Per Person Living at Local Level
					US $
	BWS	1.520,0	763,2	5.094,0	151,2
Bhutan	JDNP	4.316,0	6.533,8	6.500,0	287,7
	JSWNP	1.730,0	512,7	5.000,0	118,4
	BRP	4.800,0	971,0	30.000,0	86,2

Country	Protected area	km²	Total Revenue/km²	Persons Living at Local Level	Local Revenue Per Person Living at Local Level
					US $
Benin	TTK	480,0	10.866,3	38.000,0	101,1
	Hlan	30,0	86.083,8	10.000,0	169,7
	CNP-ICBR	445,0	92.431,7	------	----
Costa Rica	RVNP	142,0	3.576,1	---	----
	PVNP	198,0	2.865,4	-------	-------

Source: Own elaboration, based on chapters 8,9,10 of this book.

Benefits related to the area under conservation do vary widely according to ecological zone and type of uses promoted (see table 14.2). The highest benefits per square kilometer are generated by the CNP-ICBR coastal national park but a small swamp forest like the Hlanzoun and its related lake in Benin have a high benefits pr unit area due to a high productivity of natural resources feeding value chains up to urban markets.

Looking at benefits for inhabitants within the protected areas (Bhutan) or nearby (Benin) local benefits from protected areas generate income ranging from US$ 86 to 288 per person. This attests to how important such areas are as sources of income for local people[1]. Such local incomes can be obtained from sustainable and unsustainable conservation, enabling and conservation indifferent activities. Conservation promoting activities are those with benefits that increase with conservation intensity and scale, while conservation indifferent activities take place within or nearby protected areas but could also take place without conservation with no visible changes (i.e. cash crop tree plantations).

Some types of tourism are promoting conservation: observation of rare species and amenities due to the presence of a specific ecosystem (swamp forest, mangrove, etc.) relies on intensive protection of natural resources; thresholds have to be reached in term of area size, connectedness and protection so that depleted stands and rare (fauna and flora) species recover up to a visible level. Vision tourism, trophy hunting or trekking for observation of the wild depend on such levels and incomes from these are directly encouraging conservation. Cohabitation between human beings and wildlife is then made easier by zonation, differentiated rights and protection intensities according to it. The experience of the PBR in Benin is rather successful in this regard.

[1] In the Costa Rican case this indicator could not be obtained because the information generated for local contributions was obtained from economic activities that depend on the existence of the NPBRs but there are a many households that don´t depend directly on the NPBR though living around the NPBRs. They were therefore not interviewed.

A successful harvesting of rare and high value species requires secure long lasting regulated use. Conservation prevents over-harvesting, stock depletion and opportunistic behaviour of a few to the detriment of a majority. Especially when resources have a high value as in the case of the Cordyceps fungus (Bhutan), raffia wine and fibres (Benin), timber and fish (both countries), landscape beauty in Costa Rican case, regulation is particularly important and depends mainly on agreements among the local "owners" of the resources rather than on external protectors. Once resources have such an economic value, conservation measures might request that some control is kept to prevent overharvesting or depletion. In Bhutanese and Beninese cases, harvest is also subject to taxation and quotas, opportunists are fined and parts of the taxes and fines returned to the ones who help in controlling. But the success in such control depends on the institutional setting and the authority of the management or co-management entities. As soon as it is challenged as in the case of the co management committees in Benin, a few mighty stakeholders plunder the resources for their own profit. Total revenue per square kilometer may be high in the TTK, but here again it is the result of stock depletion.

5. Financial set up

Dependency on state and non state funding is high in Benin. Non state funding is partly subventions and partly loans. In Benin and in Bhutan, the development of specific funds is in the making for financing conservation in order to reduce dependency on unreliable external funding and also improve the financing of investments in conservation. In Costa-Rica, such funds already exist and are funded by fiscal and no fiscal resources. In all these cases, some of the services generated by the protected areas, which could feed such funds, are not reattributed (water conservation, carbon storage). The use of genetic resources for research and industrial purposes is subjected to regulations (prior informed consent, control on harvest) and payment of fees in Costa-Rica. This example could be extended to the other countries even if amounts collected are not very important. Tourism is a valuable source of funds for protected areas, whether managed at centralised levels (as in Bhutan) or at decentralised levels as in Benin and Costa Rica

6. Further research and assessment.

In Bhutan and Benin, this is the first time benefits assessment of protected ecosystems is done and the process was a learning-by-doing one. In Benin not all value chains were assessed while in Bhutan, the focus was put on local level through a comprehensive household survey rather than on other segments within the chains. In both cases, benefits from conservation are shared by a higher number of petty operators than in Costa Rica and therefore benefit assessment is a lengthy process. Administrations, projects and

large enterprises were reluctant in providing data, not knowing really what was being processed out of it. After a first attempt and presentation of the results, data collection and analysis should be smoother. In all cases, it appears that field studies are necessary in order to collect data on benefits from local commodities and services generated by areas under conservation and for following the value chains when they involve large number of segments and stakeholders up to the national level. Such field studies data have to be complemented by national data on benefits which cannot be allocated to specific areas, such as management budgets of conservation administration at the central level and global investments in conservation. A comprehensive survey should be planned in all three countries. Yearly different subsets of national park, biological reserves and further areas could be surveyed so that a comprehensive assessment can be achieved over 3 years. Now that the method has been assessed, the results could be widely discussed not only on their validity but mainly on their meaning for conservation strategies.

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