ANALYSIS OF THE CONTRIBUTIONS OF NATIONAL PARKS AND BIOLOGICAL RESERVES TO THE SOCIO-ECONOMIC DEVELOPMENT OF COSTA RICA
2009

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List of Acronyms

AyA	Costa Rican Institute of Aqueducts and Drains
AC	Conservation Area
ASP	Protected Wildlife Areas
BCCR	Central Bank of Costa Rica
CATIE	Tropical Agronomic Center of Research and Teaching
CONAGEBIO	National Committee for the Management of Biodiversity
DSE	Sectorial Direction of Energy
EARTH	School of Agriculture of the Wet Tropical Region
FPN	Fund of National Parks
GMP	Average Expense per Person (tourist)
INBIO	National Institute of Biodiversity
IED	Direct Foreign Investment
IMAE	Monthly Index of the Economic Activity
MIDEPLAN	Minister of National Planning and Economic Policy
MINAE	Minister of Environment and Energy
MINAET	Minister of Environment, Energy and Telecommunications
ONU	United Nations Organization
PNRB	National Parks and Biological Reserves
PSA	Payment for Environmental Services
SINAC	National System of Conservation Areas
UICN	International Union for the Conservation of Nature

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1. Executive Summary

Costa Rica has a quarter of its territory protected, of which 12.7% corresponds to the category of national parks and biological reserves. These protected areas-a total of 28 national parks and biological reserves in- provide the country benefits not only ecological but also economic, social and institutional ones, which are reflected in activities such as tourism, protection of water resources for hydroelectric energy, environmental services, and scientific research, among others.

In 2002, was found that the contributions generated by the existence of national parks and biological reserves to socio-economic development in Costa Rica was ¢ 334 128 million (US$832 million). We also obtained the datum for the national parks of Chirripó (¢243 million, US$618 million), Cahuita (¢1.977 million, US$4.9 million) and Poas Volcano (¢9.345 million, US$23.4 million) (Furst et al, 2005).

With the urge of updating the data obtained for 2002 was proposed the project **Systematization and Analysis of the Contributions of National Parks and Biological Reserves to the Economic and Social Development in Costa Rica, Benin and Bután**[1], which also sought to replicate the methodology in two other countries and work with other case studies in Costa Rica, as well as to propose policy recommendations to support to decision makers in the management of national parks and biological reserves in the three countries.

The information found at the national level and empirically aggregated on the main activities or contributions identified in this study shows that economic activities that were benefited from the existence of the PNRB for 2009 were: (1) tourism aimed primarily at nature with its related services, (2) generation of electricity through the usage of water coming from the PNRB for hydroelectric projects, (3) generation of employment and salaries, (4) incomes from MINAE in the quality of tickets collected, (5) conservation of protected wildlife areas from MINAE-SINAC in the form of fixed costs and investments in the administration and maintenance of the PNRB (6) purchase of lands for the expansion of existing PNRB or the establishment of new ones, (7) payment for environmental services (PSA) aimed at protected areas for their conservation and maintenance, and finally (8), research on biodiversity and, corresponding to this, generation of profits in the quality of bioprospection and basic research.

In an effort to interpret these contributions in monetary terms, the search, systematization and analysis of primary and secondary information allows making an estimate of the contributions of PNRB for 2009. This year the total sum of the approximate contributions of the activities mentioned in the previous paragraph was ¢778.148 million colones or $1.357 million dollars (in prices of 2009).

[1] This project was executed under the South-South Cooperation Program (financed by the Kingdom of the Netherlands and administrated by Fundecooperacion).

This amount represents a contribution to the economic development of undeniable importance, but it should be seen as the lower limit of a much higher amount, in case of having a more solid statistical basis, and include the actual amount of the environmental services attributable to PNRB. Always considering the restriction noted, the estimated total of contributions to the national economy in the quality of income generation and investment attributable to PNRB, is about 5 percent of GDP in Costa Rica in 2009 (own calculation based on the National Accounts of BCCR for 2009).

In the framework of this Project, was also worked with three case studies, with the following results: Corcovado National Park-Caño Island Biological Reserve in 2008 ₡48.197 million colones or $91.590 thousand dollars (Otoya, M. et al 2010); Rincón de la Vieja National Park in 2009 ₡12.770 million colones or $23.010 thousand dollars (Salas, F. et al 2010); and Palo Verde National Park in 2009 ₡1.106 million colones or $1.936 thousand dollars (Moreno, M. et al 2010).

2. Introduction

In Costa Rica, National Parks and Biological Reserves (PNRB) constitute the greater area of Protected Wildlife Areas (ASP) in the country both in number (22%) and occupied territory (12,7%), whose main objective is to promote conservation in favor of biodiversity. Conservation can be considered inseparable from the development processes in a society committed to the diverse ecosystems and natural resources, as is the case of Costa Rica. The way they interact dynamically the conservation and development at different spatial scales is the primary objective of this study.

The fundamental theme is the socio-economic significance of the PNRB. However, what is the meaning of these PNRB and for whom? The hypothesis associated with the previous question is that the PNRB produce additional benefits to its primary role, which is the conservation of natural and environmental resources. These additional benefits are used by different social actors.

In this sense, the total social value (expressed or not in the market) of the PNRB, is mainly generated in the usage and non-usage values of environmental services provided by ecological processes involved. These services-of nature and diverse scale-are attributable to the existence of these ASPs, which are useful as aquifer recharge areas, they contribute to the protection of biodiversity and they generate scenic beauty (which attracts about 58, 9% from the total of tourists who visited our country in 2009)[2].

The research presented in this paper focuses on evaluation of the contribution of nature contained in the PNRB for the socio-economic development in Costa Rica, and not on the value of nature- as such-in monetary terms. Additionally, socio-economic contributions of the PNRB will be evaluated taking as reference the markets and the real prices in relation to the activities developed through the use of resources and ecological services provided by the areas under natural protection. This investigation is also an update of the data obtained in 2002 by Furst et al (2005), since for the present study was used the same methodology with some adjustments.

In the process of identifying the contributions of the PNRB at national level for 2009, was taken as basis the contributions identified in 2002 with the aim of the data obtained are methodologically comparable. In this regard, it was found that the existence of the PNRB generates benefits for the following activities:

(1) Tourism and ecotourism developed around certain parks and reserves,

(2) Generation of electricity through the usage of water resources coming from the PNRB and the corresponding incomes by hydroelectric projects,

[2] This is according to ICT (2010b).

(3) Generation of direct and indirect employment for both the institution responsible of the management of the ASP and some activities that depend on the existence of the PNRB,

(4) Organized or individual visitation due to tours to the PNRB with their corresponding incomes to MINAE in the quality of tickets,

(5) Conservation of protected wildlife areas by MINAE-SINAC with their corresponding costs and investments in its administration and maintenance,

(6) Purchase of lands for the expansion of the existing PNRB or the establishment of new ones,

(7) Payment for environmental services (PSA) aimed at protected areas and their surroundings for their conservation and maintenance.

(8) Research on biodiversity and, corresponding to this one, generation of profits in the quality of bioprospection.

3. General Methodology [3]

The National Parks and Biological Reserves (PNRB) are natural assets that- in socio-economic terms – generate a phenomenon that in the analysis of the development is called *externality*.[4] In the case of PNRB, such external effect (on the local, national and international society), induced by a territorially conglomerate set of ecological services, has mostly a positive sign, since a cluster of socio-economic activities (provision of goods and services of productive, recreational nature, etc.) take advantage of these services in the surroundings of the park or reserve[5]. These services are also used by a chain related to related activities in higher scales to the local one by the emergence of subsequent socio-economic impacts on the micro-regional, regional, national and international levels. We can then speak of a socially positive externality due to the existence of the PNRB, potentially leading to a vertically and horizontally linked development process.

[3] This methodological section is based on the first version of the project and that is found in Furst, et al, 2005.
[4] See for more details: Salazar-Xirinachs (1996), and Scitowsky (1973).
[5] It is evident that an externality attributed to the initial induction of a sequential process of development is different from the externality that is known and it evaluates the analysis of the impact and environmental cost (Pearce and Turner, 1995). In contrast to the second one (reduced to the affectation of utility due to an environmental damage), the first one is equivalent to a wide set of indirect effects of chaining and conexion (from the point of view of the structural change of the pattern of the socio-economic development) that at first sight are concentrated on a territory around the PNRB (in the so-called area of influence). Such boost of development comprises also the emergence of activities of service and production in geographical spaces beyond the direct area of influence. It involves territorial units in the chain of effects originated by the PNRB, including the microregion, region, country and the global environment that goes from the regional to global at the international level.

The cluster approach (or clusters of interrelated activities in a chain of income generation) is identified as a suitable tool for the identification of productive activities (including research projects in or related to parks and reserves) and productive (in the social sense and including the recreation of different level and qualification). This allows attributing the contributions of PNRB to the emergence and consolidation of such socio-economic activities in order to estimate through both numerical calculations and through qualitative indications, the benefits in terms of employment, compensation, incomes by visitation, added value locally and nationally generated, payment of royalties in the quality of scientific research and applied in parks, etc.

The instrument that is perceived conceptual and operationally more useful to carry out the type of analysis outlined before constitutes then the combination of the local cluster analysis and cross-chain (that is, from the village of origin to final destination). With this, you can drag the multiple effects of forward linkage that have the PNRB on the socio-economic life, from its source (location) to its impact still barely identifiable (qualifying) to a higher level of spatial scale, even when provided with greater emphasis on the contribution to local development.

In the analysis of socio-economic development, what is mentioned above is referred to as *cluster* linked to a dynamics of value added chain.[6] For this study in particular, the *cluster* must be understood methodologically as a reactive process to a destabilizing initial boost of the *''status quo''*. This is equal to a sectoral and territorial concentration of activities and enterprises that arise because of certain "*bottlenecks*" (demand for raw material and services to be provided by others) increasingly interact with each other in terms of production and organization and that ultimately depend on the conservation or not of the PNRB. So, this approach involves the concept of *unbalanced development* of Hirschman (1973), which postulates the start of a socio-economic dynamics in the form of a *set of cluster-chain* each time more linked from a social investment of innovative nature in a development potential.[7] Such potential or development center is given in our case by the public investment in the conservation of PNRB.

This clearly establishes an enormous methodological difficulty to identify and define, in socio-geographical terms and chain analysis (economically and territorially chained links), the various facets of impact induced in the scales of spatial impact indicated. In particular, this applies to the observable overlap between the spatial and territorial scales and the resulting problem of attributing and accounting for socio-economic benefits to the geographical units positively affected by the existence and preservation of PNRB.

[6] See Porter (1990, 1999), Altenburg / Meyer.Stahmer (1999) and Ramos (1999).

[7] Such *cluster concept* is quite different from that of Porter (1990, 1999) and others (INCAE, 1999) which reduce the impetus to the vertical and horizontally formation (geographically) integrated from the conglomerate to the favorable synergistic effect for the global competitiveness and efficiency of cooperation on a network. Examples of this are the famous industrial districts in Europe (Schmitz / Musyck (1993) as well as in developing countries the new eco-tourist cluster around natural resources such as protected wildlife areas (for example, for Costa Rica, in: Inman, et al. 1998, or more specifically for Monteverde, in: Acuña / Villalobos / Ruiz, 2000).

Additionally, the "double counting" of benefits associated with the activities developed within the chains should be avoided, in order to generate the most accurate quantification. So, the analysis should note qualitatively the way each chain is organized, as well as clearly separate what benefits are generated from the existence of the PNRB and which ones not. These limitations are taken into account in this study at the time to describe and quantify the contributions of the PNRB.

The *cluster analysis* -in close connection with the *evaluation of chains*-constitutes the most appropriate methodology to address the *societal externality*, which characterizes protected areas from the perspective of development spurred by innovations. In this case, the original innovation (force of initial boost) is interpreted as the decision made (by the Costa Rican society) to conserve the ecological services of the park, and the externality generated by such an innovation is seen as exploiting new opportunities in the socio-economic field that are induced or at least related to the existence of the park or reserve (Hirschman, 1973). In the Annexes are specified the activities, assumptions and instruments that were used in this study.

4. General Contributions related to the PNRB at National Level

As it is shown in Chart 1, in 2009 the approximate total sum of the contributions of the PNRB to the indicated activities is ¢778.148 million colones or $1.357 million dollars (in prices of 2009). That amount represents a contribution to the economic development of undeniably relevance, but it must be seen as the lower limit of a much higher amount, in the case of having a more solid statistical basis and include the actual amount of environmental services attributable to the PNRB.

Always considering the restriction noted, the total calculated of the contributions to the national economy in the quality of income generation and investment attributable to the PNRB is about 5 percent of the GDP in Costa Rica in 2009 (own calculation based on the BCCR National Accounts for 2009). This implies that for each hectare of extension of the PNRB (in total: 650,852 hectares), the contribution (unit) of the PNRB represents a significant amount of $ 2,085. These two figures - a proportion of the GDP and amount per hectare – call the attention when they clearly indicate a significant contribution to the national development and socio-economic welfare of the country without receiving adequate compensation by the society in general and the economic activities benefited in particular, standing out in the latter case tourism as the clear winner with respect to its not canceled debt with the PNRB.

Chart 1
Summary of economic contributions of the PNRB Year 2009

Type of activity	Specific activity and benefit of the interested people	Estimate benefit*			Sources
		Colones	US$	%	
(1) Tourism at national level	Socio-economic activities and interested people related to the PNBR	**546.136.991.997**	**952.530.800**	**70,18**	**Chart 4**
Accommodation	Hoteliers, etc.	180.771.344.351	315.287.695		
Food	Owners of restaurants, etc. and their staff	152.372.220.767	265.756.093		
Transportation	Haulers, tour operators	84.105.096.768	146.689.743		
Entertainment	Diverse	44.783.233.344	78.107.526		
Others	Diverse	84.105.096.768	146.689.743		
(2) Availability of good quantity and quality of water for the generation of Hydroelectric energy	Hydroelectric Plants of ICE and some others	**205.242.318.222**	**357.968.115**	**26,38**	**Chart 8**
(3) Generation of direct and indirect employment	Payroll employees and their families	**13.469.218.581**	**23.491.991**	**1,73**	**Chart 9**
(4) Incomes in quality of tickets (National Fund of Parks)	National Fund of Parks	**7.246.810.438**	**12.639.338**	**0,93**	**Chart 10**
(5) Resources for the conservation of Protected Wildlife Areas	MINAET-SINAC	**4.885.377.844**	**8.520.706**	**0,63**	**Charts 12-14**
(6) Purchasing of lands	Private owners: incomes	**897.412.505**	**1.565.199**	**0,12**	**Chart 15**
(7) Payment for Environmental Services	Private owners: incomes	**138.742.867**	**241.985**	**0,02**	**Estimation****
(8) Contribution to the Conservation of Biodiversity	Funds for Basic Research and Biological Bioprospection, Universities and NGO`s	**131.583.340**	**229.498**	**0,01**	**Chart 19**
TOTAL		**778.148.455.795**	**1.357.187.632**	**100%**	

Source: Own elaboration

*Exchange rate: 2009 is of ₡573, 35

** Estimation of the PSA for 2009, which uses both the datum from 2007(that is presented in chart 17) and the inflation from 2008 (13.90%) and from 2009 (4.05%).

4.1 Tourism and Eco-Tourism related to the PNRB at national level

The greatest contribution of PN and RB of Costa Rica has to do, directly or indirectly, with tourism. The previous has already been expressed in a series of works about tourism linked to nature and its development in form of a cluster at local, regional and national level (Acuña et al. 2000; Fürst and Hein 2002; Inman, et al. 1998; PNUD 2005; SINAC-MINAE 2004; Ambientico 2006; SINAC 2006a; SINAC-MINAE 2006b; CEDARENA 2006; Programa Estado Nación 2007). This was also confirmed by the results obtained in this study.

In general, the socio-economic significance of tourism in comparison to other activities (exporting) is well documented in Chart 2, where can be observed the amount of foreign currency generated for the country for the years 1993-2009. In this regard, the data show that tourism reports greater incomes than the agricultural activities from 1999 onward.

Chart 2.
Tourism and other generating sources of foreign currency for Costa Rica. 1993-2009.
(Figures in millions of US$)

Year	Electronic Microstructures	Tourism	Total of agricultural activities	Coffee	Banana	Meat	Sugar
1993	0	577,4	858	201,6	564,8	63,7	27,9
1994	0	625,7	948,2	307,6	561	51	28,6
1995	0	659,6	1187	417,1	680,2	43,6	46,1
1996	0	688,6	1103,1	385,4	631,1	42,2	44,4
1997	0	719,3	1049	402,3	577,3	28,3	41,1
1998	987,2	883,5	1142,8	409,5	667,5	24	41,8
1999	2558,6	1036,1	974,9	288,7	629	27,2	30
2000	1653,5	1229,2	879,1	273,7	546,1	30,7	28,6
2001	787,8	1095,5	738,7	161,8	515,9	25,5	35,5
2002	898,7	1078	690,6	165,1	478,4	20,1	27
2003	82.3	1199,4	796,8	195,4	554,3	22,3	24,8
2004	253,3	1357,4	806,5	193,6	553,1	21,7	38,1
2005	803,3	1569,9	757,9	232,7	481,8	13,7	29,7
2006	1211,2	1.629,3	926,5	227,8	629,5	26,7	42,5
2007	1448,3	1.894,7	1005,6	254,9	673,7	28,3	48,7
2008	1060,8	2.144,2	1068,8	305	689,2	40,5	34,1
2009	861,4	2.363,6	1054,9	197,5	624.2	36,1	25,9

Source: Own elaboration based on data from PROCOMER (2009), Chaves, et al (2010), BCCR (2009), ICT (2009b) e ICT (2010a).

From 1998, operations of the Intel Company positioned the electronic microstructures exports as the primary source of Costa Rican currency. This, therefore, relocates tourism as the second major exporting activity until 2000. Since in 2001, tourism takes up again its leadership in generating foreign exchange, so that the electronic microstructures are moved into second place, this trend continued until 2009.

These data about tourism are aggregated. So, the figures reflect all variations of this activity, which include, among others, rural community, adventure, sun and beach tourism, and the so called ecotourism. Even though, each type of tourism has different attractions and therefore it generates differentiated impacts on the cluster at the local, regional and national levels.

In an effort to disintegrate the data from tourism, this document shows the impact of tourism aimed at nature and specifically from tourism in PNRB for Costa Rica. Chart 3 shows the relevance of that activity as proportion from the total of incomes generated by the visit of tourists to Costa Rica in 2009.

Chart 3
Estimate Income in the quality of Tourism associated with PNRB in Costa Rica. 2009

Activity	Value	Level	Year
Tourism in PNRB	US$952.5 million	National	2009
Aggregate Tourism	US$ 2.363,6 million	National	2009

Source: Own elaboration based on data from ICT (2010a and b).

According to official statistics (ICT, 2010a and b), the estimation of tourists who visited the PNRB corresponds to 58, 9% of whom got in via air to Costa Rica. This implies that 765.700 foreign visitors say having got in National Parks, Biological Reserves or Protected Wildlife Areas during their stay in our country. Following the same statistics, the estímate income in the quality of tourism in PNRB is calculated when considering that the Half Expense per Person (GMP) who visits Costa Rica is US$1244 for 2009. So, it is supposed that the 765.700 visitors generate a total of US$952.530.800 million as a result of their trip to the PNRB of our country during the same year.

A big part of the tourist activities, though provided in a growing way by the private sector have strict relation with the PNRB. This when are developed according to the image related specifically with the protected areas of Costa Rica (as is proved during the field works carried out by the research team between the years 2009 and 2010). In this sense, tourist promotors and owners of prívate reserves in the surroundings of National parks and biological reserves sell the image of wild nature of these when promoting and selling their packages.

To illustrate the latter with an example, in the year 2007, the travel agency Costa Rica Expediciones[8] receives an award called Lifetime Achievement Award that is given by the organization Adventure Travel Trade Association (ATTA), with head house in Canada. This acknowledgment considers among other things, the efforts that his owner has aimed towards conservation of national parks of the country through the Asociación Pro Parques, entity that develops training projects, search of funds and traveling philantrophy (Camacho, 2007).

Regarding the significance of the PNRB for the international tourism in Costa Rica, it is possible to explore the visitation habits and expense of foreign tourists. The tourist who visits Costa Rica presents a very well defined profile (Morales, 2009). In a vast majority it is an elder visitor, older than 45 years old, of which, 44, 7% has annual incomes greater than $100.000, and comes mainly to know about nature, national parks and it is recommended by friends. These motivations have remained through time and have strengthened detecting the tourist's preference for places where sustainable tourism is practiced, and where efforts are made to preserve natural resources (Camacho, 2007).

As it was shown in Charts 10 and 11a and 11b, the composition of visitors to national parks has experienced variations. In this regard, national visitors constitute a higher amount to foreign visitors during the period 1996-2002. However, this trend is reversed from 2003, when the visitation by foreigners represents the largest proportion of the total of visitors to the Costa Rican PN.

All these are strong evidences to declare that the visit to PNRB has been and remain a significant factor for tourist development in Costa Rica, contributing to the generation of national income in the quality of international visitation. Obviously not all generated by long-distance tourism is due to the attractions of the ASP. In this context, the key question for the purpose of this study is then: how much of the expenses of foreign tourists in different tourist activities can be attributed to PNRB? Of course, for this question (that sets aside what corresponds to expenses incurred by national tourists), there are only crude approximations, but plausible according to the following reasoning.

According to air surveys for non-residents in Costa Rica applied by the Tourism Costa Rican Institute for 2009, 58, 9% of tourists who got in via air to Costa Rica this year, say having visited the PNRB (ICT, 2010a and b). [9] Based on this same information, Chart 4 presents the

[8] Since its creation in 1978, this receptive travel agency is specialized in attracting tourists who enjoy adventure tourism and "green" tourism or the one who boosts contact with nature.

[9] The official data from ICT corresponding to visitation to the PNRB are available only for 1.3 million tourists who got to Costa Rica via air during 2009. Due to such statistics are built from the surveys applied to tourists in the Juan Santamaría and Daniel Oduber international airports. So, the estimations of this document should be considered as a figure that though very valuable is clearly subestimated. Since, such quantification does not

average expense per tourist (GMP) for the year 2009 in various activities related to the visitation of 1.3 million foreign tourists who get in via air to Costa Rica. GMP is reported in US$1.244 for 2009. This figure allows estimating how much is the total amount spent in the quality of tourism in the country.

For international tourism –that get in via air- an approximate expense of US$ 952,530,800 in the quality of tourist visits to the PNRB of interest for international tourism (Chart 4). This result is equivalent to a minimum estimation. Since the percentage of 58.9% of the total of international tourists should be considered as a minimal floor of the visitors to the PNRB. Since this figure does not include national tourists, which according to Chart 10 represent about 46% of the total of visitors for 2009.

From what we mentioned before, it is important to clarify that the obtained result does not constitute an exact monetary value, which has been obtained based on an even more disaggregated national accounting than the data provided by ICT. The interest here to provide this figure lies solely in providing, in an illustrative manner, a crude approximation of the contribution of the PN and RB visited to the socio-economic development. The above-mentioned is through the incomes of tourist activities that are affected positively by the local expenses of foreign tourists.

Analyzing in more detail Chart 4, it shows that in 2009 most of the total expense made by visits of foreign tourists to PN and RB has been in accommodation, representing approximately U.S. $ 315,287,695 equivalent to a third of the total (33.1%). The expense for transportation was $ 146,689,743 (15.4%), for food $ 265,756,093 (27.9%), entertainment consumed U.S. $ 78,107,526 (8.2%), medical expenses absorb U.S. $ 30,480. 986 (3.2%), and the other expenses add U.S. $ 116,208,758 (12.2%). In this way, one can derive that the item of accommodation took most of the incomes in the quality of ecotourism, followed by food and entertainment, medical expenses and other expenses.

Additionally, Chart 4 allows observing the most disaggregated behavior of such expenses. Thus, from the total of lodging expenses, the item corresponding to hotels was the most significant receiving 28.6% from the total of the expense attributable to protected areas. Similarly, other items of greater importance were expenses in restaurants, etc. with 18.7% and a total of 12.2% in other expenses. Also, cars rental and buses transportation with 8.5% and 4.4% from the total expense respectively, have been relatively important.

have official statistics of visitation to PNRB for 600.000 tourists who got in our country through different routes than the air one in such year –i.e. maritime or terrestrial-.

Chart 4
Structure of the Average Expenditure per Tourist -who gets in via air- to Costa Rica According to activity or demanded service in 2009 (in US$)

ITEM	GMP	TOTAL EXPENDITURE ON TOURISM	TOTAL EXPENDITURE ATTRIBUTED TO PNRB	% OF TOTAL
ACCOMMODATION	**411,8**	**535.293.200**	**315.287.695**	**33,1**
Hotels	355,8	462.519.200	272.423.809	28,6
Shared time hotels	5,0	6.468.800	3.810.123	0,4
Cabins	6,2	8.086.000	4.762.654	0,5
Rented house or condominium	44,8	58.219.200	34.291.109	3,6
Camping areas	0,0	0	0	0,0
TRANSPORTATION	**191,6**	**249.048.800**	**146.689.743**	**15,4**
Owned transportation	17,4	22.640.800	13.335.431	1,4
Airlines	6,2	8.086.000	4.762.654	0,5
Buses, taxis	54,7	71.156.800	41.911.355	4,4
Ferries, motorboats, boats	3,7	4.851.600	2.857.592	0,3
Renting of cars	105,7	137.462.000	80.965.118	8,5
Maintenance/repair of vehicles	3,7	4.851.600	2.857.592	0,3
FOOD	**347,1**	**451.198.800**	**265.756.093**	**27,9**
Purchase of groceries	114,4	148.782.400	87.632.834	9,2
Restaurants, coffee shops, etc.	232,6	302.416.400	178.123.260	18,7
ENTERTAINMENT	**102,0**	**132.610.400**	**78.107.526**	**8,2**
Shows	21,1	27.492.400	16.193.024	1,7
Museums	2,5	3.234.400	1.905.062	0,2
National Parks	27,4	35.578.400	20.955.678	2,2
Casinos	7,5	9.703.200	5.715.185	0,6
Sports/Sport Services	13,7	17.789.200	10.477.839	1,1
Other entertainment	28,6	37.195.600	21.908.208	2,3
MEDICAL EXPENSES	**39,8**	**51.750.400**	**30.480.986**	**3,2**
Dental services	19,9	25.875.200	15.240.493	1,6
Ophthalmological services	0,2	0	0	0,0
Plastic Surgeries	12,4	16.172.000	9.525.308	1,0
Other surgeries	0,0	0	0	0,0
Medical treatments	5,0	6.468.800	3.810.123	0,4
Other medical expenses	2,5	3.234.400	1.905.062	0,2
OTHER EXPENSES	**151,8**	**197.298.400**	**116.208.758**	**12,2**
Exit taxes	44,8	58.219.200	34.291.109	3,6
Insurance	0,0	0	0	0,0
Subscriptions	1,2	1.617.200	952.531	0,1
Shopping	36,1	46.898.800	27.623.393	2,9
Handcrafts	57,2	74.391.200	43.816.417	4,6
Other expenses	12,4	16.172.000	9.525.308	1,0
TOTAL	**1.244**	**1.617.200.000**	**952.530.800**	**100**

Source: Own elaboration with data from ICT (2010a and b).

The above-mentioned highlights the significant impact of protected areas of the country in most tourist and no strictly tourist activities, such as buses and taxis, etc. This fact could justify mechanisms as a compensation of the PSA type of these activities to the maintenance and expansion of protected areas, because they benefit many of these activities directly and indirectly by them. This would require more detailed information about the contribution of each one of the PNRB for tourism at national level. In this case is through the indicator used here of expenses made by tourists in relation to their visits of protected areas.[10]

The existence of the PNRB has had also a positive impact on attracting foreign direct investment to Costa Rica. The tourist real estate development includes two different versions that coexist in a highly dynamic environment. The first one, the so-called tourist projects, which include the construction of homes surrounded by nature. The second one, the expansion of large hotel chains settled in the country, in the late 1990s.

Since 2005, a "boom" in construction of the so-called tourist projects, resorts, or tourist developments begins in Costa Rica. These real estate development projects are both characterized by being located in sites for tourist development as well as because of the existence of foreign buyers.[11] Always using the attractions of the PNRB as a reference both for advertising and the marketing, as well as to support the high prices in U.S. dollars that these properties have achieved in the local and international market.

On the other hand, the big hotel chains are starting in the integration of the hotel with condos or apartments as a single operational unit. This ensures participation in tourism with opportunities of rental to tourists and opens with their accommodation services. Similarly, the existence of the PNRB constitutes an added value for the price of the services offered.

In 2007, Costa Rica receives U.S. $ 328 million of investment in the tourist sector, figure that represents an increase higher to 100% with respect to what it received in the previous year (BCCR, 2008). In Costa Rica, the main source of the IED is still North America because it contributes nearly 60% of the amount received last year[12]. According to data from ICT, the processed projects are primarily associated with the arrival of new international hotel chains (e.g., Hyatt and Hilton) and renewal of local hotels.

According to the Monthly Index of the Economic Activity (IMAE) of the private and public construction (BCCR, 2010), the private construction registered a strong deterioration between December 2007 and March 2009. However, this tendency is attenuated from July

[10] Currently, the generation of this type of information is part of the projects of the BCCR to complete the macroeconomic statistics. So for 2009, the officials of the Bank worked with the staff of ICT to advance in the quantification of a satellite account for tourism, which allows having more specific data about such activity (personal communication with: Brizuela (2009), Chaves (2009), Díaz (2009), Edward (2009), Solano (2009) and Umaña (2009)).

[11] The main buyers of properties come from the United States (55%), followed by Canada (7, 5%), Germany (4, 8%), Italy (3, 9%), Portugal (2, 9%) and France (2, 7%) (Camacho, 2007)

[12] From this figure, 90% corresponds to the United States.

2009 when the contraction is decelerated until getting a reduction of 9, 5% in January 2010 (this with regard to January 2009).

The behavior in tourist investments is very linked to the increase in the number of visitors that the country receives. During 2009, a total of 1, 9 million tourists visited Costa Rica (Arce, 2010a). Figure that represents a reduction of 8% with regard to the official figures for 2008. The incomes that such tourists amount to US$2.363, 6 million for 2009 (see chart 2).

Though the number of tourists who visited Costa Rica increased among 2007-2008, the variation rate of this indicator in this period (5, 5%) was smaller than that one from the period 2006-2007 (14, 7%). The tendency of contraction in tourist visitation is kept for the period 2008-2009, which reports a reduction of 8%. This is due to the consequences of the world economic crisis that decreased the amount of available resources for the tourists to visit the Costa Rican tourist centres (Arce, 2010a). Considering this, it has been elaborated several reports that are described briefly in box 1.

Box 1
Impacts of the Global Financial Crisis on Tourism in Costa Rica

From the second half of 2008, tourist activity begins a significant decline with respect to the statistics from previous years. In this regard, the international financial crisis is cited as the main factor that causes the drop in the level of visitation of international tourists to Costa Rica.

In March 2009, the items that report more layoffs of personnel are Travel Agencies and Hotel and Catering Business, which fired an average of 6, 5 and 5, 4 of employees respectively. Considering the decrease of tasks, the Tour Operators report a contraction of 79%, while the Hotel and Catering Business and Travel Agencies do it in a 73%. Regarding the occupancy, 73, 1% of tourist entrepreneurs report fewer level of occupants in their businesses compared to the same period of 2008 and only 7, 7% of the interviewees said to maintain a higher level.

In 2009 it closes with a reduction of 8% in tourist visitation. This mainly due to the global financial crisis, as well as in less degree the outbreak of the virus of AH1N1 flu.

Considering the first half of 2010, the tourist entrepreneurs manifest optimism because they wait for a recovery of the entrance of foreign tourists to Costa Rica. Although, these actors accept that such recovery could be slow in comparison to the figures reported in previous years to the global financial crisis. The diversification of the Costa Rican tourist offer is the tool that is mentioned to help to the recovery of the sector.

Source: Larios, R (2009), Jegathesan, M. (2009), Vindas (2009a, 2009b, 2009c, 2009d), and Arce (2010a and b).

4.2 Estimation of the economic contribution of the ASP for the electric generation (Energetic Development in Costa Rica)

The electric development is a key condition for strengthening the growth and economic development of a country. Its importance is expressed in the satisfaction of certain needs of both domestic and productive origin. The availability of energy allows the population to have access to lighting, cooking, heating, mass media, among other services and, moreover, it allows the different productive sectors to give the population a range of goods and services required for the satisfaction of their needs, growth and economic development.

The services that provide energy help to satisfy people's basic needs such as food production, provision and access to health services. In addition, these contribute to social development enabling the educational possibilities. Lack of access to reliable and affordable energy undermines the economic and social development in many parts of the world today.


Photo: C. Mora, 2009

In Costa Rica, electricity production is primarily driven by the Electricity Costa Rican Institute (ICE) and also buys independent producers, cooperatives and municipal enterprises, performing in turn the selling of it. The institution is responsible for the transmission, distribution and marketing of electricity; however, the latter two are also performed by the Compañía Nacional de Fuerza y Luz (CNFL), Public Services Company of Heredia (ESPH), the Administrative Board of the Electric Service of Cartago (JASEC) and the cooperatives of rural electrification.[13]

The following chart shows the structure of energetic generation for 2009. For that year it was generated approximately 9,235,909 MWh, where the ICE generated approximately 73% of energy consumed, 58% corresponds to the energy generated by water sources owned by ICE. The remaining production is generated through sources such as geothermal (13%), thermal (5%) and wind (4%). Considering the previous data, 78% of the total energy generated that year comes from water sources.

[13] There are currently four rural electrification cooperatives: Coopelesca, Coopeguanacaste, Coopesantos y Coopealfaro, which make up the Cooperative Consortium named CONELECTRICAS, dedicated to the electric generation.

Chart 5
Costa Rica, S.E.N: Generation of energy per type of source. According to the enterprise per year 2009 - in MWh –

Enterprise	*2009*
Hydroelectric	**7.224.459,99**
I.C.E.	5.351.969,063
C.N.F.L.	353.152,184
J.A.S.E.C.	139.639,615
E.S.P.H.	91.200,470
Matamoros	-
COOPELESCA	83.467,984
Private Generation (1)	1.129.540,463
COOPEGUANACASTE	75.490,206
Geothermal (2)	**1.185.839,94**
I.C.E. Geothermal	973.086,447
Private Generation (3)	212.753,496
Thermal	**498.816,86**
I.C.E. Thermal	366.673,318
Private Generation (4)	47.607,953
C.N.F.L (5)	84.535,590
Wind	**326.182,63**
Private Generation (6)	245.838,914
ICE	80.343,713
Biomass	**609,95**
I.C.E (7)	609,947
TOTAL	**9.235.909**

(1) The Hydroelectric Private Generation was started in December, 1990

(2) Miravalles I Geothermal Plant, started working in March, 1994 and Miravalles II in August, 1998; besides of three unities of mouth of well in 1995, 1996 and 1997.

(3) Miravalles III (BOT acronym in English) started working in March, 2000.

(4) El Viejo and El ingenio Taboga use the bagasse. Taboga started working in 2003.

(5) It corresponds to Moín Project

(6) Aeroenergia, Tilarán, MOVASA and P.E.Guanacaste

(7) It corresponds to the Río Azul Project that uses Biogas

Source: ICE (2010)

4.2.1 Protected Wildlife Areas and Generation of Electricity

Costa Rica has a large rainfall regime along its entire territory, reaching the average annual rainfall between 1500 to 2000 mm, the availability of water resource in abundance and quantity can have an energetic park based on water sources. On the other hand, it has one of the biggest hydraulic potentials per unit of area of the planet, enough to install over 25 thousand MW of power and satisfy the demand for electricity in the next three decades (Manso, 2001). In this sense there is a relation between rainfall patterns, forests and energy.

Forests provide multiple benefits through usable goods that are traded in the market such as the extraction of timber, fiber, plants, fruits and even animals, in addition, from the forest is used a number of other direct benefits that result from their values of direct non consumable direct use values such as the benefits generated by activities related to nature tourism and research. However, forests also provide a number of valuable environmental services such as watershed protection, scenic beauty, CO_2 fixation, among others, which in most cases are not taken into account in the market and even in economic policy decisions; therefore, its contribution to economic and social system is undervalued.

Several studies recognize the relation between the forest and hydrological services that support, mainly by preserving the quality and quantity of water. Among some of the environmental services provided by forest system to the basins can be cited (Bishop and Lander-Mills, 2001): 1 - The hydrologic cycle regulation of the water (maintenance of the flow in dry seasons and flood control), 2 - conservation of water quality, 3 - control of soil erosion and sedimentation, 4 - maintenance of aquatic habitats. As an example, Costanza *et al.* (1997) estimated the value of environmental services that forests provide in terms of regulation and water supply by US$2.3 trillion worldwide.

By preserving the water quality, forests contribute significantly to enhancing the hydrologic properties of basin ecosystems and this is achieved by minimizing soil erosion on the site, reducing the siltation of water bodies and trapping or filtering pollutants (Calder et al, 2007); the above argument is also present in several investigations where it is evident the relationship between forest and water, among them Chomitz et al, 1998; Segura and Johnson, 1998; Sheil and Daniel, 2009. Water availability in quantity and quality is a necessary condition for the production of electricity. Thus, it becomes relevant to estimate the importance of the ASP for the production of hydroelectric power for the service that these areas offer in terms of conservation and protection of water resource.

The Forest Law 7575 (1996) in its Article 3 paragraph K recognizes, among other environmental services, the environmental service that forests provide in terms of "Protection of water for urban, rural or hydroelectric usage." Based on the foregoing, the country has developed a whole institutional framework that enables the recognition (in monetary terms) of this environmental service to forest owners near to projects that use the water resource in electricity generation, mostly voluntary agreements.

For purposes of this document are considered and identified, in collaboration with the Electricity Costa Rican Institute (ICE), those projects of hydroelectric generation that use water coming from basins nearby to the ASP, so these areas play a vital environmental role for the energy production. It is remarkable then that "almost 100% of the energy generated in the country comes from sources considered of clean or renewable energy from natural resources, many of which are within or near the ASP" (SINAC, 2007a). Additionally, there are around the volcanic mountain ranges of Guanacaste and the Central one seven key and potential areas in geothermal terms: Rincon de la Vieja, Tenorio, Cerro Pelado, Pocosol, Platanar-Poas, Barva and Irazu-Turrialba. (Van der Laat. 2008). The total amount of this potential is 865 MW, which is close to half of the current installed capacity of 1,521 MW.

Thanks to the conservation in the ASP is achieved to take advantage of the richness of the water resource of Costa Rica. This is due to that more than 80% of the electricity that is provided to the Costa Rican is hydroelectric, while 12% of the energy consumed in the country is geothermal and 3% wind. Nowadays, Costa Rica is number three in the generation of electricity of geothermal origin. The production of this one dates back to 1994 in the southeast base of Miravalles Volcano. These days, there are 5 plants that produce 163, 5 MW, which represent 15% of the electricity of our country (Van Der Laat, 2008).

It should be noted that the national legislation does not permit the establishment of projects inside the National Parks and Biological Reserves. For all other management categories there are no legal restrictions (National Report SINAC-MINAE, 2003). *"Costa Rica has several areas of high geothermal potential commercially exploitable for the production of electricity such as Rincon de la Vieja, Tenorio, Pocosol, Cerro Pelado, Platanar, Poas, Barva, Irazu, among others. However, at present, due to the existence of numerous protected areas by law, the possibilities to carry out explorations and exploitations in those areas are reduced "*(Rodriguez E, 2006). In this sense, there is currently a law project in the Environmental Affairs Committee of the Legislative Assembly since 2006 called: Regulating Law of the Production of Geothermal Energy in the National Parks which seeks to "authorize ICE for the usage of the existing geothermal resources in national parks "(Law Project: Regulating Law of the Geothermal energy production in the National Parks, Article 1). The law seeks to simultaneously satisfy the energy needs of Costa Rica with the usage of clean energy in a manner that is harmonious with the environment to ensure sustainable national development and ecologically sustainable in the country.

Chart 6 shows a summary of the hydroelectric plants that use the water resource coming from protected wildlife areas, as well as in Figure 1, which shows the location of such plants.

Arenal Hydroelectric Plant

It is located in Tilarán, Guanacaste and came into operation on December 9th, 1978. This plant stores the waters from the rivers of Arenal, Aguas Gatas, Caño Negro, Chiquito and others of lesser importance. The construction phase of the reservoir, the plant forced to relocate the towns of Tronadora and Arenal changing the social and geographic conditions of the area between the Sangregado dam, near the Arenal Volcano in La Fortuna of San Carlos and the area surrounding the old lagoon of Arenal in Tilarán, in Guanacaste.

Chart 6
Hydroelectric Plants that use the waters from the Protected Wildlife Areas

Basin/River where it is located	Installed Capacity	Hydroelectric Plant	Protected Areas
San Carlos River	157 399 kW	Arenal	ZP Tenorio
San Carlos River and Bebedero River	174 012 kw	Jorge Manuel Dengo	PN Tenorio
San Carlos River and Bebedero River	31 977 kW	Sandillal	ZP Arenal-Monteverde. PN Arenal
San Carlos River	38 172 kW	Peñas Blancas	ZP Arenal-Monteverde
Basin of the Sarapiquí River	23 205 kw	Toro 1	ZP Toro River
Basin of the Sarapiquí River	65 736 kW	Toro 2	PN Juan Castro Blanco. PN Poás Volcano
Tárcoles River	37 360 kW	La Garita	RF Central Volcanic Range
Tárcoles River	97 380 kW	Ventanas Garita	
Basin of the Reventazón River	120 000 k W	Macho River	PN Tapantí-Macizo Cerro La Muerte
Basin of the Reventazón River	108 800 kW	Cachí	ZP Navarro River and Sombrero River
Basin of the Reventazón River	172 202 kW	Angostura	ZP Tuis River Basin
Basin of the Sarapiquí River	87 941 kW	Cariblanco	RF Central Volcanic Range PN Poás Volcano
R Barranca	4 696 kW	Alberto Echandí	ZP El Chayote

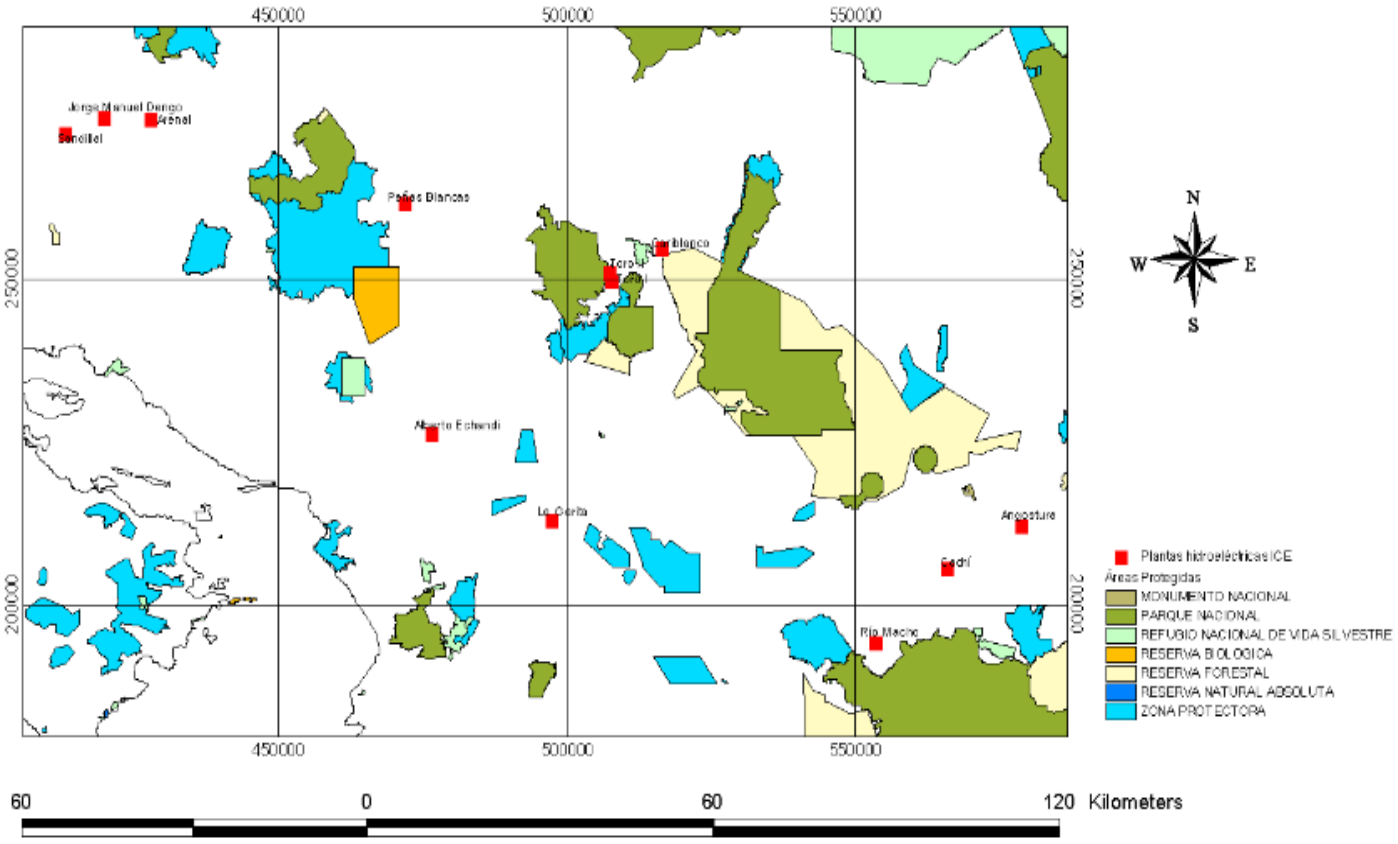
Source: ICE (2010).

Sandillal Hydroelectric Plant
It is located in Cañas, Guanacaste and came into operation on November 10th, 1992. It uses the waters from Arenal. It consists of two identical units with a potential of 31 977kW.

Peñas Blancas Hydroelectric Plant
It came into operation in August, 2002 and it is housed between the cantons of San Ramon and San Carlos in Alajuela and it uses the waters from Peñas Blancas River. It has two identical units with a combined potential of 38 172kW.

Toro 1 Hydroelectric Plant
It is located in the district of Toro Amarillo of the canton of Valverde Vega, in the province of Alajuela. It uses the waters of the Sarapiqui River basin. The plant uses a fall of 173.6 meters and the waters of the Claro River and of the Gata stream giving a contribution of 5 m^3 / sec. This plant came into operation on September 20th, 1995.

Figure 1
Location of Hydroelectric Plants of ICE with regard to ASP



Source: ICE (2009)

Toro 2 Hydroelectric Plant

It is located in the district of Toro Amarillo of the canton of Valverde Vega, in the province of Alajuela. It uses the waters of the Sarapiqui River basin. It is a shaped-cascade using a fall of 366 meters.

La Garita Hydroelectric Plant

This hydroelectric plant was the first one built ICE in 1958 and it is located in Alajuela, between La Garita and Turrucares and it uses the waters of the Grande River of San Ramon.

Ventanas Hydroelectric Plant

In 1987 came into operation this hydroelectric plant as an extension of La Garita Hydroelectric Plant. It uses the waters of the Virilla and Ciruelas Rivers and it has a power of 97 380kW.

Macho River Hydroelectric Plant

It is located in Orosi Valley, in Cartago. The initial capacity was of 120 000 KW using the waters from the Macho River, the Grande of Tapantí (formed by the Blanco and Pejiballe Rivers). These units came into operation on June 1st, 1963. This hydroelectric plant uses the waters of the Reventazon River basin.

Cachí Hydroelectric Plant

Cachí Hydroelectric Plant came into operation in 1966. It is the second use of the waters of the middle basin of the Reventazon River. This plant is between Cachí of Paraíso and Bajo Del Congo Tucurrique, in Cartago. The water exploitation is achieved using the waters of the Macho River (cascade system) plus the waters of the Reventazon, the Navarro and the Agua Caliente Rivers.

Angostura Hydroelectric Plant

It is the third use of the Reventazon River basin. It is located in Turrialba, Cartago; it uses the waters of the basin of the Reventazón River and the Tuis and Turrialba Rivers. It came into operation on October 17th, 2000.

Cariblanco Hydroelectric Plant

It is located in San Miguel of Sarapiqui, in Alajuela on the Sarapiqui River and it came into operation in 2006 and it benefits the communities of Cinchona, Virgen del Socorro, Cariblanco, Los Angeles de Pata de Gallo, Ujarrás, San Miguel and the Colonia del Toro Amarillo. The installed capacity before the earthquake on January 8th, 2009 was of 88 MW (128 000kW) of electricity. The annual generation is 325 GWh. The damages caused by the earthquake remained the plant out of operation for a year approximately (Oviedo, E. 2009)

Alberto Echandi Hydroelectric Plant

It was rebuilt in 1990. It is located in Bajo Cambronero in San Ramon of Alajuela, and it uses the waters of the Barranca River.

4.2.2 Estimation of the Economic Contribution of the ASP to the Electric Generation

For the economic estimation of the contribution that the ASP generate to the social and economic development as result of the electric generation with water sources, it was considered for the years 2007, 2008 and 2009 the total production of electricity per plant. As approximation to the actual total contribution of the income that the activity generates, having considered the total of energy produced annually, it was multiplied by its average market price. In this way it is calculated an estimate of the income generated in quality of the sale of electricity for the sector including other chaining, transmission, distribution and marketing. Chart 7 summarizes the gross generation per plant.

Chart 7
Gross generation - interchange – national consumption (Mwh)
Hydroelectric Plants that use the waters from the Protected Wildlife Areas
(2007-2009)

Hydroelectric Plants	MWH		
	2007	2008	2009
Garita	195.352,48	111.952,96	173.313,60
Ventanas Garita	465.271,63	507.921,19	426.691,64
Macho River	587.892,58	539.059,92	497.284,05
Cachí	629.251,45	643.318,22	628.600,21
Angostura	874.523,53	903.452,81	866.954,12
Arenal	644.925,79	788.676,12	911.421,40
Dengo	754.079,67	847.027,46	972.432,85
Sandillal	118.918,74	150.850,45	161.094,26
Toro I	94.436,50	108.365,71	101.397,03
Toro II	255.578,63	284.006,13	255.487,12
Peñas Blancas	170.907,90	161.875,00	159.562,00
Cariblanco	140.075,75	298.939,28	152.929,74

Source: ICE (2009 and 2010)

For purposes of estimating the total income by sales of energy, was taken into account only the hydroelectric generation in projects located in places near to the PNRB. In this regard, the data presented in chart 8 include only the projects that meet with such characteristics, whose methodology of calculation is exposed following.

Given that the Average price of electricity of ICE for 2007 was of ¢46.33Kw/h, 2008 of ¢56.58 Kw/h and 2009 ¢75.22 Kw/h respectively, the additional benefit that provide the ASP in terms of preservation and protection of the sources of water for their exploitation in the hydroelectric sector and measured in monetary terms due to the incomes generated to the energy sector is estimated in a total amount of approximately $220.6 million dollars for 2007, for 2008 its contribution represented $294.4 million dollars, and in relation to 2009 was of $357.9 million dollars, just as is observed in chart 8. When using the price of the electricity as an indicator of real income indirectly are being considered the chainings that the sector produces in terms of transmission, distribution and marketing of the electricity (see annexes).

Chart 8
Estimation of the total income by sales of energy hydroelectric generation in projects near to PNRB 2007-2009

	2007	2008	2009
Average price of electricity	46,33 Kw/h	56,58 Kw/h	75,22 Kw/h
Hydroelectric Generation KWH**	2.459.809.587,60	2.738.217.667,80	2.728.560.465,6
Total Income in Colones	**113.962.978.193,51**	**154.928.355.644,12**	**205.242.318.222,43**
Total Income in Dollars*	**$220.593.430,75**	**$294.411.864,86**	**$357.968.115,02**

Source: Own elaboration based on data provided by Segura W., 2009 and DSE 2010a.
*Exchange rate: 2007 is ₡516, 62, 2008 is ₡526, 23 and 2009 is ₡573, 35
** Estimation based on the information sent by Pérez, J. 2010 and DSE 2010b.

4.3 Generation of Direct and Indirect Employment

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

Chart 9 shows the distribution of the staff per Conservation Area and category. In this regard, is observed that 317 officials occupy the category of others, which include cleaners, security guards, office workers and others who work in the whole System, being the Osa Conservation Area the one that has the greater number (23,97%), that also reflects a bigger amount of personnel in comparison to the rest (17,72%). For its part, Central Pacific Conservation Area is the one that presents the lowest percentage of the category of others (0, 31%); but Marine Cocos Island is the one that has lowest amount of personnel in relation to the al rest of the areas (3, 75%).

Chart 9.
Distribution of the staff located in the state protected wildlife areas per conservation area*. 2009

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

*The data correspond to state official staff distinguished in the ASP.
**Others: cleaners, security guard, office workers and others
Source: National Report SINAC-MINAE 2010.

4.4 Visitation of Protected Wildlife Areas

According to data provided by the National Report about Protected Wildlife Areas of Costa Rica (SINAC-MINAE 2007a), the ASP had approximately 1.2 million of visitors in 2009, of which 54.18% were foreigners and 45.82% national.

Chart 10 shows the number of visits received to the ASP from 1990 to 2009, showing an increasing trend of between 6% and 8% from 2001 to 2004, then, 2005 was a year of poor growth in the number of visitors, only 0.3%, recovering in 2006 with a higher growth rate compared with previous years (12.6%).

Chart 10
Visitation and incomes in the quality of visitation to the PNRB Period 1990-2009

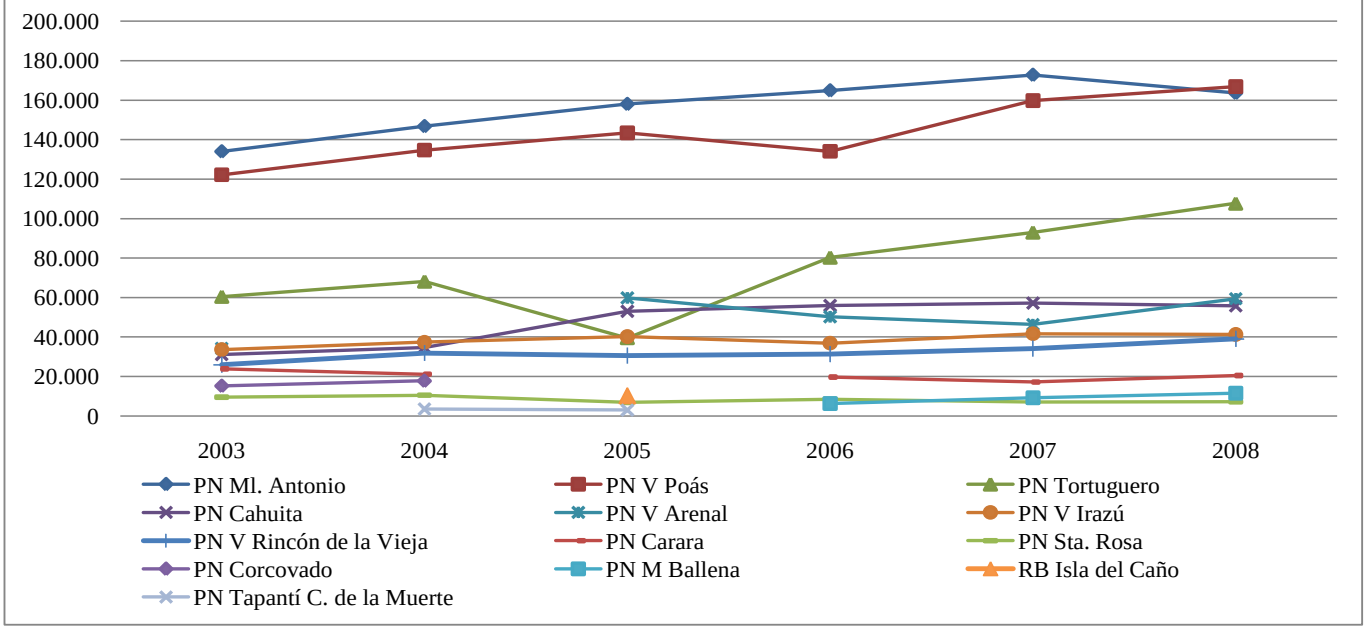
Year	National Visitors	Foreign Visitors	Total of visitors		Million colones	Thousand dollars	
			Number	Growth Rate		US$	Growth Rate
1990	304.642	206.591	511.233		24	242	
1991	226.655	265.679	492.334	-3,70	40	340	40,50
1992	255.322	324.495	579.817	17,77	76	579	70,29
1993	367.683	378.286	772.025	28,66	147	1.016	75,47
1994	322.148	378.286	700.434	-6,10	237	1.501	47,74
1995	362.341	251.740	614.081	-12,33	465	2.585	72,22
1996	389.883	268.774	658.657	7,26	290	1.526	-40,97
1997	452.680	290.081	742.761	12,77	396	2.584	69,33
1998	485.950	324.148	810.098	9,07	442	1.590	-38,47
1999	495.829	370.254	866.083	6,91	817	2.817	77,17
2000	471.528	340.574	812.102	-6,23	752	2.549	-9,51
2001	479.853	381.373	861.226	6,05	1.002	2.947	15,61
2002	507.801	411.831	919.632	6,78	1.137	3.248	10,21
2003	463.602	530.777	994.379	8,13	1.747	4.384	34,98
2004	476.633	586.959	1.063.592	6,96	2.120	4.842	10,43
2005	455.487	611.334	1.066.821	0,30	2.415	5.055	4,41
2006	556.141	645.056	1.201.197	12,60	2.556	4.999	-1,10
2007	598.812	708.018	1.306.830	8,79	2.807	5.433	8,68
2008*	632.462	745.668	1.378.130	5,46	3.316	6.301	15,98
2009*	580.942	686.937	1.267.897**	-8,00	4.001	6.979	10,75

Source: Own elaboration based on SINAC (2009 and 2010).
*The incomes from 2008 and 2009, were obtained from the reports provided by SINAC, for each period and the exchange rate for 2008 was ₡526, 23 and 2009 ₡573, 35
** Own calculations based on information from Arce (2010)

Clearly, there is a relative shift towards a greater visitation of the PN; however, the rate at which the visitation grows, begins to decrease in 2007 probably as a result of the international context, which is evident with the rate of 5,46% of 2008 and the decrease of 8% in 2009, that could demonstrate the repercussions of the economic crisis. On the other hand, the contribution of the PN in terms of generation of public incomes denominated in dollars shows a significant decrease if it is considered the period between 2004 and 2009.

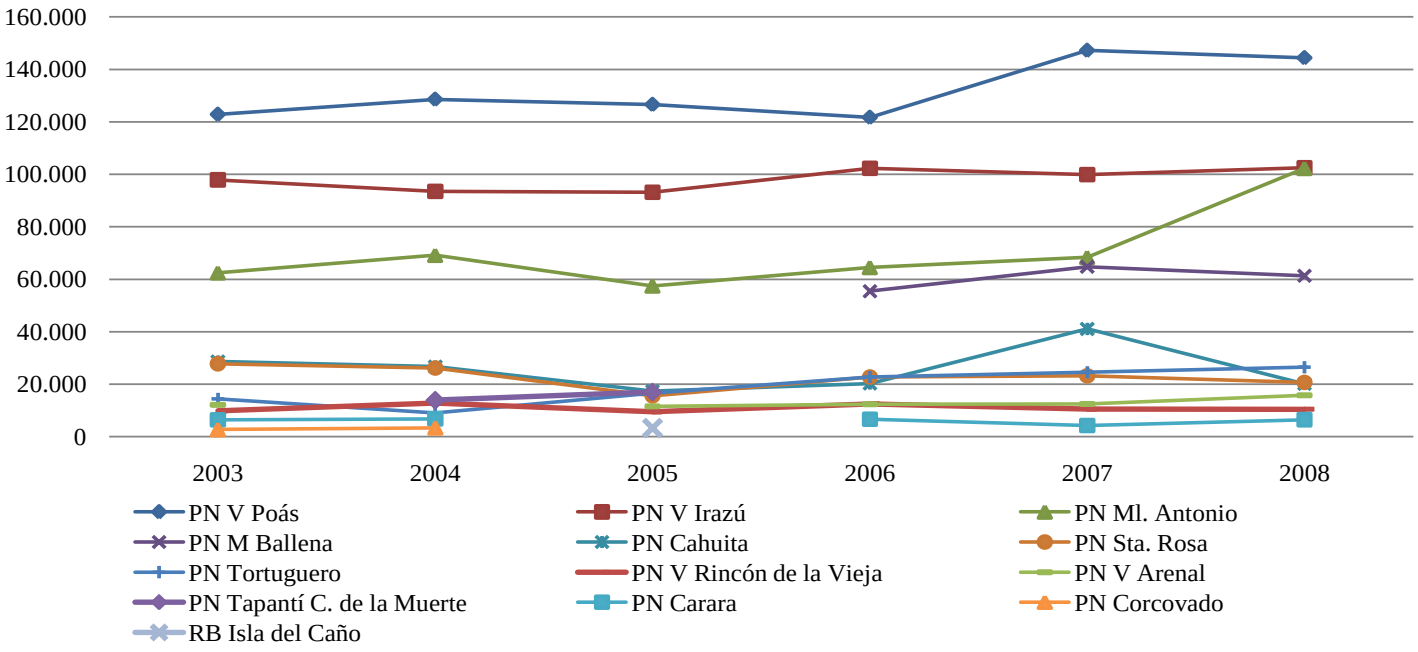
To illustrate, are presented graphs 1 and 2, which show the national parks with higher visitation for the period 2003-2008, including both residents and non-residents. As it is shown in Graph 1, the most visited parks by non-residents are Manuel Antonio, Poas and Tortuguero. On the other hand, and as it is shown in Graph 2, visitors who are residents visited more the parks: Poas Volcano, Irazu, and Manuel Antonio.

Gráfico 1. Número de Visitantes no residentes a Áreas Silvestre Protegidas. 2003 - 2008



Source: Own elaboration based on data from SINAC (2009 and 2010).

Graph 2. Number of Resident Visitors to Protected Wildlife Areas 2003 - 2008



Source: Own elaboration based on data from SINAC (2009 and 2010).

The influx of visitors for each one of the PN and RB (separately and differentiating between national and foreign visitors in 2008) it is shown in Charts 11a and 11b, where is observed that in the major "*centers*" of attraction of tourists and therefore for generating incomes by selling tickets, are: the Poas NP, Manuel Antonio NP, the Irazu NP and Tortuguero NP. Some of the reasons by which these parks are the most visited, could be: i) their natural attractions, ii) their proximity to the most populated provinces of the country such as San Jose, Alajuela and Heredia, iii) their proximity to Juan Santa Maria International Airport iv) easier access (paved roads, good bus service, etc..) among others.

Chart 11a.
National Parks Visitation residents and non-residents. Year 2008

National Parks	SUBTOTAL		TOTAL
	Residents	Non-residents	
PNV Poás	144.399	166.883	311.282
PN Ml. Antonio	102.260	163.662	265.922
PNV Irazú	102.540	41.316	143.856
PN Tortuguero	26.469	107.756	134.225
PN Cahuita	36.677	59.879	96.556
PNM Arenal	15.763	59.397	75.160
PNV Ballena	61.355	11.521	72.876
PNV Rincón de la Vieja	10.477	39.034	49.511
PN Sta. Rosa	20.707	7.159	27.866
PN Carara	6.488	20.438	26.926
PN Corcovado	4.863	20.282	25.145
PN Tenorio Volcano	14.318	5.744	20.062
PN Braulio Carrillo	12.341	2.912	15.253
PN Tapantí	11.194	2.166	13.360
PNV Turrialba	8.483	3.059	11.542
PN Chirripó	4.123	1.898	6.021
PN Palo Verde	3.299	2.248	5.547
PN Barra Honda	2.996	685	3.681
PN Cocos Island	1.149	2.045	3.194
PN Las Baulas	473	2.001	2.474
PN La Cangreja	1.114	93	1.207
PN Barbilla	486	119	605
PN Diría	389	32	421
PN Guanacaste	12	163	175
PN Piedras Blancas	21	145	166
PN Internacional la Amistad	47	75	122
PN Los quetzales	N.D	N.D	0

Source: SINAC (2010)

Chart11b.
Biological Reserves Visitation residents and non-residents Year 2008

Biological Reserves	SUBTOTAL		TOTAL
	Residents	Non-residents	
Alberto Manuel Brenes	N.D	N.D	N.D
Isla del Caño	6.073	13.424	19.497
Isla Guayabo	11.128	3.744	14.872
Isla Pájaros	N.D	N.D	N.D
Isla Negritos	N.D	N.D	N.D
Hitoy Cerere	695	133	828
Lomas de Barbudal	163	57	220
Cerro las Vueltas	N.D	N.D	N.D
TOTAL PN AND RB	**610.502**	**738.070**	**1.348.572**

Source: SINAC (2010).

4.5 Resources for the Conservation of Protected Wildlife Areas

4.5.1 Main sources of income of SINAC

According to the stipulations of the National Report about the System of Protected Wildlife Areas 2007, the incomes of SINAC come from the following sources of income:

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

Different mechanisms are used in the management of such incomes. Among them, the Ordinary Budget of the Republic, National Parks Fund (in the quality of fiscal stamps, admission fees to the ASP and fees of services provided in such areas), the Forest Fund and the Wildlife Fund (collectively with the Special Funds), foundations and allied organizations (SINAC-MINAE, 2007c).

The ordinary budget is approved annually by The Treasury Department, where is sent later to the Legislative Assembly for the definitive approval. The budgets from the National Parks, Forest and Wildlife Funds, are approved by The Treasury Department, specifically by the Technical Secretariat of the Budget Authority and the National Comptroller's Office. For its part, the private resources coming from the donations, private contributions, local cooperation, foundations, and associations, in its majority are negotiated via budget with the donor; who establishes the regular recurrence and the permanence.

Chart 12 details the actual incomes of SINAC for the period 2007-2009 both in colones and dollars. Actual incomes are all incomes received by SINAC and are subject to budget approval processes. That is, they are the total incomes previous to the budget process and approval of public funds by the competent authorities (SINAC-MINAE, 2006a).

Chart 12
National System of Conservation Areas
Actual Total Incomes SINAC 2007-2009 (in colones)

Sources of Income	2007		2008		2009	
	Colones	Dollars	Colones	Dollars	Colones	Dollars
Ordinary* Budget	6.937.443.849	13.341.152	9.224.361.787	17.404.285	12.334.520.314**	21.715.912
Fund of National Parks	5.601.134.868	10.771.343	8.533.332.344	16.100.469	10.025.882.116***	17.651.370
Forest Fund	957.147.275	1.840.656	1.857.881.307	3.505.402	1.168.028.244	2.056.407
Wildlife Fund	225.602.604	433.848	391.592.035	738.846	327.341.608	576.311
TOTAL	**13.721.328.596**	**26.386.999**	**20.007.167.474**	**37.749.001**	**23.855.772.282**	**42.000.000**

*****The amount that is specified in the ordinary budget does not consider the money for the payment of the land that is also financed with this item.
****** From this amount is registered 8.944.512.321, 90 in Chart 1 as contributions in the quality of generation of direct employment.
*******Amount considered in Chart 1 as contributions in the quality of tickets to the PNRB, to this are deducted 2.779.071.677, 97 as contributions in the quality of generation of direct employment.
Exchange rate used: in 2007 of ₡520, in 2008 of ₡530 and in 2009 of ₡567.

Source: Source: Own elaboration with information from SINAC-MINAE (2007c) and SINAC (2009 y 2010b).

On the other hand, the approved incomes (Chart 13) are those resources that by law correspond to SINAC to collect directly or indirectly, either through the Conservation Areas, or as a result of coordination with other institutions. Moreover, these approved incomes are subject to approval by various departments such as the Legislative Assembly, Department of the Treasury, the National Comptroller's Office, historically most items are represented by the Ordinary Budget and the fund of National Parks.

The incomes that come from the ordinary budget finance the wages of the officials of SINAC. The funds created by special laws, that is, from the funds like the one of National Parks Forest Fund and Wildlife Fund; complement the investment of the State through the ordinary budget of the Republic. According to the stipulations of the National Report about the System of Protected Wildlife Areas 2006, these funds are used to finance most of the operational items such as fuel, materials and supplies, equipment and traveling expenses.

Chart 13
National System of Conservation Areas
Approved Total Incomes SINAC 2007-2009 (in colones)

Sources of Income	2007		2008		2009	
	Colones	Dollars	Colones	Dollars	Colones	Dollars
OrdinaryBudget*	7.437.087.064	14.301.998	9.294.900.000	17.537.374	12.419.525.677	21.865.571
Fund of National Parks	4.663.734.074	8.968.661	5.473.626.269	10.327.495	9.862.106.473	17.363.029
Forest Fund	371.296.000	714.026	1.027.498.185	1.938.657	382.268.990	673.015
Wildlife Fund	59.230.000	113.903	136.033.404	256.664	18.128.774	31.917
TOTAL	**12.531.347.138**	**24.098.588**	**15.932.057.859**	**30.060.191**	**22.682.029.914**	**39.933.533**

*The amount that is specified in the ordinary budget does not consider the money for the payment of the land that is also financed with this item.
Exchange rate used: in 2007 of ₡520, in 2008 of ₡530 and in 2009 of ₡567.99

Source: Own elaboration with information from SINAC-MINAE 2007c and SINAC 2009 and 2010b.

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

The collection of tax incomes coming from the Pro Parks fiscal stamp is responsibility of each Municipality located inside the Conservation Area (AC). Besides, SINAC receives incomes through this same pro park fiscal stamp collected from institutions located in the metropolitan area.[14] Meanwhile, the sale of goods and services and ticket fees in the ASP are the items whose collection is done directly on the AC specifically in the entrance post (SINAC-MINAE 2007b).

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

[14] For example, the Public Registry, Department of Immigration and Foreign Services and the General Chancellery of the Republic (from the Ministry of Foreign Affairs and Culture)

Meanwhile, the Wildlife Fund is composed of tax and non-tax incomes, operational incomes, taxes and rates, financial incomes, transfers and surplus. This fund entrusted with the collection of the incomes of wildlife fiscal stamp, import and export of flora and fauna as well as those related to wildlife refuges with activities with the ticket fee, permissions of use or research, licenses for hunting and fishing. Tax incomes correspond to the incomes of the wildlife fiscal stamp, while operational incomes are those coming from the sale of hunting and fishing licenses, the fees and taxes are incomes of the wildlife refuges and financial incomes are the interest earned on current accounts.

The surplus is the result of incomes established by Law, which are executed in the corresponding budget period. This one is generated in two different ways. First, as result of problems of contracting where is not achieved to execute the total of the budget approved. Second, the existence of a bigger collection of actual incomes in comparison to the incomes showed.

Finally, SINAC receives incomes coming from international projects that are projects of technical and financial cooperation to support the management of wildlife areas, which have also contributed greatly to their development (MINAE-UICN, 2006). Chart 14 shows the incomes from this item for the period 2004-2009.

Chart 14
Budget of Cooperation (Agreements and Projects of SINAC)
2004-2009

Year	Amount assigned (in thousand colones)	Amount assigned (in thousand US/$)
2004	1.564.181	3.128
2005	1.958.695	3.917
2006	1.511.641	3.023
2007*	1.996.813	3.840
2008*	2.035.220	3.840
2009*	2.181.099	3.840

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

SINAC has subscribed 87 valid cooperation agreements with state institutions and organizations of private nature (like associations and national and international foundations), which are found directly related to the management of the ASP, during the period among 2006-2009 (SINAC-MINAET 2010).

Some of the cooperation agreements, have been subscribed with strategic members from SINAC such as the case of the National Institute of Biodiversity (INBio), State Universities, Associations and conservation foundations and public institutions and prívate entities, which contribute to the sustainable management of the ASP, in order to consolidate and complement the actions that SINAC develops, strengthening the action lines of SINAC for the administration in charge of the ASP, in aspects such as volunteering, protection and control of natural resources and biodiversity, environmental education, administration and management of the ASP, training and research.


Photo: C. Mora, 2010

In the period among 2004-2009, SINAC has executed 9 cooperation projects related to the Protected Wildlife Areas (ASP), whose work lines are focused mainly on management, conservation and consolidation of marine and terrestrial ASPs, integrated management of hydrographical basins, including the ASP located in these ones, integrated management of the territory, strengthening of the tourist activity in the ASP and reduction of negative impacts on ecosystems by the anthropogenic action. The total amount of the contribution of the cooperator of the cooperation projects is an amount of US$11.404.423; on the other hand, the counterpart of SINAC and the co-financing for the implementation of these projects amounts to the sum of US$35.436.589. During this period, is estimated that the amount executed of such projects is approximately of US$3.840.000, calculated based on the annual budget execution of each one of these. (SINAC-MINAET 2010).

4.6 Natural Heritage of the State (PNE) (Purchasing of Lands)

According to the national legislation the Natural Heritage of the State (PNE) consists of forests and forest lands of the national reserves, areas declared inalienable and other lands registered in their name, (Forest Law No. 7575 (1996). The Land Law and Settlement No. 2825 (1962) and the Law of Maritime Terrestrial Zone No. 6043 (1977) also added the maritime terrestrial zone, the areas of protection of water resources, the peaks of the mountains and others.

According to the Forest Law No. 7575 all these lands have to be registered on the behalf of the State in the General Attorney of the Republic, including those that are acquired by NGO on the behalf of the Costa Rican State. In addition, the National Lands Register law No. 6545 (1981), the Law on Certification of National Reserves No. 7599 (1996) and Law of Possession Information No. 139 (1941), govern the registration of cadastral plans and procedures for possessory information. The Expropriation Law No. 7495 (1995) establishes legal procedures for expropriation and register properties on the behalf of the State, when deemed necessary (mainly to create national parks and biological reserves) (SINAC-MINAET 2010).

The State has reduced the allocation of resources giving less than ¢1,000 million colones in the last three years, an amount less than it contributed in previous years. For 2008 and 2009, resources were allocated for ¢1.000.000.000.00, being executed for the 2008 ¢994,751,410.50 and for 2009 ¢897,412,505.00 (SINAC 2010b) which shows a deduction of 14, 68% in the resources executed from 2007 to 2009 (see chart 15).

Chart 15
Purchasing of Lands 2007-2009

Year	Amount executed	Growth Rate
2007	1.051.832.765	
2008	994.751.411	-5,43
2009	897.412.505	-9,79

Source: Own elaboration

4.7 Payment for Environmental Services (PSA)

Costa Rica has an innovative program, which is constantly in evolution: Payment for Environmental Services (PSA). This began in 1997 and it has established contracts for about 600,000 hectares in the modalities of protection, reforestation and agroforestry systems throughout the country during the period 1997-2008. The PSA has played an important role in the consolidation and protection of Protected Wildlife Areas in Costa Rica. Even though, about 87% of the national parks and biological reserves are State ownership, the remaining 13% remains in the hands of private owners. The PSA gives priority to private landowners who own lands within national parks, in their buffer zones or in biological corridors.

4.7.1 Legal Framework of PSA

The forest administration of the State is the responsibility of MINAET, both FONAFIFO as well as SINAC have responsibilities in the promotion of forest sector and between the mechanisms for this purpose lays the PSA. On April 16th, 1996, the Forest Law (Law No. 7575) is approved in Costa Rica and its implementation starts in 1997. In section k) of Chapter 3, environmental services are defined as "those that offer the forest and forest plantations, which directly affect the protection and enhancement of the environment.
Environmental services recognized by this law are: i) mitigation of greenhouse gases (fixation, reduction, storage and absorption), ii) protection of water resources for urban, rural or hydroelectric usage iii)) protection of biodiversity for its conservation and scientific and pharmaceutical sustainable use, research and genetic improvement, protection of ecosystems and life forms, and iv) natural scenic beauty for tourism and scientific purposes".

In this same law (chapter II, article 46), is indicated the creation of FONAFIFO, "which aims to finance, for the benefit of small and medium producers, through credits or other mechanisms for promoting forest management forming part or not, of processes of afforestation, reforestation, agro-forestry systems, technological recovery of special areas and changes in usage and industrialization of forest resources. Additionally, FONAFIFO will capture financing for PSA that the forest offers, forest plantations and other activities to strengthen the development of the sector of natural resources, which will be established in the regulation of this law".

Both the creation of the Law 7575 and the PSA are the result of a process of construction of institutional capacities that has been implemented in Costa Rica for decades. A number of characteristic factors of the country make possible the formation of an institutional framework, with legal, organizational solidity and social bases. The legal structure of PSA complements the Law No.7575 with annual executive decrees in which are specified the amount of hectares that will be incorporated into the PSA, authorized payment amounts per hectare and the high priority areas for the assignment of such payments. The application of those laws begins when they are published in the Official Newspaper the Gazette.

FONAFIFO also has manuals of procedures for PSA, which annually take effect after its publication in the official newspaper the Gazette. In Executive Decree 33226-MINAE in May, 2006 (The Gazette, 2006), the high priority areas for PSA are the following:

Projects of reforestation:

The criteria of high priority for the implementation of reforestation projects include the areas without forest, which meet the following criteria:

a) Sites that present / display a high potential for the development of forest plantations (classes of capacity of usage III, IV, V and VI).

b) Sites where there is a high potential to establish plantation blocks, giving special priority to projects that use genetically improved material.

c) Areas containing reforestation projects financed through incentives that have been executed and which have approved extraction plans.

d) For reforestation projects with native species, established as of high priority and that are considered in decrees of prohibition and threatened or endangered species (Decree No. 25663-MINAE (1996) and Decree No. 25700-MINAE (1997) and its amendments).

e) In the inner of the areas listed in the previous points a), b), c) and d), giving priority to those located in the cantons with a Social Development Index (IDS) of less than 40%.

Projects of reforestation in pasturelands and shrublands, through the natural regeneration:

This will be implemented only in the areas defined as Kyoto lands. This is that they have been deforested before December 31st, 1989, and they are located in the regions of Chorotega, Central Pacific and Brunca of Costa Rica according to the administrative division of MIDEPLAN.

Projects of protection of forests

a) Sites located in biological corridors officially recognized by SINAC until 2003 at the national level. As well as the areas considered in the GRUAS Report. These are considered as priority number one to join the PSA.

b) Protection projects that meet what is established in the previous point, those who have signed contracts in previous years, and who have completed its period of usage.


Photo: C. Mora, 2009

c) Areas of forest whose primary function is the protection of water resource that is considered of interest to rural aqueducts, projects of AyA and the companies of public services.

d) Lands located in private property within protected wildlife areas and those that have not been yet acquired or expropriated by the State.

e) In the inner of the areas listed in the previous points a), b), c) and d) priority to be placed in the cantons with a Social Development Index (IDS), less than 40%.

Projects of Agroforestry Systems

a) Those projects of organizations that have an existing agreement with FONAFIFO will have priority.

b) Land with capacity of usage VI, V, IV, and III in order of priority.

c) Private lands located in biological corridors.

The amounts for PSA in each modality are set by law as follows:

Chart 16
Amounts for the PSA according to Modality

Amounts	Modality	Code
320	PROTECTION	22
816	REFORESTATION	20
205	REGENERATION	28
816	REGENERATION WITH PRODUCTIVE POTENTIAL	25
1,3	AGROFORESTRY SYSTEMS	23
320	PROTECTION OF WATER RESOURCES	222
816	VARIED REFORESTATION	26

Source: Data from Méndez (2009).

4.7.2 PSA in or around the PNRB

As it was mentioned before, the lands located in the surroundings or inside the national parks will have priority in the assignment of the PSA. During the period 2005-2009, the FONAFIFO has paid a total of US$241, 984, 81 in these areas, as it is shown in Chart 17.

Chart 17
PSA in surrounding areas and inside the National Parks and Biological Reserves
2005-2009

Year	Conservation Area	PNRB	Modality	Payment (US$)	Hectares trees (1000 m^2)
2005	ACT	Diría	Reforestation (US$816/ha.)	10.608	13
	ACT	Diría	Protection (US$320/ha.)	354.400	1120,5
	ACCVC	Braulio Carrillo			
	ACA-HN	Juan Castro Blanco			
		Arenal			
	ACOPAC	La Cangreja			
	ACOSA	Piedras Blancas			
TOTAL				**365.008**	**1133,50**
2006	ACT	Diría	Reforestation (US$816/ha.)	149.440	467
	ACA-HN	Juan Castro Blanco			
	ACLA-C	Internacional La Amistad	Regeneration (US$816/ha.)	18.360	22,50
TOTAL				**365.008**	**489,50**
2007	ACT	Diría	Reforestation (US$816/ha.)	222.574.4	630,6
	ACA-T	Tenorio Volcano			
	ACA-HN	Juan Castro Blanco			
	ACOPAC	La Cangreja			
	ACOPAC	La Cangreja	Regeneration (US$816/ha.)	2562,5	12,50
TOTAL				**225.136,9**	**643,1**
2008*	ACT	Diría	Reforestation (US$816/ha.)	253.517	630,6
	ACA-T	Tenorio Volcano			
	ACA-HN	Juan Castro Blanco			
	ACOPAC	La Cangreja			
	ACOPAC	La Cangreja	Regeneration (US$816/ha.)	2.919	12,5
TOTAL				**256.436,19**	**643,1**
2009*	ACT	Diría	Reforestation (US$816/ha.)	239.231	630,6
	ACA-T	Tenorio Volcano			
	ACA-HN	Juan Castro Blanco			
	ACOPAC	La Cangreja			
	ACOPAC	La Cangreja	Regeneration (US$816/ha.)	2.754	12,5
TOTAL				**241.984,81**	**643,1**

Source: Own elaboration based on Méndez (2009).
*Estimation of 2008 and 2009, it was made using an inflation of the IPC to 2008 of 13.90% and a type of exchange rate of ₡520, and to 2009 an inflation of the IPC of 4.05% and a type of exchange rate ₡573.35.

4.8 Biodiversity, Bioprospection and Scientific Research in the PNRB

Costa Rica is ranked among the 20 richest countries in biodiversity on the planet. Taking into account the density of species (number of species per unit of area), our country could take the first places in the world. By the end of the twentieth century, about 90,000 species are discovered in Costa Rica, representing approximately 17% of the country's biodiversity, which is considered in at least 500,000 species (Obando et al, 2008).

Additionally, Costa Rica has an unquestioned leadership in the issue of bioprospection. This consists of a systematic search for direct uses of biodiversity through the use of tools of modern science and high technology. Thus, bioprospection seeks microorganisms, chemicals, molecules, genes and other components of the species with potential to be used in the manufacturing of products with economic interest (Obando et al, 2008).

Costa Rica has a framework for the prospection of biodiversity and basic research. The National Commission for Biodiversity Management (CONAGEBIO) is created within the framework of the Convention on Biological Diversity, and based on Article 14 of the Biodiversity Law (Law No. 7788, on April 30th, 1998); as a decentralized body of the Ministry of Environment and Energy, with instrumental lawful duties. CONAGEBIO works with the aim of consolidating technically a national authority to rule policies for the conservation, ecologically sustainable use and restoration of biodiversity, which serves as an advisory body for technical and independent institutions in biodiversity matters. In this way, the consultations should be presented to the committee in advance to provide authorization for national or international agreements and to establish or endorse actions or policies that affect the conservation and use of biodiversity (CONAGEBIO, 2009). CONAGEBIO approves all projects in basic research or prospection of the biodiversity that are implemented in Costa Rica. During the period 2004-2008, a total of 102 projects of basic research and 19 of prospection of the biodiversity have been approved (Chart 18).

Chart 18
Projects approved by CONAGEBIO

Type of Project	2004	2005	2006	2007	2008	Total
Basic Research	2	24	21	22	33	102
Prospection of Biodiversity	2	4	4	6	3	19

Source: CONAGEBIO, 2009

In accordance with Article 19 of the Biodiversity Law, the sources for the operation of CONAGEBIO are different, because they come from the Fiscal Stamp of National Parks, from the code assigned from the ordinary and extraordinary budgets of the Republic, contributions and donations, the income in the quality of records, procedures of application and monitoring, the implementation of access projects, a percentage of the benefits derived from the respective permissions, and concessions related to biodiversity. The administration of these resources is regulated in Article 20 of the Biodiversity Law (CONAGEBIO, 2009).

In Costa Rica, some institutions such as the EARTH, CATIE and INBIO develop research and prospection of biodiversity in national parks. This implies access to and use of genetic and biochemical resources of the Costa Rican biodiversity (Guevara, 2009a).


Photo: C. Mora, 2010

According to the statistics generated by both the SINAC and CONAGEBIO, INBIO is the only institution that has made deposits of funds, in the quality of contracts of Prior Informed Consensus (CPI). Whose figure is created through the Convention on Biological Diversity (CBD) and it is specifically contained in the Biodiversity Law (Law No. 7788) and in the Access Rules (Induni, 2007).

As it is shown in chart 19, during the period 2004-2010, have been developed projects by US$1.364.807, 99 in funds of projects for Conservation Areas, of which have been deposited to MINAET a total of US$57.275.51 corresponds to the percentage agreed in the quality of access to the elements and resources of biodiversity on basic research and prospection of biodiversity that provide some projects to MINAET. Taking into consideration the amounts in the quality of basic research and bioprospection during these 7 years, the year of greatest generation of income was 2007 with 25, 39%, and the year of lowest generation was 2008 with 5, 33%. It is evident a relatively constant behavior in the generation of flows of direct economic benefits associated with this type of researchers.

Chart 19
Projects of Basic Research and Prospection of Biodiversity of INBIO

Year	*Type of Permission*	*Total Amount US$*	*Payment of 10% to MINAET US$*	*Percentage per year*
2004	Bioprospection	179.090,00	17.909,00	13,12
2005	Bioprospection	92.636,90	9.263,69	6,79
2007	Basic Research	346.480,00	14.648,00	25,39
2008	Bioprospection	72.730,00	7.273,00	5,33
2008	Basic Research	175.000,00		12,82
2009	Bioprospection	81.818,20	8.181,82	5,99
2009	Basic Research	130.707,89		9,58
2010	Basic Research	273.345,00		20,03
-	Basic Research	13.000,00		0,95
Total		***1.364.807,99***	***57.275,51***	***100,00***

Source: Data provided by Guevara (2009), V Obando (2010) and N Marrin (2010)**.**
*It corresponds to the projects that provided 10% to MINAET

4.9 Other Contributions

Estimation of Carbon CO_2

As is has been mentioned in previous sections of this document, the PNRB provide the environmental service of sequestration of greenhouse gases, which include the carbon dioxide (CO_2). This one has been marked as the main cause of the phenomenon of Climate Change (IPCC, 2007). In this context, the presence of the forests has been marked as positive in terms of the environmental service that contributes to mitigate the negative impacts of the variations in the climate patterns.[15]

In response to this phenomenon, Costa Rica has developed the National Strategy of Climate Change in the framework of the National Plan of Development of Costa Rica (2007-2010), and the presidential initiative Peace with Nature. Both established a proposal of the framework of concrete actions of the State for the intervention before the climate change (ENCC, 2008). Everything aimed at changing Costa Rica into a Carbon Neutral territory for 2021 (year of the bicentenary of independence).

This document shows estimation about the environmental service of storage of carbon dioxide (CO_2), which is reported by the existence of the PNRB. In this regard, the calculation includes the storage of CO_2 both on grounds and biomass for the case of the existing forests in the PNRB. Chart 20 shows that a total of 143.316.338 tons of CO_2 are storaged by the grounds and forests located in PNRB, which implies 76.435.380 tons of CO_2 in National Parks and 66.880.958 tons of CO_2 in Biological Reserves.

Chart 20
Storage of CO2 on grounds and biomass of the PNRB

Type of storage of CO_2	National Parks		Biological Reserves	
	(t C/ha)	Equivalent in US$	(t C/ha)	Equivalent in US$
Average storage in tropical forest of PNRB	47.461.680	201.712.140	41.528.970	176.498.123
Average storage in grounds of tropical forest of PNRB	28.973.700	123.138.225	25.351.988	107.745.947
TOTAL STORAGE	**76.435.380**	**324.850.365**	**66.880.958**	**284.244.069**
GREAT TOTAL STORAGE PNRB	**143.316.338**			**US$ 609.094.434**

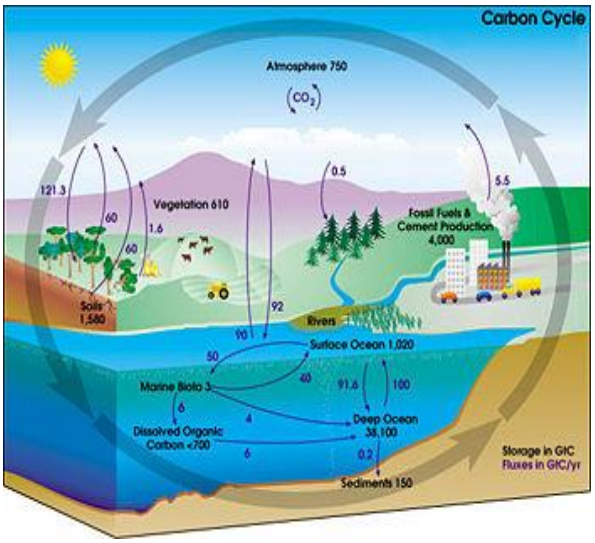
Source: Own elaboration with information from INBio (2004); ENCC (2008); and Russo (without).

[15] The storaged biomass in the PNRB avoids that CO_2 is released to the atmosphere, where would contribute to the increase of temperature of the planet. This implies that a series of negative effects forecasted, which include floods, economic loss, movement of populations, disappearance of insular and coastal territories, among others.

This estimation is aimed at contributing in the establishment both the C-Neutral Regulation and the Process of C-Neutral Certification of Costa Rica. It seems that these tons of CO_2 storaged in PNRB are translated into monetary terms following the range of prices established in ENCC (2008).[16] Giving as result that the service of storage of CO_2 that provide the PNRB represent US$ 609.094.434, which implies the contributions of National Parks (US$ 324.850.365) and Biological Reserves (US$ 284.244.069). This figure takes importance in the case that a market of emissions works in the practice, since this would imply a valuable source of incomes for SINAC. These ones could be invested in the management of the ASP.

The estimated figure though very valuable is subject to the establishment of a market of emissions of CO_2 that allows that who pollute, offset their emissions to the ecosystems that storage such gas. Unfortunately, the current conditions are presented as gloomy for the establishment of a market of emissions of CO_2. As for, diverse topics related to the adaptation of the climate change, continue pending to solve.[17]

Despite the Aqueduct of Copenhague was reached among the main economies (responsible of the greatest levels of emissions of CO_2), this one is <u>not</u> a binding political agreement and it lacks of the support of all the heads of state attending the Conference of United Nations about climate change held in Copenhague in December 2009 (ICTSD, 2009c).[18] So, the perspectives for the next Conference of the Parties in the City of México (2010) are seen as difficult. Since, the international governance and the system of decision making of Nations were affected due to the loss of confidence in the institutions and its capacity of obtaining results.



16 Specifically in the Element: Compensation, Type A, B, C, Requirement of Norm: C +, INVESTMENT, PURCHASE OF EMISSIONS, which establishes a price between US$2, 50 to $6 per ton of CO_2.

17 Among them the one of financing that could represent between US$ 140 thousand and US$ 175 thousand million annually to help to the developing countries to reduce their emissions at the level required to avoid that the global temperature amount to more than 2°C (ICTSD 2009a and b).

18 The agreement of Copenhague comprises of three pages and was leaded by the EE.UU, China, India, Brazil and South Africa. This document was elaborated by a reduced group of heads of state, while the rest waited sitting outside. As result of this situation, many of the leaders showed their nonconformity and rejection of the agreement, which finally was considered only as an annex of the final decision (ICTSD, 2009c).

5. National Policies for the Management of Protected Wildlife Areas

Since its creation, SINAC has designed and implemented several policies to guide the management of Protected Wildlife Areas (ASP) of Costa Rica. This process has shown a constant evolution that implies the make-up of a regulating legal framework. This shows certain level of dispersion (SINAC, 2010). Following it is shown a summary of such historical evolution, which constitutes the antecedent for the policy recommendations that this document proposes.

5.1 Legal and Institutional Framework for the management of SINAC

5.1.1 Rules for the performance of SINAC

The National System of Conservation Areas as a State institution and part of MINAET, on the legal framework, responds primarily to the **Political Constitution of the Republic of Costa Rica**, whose article 50 establishes a special reference to the environmental issue[19]:

> *"The State will seek the greatest welfare for all the inhabitants of the country, organizing and stimulating the production and the fairest distribution of wealth; everyone has the right to a healthy ecologically balanced environment. Therefore, it is legalized to denounce any acts that violate that right and to claim redress for the harm caused. The State will guarantee, defend and preserve that right. The law will determine the responsibilities and corresponding sanctions."*

Therefore, Costa Rica still lacks of a law in particular that meets all the current laws that show linkage to the protected wildlife areas. In this sense, the legal framework "shows certain degree of dispersion, with some redundancies and still with several conceptual gaps as result of the great existing amount of laws that have been sanctioned throughout three decades, as response to particular problems and in diverse contexts" (SINAC-MINAE, 2007a)

[19] Taken from the Political Constitution of the Republic of Costa Rica http://www.tramites.go.cr/manual/espanol/legislacion/ConstitucionPolitica.pdf

Costa Rica has a number of laws related to the ASP for 54 years. This establishes a framework to regulate various aspects of these areas, as a way of protecting the natural areas. The constitution and derogations of oldest laws by more recent ones, they provide strength to the faithful fulfillment of each objective pursued in the rules.[20]

Chart 21 cites the national laws that support the Protected Wildlife Areas. While they "mention different aspects of the usage and protection of resources contained in the ASP'' (SINAC-MINAE 2007a).

Chart 21
Laws that give support to SINAC

Year	Law
1942 y 1953	Law Nº 276 Waters and Law Nº 1634 General of Drinking water
1955	Law Nº 1917 Tourism Costa Rican Institute (ICT).
1977	Law Nº 6084 Service of National Parks (SPN)
1977	Law Nº 6043 Maritime Terrestrial Zone
1983	Law Nº 4551 Conservation of Wild Fauna
1992	Law Nº 7317 Conservation of Wildlife
1996	Law Nº 7554 Organic of the environment
1996	Law Nº 7575 Forest
1998	Law Nº 7788 Biodiversity
1998	Law Nº 7779 Usage, Management and Conservation of Soils
2005	Law Nº 8436 Fishing and Aquaculture

Source: CINPE, 2009

In 2008, the degree of institutional development of the country in terms of conservation has allowed Costa Rica's Protected Areas under the category of National Parks add 28 and 8 under the category of Biological Reserves (see Chart 22). This has a total of 650,852 hectares within the System of Conservation Areas dedicated to PNRB, which are equivalent to approximately 12.74% of the total area of the national territory.

[20] Information taken from the National Report about the System of Protected Wildlife Areas in 2003 and from each law is specific

Chart 22
National Parks and Biological Reserves of Costa Rica Hectares Year 2008*

Park Code	National Park	Extension Hectares
P01.	Arenal Volcano	12.080
P02.	Braulio Carrillo	47.272
P03.	Juan Castro Blanco	14.310
P04.	Turrialba Volcano	1.257
P05.	Poas Volcano	6.559
P06.	Barra Honda	2.296
P07.	Marino Baulas de Guanacaste	900
P08.	Guanacaste	33.780
P09.	Rincón de la Vieja	14.122
P10.	Santa Rosa	39.204
P11.	Tortuguero	26.568
P12.	Corcovado	42.438
P13.	Piedras Blancas	13.774
P14.	Marino Ballena	129
P15.	Manuel Antonio	1.771
P16.	Cahuita	1.102
P17.	Chirrípo	50.141
P18.	Internacional la Amistad	198.390
P19.	Barbilla	11.929
P20.	Cocos Island	2.310
P21.	Palo Verde	18.292
P22.	Tenorio Volcano	12.903
P23.	Irazú Volcano	1.998
P24.	Tapanti-Macizo de la Muerte	58.366
P25.	Carara	5.281
P26.	La Cangreja	2.509
P27.	Diria	5.426
P28.	Los quetzales	4.112
Code RB	**Total PN**	**629.219**
B01	Alberto Manuel Brenes	7.800
B02	Isla del Caño	326
B03.	Isla Guayabo	6
B04	Isla Pájaros	4
B05	Isla Negritos	142
B06	Hitoy Cerere	9.942
B07	Lomas de Barbudal	2.611
B08	Cerro las Vueltas	802
	Total Biological Reserves	**21.633**
TOTAL PNRB		**650.852,00**

Source: SINAC, 2009; SINAC, 2010a.
*Data to December 2008.

6. Recommendations for the construction of an innovative policy focused on the socio-economic development generated by the existence of the PNRB in Costa Rica

In 1998, the Biodiversity Law (Law N° 7788) and its Regulation (Executive Decree No. 33433-MINAE, 2008) created the National System of Conservation Areas (SINAC).[21] This as an organ with maximum disconcerts of the now Ministry of Environment and Energy (MINAE).[22] This defines legally the in force institutional framework for the administration of protected wildlife areas in Costa Rica, and it establishes as its ruling entity to SINAC.[23]

In 1997, SINAC establishes both general and specific policies and actions for its correct implementation in the document: "Policies for Protected Wildlife Areas of Costa Rica" (SINAC-MINAE, 1997). Where are planned eleven axes of the management: (1) consolidation and institutional development, (2) incentives, (3) permissions and others ways of usage, (4) management of resources, (5) protection and control, (6) planning, (7) territorial arrangement, (8) research, (9) tourism, (10) environmental education and (11) communal extension.

As part of the evolution process of SINAC, these policies are reviewed and feedback with other three documents: the chapter of conservation in situ of the "National Strategy of Conservation and the Sustainable Usage of Biodiversity" (SINAC, 2000), "Recommendations for the Thematic Area of Protected Wildlife Areas of the National Environmental Forum" (Ugalde et al, 2002) and the proposal "Consolidation of the System of Protected Public Areas of Costa Rica" (SINAC, 2003a). This updating process of the policy is shown in the "Agenda for the Protected Wildlife Areas Administrated by SINAC" (SINAC-MINAE, 2003b).

Such Agenda substitutes the eleven axes of the management planned in 1997 by a total of 39 general actions, 159 specific actions and 24 guidelines. It is organized into five fields of

[21]This one is defined as a system of management and institutional, disconcerting and participative coordination, which integrates the competences in forest, wildlife and protected areas issues, in order to dictate policies, to plan and execute processes aimed at achieving the sustainability in the management of natural resources of Costa Rica.

[22] Given that SINAC is an organization with maximum disconcert, the National Council of Conservation Areas is its maximum organ, with the Minister of MINAET working as president.

23 In 2010, SINAC has eleven regional administrative units, called conservation areas, which are located along the national territory (including the continental and marine area).

management: (1) social, (2) administrative, (3) management of natural resources; and cultural, (4) political-legal and (5) economic-financial. According to SINAC-MINAET (2010), this document can be considered like the most strategic proposal generated for the system of protected areas of the country in the last years.

Additionally, SINAC has formulated specific policies both for wetlands and for shared management. The National Policy of Wetlands -and its respective National Strategy- is composed of 10 principles and 17 strategies with their respective activities. This responds to the fact that wetlands are considered as a category of management of protected area (SINAC-MINAET, 2001).[24]

On the other hand, the "Policy of Shared Management of Protected Wildlife Areas" (SINAC et al 2005) formulates a concept of "shared management", which seeks to apply it within the national and institutional context. So, this policy constitutes an effort of SINAC to promote the effective participation of the civil society in the management of protected areas in their broad dimensions.

6.1 Integral management to boost the development-conservation synergy: Some contributions for discussion.

In 2010, SINAC is implementing several processes for the formulation of new national policies (SINAC, 2010b). In this sense, both the "Controlling Plan of the System of Protected Wildlife Areas of Costa Rica", and the "Policy of Protected Wildlife Areas of Costa Rica", will be built as a guiding framework for the management in the following years. With the aim of contributing to the elaboration of such policies, following are offered diverse reflections that rise as result of this study. So, this section presents several policy recommendations in order to complement the process that is leading SINAC as the ruling entity of the ASP in Costa Rica.

The previous sections have contributed some empirical approximations, which refer to some general characteristics and aggregated estimations of the contribution of conservation to national development.[25] These results aim at tendencies both promissory and worrying with respect to the future of the PNRB in Costa Rica.

Along the evolution of SINAC, a key point has been revealed as the main bottleneck in the management of ASP. This challenge refers to the urgent necessity of innovating referring to the institutionalization of the national system of conservation, in terms of sustainable financing, local development, social change and organizational culture at communal and

[24] Article 32º of the Organic Law of Environment (Law Nº 7554 from October 4th, 1995) grants a special connotation to wetlands within the Costa Rican legislation.

[25] As part of the same research, the analysis of three case studies estimates the generation of incomes associated with conglomerates of existing socio-economic activities in the areas of influence of the Palo Verde, Rincón de la Vieja, and Corcovado National Parks-Caño Island RB.

national level. This new approach implies more responsibility to the benefited economic sectors and participation still greater of the civil society in the management of the PNRB.

In this study (as well as in SINAC-MINAE, 2007a), the main objective was aimed at raising again the question "Where to guide our protected areas?" from the perspective of opportunities for the socio-economic development induced by the ASP. In the development of such objective are planned three stages:

a) the introduction of a perspective of systemic synergy between conservation and development, evaluating them jointly under the framework of *cluster,* composed of resulting activities and social actors with different potentials of benefit for conservation and development;

b) the empirical estimation of the incomes and other contributions generated in the areas of influence of the PNRB, where precisely the mentioned conglomerates were produced as result of the interaction of a series of innovative changes through the establishment of enterprises (in particular MIPYMES), and the development of related services to the usage (tourist, etc.) of the ASP;

c) The identification of the potentials, problems and challenges for a bigger consolidation, diversification and transformation of the *cluster*, always from the point of view of the nexus between the development and conservation, and its mutually favorable strengthening.

The proposal of recommendations will be concentrated on the c point, pointing to some strategic guidelines to guide a dynamics of socio-institutional innovation that will facilitate and reinforce the situation of "win-win", for the management of the ASP as a whole with the socio-economic evolution. This is through more solid procedures and recognized by the social actors involved. This implies re-orientate the strategy of conservation towards a process of change to make it more effective in economic, social and institutional terms.

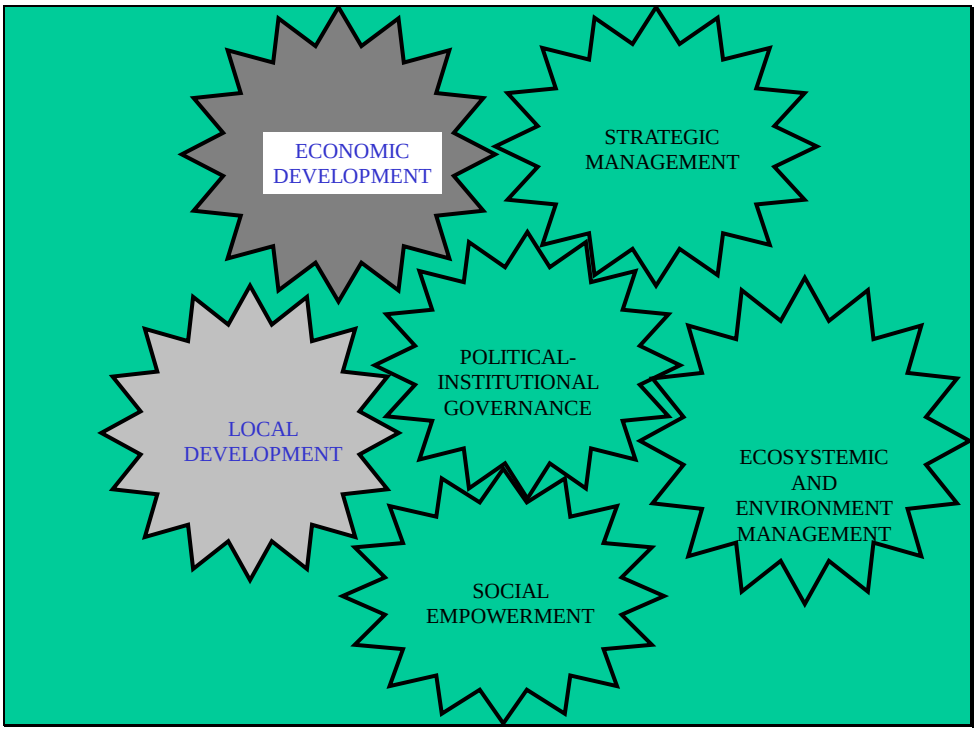
Up to this point it agrees to assume a comprehensive and integral perspective to explore and promote the potential of development, linked to conservation from a priority strategic emphasis in the communities and areas surrounding the PNRB. That is: an integral proposal must be constituted as a set of policies that are aimed at the different socio-economic and institutional subsystems. More than a decision-making of vertical nature, the proposed policies and their interaction result from a process of evolutive auto-organization and deliberative management from the people in the place to the centre of competent technical and political coordination of the ruling entity, in this case SINAC.

SINAC is facing limitations (lack of regular budget resources for staff, logistics, decrease of donations and supply of international cooperation, etc.), which must cope with taking on an essential role of the ruling entity on the basis of renewed leadership. Under this renewed competition is needed to find a virtual mechanism of reinvestment in national parks and biological reserves based on redistribution from the sectors economically disadvantaged by them, to prevent the possible collapse of the financial and professional capacity

indispensable to preserve the PNRB. After analyzing the proposal of Fürst et al (2005), it is evident that such policy recommendations have not been internalized yet. So, it is confirmed that this approach must be taken into account by SINAC. For purposes of presenting the contribution to decision makers, it is resorted to an adaptation of the graphic tool of pinions, to visualize the different spheres of policy involved and the corresponding reforms of policy proposed in favor of a differentiated and integrated improvement in the whole system under study.[26]

As is seen in Figure 2, the pinions that interlock with each other are basically driven by the pinion of institutional change.

Figure 2
Representative pinions of the policy areas to push as a whole an integral development around the ASP



Source: Fürst et al (2005).

The reforms and proposed actions must begin in the political-institutional level, being therefore, SINAC the entity ultimately responsible for articulating all levels of action with their corresponding innovations in management, politics and governance. In other words, the orientation for the new policies to take follows the direction of actions represented by the interlocked pinions; starting with the changes proposed in the institutional area (pinion) and implementing them, in this sequence, the policy actions corresponding to pinions of

[26] The graphs through pinions have their origin in Fürst et al, (2002).

economic development, strategic management, ecosystemic and environmental management, social empowerment and local development, respectively.

Then, the change in local development would be the final effect. This, in turn, would give new impetus to the area of political-institutional governance with its central entity of SINAC as core part of the public sector. To carry out, in interaction with the private sector (especially tourism), municipalities, NGOs and civil society in general, the tasks of an integral reform in the management of the PNRB.

6.2 Policy recommendations

6.2.1 Policies of management at the level of the Economic Development

It seems true that the perspectives for a permanent preservation of the ASP are bleak. This is in the case of no innovating to a dynamic context of an economic development with greater impact on productive and similar changes in favor of the communities surrounding the PNRB. For this it is necessary to have an accounting system for getting economic indicators of such changes and the incomes generated and distributed among the activities and benefited social actors.

Then, as is shown in Figure 3, the corresponding "pinion of policies for the economic development'', provides five guidelines for the design and implementation of reforms and measures needed for a permanent preservation of the PNRB.

Following are detailed these patterns of proposal to re-orient the development around the PNRB:

(1) While the case studies carried out have indicated that the future local and micro-regional development in the areas surrounding the PNRB must be consolidated and reoriented by the development of the identified *clusters*, also have made it abundantly clear that these clusters must be more diversified, integrating other activities apart from tourism, as a more dynamic center. In this sense, it is required a proactive strategy taken by a public-private partnership among MINAET, MEIC, MICIT, ICT, INA, municipalities, communities and direct social actors, to enter into a pattern of development seen as a *conglomerate network of systemic innovation*, this is according to the evolutionary approach of the National Systems of Innovation, with more recent emphasis on socio-technical and institutional learning (Johnson et al, 2009).

Figure 3
Pinion of policies at the economic level

Source*:* Fürst et al (2005).

(2) Based on the policy characterized in the previous point, it should design and implement concrete measures to support the formation and consolidation of MIPYMES with favorable impact on the local and regional economy. Such a specific policy to promote MIPYMES should have differentiated incentives (credits, logistics, training, etc.) So that these ones would be more than ancillary enterprises for the leading, which is in most cases tourism related to the PNRB. On the contrary, the proposal suggests a structural shift towards a more dynamic economic development and focused on the communities and regions involved.

(3) At community level, the economic development related to conservation requires to be strengthened through favorable attributes to its managerial reputation -as service quality, environmental awareness and pro-communal attitude-. So, it is important to look for and establish, with an explicit focus on local performance, complementary mechanisms to the current *Certificate of Tourism Sustainability (CST)* for the establishments in the tourism sector, which would help to remedy the absence of a certification program that operates

directly within the protected wildlife areas (SINAC, 2010). Seen in this way, it is proposed the implementation of a certification process communally managed and centrally endorsed to encourage and reward companies (especially MIPYMES) as well as organizations and social actors involved in clusters grouped around the PNRB, when these ones stand out by socio-economic and ecological activities with recognized contribution to the synergy between development and conservation.

(4) In close connection with the suggestion in paragraph 3, it should be formulated policies that provide adequate conditions for the development of systemic competitiveness in the sectors related to the PNRB, particularly tourism. In other high-priority strategic actions, such as the increase of the management capacity and improvement of customer service, has to obtain a *reasonably priced service-relation* for both the visitors of the PNRB and users of services of accommodation, food , guide, transportation, etc. Additionally, a systemic competitiveness in this particular context is obviously re-strengthened by the effective provision of all other innovations and improvements in the administrative, ecological, social, local, political- institutional levels, which will be presented below.

6.2.2 Policies of Strategic Management of PNRB

Another key element of a renewed integral management of the PNRB is the innovation in its administration through a strategic management. This one seeks to define new modalities of consolidated and sustainable financing (long term) to keep the parks and reserves. What might be the essential components of raising again the conservation task in the light of the main results found in this study? Some general suggestions for strengthening even more the modern management of the ASP are summarized in Figure 4.

(1) It is important to introduce gradually a sub-account within the System of National Accounts, known as satellite account, to account for the net incomes generated by the activities favored by the PNRB, with greater systematic and empirical precision than the approximations carried out along this study. It is suggested that such an innovation in accounting for development should take as reference the sale and purchase circuits related to local and micro-regional clusters in the three case studies (PN Palo Verde, Rincon de la Vieja and Corcovado-RB Caño Island) and drag the relevant value chains to the benefited activities outside this area of influence (especially in San José).

For these purposes, it is recommended that the primary information sources are the same companies, organizations and local actors, through a satellite account spatially restricted to this field. Seen in this way as a favorable activity (in the sense of better information and greater transparency in the sense of accountability) for communities and the corresponding PNRB, a certain part of the collection and primary systematization could be delegated to officials from SINAC and key actors in the communities.
In order to advance on the creation of a satellite account within the National Accounts of Costa Rica, this document proposes that the contributions of the PNRB must be included in the accounts and sub-accounts established by the Organization of United Nations (ONU) in the classification CIIU4, as is shown in Chart 23. The effort of working with this

classification would allow both the international comparability of the data like a major clarity for decision makers on socio-economic and conservation development matters, that is, SINAC and the productive sectors that report benefits from the existence of the PNRB.

Chart 23
Proposal of satellite account for counting the net incomes generated by the activities favored by the PNRB (according to the Structure CIIU Rev. 4)

Section	Division	Group	Class	Title
I				**Accommodation and food services.**
	55			**Accommodation.**
		551	5510	Short term accommodation activities
N				**Activities of travel agencies, tour operators and other reservation services.**
	79			
		791		Activities of travel agencies and tour operators.
			7911	Travel agencies
			7912	Tour operators
		792	7920	Otros reservation services

Source: ONU (2010).

In this regard, the Central Bank of Costa Rica (BCCR) is the entity in charge of the National Accounts. So, the scientific research is searching for an urgent necessity of implementing a process of monitoring to start the work of including the contributions of the PNRB in the National Accounts of Costa Rica. This one includes a rapprochement with the officials from BCCR to talk about several topics, which include for example the design of the most appropriate methodology to give continuity in time for the generation of the data associated with the incomes generated by the existence of the PNRB.

(2) To achieve a system of PNRB intertwined with an economic development, it is essential that the activities and social actors benefited from the preserved nature contribute to their maintenance. This is already recognized in part by the *Payment Program for Environmental Services (PSA)*, but it is suggested to advance even more on innovative mechanisms, which allow collecting more funds coming from the profits generated by the existence of the ASP (i.e. contributions of tourist activities directly reinvested in the conservation of nature).

The results at national and local level of this study indicate that the PSA remain relatively low. This suggests an expansion of coverage and service, as well as a greater adequate collection to the costs of proper maintenance and effective control of ASP providers of environmental services. However, the PSA in its strict sense cannot remain as the only source of compensation to pay for the profits attributable to the efforts of conservation and management of the PNRB. Due to the crisis of funds clearly available for these purposes, it should be implemented other modalities of compensation.

Figure 4
Pinion of policies at the level of Strategic management

Source*:* Fürst et al (2005).

Therefore, it is suggested here to establish a transparent, cost-effective, efficient, equitable and balanced system of ***payment for the usage of environmental services of protected wildlife areas*** that must be collected in various sources close to the origin of the utility by the existence of the PNRB. This economic instrument of charge for usage of the beneficiary has its legal justification in the nature of public good that is ascribed to the PNRB and the service provided, and must be seen as a means of payment apart from the visitation fees per person or the PSA obtained by specific users. The non-positive basis can be the sale of services or the declaration of utilities by tourist enterprises and other businesses clearly favored by the PNRB (including hotels, travel agencies and tour operators), charging for example 5 cents each dollar of net income remaining in the country for their tax contribution.

This type of payment is very different from a ‘’*green’’* tax. Since it is based on the fact that who gets the benefit through the usage of biodiversity (user-beneficiary) is the one who must pay for the service provided. In this regard, it should be justified and transparent to taxpayers under the personal, business or social benefits that really they have come through different activities of direct and indirect usage, as it has been demonstrated in previous chapters. In addition, the canon collected, managed and used (as expense) in the local-municipal level

tends to increase the local interest in conservation efforts (related to eco-tourism.) and to have greater political viability compared to a tax with bias to be imminently "universal" with respect to the administration and distribution.

Finally, as an alternative scenario to the ***payment for the usage of environmental services of protected wildlife areas***, it is worth mentioning the option of introducing a tax reform in favor of conservation with development. Such reform is raised here as a replacement of a tax charge (taxes, commission or other tax) by a tax aimed at keeping the PNRB under the regime of SINAC; this is to ensure the so-called *non-positive neutrality*.

Specifically, in the medium term could be proposed to lower the sales tax on a percentage through a determined percentage and, instead of and in the same non-positive proportion, to establish a *green tax* that would collect funds for the institutional and financial survival of the PNRB in Costa Rica. Of course, such tax innovation in the form of a specific tax for conservation (always interacting with the local development) should ensure a true remuneration to the stated destination, forcing the Treasury to re-invest the collected funds in the ASP (and the PNRB in particular), as well as in projects of local and regional development for and with communities involved in such conservation. By pursuing such canalization per destination (thus eliminating the current mechanism of "*only cash*") must also be ensured the principle of equitable redistribution, that is, to give priority to the parks / reserves and the surrounding communities where development needs are more urgent.

(3) Of course, both changes in information systems and financing outlined in point (1) and (2) are difficult to make effective in the practice of conservation management. As these are complex changes in administrative and institutional terms, it is essential an extensive training at various levels (technical-professional, organizational, and tourist and neighbor's attention, etc.) to provide highly qualified human resources in the conservation areas. Logically, this also implies a proper professional remuneration to motivate staff to think and manage beyond the horizons of concept and action which is now given. In addition, the best trained and motivated staff should have an infrastructure and logistics (stations, vehicle fleet, tele-communication equipment, etc.), which needs to be at the height of a modern management of parks and reserves in the context of community and society in permanent change. Institutional financial resources to sustain such a "*capacity-building*" professional-organizational and the corresponding payment of salary incentives and non-monetary, should have priority both in the budget allocation as in the search for external funding.

The foregoing constitutes a contribution to the production of standardized guidelines for the training processes that require officials of the ASP, which is being developed by SINAC from 2009 (SINAC-MINAET, 2010). This training process has been constructed on two levels, the first one which includes a number of issues related to the general knowledge that should have the field staff (i.e. environmental education, wildlife management, etc.). Level 2 somehow is a specialization in specific subjects such as environmental law, coastal marine zone management, among other topics. So, the creation of capacities in proposed managerial issues could be inserted at this level to contribute in the formation of trained officials in an even more integral way.

(4) Like any strategic management, the one related to proactive conservation is more likely to succeed when development projects are planned and managed in partnership with organizations and social actors related to socio-institutional management of the ASP. The benefits of PNRB for tourism are very important, and involve the need to intensify coordination and cooperation of such public-private and inter-institutional nature with the tourist sector (chambers of tourist businesses, etc.). However, in terms of a strategic alliance with SINAC should go beyond tourism as the privileged sector (including in this one a significant contribution of the tourist business to the ASP). On the contrary, the recommendation aims to seek and build partnerships with other potential partners and donors in niches not sufficiently explored yet (i.e. international and local researches related to the ASP).

(5) Case studies (Palo Verde PN, Rincon de la Vieja PN and Corcovado PN, Caño Island RB) showed a series of conflicts related both to the management of the PNRB and with the socio-economic development in the areas of influence. These conflicts are characterized by different social actors and matters of dispute.[27]

All these situations of overt or hidden conflicts undermine the ability of management and execution of the responsible for SINAC, especially in its regulating action. Therefore, a significant effort to train rangers in the resolution of conflicts between equal parts and construction of social consensus is essential to transform their conventional role of catalyzer of interest with institutional attachment, communally recognized and co-participation among target groups in areas of influence. This is equally important to initiate and keep in the social base a process of accountability regarding the benefits of the PNRB, the tasks undertaken in this regard and the threats posed by harmful practices by neighbors or social actors interested in purposes other than the conservation of the PNRB. This accountability to the social base of the parks and reserves, would constitute a legitimate part of a transparent participation of civil society in decision-making of policy and the management of the ASP under the renovating leadership of SINAC (as it is established in SINAC-MINAET, 2010).

6.2.3 Policies of Management at the Level of Conservation and Environmental Protection

There is no doubt about the importance of a conservation management from the perspective biological and ecosystemic perspective, accompanied by various environmental policies with an impact inside and outside the PNRB. However, as it is shown in Figure 2, these strictly environmental policies are not only more than a pinion inside a more holistic system of other equally essential policies to push interactively the complex task of conservation with development (Figure 5).

In several parts of the three case studies (Palo Verde PN, Rincon de la Vieja PN and Corcovado PN, Caño Island RB) has shown the desirability of prioritizing the following central themes of preventive conservation management of the parks, in interaction with a

[27] For example: the payment of tolls to travel on the access road to PN Rincón de la Vieja.

more appropriate environmental policy in the communities and surrounding areas, in particular to induce an eco-tourism development with environmental sustainability signs:

(1) Environmental management indispensable in the communities surrounding the PNRB should be aimed at reducing wastes by source and destination, the appropriate management for the environment and human health of solid wastes and sewage. This pollution is generated by hotels, tourist transportation, etc. as well as by human settlements related to the respective ASP.

(2) The best way to involve entrepreneurs, villagers and other users of the PNRB in the conservation and natural heritage protection is to promote self-environmental management (in the form of voluntary agreements, etc.) and the co-management of these ones between private and public sector, thereby ensuring further transparency, monitoring and accountability to local civil society.

(3) According to the previous, it is very important to promote and boost the participation of the communities in the management of the parks and the environmental management in the towns affected for the proposed policies put into practice to find local actors interested in their own welfare linked to ecosystems and environmental functions (SINAC-MINAET 2010).

Figure 5
Pinion of policies of management at the level of ecosystemic conservation and environmental protection

Source*:* Fürst et al (2005).

6.2.4 Policies of Management at the Level of Social Empowerment

The rules of social development and economic development are intertwined in many ways, particularly through the other three areas of management considered in Figure 2. The case studies of this research (Palo Verde PN, Rincon de la Vieja PN and Corcovado PN, Caño Island RB) show that it must yield high levels of compatibility (or integration) between the reforms and measures to take in the social area and other present areas, including the ones related to economic development and management reform already mentioned.

In this respect (see Figure 6), have been identified four areas of social management of high importance for an integral policy of successful management of the PNRB:

(1) It is important to republish strategies and actions in training, remuneration, award / concession of services and payment of taxes, all of them sufficiently effective and participatory for the local social actors, particularly the economically disadvantaged in terms of income, social services and housing, to participate equitably in the benefits generated by tourism at national and communal level.

Figure 6
Pinion of policies of management at the level of social empowerment

Source*:* Fürst et al (2005

(2) People must put greater attention to incentive policies and institutional renewal, which are really relevant to promoting or strengthening the spirit of innovation and entrepreneurship at all levels of local development (starting in the managerial field and until reaching the community).

(3) Related to the previous point, it very important to start or enhance those micro-enterprise initiatives that are based primarily on the needs of families and communities.

The policy of encouragement of innovation and development at the managerial and communal level, an emphasis should be given; much more defined so far in matters of self-management and actively co-organized training, to ensure greater compatibility between the state positions and social and managerial needs in the sector.

(4) The strategic axes already present in the management of the ASP implemented by SINAC, consisting of decentralization (transfer of functions and decisions to the regions), disconcert (redistribution and transfer of resources involved outside the central administration) and democratization (putting people in the center of the management of natural resources), it has to strengthen and develop further to enhance the necessary social empowerment in the areas of influence of the PNRB (SINAC, 2010).

6.2.5 Policies of management at the level of the local development

At the local and micro-regional level, are indispensable development policies summarized in Figure 7. In this regard, the suggestions include the following:

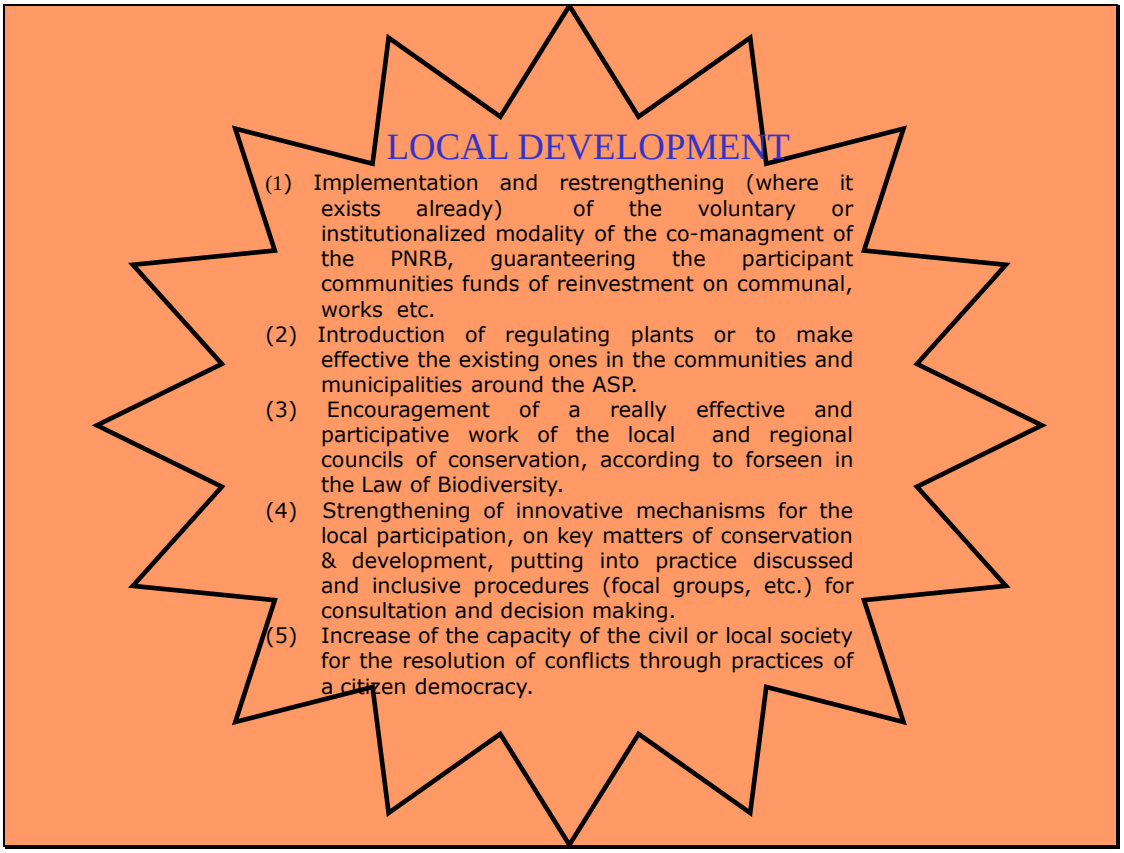
(1) A co-management regime constitutes the central axis to promote the integration of the local community in an integral management of conservation and development. This regime should be characterized by a high degree of citizen legitimacy and recognition of their socio-economic benefits to community-local life (SINAC, 2010).

(2) The planning and zoning should be enforced by regulating plans and other regulations (such as the corresponding to Maritime-Terrestrial Zones) in communities and surrounding areas. This is an integral part of land management based on ecosystems, which SINAC promotes as a basis for management, planning and land management.[28]

(3) The participation provided by the figure and practice of local and regional councils of Conservation Areas (according to the Law on Biodiversity and the existing strategy of SINAC) has a key importance, although such practices of decision-making *from below to up* deserve to be strengthened further.

[28] A scheme based on Eco-regions has as an objective to promote an integral management of the territory beyond the administrative boundaries. For this, actions are included to influence both the management plans of protected areas, and the regulating plans of municipalities, biological corridors, agricultural development and livestock plans, among others (SINAC-MINAET, 2010).

Figure 7
Pinion of policies of management at the level of the local development



Source*:* Fürst et al (2005).

(4) Similarly, conflict resolution mechanisms should be renewed and further strengthened through institutional innovations such as a modality of ombudsman's office at the local level.

(5) Finally, it is clear that all previously proposed would be difficult to implement without adequate training of social actors involved in these essential issues of local development. Therefore, it is proposed the design and implementation of a comprehensive training package for this one to be able to do with people a social learning process aimed at an integral development in the communities.

6.2.6 Policies of Management at the National Level of the Political-Institutional Change

Particular policies suggested so far cannot be introduced and carried out due to the pure will of the concerned individual, or even an isolated institution. The changes outlined in the areas of management previously presented, are intertwined with a socio-political change aimed at better governance at the national level. As it is shown in Figure 2, the improvement towards political-institutional governance is crucial to promote greater synergy between conservation and development, being the institutional reform the pinion that moves the other pinions. Moreover, innovations in this field must be started as the ones of highest priority to contribute successively to the orientation and implementation of other innovations in the economic, managerial, ecological, and social and community areas. Since, institutional policies should ensure more competition, agility and flexibility in relations of SINAC with other institutional, social and economic actors, both nationally and internationally.

Seen in this way, are revealed (from the three case studies and evaluation at national level) as necessary the following changes to induce adequate political-institutional governance (Figure 8):

Figure 8
Pinion of policies of management at the National level of the political-institutional change

Source*:* Fürst et al (2005).

(1) Strengthening of networking and coordination between the ruling entity of the ASP in the country and other sectors and national policies, demonstrating a renewed agility with recognized competence in the interaction with institutions, representations and enterprises (e.g. relevant to tourist sector).

(2) In relation to what has already been suggested for the strengthening of strategic management (section 6.2.2, paragraph 2) it is important to work on legislative and regulatory re-edition of the compensation programs of the benefits generated by the PNRB to various activities and actors, expanding the existing system of PSA and / or building new voluntary or non-positive modalities under the leadership of SINAC.

(3) Following other valuable efforts to make possible a "Policy of Protected Wildlife Areas in Costa Rica" (SINAC-MINAET, 2010) might be appropriate to include some of the desired development patterns which meet the social, economic and social-environmental needs rose over this document.

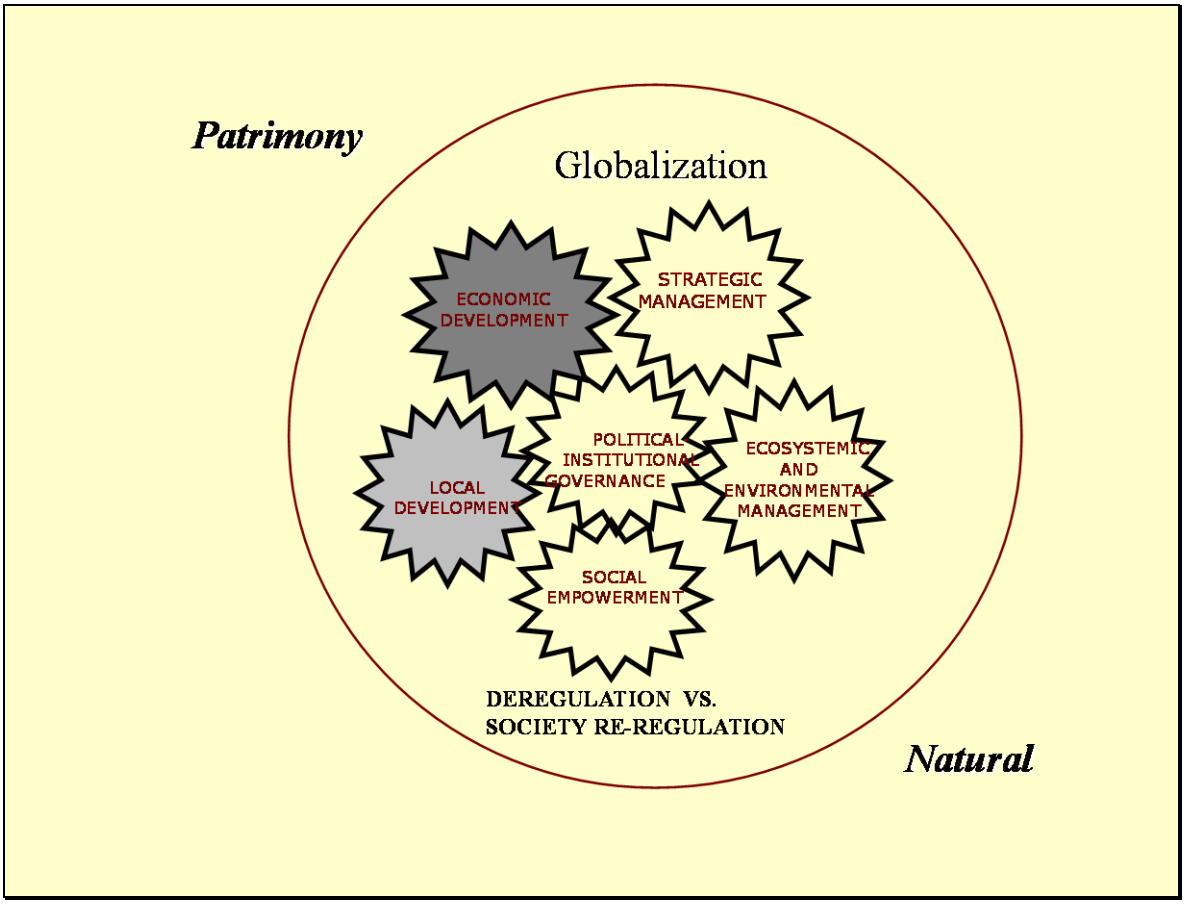
6.3 Towards a reciprocal integration between conservation and development (sustainable)

The previous section used the image of pinions to see the interaction between reforms and policies in the different subsystems of their action, emphasizing the centrality of the political-institutional change. The implementation of an innovation in any area of integral management (e.g., strengthening of micro-enterprise initiatives in the community in the area of social empowerment) has an impact on other subsystems (pinions) and management policies of conservation and development. However, as it is shown in Figure 2 (see also Figure 9), an innovative change in the pinion of institutional policies, has direct and indirect effects in all other areas of management, since the political-institutional constitutes the way in which the different subsystems of a network society are integrated. However, according to what was previously mentioned it is not desired to invoke the idea that the pinions move in total harmony, as the wheels of a clock.

It seems rather that the processes of change set in motion again cause incompatibilities and conflicts of interest, sometimes leading to stagnation rather than a dynamics- synergy of the management as a whole. The corresponding issues are not solved in further attempts to reform policies and resolutions of conflicts among different actors. Then, in the field of management of the PNRB in Costa Rica is being developed an evolutionary process, which from the decades of the 1970s and 1980s (decades of the type preservation conservation) has been adapting to new challenges of socio-economic development and institutionalization to manage parks and reserves in interaction with the social and economic change at the time (SINAC, 2007; SINAC-MINAET 2010).

At the present day, public funding of the PNRB is co-influenced by the dynamics of globalization not conducive to the maintenance of public goods and services (among other things, due to the predominance of the market with regard to such public goods of such high social sensitivity, such as education, etc.). This raises new forms of asking for accounts and mobilizes funds for the consolidation, to not mention the survival as such, of SINAC. These challenges of innovative self-organization and public-institutional reinforcement are moving to new frontiers, threats and opportunities of political-institutional de-and re-regulation and, thus reshaping the sensible ambiguous relationship between socio-economic development and natural heritage given by the PNRB (Figure 9).

Figure 9
The pinions of the policies of management on their group with regard to the relation between the global environment and natural heritage



Source: Fürst et al (2005).

A reorganization of the management adapted to current circumstances needs to be focused on a modern approach to public-private re-regulation of the responsibility of sectors and actors socially benefited from biodiversity and the proactive conservation. This is through a payment of such beneficiaries to the financing of the PNRB under the leadership of SINAC. Such re-regulation includes, among other things (like a real disconcert of collection and

reinvestment –in the destination of origin- of the incomes in the quality of charged visitation, thus exceeding the principle obsolete of only cash), the institutionalized implementation of a system of contribution system required of the sectors and actors favored by the PNRB. The information given in generic terms regarding the pinion of strategic management, has been very clear about the justification and design of a sort of canon in the quality of conservation that pretends to impose as responsible users directly and indirectly favored by the PNRB, in particular the tourist sector.

The three case studies analyzed (Palo Verde PN, Rincon de la Vieja PN and Corcovado PN Caño Island RB) show specific examples of the contributions of the PNRB at local, regional, national and international levels. In summary, Palo Verde PN generated US$1,936,446, Rincón de la Vieja PN a total of US$23,010,302 and the Corcovado PN-Caño Island RB added US$91,590,697. These numbers indicate the requirement that a portion of these incomes come back to their generating sources in the form of voluntary contributions or tax remunerations aimed at the conservation of the PNRB, whose existence makes possible the generation of such economic benefits.

Photo: F. Salas, 2009

All this concludes that conservation is closely linked to socio-economic development, and vice versa. In addition, there are potentials to induce new synergies between these two spheres, requiring innovative changes in economic, social, environmental, managerial and institutional fields in the lines of outlined integral management. It is expected that Costa Rican society develops an awareness about the synergistic link between the actual performance (and potential) of development and conservation efforts made in the past and still pending in the near and long future, returning to prioritize the green agenda from a more holistic perspective. The fate of parks and reserves is not a matter of a task relatively isolated and specialized of entities and people involved in conservation anymore. It is an integral part of future development in Costa Rica, implying a responsibility of the entire society, particularly the economically sectors benefited by the PNRB. Therefore, it is time to further strengthen synergies between the two sides of the same coin-development and conservation-based on innovative policies.

7. Summary and Conclusions

The relevant contributions of the PNRB to the national economy, systematized in the previous sections, have been the result of both a comprehensive bibliographical review (approximately 241 documents consulted for this purpose that are systematized in a database of the project) and consultations with experts (about 30 people from different institutions such as SINAC, Keto Foundation, General Directorate of Civil Aviation, JASEC, ICT, ICE, CATIE INCOPESCA NEOTROPICA, TNC, AYA, CORCOVADO Foundation, FONAFIFO, International Conservation, CNL, MINAET-COOPEGUANACASTE, COOPELESCA, COPESANTOS , COOPEALFARO RUIZ, among others.

In this review, supplemented by a consultation of secondary sources of statistical information, it appears that most of these references have in one way or another, some socio-economic datum at various levels (institutional, local, regional, national). However, it should be noted that such information is relatively small and widely dispersed, making it difficult enough to systematize and measure the main contributions identified at national level in this chapter. However, its analysis has allowed reaching the following conclusions on an empirical synopsis and of agenda to follow on.

1. **Scale of the study**. Although it has tried to identify and systematize the most important contributions of the PN and RB to the socio-economic development in the perspective that it differentiates among the spatial-territorial scales of the place (PN), area or region (AC) and country (institutionalism), the scale at national level has prevailed with respect to data and results found. This undoubtedly implies a certain bias toward the general and little precise of the activities and contributions identified and systematized.

2. **Socio-economic contributions of the PNRB**: The contributions of the PNRB to the socio-economic development at local, regional and national levels are difficult to identify as belonging to the parks and reserves, since the information found is spatially located at the geographic and territorial fields of the AC. Then, the real contributions of these to the national development are given primarily indirectly. This is because the protected areas studied as a whole so far have complex ecological functions and environmental services that generate multiple benefits (e.g. biodiversity), but this is very difficult to attribute to a particular PNRB within the areas of AC.

3. **Quantification**. The synoptic Chart 1 presents the numerical information found at the national level and empirically aggregated about the main activities or contributions identified in this study and listed in the chart according to its relative economic importance, namely: (1) tourism aimed primarily at nature with their related services, (2) generation of electricity through the usage of water coming from the PNRB for hydroelectric projects, (3) employment generation, the corresponding wages paid to 512 officials of SINAC (4) incomes of MINAE in the quality of charged tickets, (5) conservation of protected wildlife areas of the MINAE-SINAC as fixed costs and investments in the administration and maintenance of the PNRB, (6) purchasing of lands

for the expansion of existing PNRB or the establishment of new ones, and finally, but irrelevant to long term, (7) payment for environmental services (PSA) aimed at protected areas for their conservation and maintenance, (8) research on biodiversity and, for this, generation of profits in the quality of bioprospection and of contributions from INBio to SINAC.

4. **State of the knowledge**. In any case, the systematized information in the previous sections has enabled to show the accumulated knowledge on how SINAC has been innovated on conservation and development matters of institutional and organizational form. While measuring the socio-economic contributions of the PNRB at national level has been relatively short, the information found and evaluated so far is valuable and has the merit of having generated new knowledge about it. An example of the added value of knowledge leading to improvements in the future is the obvious need for a realignment of the existing national accounts, constructing *satellite accounts* specifically aimed at the income generation in productive and reproductive activities that are linked to the PNRB through the cluster of development. Thus, one could proceed to identify, assess and account more adequately the contributions of the corresponding PNRB. For example, to the environmental services related to water, carbon sequestration, scenic beauty, and so on, as well as the benefits provided by biodiversity & biosprospection, without implying that these contributions must be quantified (in monetary terms) through the economic valuation of resources always problematic for this purpose.

5. **Perspectives**. As part of the efforts still pending and outlined in the previous points, it is considered that the most concrete application of *cluster analysis* approach in combination with the *evaluation of chain*, as it was raised in the introduction and based on Annex I, can be very useful to face the problems of information and estimation evidenced in this chapter. In particular with respect to the case studies below, we can see that this approach allows identifying and understanding the network of induced socio-economic activities and chained around the Corcovado, Rincon de la Vieja and Palo Verde National Parks in two ways. One concerns the productive and socio-economic cluster, as such, in its context of innovations already under way and unresolved as potential for further development, the other one corresponds to the existing network or even emerging of social, organizational and institutional at the community field of the PN. In these terms the cluster is not only socio-economic but also social-communal that will result very important for a co-venture management between the state and civil society that could overcome many of the irrationalities and inefficiencies still evident in the administrative and financial management of the PNRB.

However, the limitations noted in the previous paragraphs, the results of the collection of secondary information seem to provide very useful inputs to further refine them more by complementing information more relevant and systematic at national level.

8. Policy Recommendations

The National System of Conservation Areas is the ruling entity for the administration of the protected wildlife areas in Costa Rica. Since its creation, SINAC has formulated policies both general and specific ones focused on different axes of management. Whose fields include aspects of: social, administrative, economic-financial, management of natural resources; and cultural, political-legal nature.

As was mentioned, SINAC is implementing several processes for the formulation both of the "Controlling Plan of the System of Protected Wildlife Areas of Costa Rica", and of the "Policy of Protected Wildlife Areas of Costa Rica", which will be built as a guiding framework for the management in the following years.

With the aim of contributing to the elaboration of such policies, following are offered several reflections that arise as result of this study. These suggestions respond to two important challenges that the conservation of the ASP faces in Costa Rica. First, the main bottleneck that persists in the management of the ASP is the urgent necessity of innovating regarding the institutionalism of the national system of conservation, in terms of sustainable financing, local development, social change and organizational culture at communal and national level. Second, SINAC keeps facing limitations that arise as important challenges the conservation of the ASP (i.e. lack of regular budget resources for staff, logistics, etc.).

This new approach points out to strengthen the linkages between socio-economic development and conservation in the PNRB. The reforms and actions proposed start in the political-institutional field, with SINAC as the entity responsible for its articulation. The changes at the political-institutional level would generate the actions of policy corresponding to the economic development, strategic management, ecosystemic and environmental management, social empowerment and local development. Therefore, the change in the local development would be the final effect of such policies model.

8.1 Policies of Management at the Level of the Economic Development.

The rules of proposal to re-orientate the development around the PNRB include: (1) to define a strategy to consolidate and re-orientate the encouragement of the *clusters* identified in the 3 study cases. (2) To design and implement concrete measures that supports the formation and consolidation of MIPYMES with favorable impact on local and regional economy. Such specific policy of encouragement to MIPYMES must have differentiated incentives of credit, logistic, training type, etc. (3) to search for and to establish complementary mechanisms to the current *Certificate of Tourist Development (CST)* for the businesses in the sector of tourism. (4) To formulate policies that provide adequate conditions for the development of a systemic competitiveness in the sectors related to the PNRB, in particular tourism.

8.2 Policies of Strategic Management of PNRB.

Some suggestions to strengthen even more the modern management of the ASP are: (1) to present a satellite account, to quantify the net incomes generated by the activities favored by the PNRB. (2) The activities and social actors benefited from the preserved nature should contribute their maintenance, both through the *Program of Payment for Environmental Services (PSA)* and through funds coming from the benefits generated by the existence of the ASP (i.e. contributions of the tourist activities that are reinvested directly on the conservation of nature). (3) To establish a ***payment for the usage of environmental services of protected wildlife areas*** that has to be collected in different sources near to the origin of the usage due to the existence of the PNRB. (4) To present a fiscal reform in favor of the conservation with development, so that it is substituted a tax charge (tax, commission or other fiscal imposition) by a tax aimed at keeping the PNRB under the regime of SINAC.

8.3 Policies of Management at the Level of Conservation and Environmental Protection

It is suggested **to** prioritize the following central axes of a management of preventive conservation of PNRB: (1) the environmental management in the communities surrounding the PNRB must be aimed at the reduction of wastes by source and destination, for the adequate management for the environment and for the human health of the solid wastes and sewage. (2) The best way of involving entrepreneurs, villagers and other users of the PNRB in the conservation and protection of the natural heritage is to promote the environmental self-management (in form of voluntary agreements, etc.) and the co-management of these ones between the private sector and the public sector, ensuring with this even transparency, monitoring and control of accounts presented to the civil local society.

8.4 Policies of Management at the Level of the Social Empowerment.

Four areas of social management have been identified for an integral policy of the successful management of the PNRB: (1) to republish strategies and actions for the local social actors in matters of training, remuneration, adjudication/concession of services and payment of taxes. (2) To put more attention to policies of incentive and institutional renewal to encourage or strengthen the innovative and enterprising spirit in all levels of the local development (starting in the managerial field and until getting to the community). (3) To strengthen micro-enterprise initiatives, which are based on the needs of the families and communities, (4) To strengthen and to study in depth decentralization, disconcert and democratization, all already present in the management of the ASP implemented by SINAC.

8.5 Policies of Management at the Level of the Local Development.

At the local and micro-regional levels, the suggestions include the following: (1) A regime of co-management constitutes the central axis to favor the integration of the local community in an integral management of conservation and development. (2) The planning and zoning must be made effective through the regulating plans and other regulations (like the corresponding to the Maritime-Terrestrial Zones) in the communities and surrounding areas. (3) To strengthen the local and regional councils of the Conservation Areas. (4) To renew and strengthen the mechanisms of resolution of conflicts must be even more por through institutional innovations, like for example a modality of ombudsman's office at the local level. (5) Training of the social actors involved in these essential arguments of the local development.

8.6 Policies of Management at the National Level of the Political-Institutional Change.

The following changes are necessary to induce adequate political-institutional governance: (1) Intensification of the network and coordination between the ruling entity of the ASP in the country and other sectors and national policies. (2) To work on the legislative and appropriate re-edition of the programs of compensation of the benefits generated by the PNRB to different activities and actors, expanding the existing system of PSA and/or building new voluntary or non-positive modalities under the leadership of SINAC.

Photo: F. Salas, 2009

In summary, a modern approach of public-private re-regulation of the responsibility of the sectors and actors socially benefited by biodiversity and its proactive conservation must guide the management of the PNRB in Costa Rica. This is through a compensation of such beneficiaries to the financing of the PNRB under the tutelage of SINAC. Such re-regulation includes, among other things the institutionalized implementation of a system of contribution forces from the sectors and actors favored by the PNRB. Through disconcert of a collection and reinvestment –in the destination of origin- of the incomes in the quality of charged visitation, thus exceeding the obsolete principle of only cash that operates nowadays.

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ANNEXES

ANNEX I:
METHODOLOGY USED

1. INTRODUCTION

In the study documented in previous sections have been resorted to the *cluster approach* to face the methodological problems that arise when is pretended to identify, systematize, estimate and assess the socio-economic contributions of the *PNRB* to the development of the country.

An analysis of methodological nature made by Fürst et al (2005), leads to the conclusion that an economic valuation or an environmental accounting of the resources and services provided by protected areas of the PNRB is not be the appropriate methodological tool for the specific case under study. The main reason for such a methodological assessment lies in the very nature of the problem addressed in this study. This means, the main object under investigation is the real development induced by the conservation and **not** an intangible value to estimate by the techniques of economic valuation of resources so far available,[29] although very controversial as to their aptitude and applicability to the case of ecosystems and environmental services of high complexity and multifunctionality.[30] This implies that the same object of study requires an empirical approximation of actually existing effects of the conservation efforts on the socio-economic development at national and local level, the former based on existing or directly obtained information. It also implies a systematization of inventory-like, on the one hand, and on the other hand, an assessment of a statistical-numerical type and qualitative of the socio-economic benefits associated with the existence and maintenance of the PNRB.

Therefore, it is argued that the *cluster* analysis - understood as a set or conglomerate of socio-economic activities induced by and chained around the PNRB - is offered as the best method. At best, such analysis essentially empirical should be combined with a specific application (partial) of the evaluation of value added chains in its context of superimposed spatial scales, for addressing the issue so defined. To address this, it employs a methodological matrix that combines the spatial-territorial scale, the socio-economic activity directly related or indirectly linked, the actors involved (in the majority: the direct and indirect users of the PNRB), the contributions to the development through induced or linked activity, and the valuations of these contributions by means of different information (numerical, qualitative, rating).

[29] Moran / Pearce, 1997 .Pearce / Moran, 1994; Garrod / Willis, 1999; Georgiou et al., 1997; Rietbergen-McCracken /Abaza, 2000. Lavin et al 2007.
[30] See, among many others, Facheux / O'Connor, 1998 and O'Connor / Spash, 1999.

2. ANALYSIS OF CLUSTER FOR THE DEVELOPMENT INDUCED BY PNRB

The following represents the approach of cluster (or conglomerates of interrelated activities within a chain of income generation) as the option that approaches methodologically the type of problem under study more suitably. With regard to the latter, it must be stressed again that the main focus of the research carried out was focused on the pattern of emerged development, especially at national level, in the sense that they result from "*effects of backward and forward chaining* "(Hirschman, 1973) provided in connection with the creation or persistence of the park or reserve.

As already noted, the PNRB are natural assets that - in socio-economic terms – generate a phenomenon that in the analysis of the development is referred to as *externality*.[31] In our case, such external effect (on the local, national and international society), induced by a conglomerate territorially set of ecological services, has mostly a positive sign, since a conglomerate of socio-economic activities (provision of goods and services of productive , recreational nature, etc..) take advantage of these services around the park or reserve. These services are also used by a chain related to related activities at the superior scales than local ones by the emergence of subsequent impacts of socio-economic nature at micro-regional, regional, national and international scale. We can talk about a socially positive externality due to the existence of the PNRB, potentially leading to a development process vertically and horizontally linked.

Even though is recognized the existence of such socially positive externality, the study of each PNRB must consider the net benefits. A recommendation of the workshop is that the quantification must consider both the positive aspects described above, as well as the negative effects associated with the human activity linked to natural assets. For example, the visit of tourists involves the generation of solid wastes, which if they do not receive an adequate treatment they result in pollution that negatively impacts on natural ecosystems.

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

What was mentioned before is essentially what is known in the analysis of the socio-economic development as *cluster* linked to a dynamics of value-added chain.[32] For our purposes of this particular study, the cluster must be understood methodologically as a reactive process to a destabilizing initial impulse of the "*status quo*". In our case is equal to a sectoral and territorial concentration of activities and enterprises that arise because of certain "*bottlenecks*" (demand for raw material and services to be provided by others) increasingly interact with each other in terms of production and organizational and which depend ultimately on the conservation or not by the protected area of the PNRB. So, this approach involves the concept of *unbalanced development* of Albert Hirschman (1973), who postulates the start of a socio-economic dynamics in the form of a *set of cluster-chain* each time more linked from a social investment in innovative nature in a development potential.[33] Such potential or development center is given in our case for the public investment for the conservation of the PNRB.

Clearly, an externality attached to the initial induction of a sequential process of development is different from the externality that is recognized and evaluated in the impact analysis and environmental cost (Pearce and Turner, 1995, Chapter 4). In contrast to the second (reduced to the affectation of utility because of an environmental damage), the first corresponds to a wide range of indirect effects of chaining and connection (from the point of view of the structural change in the pattern of socio-economic development) that at first sight is concentrated in an area around the PNRB (in the so-called *zone of influence*). Such impulse of development also covers the emergency of service and production activities in geographical areas beyond the zone of direct influence. It involves territorial units in the chain of effects produced by the PNRB, including the micro-region, region, country and global environment that range from the regional to global at international scale.

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

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

This clearly establishes an enormous methodological difficulty in identifying and defining, in socio-geographical terms and chain analysis (economically and territorially chained links), the various facets of impact induced on the scales of spatial impact indicated. In particular, this applies to the observable overlap between the spatial-territorial scales and the resulting problem of attributing and accounting for socio-economic benefits to the geographic units positively affected by the existence and preservation of PNRB.

Additionally, the "double counting" of the benefits associated with the activities developed within the chains should be avoided, in order to generate a more possible accurate quantification. So, the analysis should be noted qualitatively in the way each chain is organized, as well as clearly separate what benefits are generated from the existence of the PNRB and which ones not. These limitations are taken into account in this study at the time to describe and quantify the contributions of the PNRB.

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

To illustrate the above-mentioned with an example directly evident: the emergence of the activities of eco-tourist guides (giving more qualified and remunerative employment to people before immersed in rural poor living conditions), it is not imaginable and registered in the economic accounting, without attributing such positive change for the person (in this case the guide) and the community to the existence of the natural asset in conservation status, but with an effect of local development. This example can be extended on a scale beyond the direct influence area of the park (that is, the environs delimited by production areas and populations related to the park), to interpret the rise and socio-economic significance of tourism in Costa Rica nationally as a result of the positive externality of the efforts internationally recognized of the Green Agenda in conservation, which is currently under the administration of SINAC.

Such an approach of a direct and indirect attaching between the PNRB and the tourist development in the last twenty years has been discovered and tested empirically by a series of studies for its validity at national, micro-regional and local level, emphasizing in this connection the role of nature as an intangible factor of international competitiveness in the global market for tourism in order to enjoy the ecology (Acuña / Villalobos, 1999; Acuña / Villalobos Ruiz, 2000; Inman, 1998; INCAE, 1999, Kaune, 2002). Something similar seems to be valid for the case of research related to biodiversity and bioprospection from the perspective of conservation and development (Reid et al., 1994, Garcia, 2002).

All reasonable so far, makes plausible the cluster analysis as a tool for identifying suitable productive activities (including research projects in or related to the parks and reserves) and reproductive (in the social sense and including the recreation of different levels and qualifications). This allows attributing the contributions of the PNRB to the emergence and consolidation of such socio-economic activities in order, then, to estimate, both through numerical calculations and through qualitative indications, the benefits in terms of employment, remuneration, income per visitation, etc.

The instrument that is perceived as conceptually and operationally as the most useful to carry out the type of analysis before-outlined, constitutes thus the combination of local cluster analysis and transversal chain (that is, from the place of origin to final destination, passing through the chained links in the micro-regional, macro-regional, national scales and even if it is the case, international scale). With this, you can drag multiple forward linkage effects, which have the PNRB on socio-economic life, from its source (location) to its impact still barely identifiable (accounting) to a higher level of spatial scale, even when provided with greater emphasis on the contribution to local development.

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

3. METHODOLOGICAL MATRIX FOR GUIDING THE COLLECTION AND SYSTEMATIZATION OF THE INFORMATION REQUIRED

A cluster analysis concerning the contributions of the PNRB to the socio-economic development can be carried out based on a matrix that structures the possible direct and indirect impacts on the development in both types of contributions (income, etc.) as well as in the levels of spatial scale involved in such impacts.

A matrix of this nature is documented in Chart A-1. Its main purpose is to guide the collection and systematization of the information sought; it processes and evaluates to have an overview of the array on the socio-economic contributions attributed to a determined PNRB. In particular, it is considered relevant in this process to distinguish between the different scales of analysis (rows of the matrix), when the corresponding information is obtained from the various contributions to the socio-economic development through the conservation of the park or reserve considered.

CHART-ANNEX A-1
MATRIX OF METHODOLOGICAL GUIDE
FOR THE IDENTIFICATION, LOCATION AND EVALUATION OF THE CONTRIBUTIONS RELATED WITH THE SOCIO-ECONOMIC ACTIVITIES AND ACTORS INVOLVED

(See the glossary below)

			Corresponding Park / Reserve	Pi y / o Ri						Pi / Ri				Pi / Ri					Pi / Ri	Pi / Ri
			Type of contribution (good /service / externality)	A1	A 2	A3	…	An	A1	A2	A3	…	An	A1	A2	A3	…	An		
Scope- Scale of the contribution	Type of present activity	Type of user / Benefited "stakeholder"																		
				Valued contributions from Pi and/ Ri						Valued contributions from Pi and/ Ri				Valued contributions from Pi and/ Ri						
Direct- Inmmediate	Act1 Act2 Act3 . . . An	B1,j (j=1,..,n) B2,j B3,j . . . Bn,j		V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2						V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2					V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2						
Local (area of direct influence)	Act1 Act2 . . . Actn	B1,j (j=1,..,n) B2,j B3,j . . . Bn,j		V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2						V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2					V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2						
Micro-regional	Act1 Act2 . . . Actn	B1,j (j=1,..,n) B2,j B3,j . . .Bn,j		V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2						V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2					V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2						
Basin downstream	Act1 Act2 . . . Actn	B1,j (j=1,..,n) B2,j B3,j . . .Bn,j		V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2						V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2					V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2						
Regional	Act1 Act2	B1,j (j=1,..,n) B2,j		V1 V2 V3 V5 … n.d. ….. n.d.						V1 V2 V3 V5 … n.d. ….. n.d.				V1 V2 V3 V5 … n.d. ….. n.d.						

			Corresponding Park / Reserve	Pi y / o Ri	Pi / Ri	Pi / Ri	Pi / Ri	Pi / Ri
	. . . Actn	B3,j . . .Bn,j		V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2	V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2	V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2		
National	Act1 Act2 . . . Actn	B1,j (j=1,..,n) B2,j B3,j . . .Bn,j		V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2	V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2	V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2		
Global	A1 A2 . . . An	B1,j (j=1,..,n) B2,j B3,j . . .Bn,j		V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2	V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2	V1 V2 V3 V5 … n.d. ….. n.d. V2 … V4 n.d V1 … … …. …. … … …. …. … … …. …. V3 n.d. V5 n.d. V2		

GLOSSARY (for its acronyms used in Chart A-1):

I. ACTIVITIES AND BENEFICIARIES (in the form of hypothetical-real examples):

a) for the dimension of direct impact or "in situ" scale (within the Pi or the Ri)

Act1: collection of species of value of biodiversity and medicinal plants (indigenous communities)
- B3,1: semi-taxonomists devoted to the collection of species and medicinal plants
- B3,2: ..... (pending to identify)
- …..
- …..
- B3,n: ..... (pending to identify)

Act2: "naturalist" walks guided by staff from Pi or guides with license
- Bn,1: trained local guides
- Bn,2: … (pending to identify)
- Bn,n: ... (pending to identtify)

Act3: pending to identify
.....
.....

Actn: pending to identify

b) for the dimension or local scale (neighboring community)

Act1: ecological micro-tourism (MIPYMES)
B1,1: local families devoted to ecotourism
B1,2: local micro-enterprises devoted to ecotourism
B1,3: national and international tourists
…..
B1,n: neighbors hired for accommodations and eco-tourist activities at micro-scale

Act2: processing and sale of fruits / plants (MIPYMES) Commerce
B2,1: families devoted to the primary processing and sale of fruits / plants
B2,2: micro-enterprises devoted to the primary processing and sale of fruits / plants
B2,3: (pending to identify)
…..
…..
B2,n: ... (pending to identify)

Act3: handicraft (MIPYMES) Commerce
B31: families devoted to the handicraft based on natural raw materials (from Pi and/or Ri)
B3,2: micro-enterprises devoted to the handicraft based on natural raw materials
B3,3: (pending to identify)
…..
…..
B3,n: (pending to identify)

Actn: handmade bioprospection (MIPYMES)
Bn,1: for trained local taxonomists
Bn,2: … (pending to identify)
…..
Bn,n: ... (pending to identify)

b) for the dimension or micro-regional scale (zone of direct impact or buffering)

Act1: ecological tourism (MIPYMES)
B1,1: family enterprises devoted to ecotourism
B1,2: small and medium enterprises (PYME) devoted to ecotourism
B1,3: turistas nacionales e internacionales
…… (pending to identify)

B1,n: residents hired for accommodations and eco-tourist activities at micro-scale

Act2: processing and sale of non-timber yielding products (MIPYMES) Commerce
B2,1: small and medium enterprises (PYME) devoted to the processing and sale of non-timber yielding products
B2,2: enterprises and branches devoted to the primary processing and sale of non-timber yielding products
B2,3: … (pending to identify)
…..
B2,n: ... (pending to identify)

Act3: other activities related with the local ecotourism (services of supply, construction, repair, etc.) (MIPYMES) Commerce

B31: families devoted to related activities with tourism
B3,2: PYMES devoted to related activities with tourism
B3,3: … (pending to identify)
…..
B3,n: ... (pending to identify)

Actn: pending to identify

c) for the dimension or scale of downstream basin

Act1: hydroelectric generation

B1,1: cooperatives and micro-enterprises and devoted to the hydroelectric generation
B1,2: Projects of ICE devoted to the hydroelectric generation
B1,3: Projects of CNFL devoted to the hydroelectric generation
…..
B1,n: users of electric energy in general

Act2: surface water intake, distribution and sale of water

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

Act3: commercial agriculture

B3,1: cooperatives and small farmers devoted to agriculture downstream basin
B3,2: agricultural and forestry enterprises devoted to agriculture downstream basin
B3,3: …. (pending to define)
…..
B3,n: inhabitants of housing areas downstream basin with potential fragility of ground, water level. Etc.

Act4: sustainable agriculture

B3,1: cooperatives and small farmers devoted to sustainable agriculture downstream basin
B3,2: agricultural and forestry enterprises devoted to agriculture downstream basin ¿to separate the forest sector: plantations native species?
B3,3: …. (pending to define)
…..
B3,n: inhabitants of housing areas downstream basin with potential fragility of ground, water level. Etc.

Act5: artisanal fishing

B3,1: cooperatives and small farmers devoted to the artisanal fishing
B3,2: enterprises devoted to the artisanal fishing
B3,3: …. (pending to define)
…..
B3,n: inhabitants of housing areas downstream basin with potential fragility due to sedimentation, pollution due to solid and/or liquid wastes. Etc.

Act: pending to identify

d) for the dimension or macro-regional scale

Act1: commercial tourism of nature

B1,1: micro-enterprises devoted to ecotourism at regional level
B1,2: medium and big enterprises devoted to ecotourism at regional level
B1,3: national and international tourists
…..
B1,n: residents hired for accommodations and eco-tourist activities at micro-scale

Act2: agroindustry based on raw material coming from Pi and/or Ri (MIPYMES)
B2,1: micro-enterprises devoted to agroindustry based on natural raw material (coming from Pi and/or Ri)
B2,2: medium and big enterprises devoted to agroindustry based on natural raw materials
B2,3: … (pending to identify)
…..
…..
B2,n: ... (pending to identify)

Act3: …… pending to identify
.....…
Actn: ..... pending to identify

e) for the dimension or national scale
Act1: commercial tourism at great scale directed by nature
B1,1: enterprises directly devoted to ecotourism at national level
B1,2: enterprises devoted to related activities with ecotourism (tour-operators, providers of materials and services)
B1,3: national and international tourists
…..
……
B1,n: workers and professionals hired for accommodations and eco-tourist activities at national level

Act2: national agroindustry based on raw materials coming from Pi and/or Ri
B2,1: micro-enterprises devoted to agroindustry at national scale
B2,2: medium and big enterprises devoted to agroindustry at national scale
B2,3: enterprises devoted to related activities with agroindustry at national scale
…..
…..
B2,n: ... (pending to identify)

Act3: integrated management of bio-genetic information ("gene-pooling")
B3,1: institutes (INBio, universities, etc.) devoted to the collection and scientific processing (and educational) of the bio-genetic information at national and international level
B3,2: national enterprises devoted to the agro-productive and therapeutic processing of the bio-genetic information
B3.3 transnational enterprises devoted to the agro-productive and therapeutic processing of the bio-genetic information
…. (pending to define)
…..
B3,n: people in general with potential benefits of bio-genetic and –technological advances for human health, etc.
Actn: ……(pending to identify).
f) for the dimension or global scale

Act1: international tourism by nature
B1,1: enterprises (tour-operators, airlines, chains of hotels, etc.) Directly devoted to ecotourism at international level

B1,2: enterprises devoted to related activities with ecotourism (providers of services, etc.)
At international level
B1,3: international tourists
…..
B1,n: organizations (ONG) that promote ecotourism at international level

Act2: bio-technological industry based on bio-genetic information
B2,1: foreign institutes and universities abroad that research on bio-genetic information at international level
B2,2: transnational enterprises devoted to applied research, agro-productive and pharmaceutical-therapeutic processing of the bio-genetic information
B2.3: ..... (pending to identify).

Act3: contribution of O2 for the mitigation of global warming
B3,1: international institutions devoted to the mitigation of the climate change through the "clean mechanism".
B3,2: pollutant foreign enterprises when emitting greenhouse effect gases
B3.3 transnational enterprises that are benefited as creators of emissions in the possible interchange of "*carbon credits*" at global level
….
…
Actn: ..... (pending to identify).

II. CONTRIBUTIONS CLASSIFIED ACCORDING TO THE TYPE OF ECONOMIC AND ECOLOGICAL VALUE

A. Values of usage

a) Values of direct usage:
A1: tapping point inside the park or reserve
A2: productive use (hydroelectric, etc.), consumptive and recreational of the water outside the park or reserve
A3: recreation (used by different types of ecotourism)
A4: education (environmental, scientific, "popular" taxonomy of biodiversity, etc.)
A5: knowledge and research (environmental, scientific, etc.)
A6: species and organisms for their primary taxonomy (chemical and genetic)
A7: species for their secondary bio-prospection and of value added on the international chain
A8: ..... (pending to identify)
...
An: ..... (pending to identify)

b) Values of indirect usage
A1: recharge of subterranean water (protection of aquifers)
A2: control of floods
A3: control of erosion (retention of nutrients)
A4: stabilization of micro and macro climate
A4: prevention of natural disasters
A5: provision of habitat for fauna
A6: provision of biodiversity in situ
A7: absorption of carbon
A8: protection of basins
.. ..
An: services of ecosystem in general

c) Option values
A1: storage of future information

A2: possible offer of future usages (direct –p. E.g. non-timber yielding- and indirect –I.e. of climate stabilization)
....
An: (pending to identify)

B. Non-usage Values
Values left to others
A1: Intangible values of direct usage to benefit other people who are not present (future generations)
A2: Intangible values of direct usage to benefit other people who are not present (future generations)
.....
An: (pending to identify)
Values of existence
A1: biodiversity
A2: landscape (scenic and spiritual beauty)
A3: community and indigenous identity
A4: culture and patrimony
A5: ritual and spiritual values
.....
An: ..... (pending to identify).

III. EXPRESSIONS AND CHARACTERISTICS OF THE VALUE OR EVALUATION TO FIND FOR THE CONTRIBUTIONS (see cells of the matrix)
V1 = Statistical information available and mainly determined by the market (E.g.: incomes in respect of tickets to the National Park Pi, incomes in respect of sale of tourist services, etc.);
V2 = available statistical information, but with slant of being double-counted
V3 = applicable information from techniques of plausible valuation, p. E.g. changes in productivity (or in values of land) as consequence of the park Pi
V4 = information of value socially accepted and co-participated
V5 = information of value socially not accepted and difficult
n.d. = information statistically not available and technically not differentiable (immeasurable in numerical values).

The elements of the matrix A-1 have the following meaning [34], following first the rows (types of activity, type of user) group according to the corresponding scale, and then, explaining the columns (types of contribution) grouped by the different parks or reserves.

Blocks of Rows

a) Scope / scale of the contribution

The contributions to the development thanks to the existence of the PNRB have different scopes in terms of spatial-territorial scale. It can be distinguished the effects / links:

- In the direct-immediate field (evident inside the park itself),
- From the local scope, that is, in the area of direct influence,
- At micro-regional level (microbasin or province)
- From regional level (in socio-geographical or administrative terms),

[34] Véase, de antemano, el glosario seguido a la matriz A-1

- At national level (across the country as a territorial-administrative unit), and sometimes at the international level (in individual cases as a grant or patent royalties from international institutions in relation to biodiversity research).

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

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

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

b) Types of activity induced by the PNRB

Just to soften a bit the problem of unique attribution of the contribution generated to its corresponding scale, the rows relevant to these scales (or areas of influence) listed with Act1, 2, ... n represent the different socio-economic activities which are specified in different coverage areas indicated in a) and which provide the contributions regarding the ultimate purpose of the activity considered (see the respective columns in the matrix). Therefore, each scale belongs to a particular set of activities that are generated by the park. As an example we can mention to the local level (area of direct influence) the tourist activity of accommodation or hostels or guesthouses in direct proximity of PNRB, thus benefiting the community most related to the park. At a higher level, E.g. at the national level, something similar, but very different in its economic significance, it can be said for international and national nature-oriented tourism (with destination priority for the visitation of PNRB).

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

c) Type of user

Similar to what was agreed for the activities in b) is useful to relate the profile or the group of direct users or (for the most part) indirect of the PNRB with the socio-economic activity that provides a benefit or costs a fee (E.g. the price of the ticket for the Park collected by the tourist). So the matrix induces to a collection and systematization of the information of

benefit and cost to the actors who are involved in the activities generated, trying to approximate the corresponding contribution and its value (monetary or non monetary) in a more defined way. This would establish a relation of net profit for the user between the activity that serves as the vehicle for the benefited actor and the type of contribution generated by the same activity. Moreover, this qualified contribution could be attributed per activity for the user at the level of scale more relevant to count the net benefit (discounting from this one the expense necessary for getting enjoyment or income earned by the existence of the parks under study).

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

Blocks of columns

d) Corresponding Park / Reserve

In principle, this component of the matrix includes the three Conservation Areas that meet the requirements of funding entity (FUNDECOOPERACION). In this regard, the Guanacaste Conservation Area includes the National Parks: Santa Rosa NP, Rincón de la Vieja NP and Guanacaste NP. For its part, the Arenal-Tempisque Conservation Area involves: the Tenorio Volcano NP, Palo Verde NP and Lomas de Bambudal Biological Reserve. Meanwhile, the Osa Conservation Area considers: Corcovado NP, Marino Ballena NP, Piedras Blancas NP and the Caño Island Biological Reserve.

In the phase of case studies, this grouping of PNRB for the specific contributions will be reserved for the three selected case studies (see Annex III), for which we will deepen the analysis of their contributions based on primary information (through interviews for users and key actors) in addition to secondary data found in the national scale (in the initial exploratory phase).

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

In this item we are trying to record and estimate those contributions of different dimension / economic and social expression attributed to the park under particular study and that have some "cause-effect relationship" with the corresponding activities as direct and indirect "result" of the park / reserve, besides a relationship of benefit (measured in monetary terms only in exceptional cases, such as the payment to the guides of the park) with the user or actor affected by the respective PNRB.

Undoubtedly, to establish these relationships in a unique and measurable way between them, will be not always possible; however, the scheme as such is useful to discover and systematize information available from this perspective contribution-activity and

contribution-beneficiary to approximate a greater informative and classification transparency of such contributions attributed to parks and assessed on their corresponding scales.

In the glossary (Chart A-1) are listed some specific examples of contributions according to a more didactic classification than operational about values of use (direct, indirect), option and existence values, common classification in literature on economic valuation (Pearce / Turner, 1995: ch. 9) and also in his approach to the conservation of protected areas (Munasinghe / McNeely, 1994: 34; UICN, 1998: 11-13). Of course, the latter (option value, existence value) will not be objects of this study, since this would require an approach (valuation) very different from that proposed here (see section a). However, they are useful to illuminate some of the more general background of this issue indirectly when talking about the contribution of the PNRB, even though its difficult evaluative treatment should be considered in future studies.

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

Block of cells

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

The types of contribution listed in the columns of the matrix represent the contributions identified through documentary analysis of precedents and existing studies as well as the effects of development to reveal in field research (case studies). Their corresponding valuations are recorded in the matrix cells where the activities with their respective actors are intersected with the contributions identified. It is clear that the assignation of concrete value will be possible only for the minority of the contributions attributed to socio-economic activities related to the park or reserve. In the vast majority of the respective cells, these are going to be empty; because of they are not going to find a value so unbundled and discreet. On the other side, the empty cells invite for more empirical information about such contributions interrelated with induced activities. In this sense, is a stimulus to collect and break down the more relevant information to the thematic issue discussed in the study, thus serving as an inductive guide of considerable methodological use.

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

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

4. MATRIX-EXAMPLE FOR THREE CONCRETE ACTIVITIES: RESEARCH, ECOTOURISM AND HYDROELECTRIC GENERATION

What was designed in the general methodological matrix in "abstract" terms for heuristics purposes of research, we can conclude more, using some illustrative examples of obvious relevance for our empirical study. In the matrix-chart A-2 is expressed this illustration, emphasizing three key elements to address in the study.

On the one hand, we have the scientific research related to knowledge (and potential use) of biodiversity and ecosystems. It is classified as a socio-economic activity in the scale of in-situ direct link with the same park and reserve, although the benefits of this activity tend to be raised in higher level of impact, either nationally or internationally. The users in this case are national universities and especially international NGOs for purposes of ecological research and environmental education at the national level (as the same INBIO) and global (UICN) as well as some public and private entities oriented to natural conservation based on research. The contributions (A1 ...., An) that are generated through by the PNRB through these actors involved in the investigation in situ of the park are the following:

- Funds for international cooperation in research;
- Incomes of SINAC in respect of payment for the use of facilities of the parks by researchers (guides, facilities, etc.);
- Inputs to develop materials for environmental education;
- Species and organisms for bioprospection;
- Knowledge and potential innovation in the field of biodiversity and other ecological services essential to humanity.

CHART A-2
MATRIX OF METHODOLOGICAL GUIDE
(It is used the glossary of the matrix A-1).

PARK AND/OR RESERVE	SCOPE-SCALE OF THE CONTRIBUTION	BENEFITED ACTIVITIES AND CLASSIFICATION OF USERS		TYPE OF VALUED CONTRIBUTION (GOOD/SERVICE/EXTERNALITY)				
		Type of Activity	Type of user/ benefited "stakeholder"	A1	A2	A3	A...	An
Pi	Direct-Immediate. Inside the park or Reserve	Act1. Research Act2. . . . An	B1,1, Universities B1,2. NGO´s B2,j . . . Bn,j	Funds from international cooperation for research in ¢.	Saving of funds because of the use of the facilities of the parks by researchers (guides, facilities, etc).	Knowledge and research	Inputs to elaborate materials for environmental education	Species and organisms for bioprospection
	Local (zone of direct influence)	Act1. Act2 . . . Actn	B1,1.. B2,j B3,j .. . Bn,j					

PARK AND/OR RESERVE	SCOPE-SCALE OF THE CONTRIBUTION	BENEFITED ACTIVITIES AND CLASSIFICATION OF USERS		TYPE OF VALUED CONTRIBUTION (GOOD/SERVICE/EXTERNALITY)				
		Type of Activity	Type of user/ benefited "stakeholder"	A1	A2	A3	A...	An
	Micro-regional	Act1. Ecological tourism	B1,1 Family enterprises devoted to ecotourism	Annual incomes generated for the family enterprise due to the visit to the park in ¢ (colones)				
			B1,2. Small and medium enterprises (PYME) devoted to ecotourism.	Annual incomes generated for the PYME due to the visit to the park in ¢ (colones)				
			B2,j B3,j . . . Bn,j					

		Act2 . .						

PARK AND/OR RESERVE	SCOPE-SCALE OF THE CONTRIBUTION	BENEFITED ACTIVITIES AND CLASSIFICATION OF USERS		TYPE OF VALUED CONTRIBUTION (GOOD/SERVICE/EXTERNALITY)				
		Type of Activity	Type of user/ benefited "stakeholder"	A1	A2	A3	A...	An
	Basin downstream	Act1.Electric generation Act2 . . . Actn	B1,1. Cooperatives and micro-enterprises devoted to the electric generation with water coming from the rivers that have their source in the park and/or reserve. B2,j B3,j . . . Bn,j	Annual incomes obtained by these enterprises for the generation and electric distribution in ¢ (colones)	Incomes obtained by owners of forest by PSA, to keep their forest for electric generation	Costs avoided by cleaning of water used in generation		

PARK AND/OR RESERVE	SCOPE-SCALE OF THE CONTRIBUTION	BENEFITED ACTIVITIES AND CLASSIFICATION OF USERS		TYPE OF VALUED CONTRIBUTION (GOOD/SERVICE/EXTERNALITY)				
		Type of Activity	Type of user/ benefited "stakeholder"	A1	A2	A3	A...	An
	Regional	Act1 Act2 . . . Actn	B1,j (j=1,..,n) B2,j B3,j . . . Bn,j					
	National	Act1 Act2 . . . Actn	B1,j (j=1,..,n) B2,j B3,j . . . Bn,j					
	Global	A1 A2 . . . An	B1,j (j=1,..,n) B2,j B3,j . . . Bn,j					

First, it is clear that only a part of the contributions contained in the matrix A-2 will be identified in quantitative-monetary form. The majority, like the option of value of the scientific knowledge and applied for bio-technological progress in the future, will be addressed in a qualitative way, highlighting and characterizing the importance of such contributions for sustainability of development linked to conservation to Costa Rican society and internationally.

Second, the matrix A-2 shows other contributions of a particular park or reserve that are related to eco-tourist activity on the scale of the micro-region (also likely locally). It seems that this socio-economic activity is the most relevant in some cluster linked to a series of PNRB in Costa Rica, as in the Osa Peninsula induced by the Corcovado Park.

This gives enough reason to focus almost primarily on the eco-tourist activity from the perspective of a cluster induced by the park and consider some additional links of value added chain string in a larger territorial scale (nationwide) that have been developed from relatively isolated nuclei of eco-tourist establishments closely linked to the park.

Users or agents benefited in this case appear to be mainly:

- Tourists (for the enjoyment of the visit, though spending money to provide this recreational service provided by the park),

- family businesses devoted to ecotourism in the micro and local scale,

- Small and medium enterprises (PYME) engaged in accommodation and gastronomy component of ecotourism.

- Other companies and independent people (guides, etc.) that provide other related services for hotels and tourists, as part of the eco-tourist cluster.

The contributions associated with this activity and ultimately driven by the existence of the park or reserve visited, are very diverse and complex enough due to the many frequently energized chain links, so here are mentioned some few directly accounting for only this purpose of illustration (that is, without pretending a complete sample of the effects probably identifiable):

- Annual incomes generated in respect of the sale of park entrance tickets, varying these direct incomes from SINAC with the rate of tourist visitation of the PNRB under study;

- Annual incomes generated for the family business for the service provided of accommodation or meals for the tourists;

- Annual incomes generated for the eco-tourist PYME or by independent people related to the activity by provision of multiple services and sales of articles (crafts, etc.).

Thirdly, are named in the sample matrix, the most relevant activities within the territorial area of the basin downstream like the bottled of spring water and hydroelectric generation. In this case, raises the question of the contribution of the PNRB as environmental service provided in the form of quantity and quality of water resource due to water conservation in the park. In part, the payment of this service is already regulated and effectively collected as a fee or other remuneration of the service. Most of the payments for hydrological services attributed to recharge areas under conservation is still pending or in an emerging development. This study must take into account this contribution, without attempting to carry out the monetary valuation of environmental service. In fact, we have to look for more studies of this type already undertaken and derive from these ones the socio-economic dimension of ecological service for hydroelectric generation.

In this case, the users benefited are public enterprises, cooperatives, micro-enterprises and private co-generators, as well as receivers of Payment for Environmental Services (PSA) (owners of conserved areas), which use productively or indirectly the water from rivers that originate in the park or reserve. The corresponding concrete contributions to identify and systematize in this context are, among others, the following listed for purposes of illustration as an example:

- Corresponding part to hydrological PSA of the annual incomes obtained by the various companies engaged in electric generation and distribution;

- Incomes obtained by owners of forest by PSA, to keep their natural lands conserved for electric generation;

- Costs avoided because of the cleaning of the water used in generation.

With these three examples is reflected more clearly (in the matrix A-II) how is planned to use the methodological matrix AI, as a general guide to the collection and systematization of the information indicated both nationally (contributions attributed to all PNRB of the country) at the level of each individual park or reserve. For the latter purpose should be analyzed the information gathered for the national scale in three case studies: Palo Verde National Park, Rincon de la Vieja National Park and Corcovado National Park-Caño Island Biological Reserve.

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ANNEX II:

METHODOLOGY TO QUANTIFY THE CONTRIBUTION OF THE PNRB TO THE TOURIST ACTIVITY IN COSTA RICA

The following is exposed the methodological aspects used to obtain the figures related to tourism. First, Chart 2 (tourism and other generating sources of foreign exchange for Costa Rica. 1993-2009) is based on statistics of PROCOMER, the BCCR and the ICT. For purposes of updating these numbers in subsequent years to 2009, the Yearbook of Tourism published by the ICT offers some of the information in the chart entitled "Tourism and other generating sources of foreign exchange to Costa Rica'', as well as complementary statistics that are available online: (1) in the Yearbook of PROCOMER[35], as well as (2) in the macro-economic statistics of the BCCR [36].

Second, Chart 4 (structure of the average expenditure per tourist in Costa Rica according to activity or service demanded in 2009) presents the different items of expenditure as the ICT count them. In this sense, ICT statistics report both the total expenditure in respect of tourism for each of these items as the percentages of each item within total expenditure. This is as part of the charts of Non-Residents[37].

Future updates to chart 4 require considering the following. First, the percentage of tourists who have visited the PNRB should be determined for the year under analysis. To achieve this, the charts of Non-residents from ICT provide information entitled "Interviewees per Region of Residence as if they made a visit to any National Park. This one shows the percentage of tourists interviewed, who answered to have visited a PNRB.

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

Once you have the visitation percentage, this 58.9% is applied to each one of the items of total expenditure in respect of tourism (see box A1). For example, the total expenditure attributed to the PNRB in the item of lodging amounts to 315.287.695, representing 58.9% of the total expenditure in the quality of tourism (535.293.200). This procedure continues until completing all the items of expenditure in Chart 4.

[35] http://www.procomer.com/Espanol/Estadisticas-04/anuario-04-01/est_anuario-04-01-01.html
[36] http://www.bccr.fi.cr/flat/bccr_flat.htm
37 See chart entitled "Total Amount of Money Spent in Costa Rica per Region of Residence according to item".

Box A1. Total expense attributed to PNRB

The application of rule 3 allows obtaining the percentages of the total expense of tourists, which are attributable directly to the existence of the PNRB; that is, the total expense attributed to the PNRB.

535.293.200 ⟶ 100
? ⟶ 58,9

This implies that 535.293.200 shall be multiplied by 58.9. The result of this operation will then be divided by 100 to obtain in this way the amount that corresponds to 58.9%, which in this case amount to 315.287.695.

For practical purposes, the use of Excel for Windows software package is highly recommended to perform these arithmetic operations.

Third, the average expenditure per person (GMP) is also available in the Chart of Non-Residents of ICT. This under the title "Average expenditure per person (GMP) in Costa Rica per Region of Residence according to Main Motive of Visit and the way how they organized the Journey," Same that reports that the GMP amounts to 1244 for that year, so that Chart 4 takes this figure and derives the composition of that expenditure for each one of the items.

For each component, is taken as 1244 as the total expenditure and is derived the relative weight (%) of each item such as transportation, food, etc. Taking as an example, the expenditure of transportation, is apply the Rule 3 again (see box A2) to obtain the amount of money that each tourist spends on moving within Costa Rica. This is taking into account the percentage corresponding to transportation (15.4%), which is derived from the Charts of Non-Residents of ICT.

Box A2. Composition of the GMP

The application of Rule 3 allows getting the percentages of the items that make up the average expenditure per person (GMP). In this example, the GMP is of 1 244, which in turn is composed of various expenditures whose percentages are provided in the charts of Non-Resident of ICT. Taking into account the transportation, we can obtain:

1 244 ⟶ 100
? ⟶ 15.4

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

For practical purposes, the use of Excel for Windows software package is highly recommended to perform these arithmetic operations.

ANNEX III:

METHODOLOGY TO ESTIMATE THE TOTAL INCOME BY SALES OF ENERGY DERIVED FROM HYDROELECTRIC GENERATION IN PROJECTS NEAR TO PNRB

Following are exposed the methodological aspects used to obtain the figures related to the estimation of total income by the selling of energy in Costa Rica. This taking as reference, the hydroelectric generation in projects located in the vicinity of National Parks and Biological Reserves for the period 2007-2009. This distinction is important in the implementation of the methodology exposed in Annex I, since the study considers the quantification of the contributions that are attributable to the existence of the PNRB. This implies for the purposes of the hydroelectric generation the provision of the environmental service of protection of the water resource in quality and quantity to produce such clean energy.

Chart 8 presents the results of this estimation, whose procedure of calculation is exposed following. Taking as basis the information of sales and subscriber of ICE (year 2009) reported on the Sectorial Directions of Energy (DSE, 2010b), is taken the total of the energetic generation reported on sales of the enterprise ICE. Of which was calculated 79% as hydroelectric generation, since the remaining 21% of energy proceeds from other type of sources like geothermal, thermal, wind and/or biomass.

Once obtained the amount of hydroelectric generation is proceeded to calculate the percentage of such energy that is produced, and effectively is sold to consumers (using the data provided by DSE, 2010b). That is, the figure that represents a generated monetary income. 60% is obtained dividing the amount sold in hydroelectric generation into the amount produced by the hydroelectric plants. This responds to the fact that the quantification must include only the energy that effectively is sold to consumers, and therefore, it represents the generation of a monetary income. In this way, the methodology applies an adjustment to consider that though all the energy produced is consumed; not necessarily is sold and therefore, it does not report a monetary income at the moment of carrying out the study.

The following step consists of taking the Average price of electricity from ICE for the years 2007, 2008 and 2009 (based on the information from DSE, 2010a); and multiply it by the 60% of the generation of Hydroelectricity in KWH (that is, the one that is effectively sold and therefore reports a generated monetary income).

So, the figures reported are taken by the hydroelectric plants (which are shown in Chart 7 of this document), and is obtained the 60% of the generation of Hydroelectricity in KWH for the generating plants of hydroelectricity that depend on the existence of the PNRB for their energetic production. These ones are determined as result of the analysis of the information provided both by Figure 1 and Chart 6. This allows establishing the plants that are located in

the vicinity of the PNRB, according to the information provided by the Electricity Costa Rican Institute (ICE) for each one of the years analyzed.

Once obtained the figures of total incomes in colones, is proceeded to convert them into dollars. So, it is calculated an average between the Average sale Exchange rate and the average buy exchange rate (that is, an average exchange rate: TCP). This way of calculation is applied to the years 2007 (TCP: ₡516, 62), 2008 (TCP: ₡526, 23) and 2009 (TCP: ₡573, 35).

Finally, is divided the amount of total income in colones into the exchange rate obtained, according to the following formula:

$$\text{Ingeso Total en Dólares} = \frac{\text{Ingreso Total en Colones}}{\text{Tipo de Cambio}}$$

In this way is obtained the total income in dollars, which is shown in Chart 8.

ANNEX IV:

METHODOLOGY TO ESTIMATE THE ENVIRONMENTAL SERVICE OF STORAGE OF CO_2 IN THE PNRB

Following is exposed the methodological aspects used to obtain the figures related to the estimation of the environmental service of storage of carbon dioxide (CO_2), which is reported by the existence of the PNRB. This taking as reference, the data of coverage of forests located in National Parks and Biological Reserves obtained from INBio (2004). This distinction is important in the implementation of the methodology exposed in Annex I, since the study considers the quantification of the contributions that are attributable to the existence of the PNRB. For purposes of the storage of CO_2 this implies the provision of an environmental service that contributes to mitigate the impacts of the Climate Change.

Chart 20 presents the results of this estimation, whose procedure of calculation is exposed following. Taking as basis the information of coverage of forests in National Parks and Biological Reserves reported in INBio (2004). Where is indicated that, the PN have 54% of wooded coverage, while the RB conserve 81% of forests.

Therefore, from the total coverage of PNRB are calculated the hectares that correspond to forests. For purposes of the calculation of the average storage of CO_2 in tropical primary forest, the figure of forests in PNRB is multiply by 143, which correspond to the ton of CO_2 which storages each hectare of forest (taking as reference Russo, without date). This procedure is repeated for the calculation of the average storage on grounds of tropical forest, where the multiplying factor of 88 ton of CO_2 that storages each hectare of grounds in forest. Both figures are added up to obtain the great total of storage of CO_2 in PNRB.[38]

ENCC (2008) considers a range of price for the emissions of CO_2 that varies between US$2, 5 and US$6. Given that the market of carbon remains alive at the moment of carrying out this study, the price that is taken as reference for the calculation is an average price between the two values mentioned before. In this sense, the great total of storage of CO_2 in PNRB is multiply by US$4, 25 to obtain a monetary equivalent of the environmental service of storage of CO_2 that is associated with the existence of the PNRB.

38 In this point is supposed that all the tropical forests of the PNRB storage an Average of 143 ton of CO_2 in each hectare of forest, and on average 88 ton of CO_2 for each hectare of grounds in forest. In the case of the market of emissions of CO_2 are established, new estimations will be necessary to segment the quantities of CO_2 storaged in the different kinds of ecosystems present in the PNRB. Calculations that should respond to the standards that would be established in the agreements that eventually would be signed in future Conferences of United Nations about climate change.

ANNEX V:

RESULTS OF THE VALIDATION WORKSHOP

A first workshop of experts is carried out to validate the methodology structured for this study and presented in Annex I. In addition, the experts consulted selected the three studies carried out in this investigation based on criteria previously identified by the working group.

The selection of the parks in which is applied, in more detail, the methodology based on clusters described in Annex I, was conducted in two stages. First, a workshop with 36 experts is carried out (coming from SINAC, NGOs, academics, etc.), who work on the validation of the methodology that was used originally in the project in 2002. In this regard, the researching teams from CINPE feedbacks this methodology to include the contributions from experts. Second, it is developed a workshop with the participation of 20 experts (coming from SINAC, NGOs, academics, etc.) to select the 3 case studies. Following are presented the obtained results.

A. CRITERIA

The following criteria are identified for the selection of the case studies of the three national parks:

1) Availability of infrastructure (socio-economic and environmental) in the area of influence of the park

The sub-criteria are referred to the existence of infrastructure that facilitate the visitation (hotels, restaurants, businesses, etc) related recreational services (guided tours, diving, canopy, horseback riding, walks, service of guides, information. As well as, the local empowerment for the contribution of related services, infrastructure and services appropriate for the attention of the visitors (toilets, access to drinking water, trails, etc). Kind of tourism (ecological, rural-community, adventure), incomes generated to the surrounding communities, and incomes generated to the country.

2) Quantity and availability of information

The sub-criteria are referred to the presence of organized local communities that are interrelated or benefited from the park/reserve. As well as, the availability of information systematized on the PNRB in: Conservation Area, in office of the PNRB and Central SINAC, and the existence and availability of projects, researches and studies of the PNRB.

3) National and International Pertinence

The sub-criteria are referred to the ecological and biological importance, international recognition (Ramsar Site, Human Heritage, and Reserve of the biosphere), national and foreign annual visitation, and generation of environmental services.

4) State Management – Participating Management

The sub-criteria take into account if the park or reserve belongs to any international category of protection or management. For instance, if the park or reserve is a Ramsar site; the performance on the state management, and the synergy between the state management and the local actors

5) Diversity of landscapes, ecosystems and species

This implies diversity of landscapes (mountain, coast, volcanoes, rivers, lakes, etc), diversity of ecosystems (life zones, kinds of forests, kinds of wetlands, etc) and diversity of species (estimate total richness of species; known diversity of flora, fauna, macro-mushrooms and microorganisms; levels of endemism – unique species -; habitat of threatened species or of special interest for the country and the international community, etc).

6) Sources of pressure / conflicts

Examining the disorganized socio-economic development (urban, residential, agricultural, industrial), illegal extraction of natural resources, overexploitation on the use of resources in the buffering zones, pollution due to solid and liquid wastes in the PNRB, and conflicts between the socio-economic activities that use the environmental services of the park.

7) Water (inside and outside)

To take into consideration the importance of the park for the protection and conservation of the water resource, its demand for socio-economic purposes (industrial, commercial, agricultural, aquaculture, residential) in the area of influence of the park, and vulnerability of the water

8) Research

The sub-criteria take into account the quantity of researches carried out in the park/reserve, the variety of researches carried out in the park/reserve and incidence of the researches.

9) Potential for energetic generation

This implies potential for the environmentally sustainable generation of electric energy, starting from the water resources that the park protects. Being these ones water, geothermal resources or other kinds of renewable resources inside the park.

10) Generation of other environmental services

The sub-criteria take into account bioprospection, fishery and greenhouse gases.

B. SELECTION OF THE STUDY CASES

CINPE's professional team, based on inputs obtained in the second workshop of experts, makes a selection of 3 case studies taking into account the following three criteria:

- Existence of positive interaction (cluster type) at the local, regional, national and international level
- Increased amount of information available
- Possibility of institutional or organizational support in the area

After analyzing each one of the 8 National Parks and 2 Biological Reserves that meet the requirements of the funding entity (FUNDECOOPERACION) and according to selected criteria were selected the following PNRB for the three study cases:

- Palo Verde National Park
- Rincón de la Vieja Volcano National Park.
- Corcovado National Park and Caño Island Biological Reserve

The team of professionals from CINPE, with the support of professionals of SINAC in the areas, began the fieldwork with exploratory trip for each case study in April-May, 2009. Meanwhile, the task of interviews and surveying starts in July-August, 2009, then, it continued in December and finished in January and February, 2010.

CHART A-3

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

CRITERIA OF DECISION	1	2	3	4	Observations
1) Availability of infrastructure (socio-economic and environmental) in the area of influence					
1.1 Existence of infrastructure that facilitates the visitation (hotels, restaurants, businesses, etc)					
1.2 Existence of related recreational services (guided tours, diving, canopy, horseback ride, walks, services of guides, information about the site, etc)					
1.3 Local empowerment for the provision of related services					
1.4 The park has infrastructure and adequate services for the attention of the visitors (toilets, access to drinking water, trails, etc)					
1.5 Type of tourism (ecological, rural community, adventure)					
1.6 Incomes generated to the surrounding communities					
1.7 Incomes generated to the country					
2) Amount and availability of information					
2.1 Availability of systematized information about the PNRB in Conservation Area, in the office of the PNRB and Central SINAC.					
2.2 Existence and availability of projects, researches and studies of the PNRB.					
3) National and International Pertinence					
3.1 Ecological and Biological Importance					
3.2 International Recognition (Ramsar Site, World Heritage, Reserve of the Biosphere)					
3.3 National and Foreign Annual visitation					
3.4 Generation of environmental services					
4) State Management-Participating Management					
4.1 Presence of organized local communities that interrelate or benefit themselves from the park/reserve					
4.2 Performance in the State Management					
4.3 Synergy between the state management and local actors					
5) Diversity of landscapes, ecosystems, and species					
5.1 Diversity of landscapes (mountain, coast, volcanoes, rivers, lakes, etc)					
5.2 Diversity of ecosystems (life zones, types of forests, types of wetlands, etc)					
5.3 Diversity of species (total estimated richness of species, diversity of known flora and fauna, macro-mushrooms, and microorganisms, levels of endemism-unique species-habitat of threatened species or of special interest for the country and international community, etc.)					

CHART A-3

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

6) Sources of pressure / conflicts					
6.1 Disorganized socio-economic development (urban, residential, agricultural, industrial)					
6.2 Illegal extraction of natural resources					
6.3 Overexploitation in the use of resources in the buffering zones					
6.4 Pollution because of solid and liquid wastes in the PN-RB					
6.5 Conflicts between the socio-economic activities that use the environmental services from the park.					
7) Water (inside and outside)					
7.1 Importance of the park for the protection and conservation of the water resource					
7.2 Water demand for socio-economic purposes (industrial, commercial, agricultural, aquaculture, residential) in the area of influence of the park					
7.3 Vulnerability of water resource					
8) Research					
8.1 Amount of researches carried out in the park/reserve					
8.2 Variety of researches carried out in the park/reserve					
8.3 Incidence of the researches carried out in the park/reserve					
9) Potential for the energetic generation					
9.1 Potential for the environmentally sustainable generation of electric energy, from the water resources that the park protects					
9.2 Potential for the environmentally sustainable generation of electric generation, from geothermal resources that the park protects					
9.3 Potential for the environmentally sustainable generation of energy, from other types of renewable resources that are in the park					
10) Generation of other environmental services					
10.1					
10.2					
10.3					

ANNEX VI:

COLLECTION OF INFORMATION AND SURVEYS

1. Introduction

In order to collect information relevant to the case studies that complement the entries of the matrices described in Annex I, and corresponding to the local and regional scale, we used the survey instrument in each one of the three case studies selected.

Four fieldtrips of about a week each were carried out at Corcovado, Palo Verde and Rincon de la Vieja National Parks. In order to optimize the fieldwork and taking advantage of geographical proximity, the fieldworks to Palo Verde PN and Rincón de la Vieja PN are conducted jointly. So, the exploratory trip takes place from April 4th to April 7th, 2009. Meanwhile the task of surveying was carried out from August 5th to August 15th, 2009; besides, from December 2nd to December 9th, 2009 and from February 22nd to February 24th, 2010 and one more trip to PN Palo Verde on May 19th, 2010.

In the case of Corcovado PN, the exploratory trip was made from April 30th to May 4th, 2009. Meanwhile, the task of surveying was between July 27th and July 31st, 2009, for productive activities in the area of Puerto Jimenez between December 2nd and December 6th, 2009, the productive activities in the sector of Drake Bay and from January 20th to January 26th, 2010, was carried out the surveying of tourists.

After an exhaustive bibliographical review and an analysis of the characteristics of the parks and economic activities conducted there, we proceeded to the structuring of eight types of forms of questionnaires, according to the economic activities developed and the type of agent from which was desired to get the information.

In this way an instrument is developed for tourists (see the documents in each case study) with which was obtained the information relevant to the construction of tourism cluster in each area. The interviewed tourists are those who could be located inwardly of the park.

The ten additional instruments to the survey for tourists include the major sectors in which are divided the commercial and production activities related to national parks. This will build surveys for 1) Hotels and Cabins, 2) Restaurants and Coffee Bars, 3) Related Activities, 4) key actors, 5) students, 6) Researchers and 7) Teachers and 8) Transportation, 9) Stockbreeders and 10) Travel Agencies.

For hotels and cabins were conducted tours in the communities directly surrounding to the national parks, Bagatzi and Bagaces for the case of Palo Verde PN. The communities of Curubandé and San Jorge for Rincon de la Vieja Volcano PN, as well as Puerto Jiménez and Drake Bay in the case of Corcovado PN.

In all cases the tours were conducted to determine how the park has influenced the surroundings. Moreover, some conversations are made with members of the administration of three national parks in order to determine which is the influence of the park in terms of tourist visitation and demands for food and lodging?

The same procedure is followed for restaurants and related activities. The latter present a wide range of heterogeneity in the sense that it covers activities ranging from grocery stores to tourist transportation. However, the focus of attention of the questions is focused on income generation and expenditures, its relationship with other activities and with tourism rather than on the particularities of each activity.