

# The Contribution of Protected Nature Areas towards Socio-Economic Development in Costa Rica:

## A Cluster Analysis of Braulio Carrillo National Park



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# **The Contribution of Protected Nature Areas towards Socio-Economic Development in Costa Rica:**

## **A Cluster Analysis of Braulio Carrillo National Park**

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## **Abstract**

Nature conservation plays a fundamental role in Costa Rica's development. The existence and conservation of nature areas support various socio-economic activities around the areas that contribute towards development at local, regional and national levels. The National Institute of Biodiversity (INBio) and Centre of Economic Policy for Sustainable Development (CINPE) implemented a project that uses a cluster analysis to evaluate the economic contribution of protected wild areas towards the social and economic development of communities in Costa Rica. This study makes use of this methodology to determine the economic impacts of Braulio Carrillo National Park on its surroundings. BCNP will be a new study area; entailing different characteristics which can provide us with a greater understanding of the methodology. The economic relationship between BCNP and its surrounding communities is discussed in the main content. These communities show potential advantages for the development of eco-tourism as a complementary economic activity where landscape, accessibility and organizational achievements provide the environment with diverse opportunities for a communitarian development to emerge.

*Keywords:* socio-economic development, contribution protected nature areas, cluster analysis, Braulio Carrillo National Park, Costa Rica.



## Summary

Protected nature areas are very important for Costa Rica's economy, and nature conservation plays a fundamental role in the economic development of the country. Its existence and conservation support various socio-economic activities around the area that contributes towards development both at the local, regional and national levels.

A project implemented by INBio and CINPE used a cluster analysis to evaluate the economic significance of protected nature in its contribution towards the socio-economic development of Costa Rica. The methodology was applied to three different National Parks and became an important empirical tool to approximately assess the real revenues generated by nature parks.

This study continues to use the developed methodology in order to determine the economic contribution of Braulio Carrillo National Park surroundings. The application on new study areas entailing different characteristics can put to the test this methodology, thereby providing a greater understanding for its further use. Braulio Carrillo National Park shows a different panorama from the previous case studies. Tourism visitation is low compared to other national parks and water resources as well as hydrological processes, are vital for sustainable water supply in the region.

This study aims to identify, systematize and estimate the economic revenues in those socio-economic activities which are directly or indirectly related to BCNP. The economic contributions towards the different spatial levels are estimated and presented. The protection of water resources seems to be the largest contribution towards social and economic development. A possible contamination of the water aquifers as a result of non-sustainable use is the major environmental flaw of BCNP.

The surrounding communities show potential advantages which enable the development of eco-tourism as a complementary economic activity. The landscapes, the location near main urban areas, governmental and non-governmental organizations interventions, offer opportunities for a communitarian development.



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## Abbreviations

AyA	Acueductos y Alcantarillados (Aqueducts and Sewage systems)
ACCVC	Área de Conservación Cordillera Volcánica Central (Conservation Area Central Volcanic Mountain Range)
CINPE	Centro Internacional de Política Económica para el Desarrollo Sostenible (Centre of Economic Policy for Sustainable Development)
ESPH	Empresa de Servicios Públicos de Heredia (Heredia Public Services Company)
FONAFIFO	Fondo Nacional de Financiamiento Forestal (National Forestry Found)
GDP	Gross Domestic Product
INBio	Instituto Nacional de Biodiversidad (National Biodiversity Institute)
INEC	Instituto Nacional de Estadística y Censos (National Statistics Bureau)
MINAE	Ministerio del Ambiente y Energía (Ministry of the Environment and Energy)
NP	National Parks (Parques Nacionales)
NPBR	National Parks and Biological Reserves (Parques Nacionales y Reservas Biológicas)
BCNP	Braulio Carrillo National Park (Parque Nacional Braulio Carrillo)
PES	Payment for Environmental Services (Pagos por Servicios Ambientales)
PWA	Protected Wild Areas (Áreas Silvestres Protegidas)
SINAC	Sistema Nacional de Áreas de Conservación (National System of Conservation Areas)



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# 1 Introduction

## 1.1 Background

Costa Rica covers 51,100 km<sup>2</sup> of land in a consolidated system of protected nature areas that covers 25% of the territory characterized by its natural beauty providing refuge to approximately 4% of the world's total biodiversity (INBio, 2007). The country's economy is sustained mainly from the export of coffee, pineapples, bananas, electronic microstructures and especially from eco-tourism. In 2005, the income from tourism represented 8% of the GDP with more than one million tourists visiting the country (Estado de la Nación, 2006). These revenues, rather than being allocated solely from park fees or conservation efforts, are merged with other economic activities indirectly influenced by protected nature areas.

Therefore, the protected nature areas are very important for the country's economy and nature conservation plays a fundamental role in the development process. Its existence and conservation support various socio-economic activities. These socio-economic activities are tourism-related businesses, horticultural companies, water distribution and others that directly or indirectly are positively economically affected by being located around a protected nature area.

The project realized by the National Institute of Biodiversity (INBio) and Centre of Economic Policy for Sustainable Development (CINPE) uses an analysis cluster<sup>1</sup> to evaluate the economic significance of National Parks and Biological Reserves (NPBR) in supporting the socio-economic development of Costa Rica. This methodology was applied to three different National Parks (NP): Chirripó NP, Cahuita NP and Volcán Poás NP; and has been an important empirical approximation for the revenues generated surrounding the parks. Its aim is to investigate the real economic development induced by conservation and not by intangible values estimated with traditional environmental evaluation techniques (Fürst, Moreno et al. 2004).

This study continues to apply the methodology of cluster analysis in order to determine the economic contribution of Braulio Carrillo National Park (BCNP), focusing on the effects upon the local districts near the park. This tool allows one to identify possible chain productive activities. These activities consist in the relationship between suppliers, skilled labour, government, NGO's and other services, which enable the creation of new opportunities for socio-economic development. Thereby the real absolute contribution of BCNP in 2006 is estimated, and not the relative opportunity cost of the park. To identify the real significance of BCNP and for whom, allows future policy making for a combined nature conservation and development.

The use of a new study area, that entails different characteristics from other case studies, tests the developed methodology and provides greater understanding for possible further application. The park provides spectacular scenic beauty for the local people and principal urban centres. Nevertheless, the visits are very low compared to other National Parks in the Central Valley area, present lack of infrastructure and access points. Water resources and hydrological processes is the most important feature providing sustainable water supply to the region.

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<sup>1</sup> Conglomerate activities interrelated in a value chain (Fürst, Moreno et al. 2004).

For a better understanding of the background, a number of concepts must be defined. The National System of Conservation Areas (SINAC) divides the country into Conservation Areas. These areas hold 160 Protected Wild Areas (PWA) classified in different categories (Table 1) (SINAC, 2007).

**Table 1: Protected Wild Areas in Costa Rica**

Categories	PWA	Continental area (51,100Km2)		Marine area (30,308Km2)*		Total area (81,408 Km2)	
		(ha)	%	(ha)	%	(ha)	%
Biological Reserves	27	625,531	12.2%	475,620	15.7%	1,101,151	13.5%
National Parks	8	22,032	0.4%	5,207	0.2%	27,239	0.3%
National Refuges of Wild Life	67	243,040	4.8%	18,425	0.6%	261,465	3.2%
Protective Zones	31	153,506	3.0%	0	0.0%	153,506	1.9%
Forest Reserves	9	221,239	4.3%	0	0.0%	221,239	2.7%
Wetlands	13	66,388	1.3%	5	0.0%	66,393	0.8%
Other category (National Reserves and National Monuments)	5	7,843	0.2%	1,612	0.1%	9,455	0.1%
<b>TOTAL</b>	<b>160</b>	<b>1,339,579</b>	<b>26.2%</b>	<b>500,869</b>	<b>16.5%</b>	<b>1,840,448</b>	<b>22.6%</b>

Source: Gerencia de Planificación SINAC, 2006.

Different terms for protected nature areas are direct translations from the official classification used by SINAC in Costa Rica. For simplicity reasons, Protected Wild Areas are also mentioned as protected areas or nature areas. Most of the natural resources are preserved in these Protected Wild Areas. It is around these wild areas, where several of socio-economic activities are developed from the environmental services that they provide.

The definition of environmental services is adopted from the Ministry of the Environment and Energy (MINAE) the Decree No. 33226-MINAE, by which four environmental services are recognized for its ecological, social and economic value to society. The environmental services are: carbon fixation, hydrological services, biodiversity protection, and provision of scenic beauty.

#### Carbon fixation

It is the largest quantifying component of forest services. By refraining from deforestation, or by promoting plantations and secondary re-growth, atmospheric concentrations of carbon dioxide are reduced.

#### Watershed protection

The loss of forest cover can result in erosion with consequent sedimentation of streams and rivers. Sedimentation reduces the quality of drinking water, and may damage fisheries. Loss of forest can also increase the risk of flooding that can cause serious damage to the population.

#### Biodiversity

The potential loss of flora and fauna is a big concern surrounding deforestation. Despite its small size, Costa Rica is famous for its biodiversity which is highly valued for science and ecotourism purposes.

Landscape

It is a vital factor for ecotourism purposes. Forests are the main attraction for the growing tourist industry.

These environmental services carry out a number of activities that directly or indirectly are positive affected by protected areas. These chains of connected activities are linking forward to a developing process and add socio-economic development to the area (Fürst, Moreno et al. 2003).

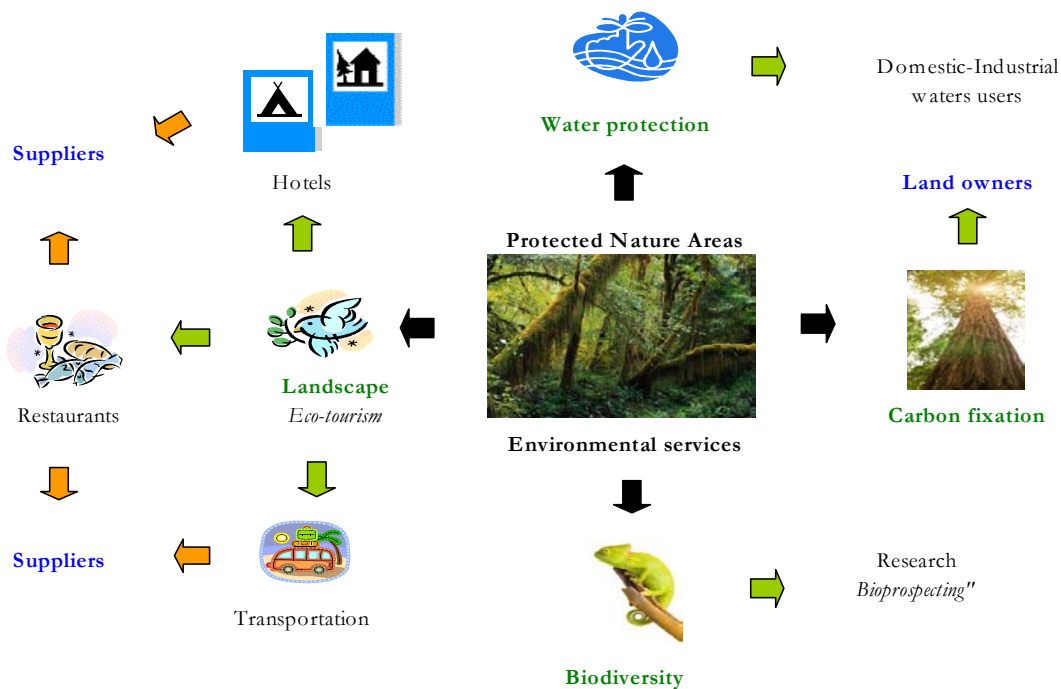
Describe development is complex, subjective and of a comparative nature, which is sustained in a series of components marked by the surroundings. Culture, individual schemes, policy legislation, organizations, behaviours and decision making, are factors that determine the economic and social development (Galindo, 2007). In this context, socio-economic development is analysing focusing on a potential social impact of an economic change. For practical analysis, the economic change is triggered by the conservation of nature where an economic contribution can be measure. Although, social factors and social changes are developing by nature conservation, these are not deep subjects of analysis in this research.

**1.2 Problem definition**

Different activities generated by protected areas are very characteristic of the country’s socio-economic development and the environmental policies applied. In general, these policies focus on tourism, water resources, biodiversity research and environmental education, park access and other co-management procedures with local communities (Fürst, Moreno et al. 2004).

At the same time, the effect is spread in geographical areas of interconnected activities and suppliers, or producers and consumers. Figure 1 shows a number of activities that can be derived from the environmental services given by protected nature areas.

**Figure 1: Activities around protected nature areas**



Much has been done seeking towards the better understanding of the additional economic value of the natural environment. Since the market usually fails in accounting environmental costs, it can often result in watershed degradation, soil erosion, loss of biodiversity or other irreversible losses. Furthermore, a simple environmental evaluation or account of the natural resources is insufficient to investigate and fully understand the real socio-economic impact supported by nature conservation (Fürst, Moreno et al. 2004).

The questions that arise are: how to evaluate this contribution?, and furthermore; what is the significance of nature for the socio-economic development and not the value of nature itself?, the answers require an approach that can give a clear reference of how much and the extent to which protected nature areas are benefiting society.

### **1.3 Objective**

The research objective is to identify, systematize and estimate the contribution of Braulio Carrillo National Park towards the socio-economic development of the surrounding communities.

The aim is first to identify these socio-economic activities offered by the National Park, and then systematize the effect in geographical areas with an estimation of the economic contribution for 2006. Following are the next research questions:

1. Which socio-economic activities are developed surrounding the communities and influenced by the national park?
2. How is the contribution of BCNP diffused in the surrounding communities?
3. How much is the economic contribution of the National Park towards the socio-economic benefits of the community?
4. Where is the major contribution of BCNP perceived?

### **1.4 Methodology**

This research uses a cluster analysis approach. Clusters are defined as geographic concentrations of interconnected companies and institutions in a particular field. Its theory, gives a new spatial organizational way of analyzing chain values (Porter, 1998). The concept can be also applied to natural resources, where the extraction and processing of the natural resource develops various activities around the nature area (Ramos, 1998). In this particular case, clusters are situated around nature areas, and the contribution of nature is directly or indirectly reflected in the regional economy taking advantage of the environmental services present in the area. (Fürst, Moreno et al. 2003). A detail description of this methodology is given in chapter 3.

### **1.5 Research outline**

Starting in Chapter 2, the report presents a general description of Costa Rica's nature conservation system. Chapter 3 presents different evaluation methods in how to assess nature value, and finalizes with a detailed analysis of the cluster methodology. Chapter 4, introduces a new case study area. The generalities of Braulio Carrillo National Park and

its surroundings are described in anticipation of the empirical analysis. Chapter 5 presents the application of the cluster analysis in the surroundings of BCNP. It describes information from the questionnaires on tourism related activities in the communities. It also describes through qualitative and quantitative facts the environmental services contribution and the characteristics of tourism visits and interest in the area. The systematization and estimation of the contribution is completed in chapter 6. The tables present the values of the contribution of the different socio-economic activities for the local, regional, national and down stream areas. Finally, chapter 7 explores how BCNP and the communities are working towards socio-economic development, following by a related discussion and the final conclusions.

## 2 Nature conservation and development in Costa Rica

### 2.1 Introduction

According to the XII Report of Estado de la Nación<sup>2</sup>, the conservation of the natural areas in Costa Rica, for 2005 reported positive progress. Diverse studies show an increase of the protected areas and better knowledge towards the own natural resources. Nevertheless, threats persist, from inefficient territorial ordering, shortage of resources for land payments and for the operation of institutions in the environmental sector. In addition, the illegal extraction of wild species, the growth of productive activities under scarce regulations and deficient measurement of environmental impacts, are major environmental weaknesses (Estado de la Nación, 2006).

This chapter presents the general characteristics of Costa Rican's nature conservation system and environmental programs that embody the relationship between nature conservation and development. More specific, the programs embrace the Payments for Environmental Services Program (PES), Conservation and Recovery of the Micro River Basins Programme, Heredia Public Services Company (ESPH) and INBio's prospecting of biodiversity. These programs and policies are influencing the study area.

### 2.2 Protected nature areas

As it was mentioned before, the National System of Conservation Areas (SINAC) divides the country into 11 Conservation Areas (Figure 2). National Parks and Biological Reserves constitute 35 areas that represent the biggest part of the Protected Wild Areas and are the main attraction for ecotourism (Table 1) (SINAC, 2007).

Figure 2: Conservation Areas in Costa Rica



Source: SINAC, 2007

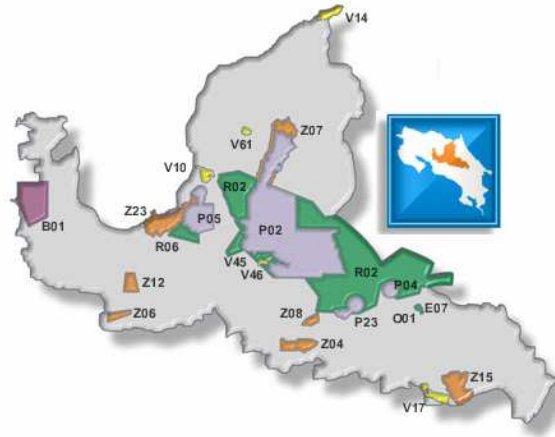
These conservation areas are territorial and administrative delimited units supervised by the Ministry of the Environment and Energy (MINAE). This ministry is responsible for the protection of the environment in Costa Rica. Next to this, each Conservation Area establishes joint cooperation between private and governmental stakeholders, conservation strategies and a sustainable use of natural resources (SINAC, 2007).

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<sup>2</sup> State of the Nation XII Annual Report: research program towards human development in Costa Rica.

Braulio Carrillo National Park (P02 in Figure 3) covers 47,586 ha, is the biggest park of the Conservation Area Central Volcanic Mountain Range and one of the biggest protected areas in Costa Rica. The Conservation Area Central Volcanic Mountain Range (ACCVC) covers almost the entire Central Valley<sup>3</sup>, with an area of 642,000 ha; 12% of Costa Rican territory. From Desamparados in the south to the north part of Sarapiquí and from Turrialba in the east to San Ramón in the west, and in its territory 149,653 ha. is under a protection category (SINAC, 2007).

**Figure 3: Conservation Area Central Volcanic Mountain Range**



Source: SINAC, 2007.

The topography and climatic variation found in the region results in very diverse ecosystems, and making it an important area for water production. 54% of the country's population is concentrated here and dedicated to activities like agriculture, livestock, industry and urban development; which has a significant impact on the natural environment.

### 2.3 Environmental programs

Under the support of international agreements such as the United Nations Framework Convention on Climate Change (UNFCCC), its Kyoto Protocol and the emerging Clean Development Mechanism (CDM), Costa Rica has been able to take a leading role in the prevention of global climate change through internationally financed projects in natural forest management and conservation as well as plantation forestry, with particular emphasis on the participation of smallholders. Costa Rica has thus linked its legal obligations to UNFCCC with the domestic potentials of fostering sustainable forest management in an innovative way (Rodríguez, 2003).

In order to maintain the natural environment, government of Costa Rica devised environmental programs in cooperation with NGOs and foreign governments. One of these programs is the Payment for Environmental Services (PES). The legislation of PES was enshrined in the Forestry Law 7575 in 1996 and created the National Forestry Fund (Fondo Nacional de Financiamiento Forestal, FONAFIFO). This organism part of the

<sup>3</sup> The Central Valley (Spanish: Valle Central) is a geographical region located in the centre of Costa Rica. The land is relatively plain, and is surrounded by several mountains and volcanoes, part of the Central Volcanic Mountain Range. The region includes San José and the provinces of Alajuela, Heredia, San José and Cartago, which are the most populated cities in Costa Rica.

Ministry of the Environment has the objective to capture financing for the environmental services that natural forest, forestry plantations and other activities give to the environment. As a result, the forest owners receive US\$/per hectare according to the forest modality (Table 2).

**Table 2: Payments PES - FONAFIFO, 2006**

Modality	US\$/ha.
Forest protection	64
Natural regeneration	41
Reforestation	816
Agroforestral Systems*	1.3

\* Amount per tree

Source: FONAFICO, 2006.

Decreto Ejecutivo No. 33226-MINAE

Together with the PES program, the Heredia Public Services Company (ESPH) developed the Conservation and Recovery of the Micro River Basins Programme (PROCUENCAS). This programme promotes the conservation and recuperation of aquifer recharge areas that feed water sources and economically stimulates the land owners that protect and practice reforestation to ensure environmental services provided to society (La Gaceta, 2000).

This programme only apply in the highlands rural districts of Heredia, including San José de la Montaña, where land owners receive the following amounts per modality for conservation (Table 3).

**Table 3: Payments for Hydro-Environmental Services - ESPH**

Modalities	US\$/ha.
Conservation and regeneration	92
Reforestation	852
Established plantations	92

Source: La Gaceta, 2002

The value of biodiversity relates indirectly to tourism attraction, but it also concerns scientific medical research, which engenders a new context for sustainable use of biological diversity, where private companies and conservation efforts join together and benefit from the different uses of biodiversity. Bioprospecting or prospecting of biodiversity refers to the systematic search of genetic compounds, in macro and micro organisms with potential uses for industries, e.g. pharmaceutical industry or medicine research centres, in combination with the conservation of biologic/genetic resources and the economic development of countries rich in biodiversity (Sittenfeld, 1997).

INBio, through the Bioprospecting Unit, established in this way agreements for the development of projects in co-operation with industries dedicating to a sustainable use of the biodiversity. Specifically, the search for new sources of chemical compounds, genes, proteins, micro organisms, and other products with potential economic value (INBIO, 2007).

As a result, of established agreements a contribution of 10% goes to the investigation budget of MINAE to support the costs of biodiversity conservation. At the same time, the project budget should finance the Costa Rican scientific infrastructure, with technological transfer in equipment and qualification of Costa Rican scientists that contribute to the identification and collection of samples. In case major benefits are derived from the discovery, 50% of the benefits granted by INBio are shared with SINAC.

### 3 Nature value assessment

#### 3.1 Introduction

The following chapter explains the character of nature as a public good that given its characteristics; derive a complex way of assessments to approximate its value and importance. Initially, gives definitions for private and public goods, then description of different approaches in natural resource economics to finally justify the implementation of cluster analysis to assess significance of nature for the socio-economic development.

#### 3.2 The nature of a public good

Economic theory defines **private goods** as goods in which the market mechanism operates relatively well in terms of resource allocation. In other words, are rivalrous and exclusive<sup>4</sup>, and a rational exchange is possible when each economic agent maximise its welfare under perfect competition and no externalities (Perman et al., 1996).

The non-rivalrous or non-exclusivity<sup>5</sup> consumption or production goods characterize **public goods**, which cannot be efficiently produced or consumed under a controlled market mechanism. The presence of positive or negative externalities in the consumption of production, leads the market to produce inefficient quantities. Through the perspective of economic theory, this is not considered as a common good, because it does not imply an economic decision nor a trade off. It is possible to increase consumption with more people without an additional cost for society (Perman; et al., 1996).

Natural resources and the natural environment are not subject to private property rights. Its exclusion from consumption is impossible and “free ride” can be a problem with respect to public good provision. Nevertheless, under certain conditions some restrictions can be imposed on its consumption that consequently will involve a reduction in welfare (Perman et al., 1996).

Wilderness areas are defined as congestive resources. Congestive resources exhibit excludability but not, up to the point at which congestion sets in, rivalry. When a person visits a nature area he/she can consume its services, but does not prevent others from

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<sup>4</sup> **Rivalrous:** for goods which production and consumption are subject of the economic scarcity problem of implying a trade-off (opportunity cost). In other words, the cost of production or consumption implies stop producing or consuming other goods; and that fact that someone is able to purchase it, implies no one else is able to purchase it again (Perman; et al., 1996).

**Exclusive:** for goods which can particularly be purchased in form of commodities in an excluding form, in the sense that those that do not pay for it are excluded for it use. Therefore, it is possible to charge a price and exclude its use for those without property rights (Perman; et al., 1996).

<sup>5</sup> **No-rivalrous:** these kind of goods will have no economic scarcity, they have no opportunity cost. Therefore, its consumption does not imply stop consuming other goods and the fact that it is consumed by someone, does not obstruct its consumption for someone else. It can be consumed by society without a price (Perman; et al., 1996).

**Non-Exclusive:** given its characteristics, are goods with difficulties assigning property rights. In consequence, it is not possible to exclude for its consumption for those without property rights, and it is not possible to charge a price for its enjoyment (Perman; et al., 1996).

consuming those services as well. There is no rivalry between the consumption until the level of congestion is reached. This congestion occurs when one individual visit reduces another's of theirs. Therefore, excludability is possible if the area is of private ownership or subject to common-property management (Perman et al. 1996).

### 3.3 Assessing nature values

How valuable an ecosystem is and to whom, has been answered in several ways. Pagiola et al. (2004), distinguishes four distinct approaches:

- Determining the net benefits of interventions that alter the ecosystem conditions: Relevant in project or policy context to consider if the benefits of conservation or regulation justify the costs.
- Examining how the cost and benefits of an ecosystem are distributed: Difference in participation, where different stakeholders often perceive different costs and benefits.
- Identifying potential financing sources for conservation: Helps to identify the main beneficiaries of conservation and the magnitude of the benefits. In this way, device mechanisms to capture financing for conservation.
- Determining the value of the total flow of benefits from an ecosystem: The benefits are not only in-situ, but located in a multi-spatial area, reaching local, regional, national and global levels.

The evaluation of these approaches proposes different tools to assess the economic value of nature and the environment. Turner et al. (1994) divides the methods in two broad categories: those which value a commodity via a demand curve and those which do not.

The non-market demand approaches are traditionally used in government regulation. It values the benefits of environmental protection in terms of what is being forecast to achieve, or by those response approaches that requires information on effect of a particular damage in economic activity or utility (Garrod and Willis, 1999).

Demand curve approaches are broadly divided into techniques: revealed preferences and stated preferences. The first is based on the observed behaviour of people's reactions in surrogate markets that can be related to an ecosystem interest. Stated preferences techniques are based on hypothetical behaviour, where people respond to hypothetical situations and the answers are used to infer their preferences (Pagiola et al. 2004).

The most common revealed preferences methods are the travel cost method, which estimates the demand for recreational sites; and the hedonic price method<sup>6</sup>, that approximates demand upon characteristics that determines the consumer's welfare.

Stated preference methods ask individuals explicitly, how much they value an environmental good. The most common way is by contingent valuation methods. It basically consists of asking people (usually by questionnaires or by experimental

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<sup>6</sup> For example, the prices of housing are determined by structural characteristics (number of rooms, garage, etc) and environmental characteristics in the area (Garrod and Willis, 1999).

techniques) what they are willing to pay for a particular benefit, or their willingness to accept in compensation for damage caused (Markandya et al. 2002).

Most of these methods measure the demand for a good or service in monetary terms, or either they are based on the opportunity cost principle. Other tools are referring to non-existing markets, which in most of the cases make calculations with mitigation or damage costs.

To be able to identify the contribution of Braulio Carrillo National Park while systemizing and estimating the value of the contribution, a simple environmental valuation or accounting of the natural resources is not enough to investigate socio-economic development. A cluster analyses though represent a tool that evaluates the effect of protected nature on the communities (Fürst, Moreno et al. 2003).

### **3.4 Cluster analysis**

Clusters are defined by Porter (1998) as geographic concentrations of interconnected companies and institutions in a particular field. They include for example suppliers of specialized inputs, such as components machinery, services, providers and specialized infrastructure. Many clusters include governmental institutions such as universities, standard setting agencies and vocational training. This gives a spatial organizational way of analyzing chain values.

This approach is also applied in natural resources, where the extraction and processing of the natural resource develops multiple activities around the nature area. These activities are related with other economies, specialized sectors of production, suppliers, skilled labour, government, NGO's and other services. Some of these activities are near and directly affected by the natural resource, others are far way, but still indirectly affected as well. In some of the cases, this contribution can even be bigger than the initial activity (Ramos, 1998).

In this case, clusters are situated around Protected Wild Areas. These nature areas functions as a positive externality that generates the dynamic processes. As a result, the contribution of nature is directly or indirectly incorporated in the local economy (Fürst, Moreno et al. 2003).

Assessing the value of nature usually leads to the use other methodologies. In this case, the aim of the study is to evaluate the significance of nature for the socio-economic development and not the value of nature itself. The cluster analysis was selected because it allows systematizing and evaluating the chains originated by nature conservation and its benefits in different level areas (Fürst, Moreno et al. 2003).

#### **3.4.1 Methodological matrix**

For the data analysis, the data will be organized in a matrix like table 4. This matrix structures the impacts of the development in different levels. It combines territory, economic activities, stakeholders, the contribution to the economic development and estimated values of this contribution (Fürst, Moreno et al. 2003).

The first column refers to the spatial-territorial area where the activity is located. Different scales can be distinguished according to the extended effect. Using Costa Rican

official administrative divisions<sup>7</sup>, the contribution is calculated for the communities in the district area bordering the park (local-immediate). This is followed by the cantons - in this case the largest town close to the district (local-influence), the provinces or other geographical extensions (regional) and finally, the effects that reach up till the national level and the downstream areas.

The second column shows the different socio-economic activities (A1, A2,..., An) in each spatial-territorial area. From this point, the methodology tries to perceive the chain of connected activities that carry the development to a bigger area, from local-immediate to regional. For example, the suppliers of activities in the local-immediate space that benefit from an indirect income effect from the park.

There are other activities located further away from the protected area which depend directly on the hydrology processes of the park. This is the case of the water suppliers or other industries extracting water from the aquifers located upstream. Furthermore, there are also activities that can be considered having national effect, for example the income perceived by MINAE and SINAC.

**Table 4: Methodological matrix**

Braulio Carrillo National Park			Estimation of the contribution			
Spaces	Activities	Stakeholders (j=1,...n)	Estimations		Observations	%
			CRC	USD		
Local- immediate ( <i>district</i> )	A1	B1j				
	A2	B2j				
	A3	B3j				
	...	...				
	An	Bnj				
Local- influence ( <i>canton</i> )	A1	B1j				
	A2	B2j				
	A3	B3j				
	...	...				
	An	Bnj				
Regional ( <i>province</i> )	A1	B1j				
	A2	B2j				
	A3	B3j				
	...	...				
	An	Bnj				
Downstream	A1	B1j				
	A2	B2j				
	A3	B3j				
	...	...				
	An	Bnj				
National	A1	B1j				
	A2	B2j				
	A3	B3j				
	...	...				
	An	Bnj				

Source: Own elaboration, variation from: Fürst, Moreno et al. 2003.

<sup>7</sup> The administrative divisions in Costa Rica are seven Provinces (Provincias in Spanish) divided in cantons (cantones in Spanish) which are also divided in districts (distritos in Spanish). The districts are also divided into neighbourhoods.

These activities are directly connected to a number of stakeholders ( $B_{1j}$ ,  $B_{2j}$ ,  $B_{3j}$ , ...,  $B_{nj}$ ). The owners of the shops, hotels and water supplies, have different interests and will probably give a different use to the surrounding.

The economic contribution is estimated in different ways. The column “observations” describes how the estimation is done, followed by the source. The percentage of the contribution identifies those activities that perceive more benefits from the protected area.

### 3.4.2 Data collection

During October and November 2006, questionnaires were applied in San Jerónimo, Moravia; Cascajal, Coronado; and San José de la Montaña, Barva. These questionnaires are the same used in the previous case studies to include the main economic activities: accommodation places (hotels, cabins, camping and rent houses); restaurants and other activities related with tourism (shops, mini-markets). A separate questionnaire, also previous apply; capture the characteristics and opinions of tourists visiting the area (See annex 1).

An original population of 173 commercial activities registered at the local municipalities of Moravia, Vázquez de Coronado and Barva were initially considered. Following a comprehensive route through the towns and interview business, it was found that some of these were not open and others were never found. Finally, the questionnaires were applied in 66 commercial activities (divided into 21 eating places, 4 accommodation places, 41 other activities related with tourism). Questions included general characteristics of each business and its customers in order to identify a spatial link with the supplier’s (e.g. location of distribution centres, big supermarkets, and central markets) and to obtain information about the income and costs, cross-checking with the amount of sales and desegregate costs to try separating the chain effect.

Simultaneously, 43 tourists visiting the communities were encountered, especially during the weekend when they were enjoying most of the attractions (Río las Juntas, Volcán Barva facilities, mountain biking or eating in the restaurants of the area). Questions included information about place of residence (for both national and international tourism) so as to identify the additional expenditure made (e.g. staying in a hotel, eating at local restaurants), and his/her own opinion about the general conditions and facilities in the area. Questions were asked in Spanish or in English according to the tourist preference.

At the same time, important influential actors were located and interviewed, due to their vital participation in the development process incorporating the community with the producer a chain strategy employed in the park. For example, Mr. Anselmo Rodríguez Umaña, owner of “Finca Conservacionista La Esperanza” an organic farm located in Platanares, merges organic farming activities together with environmental education; and Mrs. Margarita Bottazzi Project Director of “Armonía Natural” is developing new economic alternatives for families living in the community of Monserrat.

For other activities, the data is taken from statistics and literature sources issued by the different institutions that manage the service. Once this information is compiled and analyzed, estimations have to be done in order to complete the methodological matrix. The next section introduces the new case study area, where this methodology is applied.

## 4 Case study: Braulio Carrillo National Park

### 4.1 Introduction

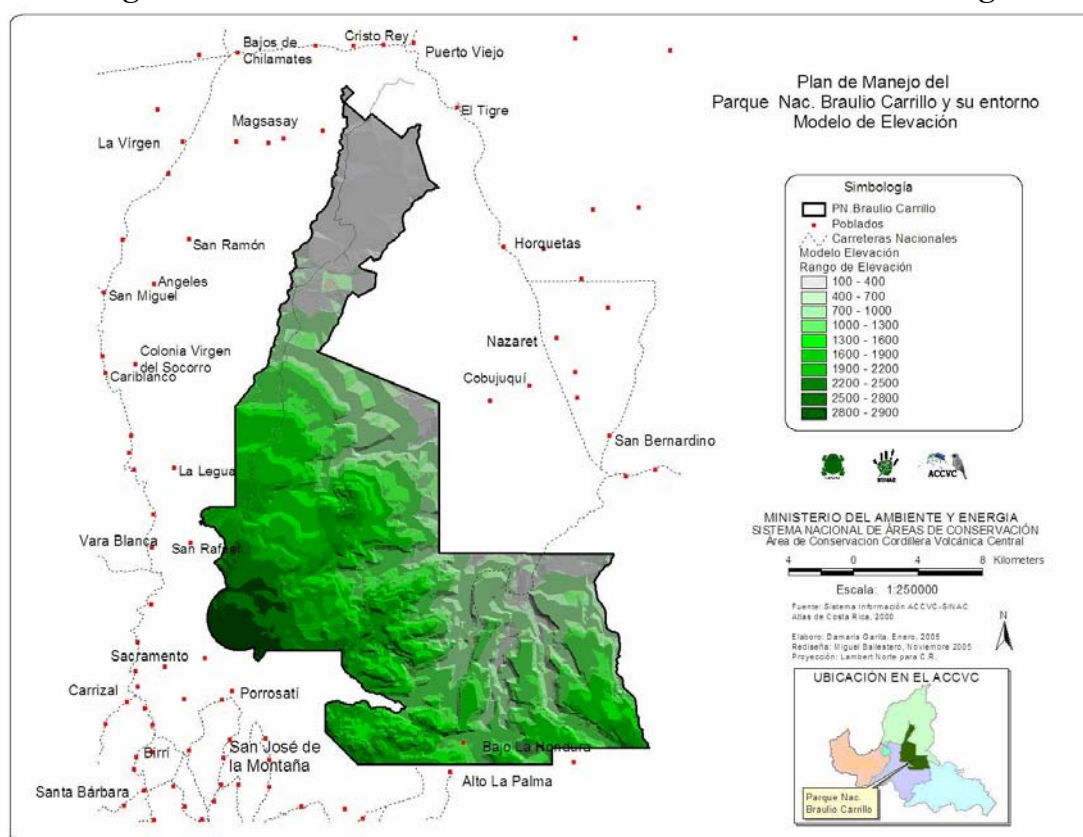
As mentioned before, the methodology was applied in three National Parks: NP Chirripó, NP Cahuita and NP Volcán Poás and has been an important empirical approximation analysis to identifying possible chain productive activities, which allows new opportunities for socio-economic development. In the three cases, the economic contribution for the local, regional and national contribution was identified and estimated in a cluster analysis.

In order to further understand how protected areas contribute towards the development of communities in Costa Rica, the ACCVC showed its interest in applying this methodology to another park. In cooperation with INBio, the Director of ACCVC and Projects and Scientific Research Coordinators from ACCVC, was decided to carry out the research in Braulio Carrillo National Park, southern sectors and three selected communities in the surroundings.

### 4.2 General characteristics

Braulio Carrillo National Park is located in the Central Volcanic Mountain Range (Cordillera Volcánica Central), covering 47,586 ha. The territory covers nine cantons from four different provinces (San José, Heredia, Limón and Cartago). This fact divides the park in different sectors: Volcán Barva, Bajo la Hondura, Quebrada González and Sarapiquí (Horquetas Magsasay, El Ceibo) (ACCVC - Onca Natural, 2005).

Figure 4: Braulio Carrillo National Park: altitudes and surroundings



Source: Management Plan BCNP, ACCVC, 2005.

Its topography is made up of high mountains covered by dense forests with many types of vegetation including tropical rainforest and cloud forest and five different biological zones. In addition, the park is vital towards the protection of superficial waters and recharge of the aquifers and a source of supply water for several urban areas (ACCVC - Onca Natural, 2005).

Being near to the principal urban centres, the park provides spectacular scenic beauty for the local people and especially on the road to Limón. Nevertheless, the visits are very low compared to other National Parks in the Central Valley area (INBio-NINA, 2005).

Concerning the characteristics of its size, the different altitudes and the lack of access due to its topography, give the park the perfect conditions for a rich variety of biodiversity (ACCVC, 2005). A large portion of the park is primary forest, with approximately 6,000 plant species that represent 50% of all the species found in the country. The fauna present has a strong relationship with the vegetation habitat. A total of 218 species of amphibians and reptiles, 550 birds, 164 mammals (79% of the total in the country) including several endemic species in danger of extinction inhabit the park (Brenes and González, 1993).



Landscape Braulio Carrillo National Park

In 1998, the BCNP was entirely declared part of Central Volcanic Mountain Range Biosphere Reserve designated by UNESCO<sup>8</sup> based on the variety of natural resources protected by the park.

Braulio Carrillo NP develops a number of activities in the communities around the area. These activities are related with other sectors of the economy, specific sectors of production, suppliers, skilled labour, and other services (Ramos, 1998). The next section gives a general socio-economic overview of the communities surrounding this park.

### **4.3 Surrounding communities**

The communities located around the park have very different characteristics. The socio-economic development of the districts varies with the location and the proximity of the urban areas. According to INBio-NINA (2005) the zone determined by NP Braulio Carrillo extends into nine cantons (Table 5).

There is a large contrast between the cantons. Those close to the Central Valley have access to better services. Some of these cantons are experiencing a change from a rural to

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<sup>8</sup> United Nations Educational Scientific and Cultural Organization (UNESCO), Biosphere reserves of the Man and the Biosphere (MAB) Programme.

an urban infrastructure. Others, by having a beautiful landscape and still being close to urban areas, ideal for high living standards, suffer from high urbanization (INBio-NINA, 2005).

**Table 5: Social Development Index<sup>9</sup> surrounding communities**

Cantons	Province	SDI
San Isidro	Heredia	79%
Vásquez de Coronado	San José	71%
Moravia	San José	71%
Santo Domingo	Heredia	70%
Santa Barbara	Heredia	69%
Heredia	Heredia	68%
Oreamuno	Cartago	65%
Barva	Heredia	63%
Sarapiquí	Heredia	29%

Source: MIDEPLAN 2001, INEC 2004.

Given the dimensions of the area, the research will focus only on three communities bordering the south part of the park. These districts are: Cascajal, Vásquez de Coronado; San Jerónimo, Moravia and San José de la Montaña, Barva. These are bordering the park, close to the two of the public access areas: Bajo la Hondura and Volcán Barva (Figure 5).

The situation near these two access points is very different. The access through Volcán Barva has better infrastructure, marked by a guard park attention, camping and lunch area, toilets, five natural footpaths. On the other hand, the access via Bajo la Hondura is not officially open to the public; therefore, there is no infrastructure at all. Nevertheless, with its natural beauty, this is an area full of potential and is under consideration for future park infrastructure development (ACCVC - Onca Natural, 2005).

The population in San José de la Montaña is considerably older (it has been established for a long time). The people of the region live around farming activities and in residential areas for urban workers, retired Costa Ricans and foreigners. The town of Cascajal is relatively younger and very attractive as a place for immigrants to settle down. Their inhabitants are manual workers living in precarious conditions and characterized by low socio-economic and education levels (INBio-NINA, 2005).

**Table 6: Selected Districts surrounding NP Braulio Carrillo**

District	Population	Older 65	Alfabetism	Unemployment
Cascajal	6,543	3.7%	74.5%	5.9%
San Jerónimo	4,911	5.2%	78.0%	4.4%
San José de La Montaña	3,801	4.7%	76.7%	2.3%

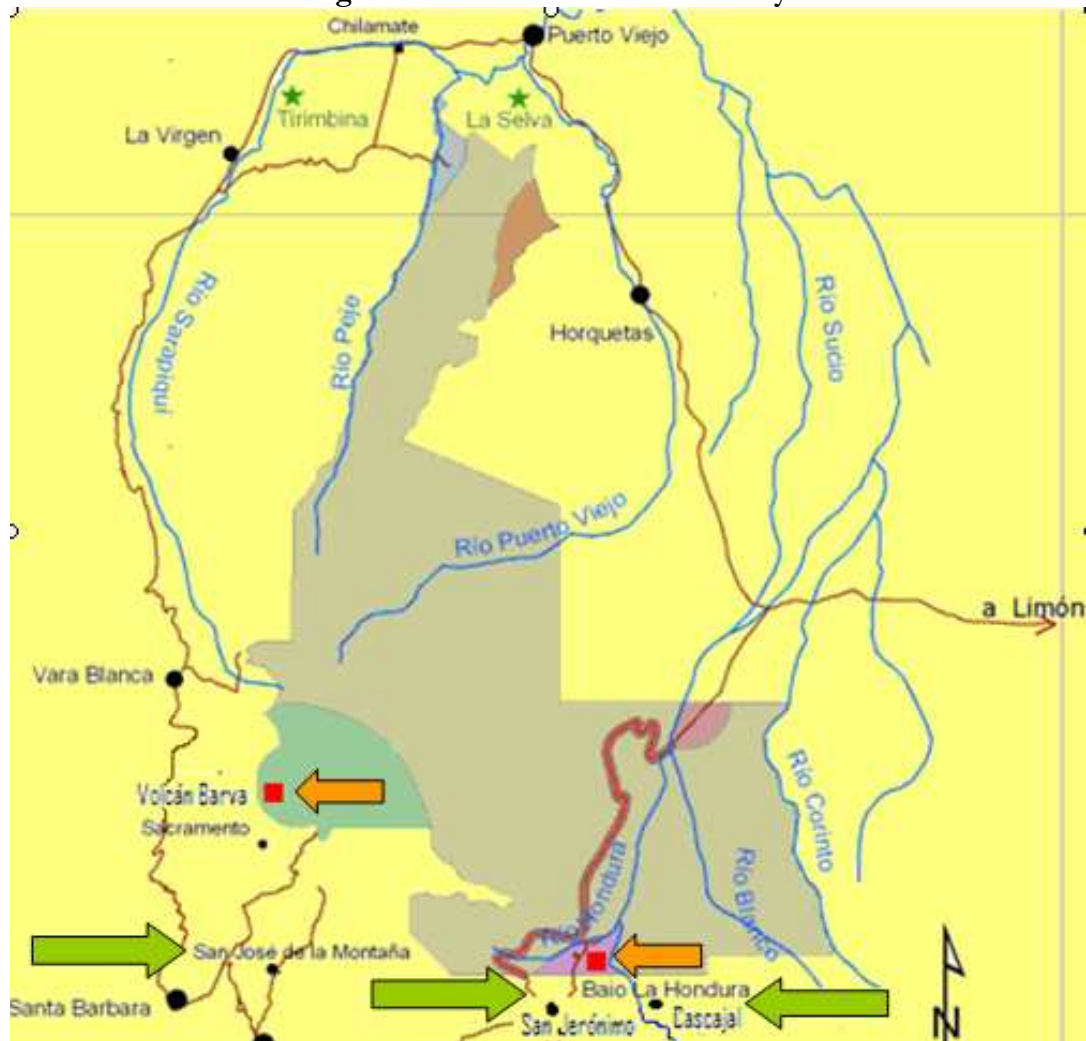
Source: INEC, 2004

Apart from the nature's attractions, there is also a historical-cultural relevant site in San Jerónimo. The old road Braulio Carrillo, in Bajo la Hondura, is formed by accommodated stones that do the service like past times, between the Central Valley and the Caribbean coast. These old roads essentially emerged because of the need of coffee

<sup>9</sup> SDI indicator measures social breaches between geographic areas, using variables like education infrastructure, access to special educative programs, child mortality, mortality rates in population under 5 years old with respect to general mortality rates, the delay of students to achieve their first degree, consumption average rates of residential electricity and the number of children per lone mother. The latter can range from 0 to 100 (INBio-NINA, 2005).

producers to transport the coffee grains from San José to Puerto Limón for exportation to Europe (INBio-NINA, 2005).

**Figure 5: Communities under study**



Source: Management Plan BCNP, ACCVC, 2005.

Next to the old road of Braulio Carrillo<sup>10</sup>, lies the historical emblem, that is, a little Chapel in Bajo la Hondura in memory of the stage of Monseñor Thiel in the area before his exile. These cultural attractions are not being taken advantage of due to the lack of touristic services in the area (INBio-NINA, 2005).

San José la Montaña and Cascajal de Coronado, are both very colorful towns located in the high lands, they represent a quiet and relaxing spot between natures, traditional agriculture and cattle farms with typical food restaurants appealing to the local people.

The following Table summarizes the attractions found in these communities surrounding the two access points in the south sector of Braulio Carrillo NP.

<sup>10</sup> First road linking San José to the Caribbean coast, built by the president Braulio Carrillo during the early 1800's. The park is named in honor of the former president.

**Table 7: Attractions in the selected communities surrounding BCNP**

Sector	Nature and cultural attractions	Activities	Services
<b>Sector Volcán Barva</b>	Colourful towns: San José de la Montaña and Sacramento Agricultural Activities Coffee Production Milk cattle Local traditions Local gastronomy Cypress plantations Tropical cloud forest Barva Town Local handcrafts	Footpaths long walks Scenery Guide long walks Bird watching Photography Forest exploration Canopy tour Mountain biking Horse back riding Visit to forestall and agro-farms Visit to dairy farms Historical and cultural exploration Trying local dishes (cheese, bread, sweets)	Food Accommodation Guide routes Local Guidance Camping area Parking space Private footpaths with nature and agriculture
<b>Sector Bajo de la Hondura</b>	Milk production Historical road Bernardo Thiel tales Scenery Birds Colourful towns Local gastronomy Reforestation	Visit production farms Buying handcrafts Trying local dishes (cheese, bread, sweets) Mountain biking Horse back riding	Information services Food Accommodation Drinking water Handcrafts stores Horse and bike tours

Source: INBio-NINA, 2005.

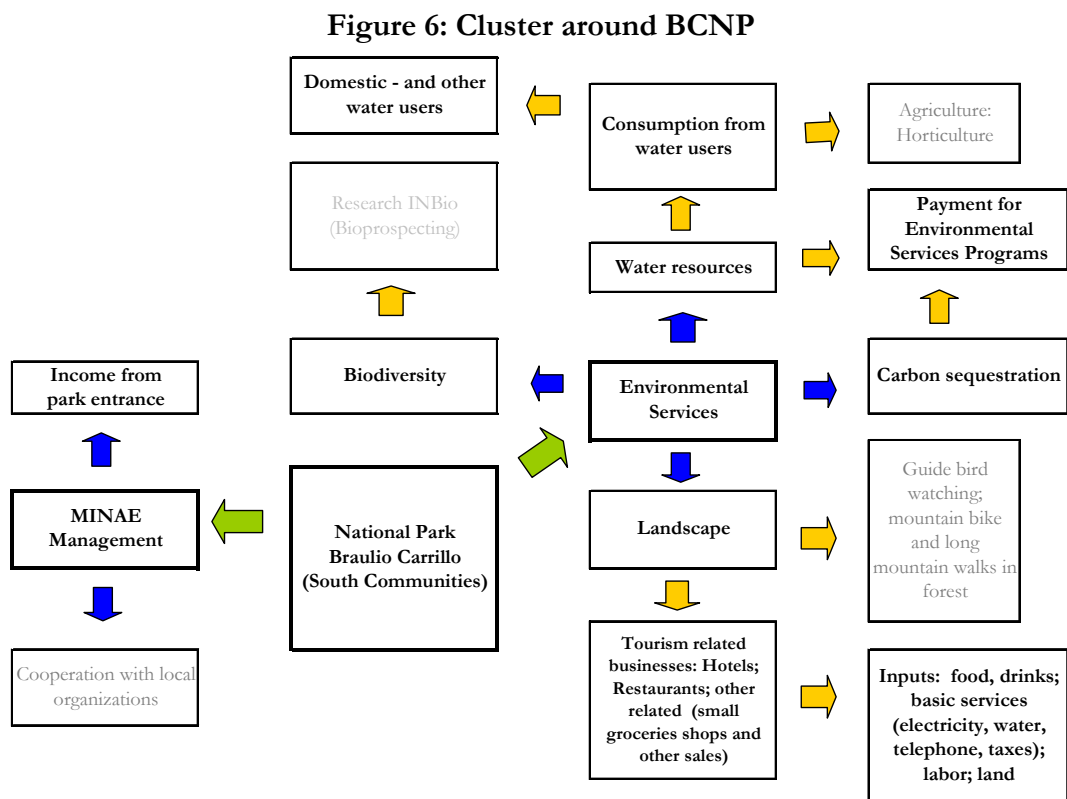
MINAE have under consideration developing of projects in the two areas mentioned. First, modernize the installations of the Vocán Barva Sector, including reconstructing the access road. A better road will connect the top of the mountain with the capital San José in less than an hour. This will attract more visits considering the quantity of tourism going to Volcán Poás, located at two hours away from San José. Secondly, a future opening of Bajo la Hondura Sector, this project will include “El Camino de Carrillo” giving the place a great historical and cultural value attracting more people to the park.

This research evaluates the significance of the BCNP for the socio-economic development from these two access points and through the direction of the three selected communities.

## 5. Cluster surrounding BCNP

### 5.1 Introduction

The cluster surrounding BCNP identifies the socio-economic activities that show to be positively affected by having been round a protected nature area (Figure 6). First of all, the tourism-related businesses take advantage from the tourist visits attracted by the beauty of the area. These are linked to suppliers of food, drinks, labour and other basic services. Payments for environmental Services Programmes capture the value of the environmental services given to land owners for its protection. Water resources, is also reflected in the number of water users receiving the service from water distribution companies who take water recharge in the highlands of the park. Biodiversity contribution is captured through Bioprospecting programmes and MINAE receive an economic contribution through the park's entrance fees.



Source: adapted from Fürst, Moreno et al. (2004).

In general, BCNP surroundings show a very different panorama from the previous case studies. Tourism is not strong compared to the other national parks, but water resources and hydrological processes are vital for water sustainability. The next section presents the application of the cluster analysis starting with a discussion of the important features of tourism in the area, then shows relevant descriptive information from the questionnaires on tourism related-businesses and describes through qualitative and quantitative facts, the contribution made through the other environmental services in the area.

## 5.2 Features of tourism

According to the Park's Management Plan (2005), the BCNP has a low level of touristic visits comparing to other parks in the ACCVC like Volcán Poás NP and Volcán Irazú NP. Even with the extension of the park, there are only available two public accesses: Quebrada González and Barva. The sector Quebrada González is located in the road to Limón and it can be reached by any kind of vehicle. On the other hand, to reach the Sector Volcán Barva, the person has to travel to the community of Sacramento and then walk 4 kilometres, or reach the entrance on a vehicle with double traction.

The following Table shows the visits to the park through these various points. It can be seen that most of the visitors of both sectors are national tourists. The visits are higher in Quebrada González (58%); but the number of visitors has increased in Volcán Barva during 2006, showing the highest visit rate in this sector during the past eight years.

**Table 8: Visits to BCNP through public accesses and type of visitors 1999-2006**

Año	ZUP-Barva				ZUP-Quebrada González				Total
	Nac.	Ext.	Subtotal	%	Nac.	Ext.	Subtotal	%	
1999	4,970	710	<b>5,680</b>	39.3	5,771	3,000	<b>8,771</b>	60.7	<b>14,451</b>
2000	4,853	600	<b>5,453</b>	42.8	4,189	3,096	<b>7,285</b>	57.2	<b>12,738</b>
2001	4,264	761	<b>5,025</b>	41.2	4,059	3,117	<b>7,176</b>	58.8	<b>12,201</b>
2002	5,755	555	<b>6,310</b>	50.8	3,903	2,202	<b>6,105</b>	49.2	<b>12,415</b>
2003	6,436	648	<b>7,084</b>	53.6	3,437	2,691	<b>6,128</b>	46.4	<b>13,212</b>
2004	5,030	527	<b>5,557</b>	49.6	3,358	2,288	<b>5,646</b>	50.4	<b>11,203</b>
2005	5,111	607	<b>5,718</b>	49.9	3,546	2,189	<b>5,735</b>	50.1	<b>11,453</b>
2006	6,715	632	<b>7,347</b>	59.8	3,101	1,846	<b>4,947</b>	40.2	<b>12,294</b>
<b>Promedio</b>	<b>5,392</b>	<b>630</b>	<b>6,022</b>	48.2	<b>3,921</b>	<b>2,554</b>	<b>6,474</b>	51.8	<b>12,496</b>

Source: ACCVC, 2006.

The research focuses on the Sector Barva and another potential sector, Bajo la Hondura (southern sectors). During the field work, 46 questionnaires were distributed to all tourists founded in the area during the fieldwork time. Tourists were interviewed at the park installations (in the case of Sector Volcán Barva), and also while enjoying the surroundings of the communities of Cascajal, San Jerónimo y San José de la Montaña.

In percentages, the interviews confirm that the main visitor is the local tourist 87%, and then foreigner, 9%, and a small group of "local foreigners" 4% who have been residing in Costa Rica for several years. This local tourism remains under the local influence and regional space, some coming from the nearby towns and some from the main cities, but always from the provinces of San José and Heredia.

The questionnaire shows that to reach the park and the nearby communities, the means of transport includes, their own car (41%), bicycles (35%), public bus (7%) and rented bus (7%), motorcycles or walking (8%) and rented cars (2%). These numbers reflect the high rate of visits of local (national) tourists who use their own cars or bicycles in comparison to the foreign visitors who usually come by rented car.

Given the BCNP location, close to the biggest urban areas in the Central Valley, it is not common either for the national and international tourists to accommodate in the local hotels or "cabañas". The survey reveals that 89% of the visitors go back to their homes. Some others make use of hotels or hostels in San José (4%), some stay in the park lodge or camping area (4%) and only (2%) stay in a local hotel in San José de la Montaña.

The cost to stay in the park lodge represents only the cost of three meals ₡3,500 (6.7 US\$)<sup>11</sup> and the camping is 2 US\$ per day. The cost of the “cabañas” is on average ₡25,000 (48 US\$) per night. The additional cost of entering the park is an entrance fee of: ₡600 for nationals and 6 US\$ for international tourists.

In the special case of the mountain bikers the average expenditure is ₡800 (1.5 US\$) per person in the local “*pulperias*” (mini-shops), for some drinks and snacks. The family groups usually have lunch at local restaurants after visiting the park, spending an average of ₡3,000 (5.7 US\$) per person. Nevertheless, some still prefer to bring their food from home, like those who visit “Rio las Juntas” in San Jerónimo, where no eating places are available nearby.

The interviewed people consider in general the area as an attraction site which enables one to enjoy nature, fresh air and tranquillity near the main urban areas. All of them organize field trips on their own, basing themselves on information from travel books (international tourism) or recommended by Costa Rican friends. For the local tourists, the park is well known as a recreation site to enjoy during the weekends. Therefore, there are no intermediaries or travel agencies involved in the visits to the park.

In the community of San Jerónimo, there are two kinds of visitors: mountain bikers that come from other nearby towns and who spend time in the trails around the area; and groups of families who do picnics and enjoy swimming in “Rio las Juntas”.

In Cascajal, besides visitors, there is also a large number of mountain bikers who come to enjoy typical Costa Rican food in traditional restaurants and “*sodas*”. The rural landscapes of the highlands, together with the fresh air are the main attractions.



Landscape: Rio las Juntas, San Jerónimo.



Landscape: Volcán Barva Lagoon

Inside the park, via the sector Volcán Barva, tourists come to enjoy attractions as: the impressive view of the Barva Volcano Crater Lagoon and nature surrounding the three mountain trails (Laguna Copey trail, “Cacho Venado” Trail, and Vara Blanca Trail) ideal for long walks, together with a view of the central valley and the cosy environment of the local restaurants.

Regarding the park’s infrastructure and its surroundings the questionnaire reveals two strong opinions. First, those who request better infrastructure (e.g. toilets, camping area,

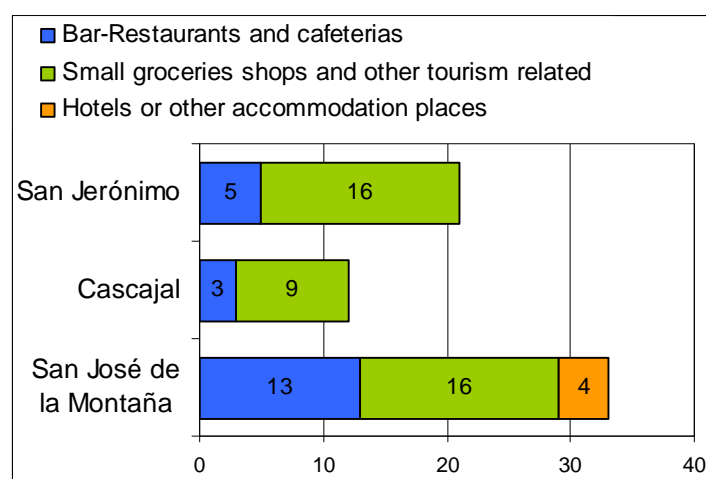
<sup>11</sup> Exchange rates average September 2006 (1 USD = 520.789 CRC)

and cafeterias) for tourism purposes and a better road for accessing the park. These are usually big groups or families that come with their own transport to spend day at the park and surroundings. Secondly, the visitors looking for a quiet remote area that prefer the access as it is, perfect for mountain cycling and hiking in a natural adventurous environment. Nevertheless, it all seems to point out the lack of information about the location and facilities available.

### 5.3 Aspects of the tourism-related businesses

The cluster analysis focuses first of all on the measurement of the local-immediate effect (district communities) derived from tourism-related businesses, in particular the 173 businesses registered at the local municipalities. The questionnaires were distributed in 66 of them. These correspond to those tourism-related businesses found during the field work period, (divided into 21 eating places, 4 accommodation places, 41 other activities related with tourism). The following figure shows the distribution of these activities in each community and by type of service.

**Figure 7: Tourism-related businesses in selected communities**



Source: Own elaboration with fieldwork data.

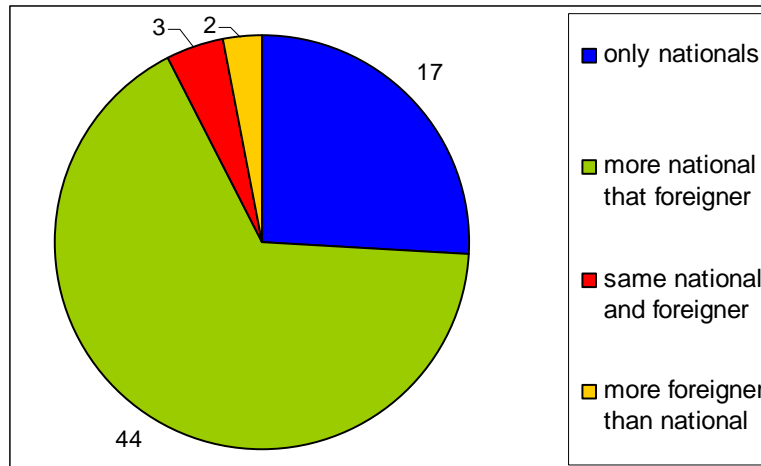
San José de la Montaña has developed more touristic related activities, 33 businesses compared to San Jerónimo 21, and Cascajal, only 12. Cascajal and San Jerónimo show a larger amount of small business like small grocery stores or “pulperías”, than restaurants, which, in many cases, generate only a subsistence income to the family’s owners. Only the community of San José de la Montaña has built a small number of hotels with mountain cabins (*cabañas*) used mainly by national visitors during the weekends.

Restaurants and typical coffee bars or “sodas” are also more commonly found in San José de la Montaña. In Cascajal and San Jerónimo, many of the “sodas” are either next to or inside the house. This has made the locals owners from the business and thereby increases their business family tradition, where the same family manager the business for generations. In 68% of the cases the activity is owned by the administration, and the other 38%, is allocated to the lending of the business.

The interviews confirm that most customers are essentially nationals and very few foreigners (Figure 8). Most of the customers are describe as more national than foreigner or only national customers. Only one business report more foreigner than national

visitors. This is the case of Canopy Adventure (canopy tour<sup>12</sup>, horseback ridding, and other recreation in the forest); located in San José de la Montaña, where most of the adventurous are visitors organized the trip through travel agencies. Although, it was not possible to get the require information to measure this contribution, and therefore it not taken into the calculations. Nevertheless is an example of the different kind of activities that can be developing more in the area.

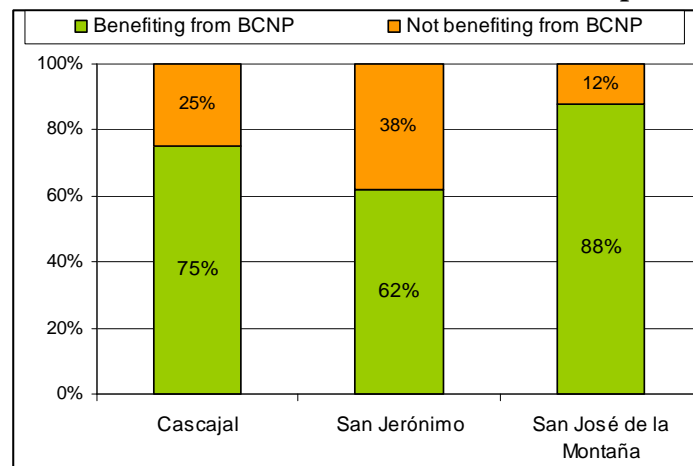
**Figure 8: Customers from tourism related businesses**



Source: Own elaboration with fieldwork data

From the 66 tourism-related businesses interviewed, 15 (23%) have reported not to be influenced (e.g. to have a positive change in income) by BCNP. In comparative terms between the three communities, the quantity of tourism-related businesses in San José de la Montaña benefits more (88%) from being close to the park than Cascajal and San Jerónimo. On the other hand, the number of tourism-related commerce not benefiting from BCNP is higher in San Jerónimo (38%). These are those located far away from the town center and not on the road to the park. For the estimation of the economic contribution, only the tourism-related businesses, which are positively benefiting from the park, 51 (77%), are taken into account for the calculations.

**Figure 9: Effect BCNP on tourism-related businesses per community**



Source: Own elaboration with fieldwork data

<sup>12</sup> Soar through the forest high above the forest floor from tree to tree.

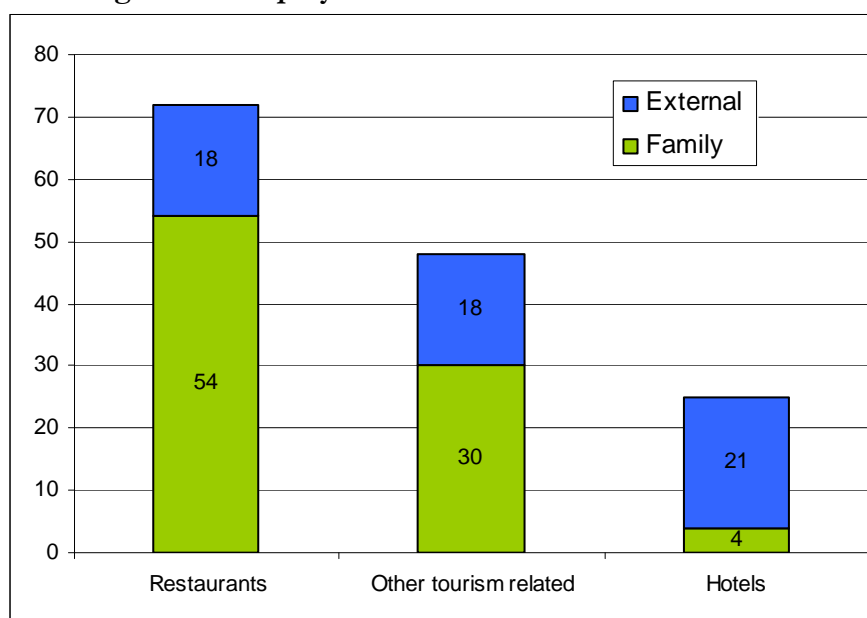
It is important to note though, that in some places of Cascajal and San Jerónimo, there is a reason to think BCNP is only around the road to Limón, or what is called “Zurquí”. Therefore, some businesses neighbourhoods of San Pedro and Platanares (dispersed in the town) advocate not to be affected or getting any advantage by being near the park.

Each community perceives a contribution from BCNP differently, and each type of tourism-related business attracts different amount and kind of tourism-related customers. In case of groups and families, these are more attracted to visit the restaurants of the area during the weekends. Mountain bikers, on the other hand, stop at the small groceries shops. In the first case these bring much more revenues to the restaurants than the bikers to the small groceries shops.

As result, small groceries shops or other tourism-related businesses in Cascajal and San Jerónimo perceive very little contribution from BCNP, only approximately 3% from their net benefits<sup>13</sup>. San José de la Montaña receives more, 10% from the annual net benefits during 2006. Restaurants and other eating places, show to have more contribution from BCNP: San José de la Montaña 45% and specially Cascajal 59%, where most of the income depends on the customers who come over during the weekends, although San Jerónimo still perceives only 5%, where its revenues are coming mainly from customers within the same community and not from tourism visits. For the hotels in San José de la Montaña, the estimation assumed, represents only an occupation during the weekends as a by-product of the park. Still, this represents 50% of the annual net revenues perceived in 2006.

As follows, the methodology attempts to capture the effect spread in other spaces, reflected in the cost spent by the previews tourism-related businesses on wages, suppliers and municipality taxes.

**Figure 10: Employment in tourism-related businesses**



Source: Own elaboration with fieldwork data.

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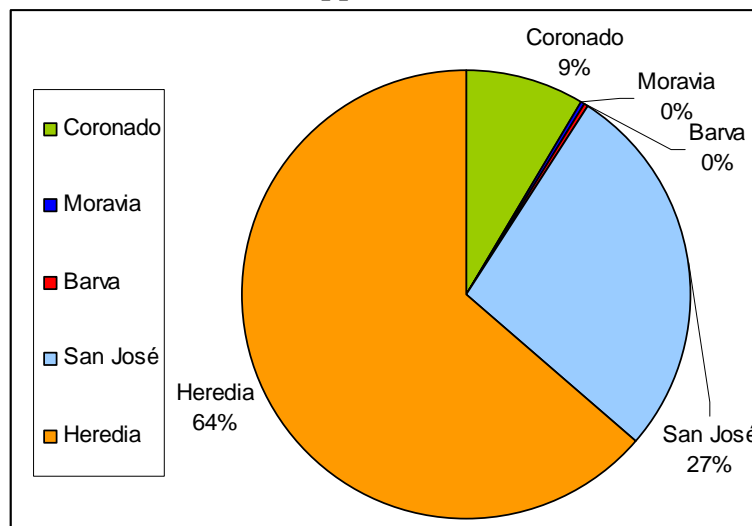
<sup>13</sup> Annual net benefits: Annual gross benefits – (wages + suppliers cost + municipality taxes)

Most of the tourism-related businesses employee first of all family members, and if it is necessary an external person (usually from the same community). The restaurants capture most of the employment from the small tourism-related businesses. Figure 10 shows the high participation of the family members in the business. Even though family members are also considered as employees, for estimation purposes only those external employees' wages are considered as a cost. The estimation of this contribution is presented in section 6.6.

The methodology attempts to identify the amount and direction of the effect from the costs derived from suppliers. In other words, the activities that buy or settle contracts with services from the surroundings cantons (Vasquez de Coronado, Moravia o Barva) for the local-influence area, and San José or Heredia at the regional area. These kinds of services are mainly, packed food, groceries, drinks, and/or any other kind of products requested by the main tourism-related businesses in the districts. They are usually supplied from markets, town-supermarkets or big distribution centres in the main urban areas.

By being near to Central Valley, it is easier for the commerce in the districts, to access suppliers in the urban areas of San José and Heredia. This has a boost effect spreading from local-immediate to regional space without benefiting the suppliers in the local-influence area (Barva, Moravia and Coronado). Coronado, nonetheless, has a significant 9% contribution, capturing the main income from Cascajal which still is a remote district compared to San Jerónimo. In these sense, the methodology only allows to identify the location of the effect (contribution of BCNP to suppliers), and not a detailed chain supply analysis of the participants of the cluster.

**Figure 11: Location main suppliers for tourism-related businesses**



Source: Own elaboration with fieldwork data.

Each activity pays a premise or municipality tax for the sale of goods or services. According to information provided by the three municipalities, each activity pays 3% of the annual gross rent in Moravia per year; 5% of the annual gross rent in Coronado per year; and a specific amount for each activity per year in Barva<sup>14</sup>. The estimation of this

<sup>14</sup> Hotel: ₡ 79,200 per year; Bar/Restaurant: ₡ 37,400 per year; Small cafeterias (*sodas*): ₡23,000 per year; Small groceries stores (*pulpería*): ₡25,200 per year (Municipality of Barva).

contribution is presented in section 6.6. Despite the tax collecting method, the districts of San José de la Montaña have paid fewer taxes than Cascajal and San Jerónimo businesses, even though it gains more from the park and from the other two districts. These facts open opportunities for the municipality of Barva to improve their contribution from BCNP in the canton (local-influence space) through a better tax system.

It is not common for the tourism-related businesses to do any publicity or promotion. When they do so, they tend to sponsor town festivities, or what they call “by recommendation” from the usual fix customers in order to get more customers. Nevertheless, the businesses interviewed consider BCNP helpful for attracting customers. An even more if there is more publicity and infrastructure fostered by the authorities on the park. These commercial activities are not organized and neither form part of a community organization although there are other small organizations in the communities that will be discussed in chapter 7.

#### **5.4 Horticulture**

Next to the tourism related businesses, horticulture has been developed in the northern high lands of Heredia and in Vázquez de Coronado. This activity benefits from consumption of water for irrigation. The income through this activity has grown by 25% between 1998 and 2003 in Costa Rica (INBio-NINA, 2005).

Although, it has not been possible to get statistical data from the horticultural activities, INBio-NINA (2005) describes that the farm Flor Bella in San José de la Montaña, employes 115 men and woman of the area in 2005. This activity gives more employment than tourism related activities, considered an indirect effect of BCNP. An estimation of the contribution of BCNP to the four register horticultural farms is vague without the proper information. Nevertheless, its contribution is expected to be more significant than tourism related businesses; by the amount of labour intensive activity and gains from flower and fern exportation. The indirect contributions through wages in these farms are estimated using only those register by Flor Bella.

With the growing agricultural sector, soil erosion problems are becoming an issue near BCNP. To reduce the negative impacts from intensive agriculture and at the same time, upkeep attraction for eco-tourism, organic agriculture implementation is an option carried out by some farmers of the area. The development of this kind of activities is further discussed in Chapter 7.

#### **5.5 Payments for environmental services**

Next to the tourism related businesses, the park provides other number of activities identified in the surroundings. The environmental services explained before, should be taken into account estimating the contribution.

Around the park, there are still a number of hectares which remain in private hands. These land owners are compensated to keep the forest and the services it provides in its natural state through two established programs: Payments for Environmental Services Program (PES) and Payments for Hydro-Environmental Services, ESPH. So far, the ESPH has covered 768 ha. water recharge areas in Heredia (ESPH, 2006) and the PES has under its protection 2,680 ha in Barva, Moravia and Vasquez de Coronado (FONAFIFO,

2007). More specific, FONAFIFO and ESPH-PROCUENCAS Program have registered for the year 2006, the following payments:

**Table 9: Payments for environmental services, selected communities, 2006.**

District	Protection			Natural regeneration			Establish plantations			Reforestation		
	Area (ha)	Amount (\$)	No. Contracts	Area (ha)	Amount (\$)	No. Contracts	Area (ha)	Amount (\$)	No. Contracts	Area (ha)	Amount (\$)	No. Contracts
San José de la Montaña*	-	-	-	-	-	-	2.23	1,026	1	2.27	9,670	1
San Jerónimo**	63.20	20,224	1	-	-	-	-	-	-	-	-	-
Cascajal**	172.90	55,328	3	7.40	1,517	1	-	-	-	-	-	-
<b>TOTAL</b>	<b>236.10</b>	<b>75,552</b>	<b>4</b>	<b>7.40</b>	<b>1,517</b>	<b>1</b>	<b>2.23</b>	<b>1,026</b>	<b>1</b>	<b>2.27</b>	<b>9,670</b>	<b>1</b>

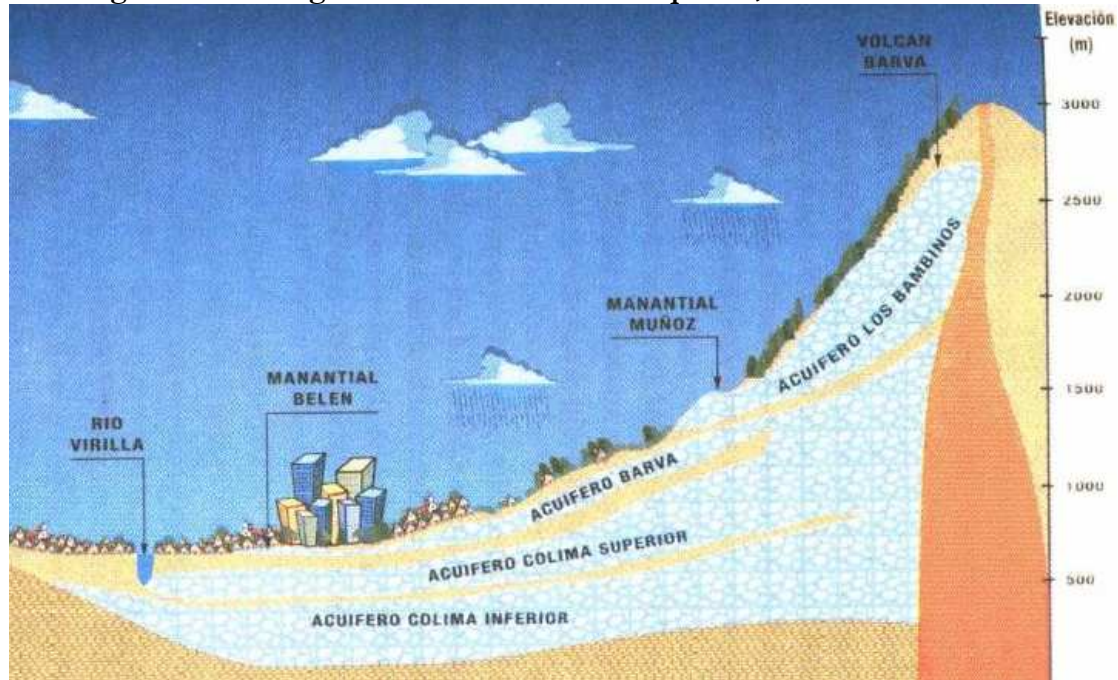
Source: \* ESPH, 2006.

\*\* FONAFIFO, 2006.

### 5.5.1 Water resources

The high lands of Heredia bordering BCNP through Volcán Barva Sector are characterized for their hydrological importance. The location and geomorphology of these high lands, and its aquifers, represent an important source of water. These areas are vital for water production for the Grande de Tarcoles River basin, the most important river basin in the country. This basin provides water to the three main urban cities (San José, Alajuela and Heredia), where most of the country population is located. The major use of this water is destined to wells and springs, and for uses such like domestic, industrial and agricultural purposes. Unfortunately, a quantification of the water extraction is hard to obtain.

**Figure 12: Underground waters and main aquifers, Volcán Barva Sector**



Source: ESPH, 2006. Unidad de gestión ambiental. Adaptation from: Reynolds, J. 2003.

To mention just an example, MINAE Water Office registers 1,720 water point extractions from these aquifers (MINAE, 2006). A minimum volume of water flow for each user group<sup>15</sup> is estimated, but there are still many water points of which no information can be extracted from (Losilla et al., 2001). The two main water suppliers - Acueductos y Alcantarillados (AyA) and ESPH - serve 93,371 and 51,937 users respectively (ESPH, 2006 and AyA 2006).

### 5.5.2 Biodiversity

Next to carbon fixation and watershed protection, the BCNP has become an important area for capturing the value of biodiversity. The Bioprospecting Projects coordinated by INBio, has undergone sample collection in projects with MERCK & Co., INDENA SPA, PHYTERA, Ehime Women College of Japan and others. More recently, the sample collections has extended to contracts with Harvard University, Utah University and the National Institute of Cancer in the United States of America.

Although it has not been possible to estimate the exact amount of budget gathered from projects at BCNP, Nora Martín (Administrative Coordinator from the Bioprospecting Unit, INBio), recalls that given the near location to San José and its biodiversity density, the park is an important point of sample collection. During its 14 years of operations, the Bioprospecting Unit receives an average income of US\$700,000 per year for the projects and biological services. This is in addition to the infrastructure and equipment invested in different research centres at the University of Costa Rica (UCR) and at the National University (UNA) (Unidad de Bioprospección, INBio, 2006).

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<sup>15</sup> User groups: Municipalities, local associations, AyA and ESPH (Losilla et al., 1992).

## 6 Systematization and evaluation of the contribution.

### 6.1 Introduction

The commercial socio-economic activities described in the previous chapter: tourism-related businesses, horticulture and other activities stemming from other environmental services: forest, water, and biodiversity resources, gives us a panorama of the economic contribution of BCNP towards the socio-economic development of its surroundings.

The following Chapter systematizes the results for the local-immediate, local-influence, regional, downstream and national contributions for 2006. The matrix summary, which concludes this Chapter, shows the estimations in detail, together with the adjoining description of the sources.

### 6.2 Local contribution

The local contribution is divided in local-immediate (weight at the selected districts) and local-influence (weight at the correspondence head of canton for each district).

First of all, the methodology focuses on the analysis in the local immediate contribution. These are the estimations done for the tourism-related businesses: hotels, restaurants and other tourism-related businesses in Cascajal, San Jerónimo and San José de la Montaña. In this case, it is the hotels, which receive most part of the contribution (22% of the total local-immediate contribution), especially from the revenues coming from the biggest hotels in San José de la Montaña: *Cabañas de Montaña el Cipresal* and *Hotel Las Ardillas*. It is important to clarify though, that whilst most of the time customers are not visiting the park, they are still attracted by the weather mountain, the rural sights and nature in the surroundings.

Despite not having been possible to estimate the contribution from the horticulture activities in the area, farms located in San José de la Montaña and Coronado are involved in the production of flowers and ferns for exportation. This seems to be the most profitable activity provided by the park (mainly through water irrigation, obviously).

As a result of these tourism-related businesses and horticulture, jobs and employment opportunities are being created indirectly by the National Park. A total of 145 jobs emerge from these commercial activities. This includes, family members collaborating in a volunteering manner in the family business. Therefore, for the final estimation it is only considered those external employees who are currently being paid for. This is mainly the case of people working in the horticulture farms. Estimations were carried out in one of the biggest farms, where 115 people from the area in 2005 were employed. Supposing the same amount for 2006, this activity represents the main source of employment, capturing 31% of the possible estimated contribution, that is, the major contribution in the local immediate space.

Besides the tourism-related businesses, payments for environmental services programs capture 10% of the total local-immediate contribution paid to forest land owners.

Secondly, local-influence identifies first of all, suppliers of the previews tourism-related businesses in the local-immediate area. The estimation shows the suppliers, as the biggest contribution towards the local-influence space (47%). However, a detailed analysis of the

supply chain originated from BCNP is not possible to do using this methodology. The outcome from the questionnaires shows the aggregated cost, from which the only possible result is the direction or space of the effect (local-influence of regional contribution).

Finally, ACCVC and the park's administration have nine park rangers available, working on these two south sectors of Braulio Carrillo NP, five park rangers permanently working in the Volcán Barva sector and four in Zurquí station (Road to Limón), who occasionally patrol in the Bajo la Hondura sector. These employees are also considered in the local-immediate contribution (Barva station) and the local-influence contribution (Zurquí station), respectively. The relative comparison of the contributions, assign the park rangers' wages in Zurquí station as the major contribution in the local-influence space.

### **6.3 Regional contribution**

The regional contribution only reports a contribution for suppliers located within the related head of province. These are usually referred to as large distribution food centres or drinks suppliers located in the principal urban areas (San José or Heredia). This value is estimated in ₡238,745,622 (458,439 US\$), much bigger than the local-influence suppliers. This can be explained if it is taken into consideration, the facilities that have been established near big urban areas which have a larger variety of goods and services to offer and are still relatively easier for the businesses in the districts to get access to.

### **6.4 Downstream contribution**

An economic estimation of BCPN's contribution towards the hydrological processes and water production, is intangible. A recent Decree has imposed a canon per used water, 32868-MINAE<sup>16</sup> in order to improve control upon legal regulation; however, there are many other water users that are not under regulated supervision. Given the data sources and complexity of the hidroprocesses, to be able to reach a real approximation is far from easy. This research only attempts to highlight the importance of Braulio Carrillo NP for the downstream area. When large quantities of water are diverted or taken out of the natural system, this affects the local surface water supply, which, in the long run, affects the ecosystem, plants and animals, as well as the local communities (FAO, 2006). Considering its importance for development, the water resources constitute the largest contribution of BCNP for the surrounding communities in the local, regional and further down stream areas.

### **6.5 National contribution**

Finally, there are some contributions that are considered to have a national impact. The income derived from the entrance fee to the park is destined to SINAC and MINAE, as part of the resources for the general management of the protected areas. This contribution was estimated in ₡6,003,798 (\$11,528) considering the total touristic visits done in 2006 via Volcán Barva Sector.

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<sup>16</sup> Canon: payment according to a base of the volume of water (cubic meters per year) assigned in agreement or concession registered in the National Registry of Waters Use and Channels (Registro Nacional de Aprovechamiento de Aguas y Cauces) (MINAE, 2006).

As it has already been mentioned, it has not been possible to estimate the exact amount of budget stemming from projects implemented in Braulio Carrillo NP, Nora Martín (Administrative Coordinator from the Bioprospecting Unit, INBio), recalls, that given the near location to San José and its biodiversity density, the park is an important point of sample collection. At the same time, the infrastructure and equipment invested in different Costa Rican research centres together with the training of Costa Rican's students, contribute towards a relatively important socio-economic development but is not easy to estimate (Unidad de Bioprospección, INBio, 2006).

The following section, presents the results in a methodological matrix. The local, regional, downstream and national contributions are estimated, and explain for 2006.

## 6.6 Matrix summary

Braulio Carrillo National Park			Contribution				
Space	Activity	Stakeholders	Income from NPBC		Observations	Sources	%
			CRC	USD			Local-immediate
Local-immediate	Accommodation (Hotels)	4 hotels in San José de la Montaña	₡103,422,000	\$198,591	Estimated with price per night and occupation during the weekends.	Field work questionnaires	21.7%
	Restaurants, sodas and other eating places	3 Cascajal	₡6,906,252	\$13,261	Estimated with % of the contribution of NPBC on the net income (dish sales during weekends)	Field work questionnaires	9.2%
		5 San Jerónimo	₡926,520	\$1,779			
		13 San José de la Montaña	₡35,940,461	\$69,013			
		<b>Sub-total</b>	<b>₡43,773,233</b>	<b>\$84,053</b>			
	Supermarkets and small groceries-shops	6 Cascajal	₡2,543,471	\$4,884	Estimated with % of the contribution of NPBC on the net income.	Field work questionnaires	3.2%
		8 San Jerónimo	₡502,691	\$965			
		11 San José de la Montaña	₡12,467,529	\$23,940			
		<b>Sub-total</b>	<b>₡15,513,690</b>	<b>\$29,789</b>			
	Horticulture (ferns)	Horticultural farms in San José de la Montaña and Coronado	-	-	Estimation not possible.	-	-
	Wages and employment in hotels	25 employees in San José de la Montaña	₡44,100,000	\$84,681	21 External employees, estimated with the average wage according to hotel administration.	Field work questionnaires	9.2%
	Wages and employment in Restaurants, sodas and other eating places	12 Cascajal	₡1,680,000	\$3,226	72 employees including family. Estimation only with 18 external paid employees.	Field work questionnaires	6.1%
		17 San Jerónimo	₡11,347,200	\$21,789			
		43 San José de la Montaña	₡15,998,400	\$30,720			
	<b>Sub-total</b>	<b>₡29,025,600</b>	<b>\$55,735</b>				
Wages and employment in supermarkets and small groceries-shops	14 Cascajal	₡1,920,000	\$3,687	48 employees including family. Estimation only with 18 external paid employees.	Field work questionnaires	5.8%	
	12 San Jerónimo	₡1,800,000	\$3,456				
	22 San José de la Montaña	₡23,928,000	\$45,946				
	<b>Sub-total</b>	<b>₡27,648,000</b>	<b>\$53,090</b>				
Wages and employment in horticulture activities	115 employees in Flor Bella, San José de la Montaña	₡147,450,240	\$283,133	Estimated with the minimum wage and data from only one company in literature sources.	(INBio-NINA, 2005)	30.9%	
Wages and employment of guard parks	5 guard parks in Volcán Barva Sector	₡21,000,000	\$40,324	Estimated with the average wage according to ACCVC.	ACCVC	4.4%	
Payments for environmental services	4 contracts in Cascajal	₡29,603,739	\$56,845	180 ha. Paid in 2006 .	Fonafifo	9.6%	
	1 contract in San Jerónimo	₡10,532,255	\$20,224	63 ha. Paid in 2006 .	Fonafifo		
	2 contracts San José de la Montaña	₡5,570,263	\$10,696	4.5 ha. Paid in 2006.	ESPH		
	<b>Sub-total</b>	<b>₡45,706,257</b>	<b>\$87,765</b>				
<b>Total local-immediate</b>			<b>₡477,639,020</b>	<b>\$917,161</b>			<b>100%</b>

Exchange rate: average September 2006 (1 USD = 520.789 CRC)

Braulio Carrillo National Park			Contribution				
Space	Activity	Stakeholders	Income from NPBC		Observations	Sources	%
			CRC	USD			Local-influence
Local-influence	Suppliers	Suppliers in Coronado	₡22,677,000	\$43,544	Estimated according to place and amount of cost in suppliers from tourism related bussiness.	Field work questionnaires	47.1%
		Suppliers in Moravia	₡960,000	\$1,843			
		Suppliers in Barva	₡132,000	\$253			
		<b>Sub-total</b>	<b>₡23,769,000</b>	<b>\$45,641</b>			
	Municipality taxes	Coronado Municipality	₡5,685,960	\$10,918	66 tourism related bussiness with permission in Cascajal, San Jerónimo and San José de la Montaña.	Coronado Municipality	19.6%
		Moravia Municipality	₡3,157,031	\$6,062		Moravia Municipality	
		Barva Municipality	₡1,020,400	\$1,959		Barva Municipality	
<b>Sub-total</b>	<b>₡9,863,391</b>	<b>\$18,940</b>					
Wages and employment of guard parks	4 guard parks in Puesto Zurquí (attending Bajo la Hondura Sector)	₡16,800,000	\$32,259	Estimated with the average wage according to ACCVC.	ACCVC	33.3%	
<b>Total local-influence</b>			<b>₡50,432,391</b>	<b>\$96,840</b>			<b>100%</b>
Regional	Suppliers	Suppliers in San José	₡71,510,886	\$137,315	Estimated according to place and amount of cost in suppliers from tourism related bussiness.	Field work questionnaires	100%
		Suppliers in Heredia	₡167,234,736	\$321,124			
		<b>Sub-total</b>	<b>₡238,745,622</b>	<b>\$458,439</b>			
<b>Total regional</b>			<b>₡238,745,622</b>	<b>\$458,439</b>			<b>100%</b>
Downstream	Water consumption	93,534 water services users supply by AyA	-	-	Estimation not possible.	MINAE-Water Office	-
		51,890 water services user supply by ESPH	-	-		AyA - ESPH	
		<b>Sub-total</b>	<b>₡0</b>	<b>\$0</b>		ARESEP	
<b>Total downstream</b>			<b>₡0</b>	<b>\$0</b>			<b>0%</b>
National	Entrance fee to the park	Income for SINAC and MINAE from park entrance	₡6,003,798	\$11,528	Estimated with total visitation in 2006 and correspondence entrance for national and foreigner visitor.	Visitation reports, ACCVC	100%
	Bioprospecting	Income for SINAC and MINAE from Bioprospecting projects	-	-	Not possible to estimate amount of budget from projects at BCNP.	Bioprospecting Unit, INBio	-
<b>Total national</b>			<b>₡6,003,798</b>	<b>\$11,528</b>			<b>100%</b>

Exchange rate: average September 2006 (1 USD = 520.789 CRC)

## **7 Development and nature conservation: strengths and weaknesses**

### **7.1 Introduction**

Taking into account the previous chapters, BCNP and its surroundings essentially show a variety of landscapes, nature and interaction from a variety of stakeholders. This interrelationship joins together governmental, non-governmental and private organizations that in one way or another, aim for a joint cooperation between the community and nature conservation.

BCNP and its surroundings, shows a number of strengths and weaknesses which are still a challenge for future development. This last Chapter aims to show the effort done by the local people and certain organizations that seek for a full integration of the community in the developing process originated in protected areas. Then, pinpoint the actual strengths and weaknesses.

### **7.2 Community development and nature conservation**

Besides the different institutions and programs mentioned before, there has been an increasing interest emerging from some of the municipalities to collaborate towards a strong socioeconomic development and bonding participation.

The *Cámara de Turismo de Coronado*, (Coronado Tourism Chamber) promotes Coronado as an old fashioned farming village with old horticultural traditions, where its agro-ecological orientation endorses local schools to teach eco-sustainability courses and enable the creation of organic farms. At the same time, many commercial activities join the camera, to have advertisements and information through its website and leaflets (Corotour, 2006).

Mr. Anselmo Rodríguez Umaña, owner of “*Finca Conservacionista La Esperanza*” an organic farm located in Platanares shares organic farming activities with environmental education courses. The farm produces dairy products under the category of organic certification for the local market and gives seminars to schools and other organized groups on the processes and functioning of the farm. At the same time, internships are available for national and foreigner students interested in carrying out research.

*Armonía Natural* represents another example in the small town of Monserrat. This is a conservation-based company which envisions a future where environmental, social, and economic needs are harmoniously balanced (Armonía Natural, 2007). The centre protects nature by promoting good environmental practices and certification of micro-business for the development of new economic alternatives for families living in the community. They promote tourism education at the same time with maintain the traditions and values of small Costa Rican communities. They also train the community, NGO's and other governmental entities into environmental friendly technologies and social-ethical environmental planning (Armonía Natural, 2006).

The *Cámara de Turismo de Barva* (Barva Tourism Chamber) is a private organization interested in sharing the cultural heritage of the town of Barva with the natural heritage in the high lands of BCNP Barva sector. Joint efforts have already been made with ACCVC towards the reconstruction of the road to the park entrance. Nevertheless, there

still lack of participation from the Municipality, as well as other tourism chambers in neighbour cantons (Miranda et al. 2005).

### **7.3 Strengths and weaknesses for tourism development**

Braulio Carrillo National Park and its surroundings have still got, however, some potential for tourism development and especially for the promotion of national tourism. Nevertheless, the uncontrolled development of different economic activities can cause environmental impacts which increase the threats for the natural environment of the park (Miranda et al. 2005).

The strengths surrounding BCNP and its nearby communities are directly related with the opportunities for the communities to develop eco-tourism as a complementary economic activity. Landscape, close location to main urban areas and presence of several organizations, offer the opportunity of a communitarian development (Miranda et al. 2005).

On the other hand, Miranda et al. (2005) summed the weaknesses into environmental, social and economic weaknesses, essentially because of the interaction of harmful actors and a lack of implementation of governmental policies:

The environmental weaknesses consist in first of all; the potential damage of the aquifers originated by a non-sustainable human development and by contamination of superficial and underground sources. This is the case of Colima and Barva aquifers; given their hydrological characteristics, are particularly vulnerable at the recharge area. This risk increases with unsustainable land management like urban development, agriculture, livestock, and agro-industry.

Secondly, the lack of control of urban development is another environmental weakness or threat surrounding BCNP and is also related to social weaknesses. The landscape is threatened by the development of urban areas, getting each day closer to the borders of the park.

Thirdly, the illegal hunting or extraction of biodiversity, specially the extraction of birds is a threat in different sectors of the park. This informal economic activity gives more income than other legal activities.

Finally, the construction of a better road to the entrance to the park is also considered as potential environmental problem. According to the Tourism Camera of Barva this construction will benefit the communities with more touristic visits and development of local infrastructure. On the other hand, the park's administration and other park rangers have reached to the conclusion that the construction of the road can also make the area noisier, dirty and possibly increase the pollution of water sources.

Miranda et al. 2005, note the social weaknesses as the lack of integration between local governments and other actors in the local sustainable development process; a lack from the institutional bodies to apply environmental policies and a general lack of responsibility from society for the management of natural resources. Considering the economic weaknesses, the lack of resources to implement environmental programs and the absence of investment in tourism infrastructure are the most important.

One can say that BCNP surroundings show potential advantages for the development of eco-tourism as a complementary economic activity. This research has identified chain activities, which together with the landscape, location and the different organizations interventions, allow new opportunities for communitarian development.

## 8 Discussion

The cluster analysis presents a relatively new approach for the evaluation of a real economic development induced by conservation and not intangible values estimated by traditional environmental evaluation techniques. This tool helps to identify possible chain productive activities, which allows new opportunities to emerge for socio-economic development. Nevertheless, socio-economic development is analysed by focusing on a potential social impact of an economic change triggered by conservation. Social factors and social changes are not important subjects of analysis in this research, despite being essential in their contribution towards a real social development.

The questionnaires facilitate data collection for a detailed analysis of the characteristics of tourism-related businesses at the districts (local-immediate space). Yet, from this point onwards, the methodology applied, only allows to identify the location of the effect (contribution of BCNP to suppliers) and not a detailed supply chain analysis of the participants of the cluster of tourism-related businesses which involves other tourism related activities located in the other spaces. In these sense, the methodology should be improve to extend the analysis.

At the same time with different chain activities involved, estimations should be carefully done to avoid problems such as double counting or diffusion of the values. Some activities report aggregated costs (e.g. costs in suppliers includes: drinks, electricity and telephone costs) which are supplied by different private and national companies. Depending on the responses of the questionnaires; it maybe that the effect had been counted in the local contribution, but still belongs to the regional or national effect.

In fact, a number of common problems appeared in the questionnaires. First of all, it was not easy to have an interview directly with the owner of the business. Secondly, the interviewed person was not fully informed particularly on those questions related to income costs. In this case, the data was estimated through approximate analysis with other similar commercial activities in order to be able to capture the effect. Some other activities (such as horticulture), refused to give any information because of company policy security reasons, thus this information has been taken from secondary sources and do not appear in the quantifications.

In comparison with the previews case studies, this research does not take into account the contribution made towards public transportation nor other ways which enable the access to the park. The questionnaires show that most of the visits were done on private owned cars, or on bicycles, and given the variety of locations, an approximation assessment of the fuel costs involved, was difficult to do.

The last point to mention is the issue of patenting biodiversity. Multinational pharmaceutical companies and medical research centres are the most economically privileged actors in the process; hence raising the question of the budget which is allotted to the local communities. Bioprospecting could be a promising way to capture the effect through biodiversity research. So far, it has reattributed important contributions towards conservation. Nevertheless, since INBio is a private research and biodiversity management center which collaborates with governmental institutions. ACCVC-MINAE requests more participation in the negotiations of Bioprospecting projects, as managers of protected nature areas.

## 9 Conclusions

To identify, systematize and estimate the contributions of Braulio Carrillo National Park for 2006, this research has applied a cluster analysis methodology on its surrounding communities. Number socio-economic activities influenced directly or indirectly by the park were identified. The activities analyzed were:

1. Hotels
2. Restaurants and cafeterias
3. Local mini-shops “*pulperías*” and other related activities (bakeries, slaughter)
4. Horticultural farms
5. Payments for environmental services
6. Water consumers
7. Park entrance fee
8. Bioprospecting projects
9. Wages and salaries for employees in hotels, restaurants, shops, horticulture and guard parks.
10. Tax payments from the tourism related activities to municipalities.

Different scales were distinguished according to the extension of the effect. First of all, the contribution is calculated for the communities in the district area bordering the park (local-immediate). This is followed by the cantons - in this case the largest town close to the district (local-influence), the provinces or other geographical extensions (regional) and finally, those effects that reach the national level and the downstream areas. Table 10 summarizes the results of the cluster analysis for each spatial area.

**Table 10: Summary results cluster analysis.**

Space	Total	Local-immediate	Local-influence	Regional	Downstream	National	
Activity	Braulio Carrillo National Park	Accommodation (Hotels)	Suppliers	Suppliers	Water resources	Park entrance	
		Restaurants, sodas and other eating places					
		Supermarkets and small groceries-shops					
		Horticulture (ferns)	Wages and employment (guard parks)			Municipality taxes	Bioprospecting
		Wages and employment					
		Payments for environmental services					
		Estimation of the contribution	₡772,820,830			₡477,639,020	₡50,432,391
	\$1,483,968	\$917,161	\$96,840	\$458,439	-	\$11,528	

The major influence amongst the districts is reflected both in the wage and employment rates, especially by the large number of workers from the surroundings, employee in horticultural activities. Suppliers in the cantons and provincial urban centres are the next in the chain to mostly benefit from the BCNP; in addition to the park entrance fee gained nation wide.

Given its importance for development, the water resources, is considered as the biggest contribution of BCNP. Although an economic estimation has not been possible to do, the relevance of the park towards a hydrological equilibrium has been hopefully clearly shown. A possible contamination of the water aquifers is an important environmental flaw which could have serious repercussions for public health and development.

Being near to the Central Valley, the park is determinant upon the chain effects tourism-related businesses. For the business in the districts, it is easier to access suppliers in the urban areas of San José and Heredia. This has a boost effect, spreading from local-immediate to regional space without benefiting much the suppliers in the local-influence area (Barva, Moravia and Coronado).

The estimation of the contribution represents an economic change triggered by nature conservation, which may cause a potential social impact. San José de la Montaña gained more contribution from BCNP in 2006 than the other districts. Cascajal is growing as a popular destination for weekend visitors and it seems to be more organized in terms of community involvement with the park in comparison to San Jerónimo. San Jerónimo is still not involved to any extent so that businesses are able to increase their benefits. Nevertheless, the history surrounding the old road of Braulio Carrillo, with the emblematic Chapel in Bajo la Hondura, exhibits cultural attraction which is highly potentially touristic.

Besides the efforts made to involve the community and its commercial activities within the park, a lot more ought to be done. Both infrastructure development and advertising activities are keys issues which could increase the attraction of national tourism and call the attention of international tourists. A future park access through Bajo la Hondura Sector should be controlled under the efficient management of MINAE; in San Jerónimo some businesses are fearful of an increase of social insecurity; as well as of local mountain cyclists who undermine the quiet nature atmosphere. A future opening in the park should consider the consequences of the actual visits rates as well as of other recreational activities.

Payments made for environmental services projects, are a good example of policy making for forest protection, as well as promoting forest land owners to join nature conservation and still be economically feasible. It is important to recall that this program is done on a voluntary basis though. The amount of hectares reported for 2006 may not be significant, although a possible explanation could be that many land owners have joined in during the previews years or that little privately own forest is left. An important consideration is the expansion of the urban border given the attraction of urbanizations projects being carried out in the area.

As a final conclusion, one can say that BCNP surroundings show potential advantages for the development of eco-tourism as a complementary economic activity. This research has attempted to identify the socio-economic activities developed in the area, which together with the landscape, location and the different organizations interventions, allow new opportunities for communitarian development to emerge. However, the methodology used focuses on those activities which reflect a real economic change, leaving besides in the analysis, the relative value or opportunity cost of having or not BCNP. It involves only the participation of economic affected actors and not the rest of the community which may value differently the protected area and which one can have better access to by using contingent evaluation methods.



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## Annexes

### Annex 1: Fieldwork questionnaires

(in Spanish) (Fürst, Moreno et al. 2004).

#### A. Encuesta a turistas

1. ¿De dónde proviene?
2. ¿Cuántas personas lo acompañan?
3. ¿Cuánto costó el tiquete aéreo?
4. ¿Cuánto tiempo piensan quedarse en Costa Rica?
5. Sabía de la existencia del parque nacional? \_\_SI / NO\_\_.
6. Cómo se enteró? \_\_\_\_\_
7. ¿Cual es la importancia del parque en la realización del viaje?Cuál es el principal atractivo del Parque.(preguntar sobre la importancia del parque para que realizara su vista a la zona):
8. De qué forma se organizó el paseo a este parque nacional?
  - a) \_\_Agencia de viajes
    - a.1) \_\_Nacional  
Cuánto costo el paquete \_\_\_\_\_  
Qué lugares incluye: \_\_\_\_\_
    - a.2) \_\_Internacional  
Cuánto costo el paquete \_\_\_\_\_  
Qué lugares incluye: \_\_\_\_\_
  - b) \_\_Operadora turística o transportista independiente  
Cuánto costo el paquete \_\_\_\_\_  
Qué lugares incluye \_\_\_\_\_
  - c) \_\_Por su cuenta
  - d) \_\_Por otro medio \_\_\_\_\_
9. Qué medio de transporte empleó para llegar hasta aquí?
  - \_\_Autobús público
  - \_\_Bus de turismo
  - \_\_Auto propio o familiar
  - \_\_Auto alquilado, Por cuántos días de alquiler,  
precio \_\_\_\_\_
  - \_\_Otro  
medio \_\_\_\_\_
10. Cuánto tiempo piensan quedarse en el parque?
11. Se hospedarán en la localidad cercana al parque? \_\_ NO / SI\_\_, cuántos días? \_\_\_\_
12. Dónde se hospedarán en ese caso?
  - \_\_ Hotel, costo \_\_\_\_\_
  - \_\_ Cabina, costo \_\_\_\_\_
  - \_\_ Zona de camping, costo \_\_\_\_\_ alquila el equipo \_\_NO/SI\_\_,  
costo \_\_\_\_\_
  - \_\_ Otro, costo \_\_\_\_\_

13. Cuál es o será el gasto diario de su estadía en el parque y sus alrededores (incluyendo alimentos, hospedaje)? \_\_\_\_\_
  14. Cree que podrían mejorarse los servicios que brinda el parque? \_\_SI /NO \_\_, cuáles \_\_\_\_\_
  15. Piensa visitar otras atracciones o lugares en la zona? \_\_SI / NO \_\_, cuáles \_\_\_\_\_
-

**B. Entrevistas para hoteles / cabinas / camping / alquiler casa**

Fecha: \_\_\_\_\_

Lugar: \_\_\_\_\_

Tipo de alojamiento (hotel / cabina / camping / casa): \_\_\_\_\_

Nombre de la empresa / marca:  
\_\_\_\_\_

Nombre de la persona entrevistada: \_\_\_\_\_

Cargo de la persona entrevistada: \_\_\_\_\_

1. Quién/es es/son el/los dueños del negocio?, ¿De dónde es/son?
2. Cuándo se abrió al público el hotel / cabinas?
3. El hotel / cabinas son de su propiedad o alquiladas?  
 Propias  
 Alquiladas. Cuánto paga al mes? \_\_\_\_\_
4. Sabe quién construyó el hotel / cabinas?
5. Dónde compraron los enseres (muebles lámparas, etc.)?
6. Cuál fue el uso de la tierra antes de la construcción del hotel / cabina (pastizal, bosque)?
7. Destina parte del terreno todavía a este uso? SI  / NO
8. Cuál es el uso más importante para su ingreso actualmente? \_\_\_\_\_
9. Cuántos turistas se alojan anualmente en su hotel / cabina?
10. Cuántos de sus clientes son nacionales? \_\_\_\_\_ y extranjeros? \_\_\_\_\_
11. Con qué medios de transporte vienen los turistas?
12. Cómo se promociona este hotel / cabinas?
13. Según su opinión, qué porcentaje de sus clientes son atraídos por el Parque?  
 i. Sólo el parque \_\_\_\_\_  
 ii. Otras atracciones \_\_\_\_\_ Especifique cuáles: \_\_\_\_\_
14. Colabora o tiene relación con alguna empresa u organización a nivel local, nacional o internacional?  SI / NO   
 ICT  
 Cámara  
 Tour operador  
 Agencia de viajes  
 Otros, cuáles: \_\_\_\_\_
15. Cuántos cuartos tiene este hotel cabina?, Cuántas camas hay por cuarto? \_\_\_\_\_
16. Cuál es el precio que se cobra por habitación en cada temporada?  
 Alta: \_\_\_\_\_  
 Baja: \_\_\_\_\_
17. Cuál es la tasa de ocupación en cada temporada?  
 Alta: \_\_\_\_\_  
 Baja: \_\_\_\_\_
18. Ha podido notar diferencias en la tasa de ocupación en los últimos años?  
 SI /  NO  
 Explique \_\_\_\_\_
19. Aproximadamente a cuánto asciende su ingreso anual (antes de beneficios) por el servicio de hospedaje?  
 \_\_\_\_\_

\_\_ NS / NR, entonces, tiene idea de cuál es su ingreso mensual (antes de beneficios) en cada temporada?

Alta:

---

Baja:

---

20. Tiene idea de qué porcentaje de sus ingresos dependen del parque nacional?

21. Está pensando en ampliar la capacidad del hotel / cabinas (construir más habitaciones u ofrecer más servicios) \_\_NO / SI\_\_, cuáles:

---

22. Tiene servicio de restaurante el hotel / cabinas? \_\_NO / SI\_\_, es usted propietario/a \_\_SI / \_\_NO, si se lo alquilan, cuánto paga de alquiler: \_\_\_\_\_

23. A cuánto ascienden las ventas del restaurante por año?

---

24. Usted tiene idea de cuántos huéspedes utilizan el servicio de restaurante? \_\_NO / \_\_SI, cuántos:

---

25. Tiene idea de cuántas personas que no son huéspedes utilizan el servicio de restaurante? \_\_\_\_\_

26. Cuánto dinero ha invertido aproximadamente en su negocio hasta la fecha?

---

Descripción

general \_\_\_\_\_

27.Cuál es el costo de operación y mantenimiento del hotel /cabinas (en cuanto la temporada)? \_\_\_\_\_

28. Cuántas personas trabajan en su hotel/ cabinas en cada temporada?

Alta: Familiares \_\_\_\_\_ Extra \_\_\_\_\_

Baja: Familiares \_\_\_\_\_ Extra \_\_\_\_\_

29.Cuál es el monto que paga en salarios (semana/quincena /mensual)? \_\_\_\_\_

30. De dónde provienen los empleados?

---

31.Cuál su gasto (mensual / anual) en cuanto a:

i. Alimentos \_\_\_\_\_

ii. Bebidas \_\_\_\_\_

iii. Agua \_\_\_\_\_

iv. Consumo de energía eléctrica \_\_\_\_\_

v. Otros servicios \_\_\_\_\_

32. Dónde se compran estos bienes? \_\_\_\_\_

33. Están apoyando financieramente o de otra manera el mantenimiento de algún área protegida?

\_\_SI, cómo:

---

\_\_NO, estaría dispuesto a hacerlo en el futuro?

---

34. Está de acuerdo con la gestión que realiza el MINAE en el parque? \_\_SI / NO\_\_  
Por qué?

---

**C. Entrevistas para restaurantes y sodas**

Fecha: \_\_\_\_\_

Lugar: \_\_\_\_\_

Nombre de la empresa / marca: \_\_\_\_\_

Nombre de la persona entrevistada: \_\_\_\_\_

Cargo de la persona entrevistada: \_\_\_\_\_

**Antecedentes del local**

1. Quién/es es/son el/los dueños del negocio?, ¿De dónde es/son?

2. Cuándo se abrió al público el restaurante / soda?

3. El restaurante / soda es de su propiedad o alquilado?

\_\_\_ Propio

\_\_\_ Alquilado. Cuánto paga al mes? \_\_\_\_\_

4. Sabe quién construyó el restaurante / soda?

5. Dónde compraron los enseres (muebles lámparas, etc.)?

6. Cuál fue el uso de la tierra antes de la construcción del hotel /cabinas (pastizal, bosque)?

7. Destina parte del terreno todavía a este uso? SI \_\_\_ / NO \_\_\_

8. Cuál es el uso más importante para su ingreso actualmente?

**Características de clientes**

9. Cuántos turistas atiende anualmente en su rest./soda?

10. Cuántos de sus clientes son nacionales? \_\_\_\_\_ y extranjeros? \_\_\_\_\_

11. Con qué medios de transporte vienen los turistas?

12. Según su opinión, qué porcentaje de sus clientes son atraídos por el Parque?

i. Sólo el parque \_\_\_\_\_

ii. El parque y otras atracciones \_\_\_\_\_

Cuáles \_\_\_\_\_

iii. Sólo otras atracciones \_\_\_\_\_ Especifique cuáles: \_\_\_\_\_

**Promoción del local**

13. Cómo se promociona este rest. / soda?

14. Colabora o tiene relación con alguna empresa u organización a nivel local, nacional o internacional? \_\_\_SI / NO \_\_\_

\_\_\_ ICT

\_\_\_ Cámara

\_\_\_ Tour operador

\_\_\_ Agencia de viajes

\_\_\_ Otros, cuáles: \_\_\_\_\_

15. Cuál es el precio que cobra por el plato del día? (se tiene que incluir los tipos de comida)?

16. Cuántos platos vende en cada temporada?

Alta: \_\_\_\_\_

Baja: \_\_\_\_\_

17. Aproximadamente a cuánto asciende su ingreso anual (antes de beneficios) por el servicio de res./ soda? \_\_\_\_\_

\_\_\_ NS / NR, entonces, tiene idea de cuál es su ingreso mensual (antes de beneficios) en cada temporada?

Alta: \_\_\_\_\_

Baja: \_\_\_\_\_

18. Tiene idea de qué porcentaje de sus ingresos dependen del parque nacional?

---

### **Expectativas de la actividad a futuro**

19. Ha podido notar diferencias en la cantidad de clientes en los últimos años?

\_\_SI / \_\_NO Explique \_\_\_\_\_

20. Está pensando en ampliar la capacidad del rest. / soda (construir más u ofrecer más servicios) \_\_NO / SI\_\_, cuáles: \_\_\_\_\_

21. Cuánto dinero ha invertido aproximadamente en su negocio hasta la fecha?

Descripción general \_\_\_\_\_

### **Costos y gastos**

22.Cuál es el costo de operación y mantenimiento del rest. / soda (en cuanto la temporada)? \_\_\_\_\_

23. Cuántas personas trabajan en el rest. / soda en cada temporada?

Alta: Familiares \_\_\_\_\_ Extra \_\_\_\_\_

Baja: Familiares \_\_\_\_\_ Extra \_\_\_\_\_

24. Cuál es el monto que paga en salarios (semana/quincena / mensual)? \_\_\_\_\_

25. De dónde provienen los empleados?

\_\_\_\_\_

26. Cuál su gasto (mensual / anual) en cuanto a:

i. Alimentos \_\_\_\_\_

ii. Bebidas \_\_\_\_\_

iii. Agua \_\_\_\_\_

iv. Consumo de energía eléctrica \_\_\_\_\_

v. Otros servicios \_\_\_\_\_

27. Dónde se compran estos bienes? \_\_\_\_\_

### **Relación y opinión con el Parque**

28. Están apoyando financieramente o de otra manera el mantenimiento de algún área protegida?

\_\_SI, cómo: \_\_\_\_\_

\_\_NO, estaría dispuesto a hacerlo en el futuro? \_\_\_\_\_

29. Está de acuerdo con la gestión que realiza el MINAE en el parque? \_\_SI / NO\_\_

Por qué? \_\_\_\_\_

**D. Entrevistas con los Representantes de Supermercados, Talleres, excursiones, y otras actividades Turísticas Conexas**

Fecha: \_\_\_\_\_

Lugar: \_\_\_\_\_

Nombre de la empresa / marca: \_\_\_\_\_

Nombre de la persona entrevistada: \_\_\_\_\_

Cargo de la persona entrevistada: \_\_\_\_\_

**Preguntas Generales**

1. Historia de la Empresa: antecedentes, apertura, períodos de crecimiento, contracción etc.

\_\_\_\_\_

2. Dueño, Gerente de la empresa: ¿a qué se dedicaba antes de trabajar en la empresa?

\_\_\_\_\_

3. Que tipo de servicios o productos ofrece la empresa ?

\_\_\_\_\_

4. A quién se los ofrece:

Turistas: \_\_\_\_\_

Vecinos: \_\_\_\_\_

Otros: \_\_\_\_\_

5. Realiza algún tipo de publicidad de su establecimiento: Si: \_\_\_\_\_ No: \_\_\_\_\_.

En caso de que así sea, considera su publicidad el Parque Nacional.

Si: \_\_\_\_\_ No: \_\_\_\_\_

¿Cuál? \_\_\_\_\_

\_\_\_\_\_

6. Sus clientes son mayoritariamente costarricense o extranjeros? En qué porcentaje? \_\_\_\_\_

**Preguntas sobre Proveedores**

7. ¿De donde provienen las mercancías que utiliza en su negocio?

8. Que tipo de transporte utilizan carros, camiones, etc) para traer y llevar mercancías?

9. ¿Dónde ha comprado muebles? ¿Máquinas de oficina?

**Costos Fijos y de Operación**

10. ¿Alquilan el lugar donde trabajan? Si: \_\_\_\_\_ No: \_\_\_\_\_ ¿Cuánto tiene que pagar?

11. ¿Cuanto gasta en:

Luz: \_\_\_\_\_

Agua: \_\_\_\_\_

Teléfono: \_\_\_\_\_

Otros: \_\_\_\_\_

12. ¿Cuanto gasta en mantenimiento:

Limpieza: \_\_\_\_\_

Otros: \_\_\_\_\_

13. ¿Cuántas personas trabajan en su empresa incluyéndose usted mismo?

¿Cuántos?: \_\_\_\_\_

Familiares: \_\_\_\_\_

Externos: \_\_\_\_\_

14. ¿Cuánto es el monto que usted paga por salarios?  
(semana/quincena/mensual)\_\_\_\_\_

### **Ingresos**

15. ¿Usted vive solamente de esta actividad o tiene otras fuentes de ingresos?.

Si: \_\_\_\_\_ No: \_\_\_\_\_Cuál? \_\_\_\_\_

16. Que aporta más a los ingresos de su negocio: el parque o la comunidad? \_\_\_\_\_

17. ¿Qué porcentaje de sus ingresos provienen del turismo? \_\_\_\_\_

18. ¿A cuanto ascienden las ventas anuales que realizan? \_\_\_\_\_

19. ¿Qué porcentaje de sus ventas se realizan a visitantes del Parque? \_\_\_\_\_

### **Inversión**

20. Está pensando en ampliar la capacidad del local (construir más u ofrecer más servicios? \_\_ NO / SI \_\_, cuáles: \_\_\_\_\_

21. Cuánto dinero ha invertido aproximadamente en su negocio hasta la fecha?

### **Organización y relación con el Parque**

22. ¿Usted/Empresa es miembro de una asociación comunal, comercial, turística ( a nivel nacional, regional, nacional)? \_\_\_\_\_

23. En su opinión ¿Estaría a favor de un incremento en el turismo hacia le parque?

Si: \_\_\_\_\_

No: \_\_\_\_\_

Por qué? \_\_\_\_\_

24. En su opinión: ¿Qué se puede hacer para fomentar y mantener el turismo hacia le Parque Nacional?  
\_\_\_\_\_

25. Está apoyando Financieramente el mantenimiento del Parque Nacional?  
\_\_\_\_\_

26. Está de acuerdo con la gestión que realiza el MINAE en el parque? \_\_ SI / NO \_\_, por qué?