

# Natural Capital's perception by Kodagu communities - a comparative study

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When we ask ourselves about a concrete definition of "Natural Capital" we can find a large and wide range of conceptions, which are attached to it. These can turn out to be confusing and contradictory in some cases. In theory, through books and different studies we know natural resources are composed by all the natural actives originated by the nature itself. Besides, these conform a patrimony for society as them are translated into a path towards economy: The Natural Capital. May not the Natural Capital be an easy conception to put in terms of economy it turns out to be an important capacitor for economy growth in most countries. In any case, we can clearly distinguish two ways as Natural Capital can be seen. One may elaborate a definition about it by reading what others have previously written, those who usually are quite far from the direct use of natural resources. On the other hand it would also be interesting to conform a definition of it by asking people who are constantly in contact with natural resources and consequently contribute to form the Natural Capital.

## 1. INTRODUCTION

Nature plays an essential role when referring to local communities, as it constitutes a part of their everyday-life. It generates a considering amount of goods and services contributing to human's wellbeing (E. Gómez, 2007). While in some cases benefits from nature are obtained throughout economic markets, in some others they are directly consumed without any intermediary, as it occurs in some rural areas, where local communities use nature as a direct way of subsistence.

Perception and valuation on these benefits obtained from nature immediately deliver to human life and society, but they might be seen as a subjective matter (Ekins et al 2003).

However, natural capital, described as a stock that generates goods and services flows or a natural income throughout time (Costanza and Daly, 1992), might be validly described by perception. Local perceptions of resource use can be explored through different lenses such as religious, cultural, socio-political and socioeconomic practices (Harber et al, 2006). There is a substantial literature examining the role of culture in shaping human environmental behaviour (Drivers of Change in Ecosystems and Their Services).

Here natural capital concept and the perception by local rural communities is stated as a trial to fill the gap within a small illustration in Karnataka, India. Perception on natural resources and services might help to understand people's behaviour towards nature and its access to the forest. Within all land-tenure system established by local government this might be beneficial in order to formulate public policies.

The main goal of this project is based in two general ideas. The first of them is to evaluate natural capital's perception in Virajpet taluk inhabitants (Kodagu). The second one implies a comparing study between the previously mentioned perception and what some specific authors have said about it.

To achieve these objectives a body of primary data has been used (quantitative and qualitative) collected among rural populations (divided into towns and small villages) and tribal communities, all of

them living in the same area, close to a wild life sanctuary and one national park in Kodagu district (Karnataka, India).

This project was carried out from October 2008 to July 2009. On September the bibliography and review on literature about Natural Capital started till the departure, which was on December.

### **1.1 Natural Capital: NNRRs and Services**

The concept of Natural Resources (from now on, NNRR) emphasizes the idea of goods coming from nature without any alteration and not generated by human being. They also contribute to human society's welfare and development (Naredo, 1993). In economy its definition focuses on a process towards contribution to goods and services production, which human being uses. The ecosystem service terminology and conception appears from the idea of evaluating and comparing natural scenery with an analogous economy's language (Robert Costanza). It is defined as "benefits people obtain from ecosystems" (Millennium Ecosystem Assessment, 2005). Although standard economy talks about value just in monetary terms, we will use this expression to refer to ecosystem services, as others have done.

Analyses made by authors as Robert Costanza and Rudolf de Groot demonstrate the fact that ecosystem services present several values. Logically, ecosystem services depend directly on ecosystem functions and its biodiversity, as when they suffer from degradation its services experience depletion too.

Once brought up both basic concepts within natural capital (NNRR and ecosystem services), we will formally introduce natural's capital definition as the capacity of natural processes and components to provide goods and services and satisfy human needs (de Groot, 1992). When talking about goods we refer to ecosystem components while talking about services we make reference to ecosystem processes. The terminology "Natural Capital" has lead to the conception of being a metaphor to designate the importance of elements of nature to human being (Ekins et al, 2003). Some authors have talked about the fact that seeing natural systems within capital is useful so the action of man can whether improve or degrade them and, in that way, their productive capacity might be more realistic. So, this expression would not exist without human's intervention on it.

### **1.2 Natural capital and people: uses**

Although important references are found within NK's world (see Peace and Turner, Daly, Ekins, Noel and O'Connor...), two main authors will be considered and described in this research as, further on some comparisons with their analysis will be done. Both, Rudolf de Groot and Robert Costanza are experimented researchers focusing its careers in the relationship between ecological issues and economy.

The most interesting point about both authors related to this research is the fact that they have constructed a classification for NNRR and ecosystem services within uses in nature. Thus, we will compare their definition with what obtained in the fieldwork. As both authors have formulated similar classification on NK's topic with slightly small disparities, their conception will be generally treated as a whole one. Hence, when referring to ecosystem function, associated to natural processes, four primary categories will be grouped (de Groot et al, 2000) as regulation, habitat, production and information functions. The first of them will make reference to the capacity nature has to regulate certain systems and ecological processes. This regulation provides direct and indirect benefits to humans, finding clean air, water and soil and biological control services. The second, habitat functions, makes reference to natural ecosystems providing the habitat to wild animals and plants in order to use it as a refugee and place to reproduce. This way, animals contribute to the conservation of conservation of biological and genetic diversity and evolutionary processes. These two groups are likely to be essential to the maintenance of natural processes and components so the availability of the next two ones depends on

them. The third of them, the production functions, are based on photosynthesis and nutrient uptake forming diversity in carbohydrate structures providing goods for human's consumption. Some examples would be food, raw materials, energy resources and genetic material. The last one is known as a reference function so most part of human evolution has taken place in an undomesticated habitat. It helps to the maintenance of health. Within this category we might find feelings as reflection, spiritual enrichment, cognitive development, recreation and aesthetic experience.

De Groot and Costanza have formulated accurate classifications for NK services and ecosystem functions as seen above. Within this categorisation an overview of them attributed to natural ecosystems is divided into 17 functions, in Costanza's case, and 23, in de Groot's, with its corresponding ecological structures and processes underlying these functions.

### 1.3 Area of study

The Western Ghats (WG) are considered as an environmental "hotspot". The area, ecologically sensitive to development, was declared an ecological hotspot in 1988. According to Myers 2000, a hotspot must contain at least 0.5% or 1500 species of vascular plants

being endemics, and it has to have lost at least 70% of its primary vegetation. Traditionally the WG were an important source of natural products that feed and provided several services to native tribal people. Within time, and during British colonization, most of the territories were destined to agricultural plantations and timber. So, due to habitat loss the WG have been severely fragmented and it has been estimated that nearly 40% of the forest cover in the WG was lost between 1920 and 1990 (Menon & Bawa 1997). Human activities, as tea, coffee and teak plantations have affected tropical rainforests, which are much more affected than other habitats (Kumar et al, 2002).

Kodagu, also known with the anglicised name of Coorg and located in southwest Karnataka, appears to be its second smallest district. With an area of 4102km<sup>2</sup> (Mani, 1998) and a population of 5,48 lakh (according to census 2001) it constitutes an important spot in the Western Ghats and a land of mesmerizing geographical diversity with forests and hills, rivers and streams that flow in the course of the valleys, pasture land and plantations, wildlife sanctuaries and historical monuments (Mani et al, 2006). Kodagu consists on 3 Taluks: Madikeri, Somvarpet and Virajpet and three forest divisions namely Virajpet, Madikeri and Hunsur. Its main city and capital is Madikeri.



**Figure 1.1-** Kodagu's map divided into three different taluks

**Source-** Own elaboration

Within this territory, one-third might be classified as forest (Reserve Forest and Protected Areas). Besides, we find large extensions of uncultivated government lands covered with dense vegetation from the forest (e.g.: Paisaris, Devarakadu) also to be taken on account (Report on inventory of forest resources of Kodagu

district, Karnataka, 1995). In addition, we find a whole system for the administration of tree growth all over a 38-land tenure system depending on the use of the land (e.g.:



Jammamalai, Sagu) (Mani, 1998). Reserve Forests, Protected Areas, Village Forests and Jammamalais are owned and managed by the Forest Department and constitute 46% of geographical area (Satish et al).

This study is basically focused on Virajpet taluk, in the southwest of the region (as shown in the Figure 1.1) with 1646 sq.km. Within this territory population is diversely spread since they might be concentrated in urban agglomerations (small towns with a street-conformation and diverse social services as a school, a central market, hospitals and public transports) or living in scattered houses surrounded by coffee estates and evergreen forests, with less access to social services but belonging to a same administrative territory (in this case the same Revenue Village). The first type of distribution will be named as "towns" while the second one will be referred as "small villages". In Virajpet taluk, as in the immense part of Karnataka state, tribal settlements might be found, not belonging to any of the categories described above. Tribal settlements are regarded as communities belonging to ST casts (Scheduled Tribal), usually developing a specific task. These communities do generally live amidst a forest area, with a theoretical easier access to NNRRs than people living in other settlements. Nevertheless, this situation has been changing in the last decades, since some communities had been forced to move from their original birthplaces with new regulation and protection for forest areas, as protected areas, wildlife sanctuaries and forest reserves.

Kodagu is a totally rural area, with 86,26% of its population living in the countryside. Within Kodagu, Virajpet's rural rate is also very high, with 88,80% of the population in rural areas. People in Virajpet taluk depend basically on natural resources, throughout the commercialisation of them or directly straight form nature (as some tribal communities do).

Two-thirds of Kodagu district are covered by forest (Chandrakanth et al. 2004), in which are included coffee plantations, sacred groves, three Wildlife Sanctuaries and one National Park. This situation brings to the conflict between the natural resource needs from local communities and wildlife located in the area. In Kodagu we find settlements that are not usually condensed as village units (as they are in other rural parts of India) (Neilson, 2008) as most houses are scattered forming meeting points surrounded by the landscape. Within this situation, lots of restrictions are imposed about the landscape.

As a rural region, most of Kodagu's economy is based on agriculture, plantations, and forestry. Kodagu is one of the most prosperous parts of Karnataka mainly because of coffee and other plantation products. The economic strongholds of the district are coffee, cardamom and pepper. It has the highest per capita income in Karnataka. Kodagu contributes about 30% of the Coffee produced in India (Coorg Institute of Technology, 2006). We might find numerous people of distinct ethnic or caste origins. However, political and economic domination is with those who bear the name of the area, the Kodava (coorgis as the anglicised name). Although other communities have also been traditionally established in the district, including migrants from neighbouring areas, the Kodavas still represent 20% of the Kodagu inhabitants (Karnataka govt, tourism dept.). Tribal communities are also found in the area as an important social group. They are included as ST (Scheduled Tribal) cast, which constitutes 14,96% of the total Virajpet population, a considerably high rate comparing it to the state's one. They generally live in small settlements called Hadi or Hatti. These tribal communities have traditionally been food-gatherers and have practiced shifting cultivation as well as agriculture as a subsidiary occupation. Although tribal communities have always lived according to its own patterns, more recently, they have taken to living in larger hamlets, with government interventions.

## 2. METHODS

Within methodology, several techniques were applied on the field. Participant observation was used in order to obtain a general idea of the study context and try to feel more comfortable with the surrounding

as well as getting secondary information. Unstructured and semi-structured interviews were also used to reach that last point. Afterwards, structured methodology was used in order to approach to the area cultural domain. This was made throughout the free-listing technique and control variables, constructed and collected from the secondary information and supported with bibliography. This method is used when one might have a general idea of a cultural domain but wants to get a closer approximation to what its respondents consider to be the specific items conforming it. The free-listing technique consists on asking a brief set of respondents, around 30, to name all items corresponding a given description (Gatewood, 1983). Once you have this list and no more significant new items are appearing on it, several conclusions can be taken. Some I looked at were referred to frequency and position of mention of the items across the list. This is called free-list salience, a combination of frequency and position throughout the list, named Smith's value, which represents the global importance of every item in a rang between 0 and 1 (Smith, 1993).

In this study I carried out two free-listings made to the same respondent, as following:

- 1) What are the things people use from nature in (the corresponding area)?
- 2) Why do people need nature?

Within this kind of questions I got a list of different answers. The first of them aimed to obtain a list of different natural resources and the second one to achieve the list of diverse ecosystem services. Free-listings were split depending on the settlement, obtaining 30 from tribal communities, being one discarded, 33 from small villages and 30 from towns with its corresponding control variables, based in gender, age, wealth, education and general knowledge. To each of the answers within the lists respondents were asked: "Why?" in order to obtain the use of every item. So, if someone answered "trees, water, pepper and coffee" once the list was ended the question "why" was applied to each of them. Once the list was obtained, a grouping criterion was decided to be applied, in order to maximize NNRRs and services uses and make the list firmer. In the following table the original and gathering lists are shown with its corresponding number of items.

**Table V.6-** Natural Capital quantity lists  
**Source:** Own elaboration

		<b>Number of items</b>		
		<b>Tribal</b>	<b>Small Villages</b>	<b>Towns</b>
<b>NNRR</b>	<b>Original list</b>	42	61	72
	<b>Gathered list<sup>1</sup></b>	23	38	44
		<b>Number of items</b>		
		<b>Tribal</b>	<b>Small Villages</b>	<b>Towns</b>
<b>Ecosystem services</b>	<b>Original list</b>	31	48	45
	<b>Gathered list</b>	30	45	45

The study population consisted on men and women without distinction over 18 years old (considering 18 as an adult age.) The sample has been carried out in different settlements due to the study's character. Different aspects had been taken on account to make the selection of the sample.

- I) Near Brahmagiri wildlife sanctuary
- II) Inside the evergreen forest area (although surrounded by coffee estates)
- III) Divided into revenue villages

<sup>1</sup> Where some NNRR have been put into more general groups (fruits, vegetables, animals...). This is the list used for the final analysis.

Population living near a Wildlife Sanctuary (50km far away maximum from it) was considered to have more access to NNRRs and covered a closer relation with nature. Living inside the evergreen forest area was another requirement in order to obtain a wider NNRRs and services variety and longer lists. Last point was to divide the area with administrative boundaries so I could randomly choose the sample. This was done through Revenue Villages.

The sample has been divided into three categories, as previously said in the objectives and hypotheses section:

- Towns
- Small Villages
- Tribal Settlements
- 

The conditions to set up a town were established as:

- >150 inhab./acre<sup>2</sup>
- >2000 inhab. totally

Some control variables as access to medicines, school, market or public transport were also taken on account.

### **3. RESULTS**

#### **3.1 Natural Capital according to settlement**

Within the three categories, 92 respondents participated and 16 NNRR and services in tribal communities, 18 NNRR and 22 services in Small Villages and 30 NNRR and 21 services in towns were said by more than one respondent. On average, informants listed 5,30 different NNRR and 3,34 Services. The shortest listed for NNRR and Services together included only one item and the longest one fifteen. Although the list of items went over 50 in some cases, we will analyse the top ten ones where frequency answering is usually more than 3 respondents. These lists have been sorted according to Smith's Saliency Index based on frequency and ranking.

Looking at table 2.1 perception on NNRR does not seem to present a wide variation according to settlement. NNRR might be recognized as a path towards subsistence and economy, thus all respondents state main economic crops as the main NNRR, regardless of its settlement. It is worth pointing out the fact that interviews were carried out during coffee peak season. Besides, no significant difference has been realised in tribal communities. This might be a consequence of its displacements in the last years from the forest to government settlements, where its access to the forest and the NNRRs is not so easy. In terms of environmental services a different conception from NNRR appears as it looks like nature is perceived as a source of satisfaction since items as "healthy life", air and animals appear in the lists.

When evaluating Natural Capital's perception I focused on disparity according to settlement and even if they were not taken on account to develop the research, some control variables as sex, age and income were considered. No significant differences were found.

**Table 2.1-** NNRRs and Services top-ten  
**Source:** Own Elaboration

<b>NATURAL RESOURCES TOP TEN<sup>2</sup></b>											
<b>TRIBAL COMMUNITIES (0,05 &lt;saliency&lt;0,6)</b>				<b>SMALL VILLAGES (0,06&lt;saliency&lt;0,8)</b>				<b>TOWNS (0,1&lt;saliency&lt;0,5)</b>			
<b>Items</b>	<b>% of resp.</b>	<b>Freq.</b>	<b>Rank</b>	<b>Items</b>	<b>% of resp.</b>	<b>Freq.</b>	<b>Rank</b>	<b>Items</b>	<b>% of resp.</b>	<b>Freq.</b>	<b>Rank</b>
coffee	69	20	1,7	coffee	94	31	2,2	coffee	67	20	3,0
pepper	66	19	2,4	paddy	55	18	2,4	fruits	80	24	4,4
fruits	66	19	3,1	pepper	70	23	3,8	paddy	50	15	3,5
paddy	28	8	2,9	fruits	61	20	3,3	pepper	50	15	3,7
ginger	28	8	3,7	arecanut	39	13	3,5	firewood	33	10	2,9
arecanut	21	6	3,7	water	15	5	2,6	water	27	8	2,0
vegetables	17	5	3,4	cardamom	21	7	3,3	vegetables	50	15	4,9
trees	17	5	4,4	vegetables	18	6	3,8	plants	23	7	3,9
bamboo	7	2	1,0	firewood	15	5	4,6	trees	17	5	3,4
firewood	10	3	4,0	trees	9	3	3,3	air	13	4	2,7

  

<b>ECOSYSTEM SERVICES TOP TEN<sup>3</sup></b>											
<b>TRIBAL COMMUNITIES (0,05&lt;saliency&lt;0,2)</b>				<b>SMALL VILLAGES (0,07&lt;saliency&lt;0,6)</b>				<b>TOWNS (0,09&lt;saliency&lt;0,5)</b>			
<b>Items</b>	<b>% of resp.</b>	<b>Freq.</b>	<b>Rank</b>	<b>Items</b>	<b>% of resp.</b>	<b>Freq.</b>	<b>Rank</b>	<b>Items</b>	<b>% of resp.</b>	<b>Freq.</b>	<b>Rank</b>
lead life	14	4	1,0	air	64	21	2,1	air	60	18	2,2
rainfall	14	4	1,5	water	39	13	2,6	water	40	12	2,6
animals	14	4	2,2	environment	30	10	3,6	trees	30	9	2,9
fruits	10	3	1,7	rainfall	24	8	2,5	rainfall	23	7	2,1
atmosphere	10	3	1,7	trees	24	8	2,4	plants	17	5	2,6
firewood	10	3	2,0	oxygen	15	5	2,6	Natural goods	10	3	1,0
shelter	7	2	1,0	firewood	15	5	3,0	lead life	10	3	1,0
food	7	2	1,0	food	15	5	3,0	healthy life	13	4	2,2
plants	7	2	1,5	Natural goods	12	4	1,5	food	13	4	2,5
air	7	2	1,5	enjoy nature	9	3	2,7	sunlight	17	5	3,0

### 3.2 Natural Capital Uses

When using the free-listing technique, I wanted to capture the cultural values and domain (Smith, 1993) of a specific area and get the list of different NNRR and Services perceived. Besides, a curiosity about the uses on these items was in attendance. In order to accomplish so, the question "why" was employed for each of the items so the use of it could be taken.

As seen in table 2.2, functions have been divided as in the bibliography following de Groot and Costanza's patterns, between regulation, habitat, production and information. Sub-functions (not stated in here) have been modified from author's classification since they have been adapted to the field needs and context. The first part of it makes reference to the number of NNRR and Services respondents have mentioned having the corresponding function. The second part of it reflects the same results but in % mode, in order to make it clearer.

Four main findings emerge from table 2.2. The first of them shows that in the three types of settlement, NNRR are mostly value for their production function. Listing of natural resources for their regulation, habitat, and information function is rare or inexistent in the three types of settlement. Secondly, in the three types of settlement, services are valued for their production function (between 48 and 53% of the mentions), but also for their regulation function. Thirdly, respondents from tribal and small villages give some value to the information function of environmental services (16% and 14% approx.), but not respondents from towns (less than 5%). Finally, it is observed that habitat function is not relevant for informants in the sample.

<sup>2</sup> and <sup>3</sup> make reference to the top ten listed NNRR/services with the highest saliency's indexes concreting the indexes rang of each list at the beginning of them.

**Table 2.2-** Natural Capital rate uses according to settlement

Source: Own elaboration

Function	Tribals				Small Villages				Towns			
	NNRR		Services		NNRR		Services		NNRR		Services	
	N <sup>4</sup>	% <sup>5</sup>	N	%	N	%	N	%	N	%	N	%
<b>Regulation</b>	0	0,00	17	29,82	4	1,51	4	32,88	13	4,21	55	41,04
<b>Habitat</b>	0	0,00	2	3,51	0	0,00	5	3,42	4	1,29	1	0,75
<b>Production</b>	192	99,48	29	50,88	258	97,36	71	48,63	287	92,88	72	53,73
<b>Information</b>	1	0,52	9	15,79	3	1,13	22	15,07	5	1,62	6	4,48

### 3.3 Functions in the field Vs Functions in the bibliography

As explained in the literature revision section, de Groot and Costanza make a classification of Natural Capital divided into NNRRs and Services. Both of the authors construct a list of ecosystem functions evolving this NNRR's and Services within the same one. In my own elaboration the same main-function classification has been taken from the authors' one, divided into four categories, since they range the key and central ecosystem functions and are feasibly applied to the field.

Within the researcher's list regulation appears as a whole function, with no distinction. This is due to respondent's nature, background and context. It was believed that regulation sub-functions within literature would not work since people would not consider ecological processes as a part of their nature's perception. Still regulation function was decided to be stored up since it plays an essential role in nature processes and systems. In the study regulation function was practically inexistent when capturing NNRRs but made a strong appearance when referring to Ecosystem services as "air" was perceived as an essential component for breathing and as an important path to survive. Habitat function was included as it represents a vital function within nature, even if with no distinguished sub-functions. In the field this particular function did nearly have repercussion on people's perception since in NNRRs observation no people from tribal communities or small villages answered habitat function for any of the items listed.

Production function became to be the most cited by people, almost concentrating all answers on it, moreover in NNRRs lists, where in some cases (as in tribal communities) it almost evolved 100% of the answers. Although in Services rates were not so concentrated, still production was the most cited, followed by regulation and information. That way, production function was also divided into five different categories, adapted, however, from fieldwork observations: domestic, energy/materials, medicine/health, decorative/aesthetic and economic. When dealing with information function's it was decided to divide it into two different categories, as recreation and spiritual/traditional values. No research and educational components were applied since it was observed people would not perceive nature that way. This function appeared mostly when treating ecosystem services since it implied a more global perception about nature with a non-subsistence meaning but spiritual one. Within it, recreation had a great significance, contrary to what initially was though since no considerable traditional and spiritual values were listed.

In the following table a comparison between author's and researcher's classification can be seen:

<sup>4</sup> N is the number of NNRR and services, respectively

<sup>5</sup> % is the percentage of NNRR and services, respectively



**Figure VI.2-** Comparison between author's and research classification**Source-** Own elaboration based on Costanza and De Groot's classification

<b>RESEARCHER'S CLASSIFICATION<sup>6</sup></b>		<b>COSTANZA'S AND DE GROOT'S CLASSIFICATION<sup>7</sup></b>	
<b>Function</b>	<b>Sub-function</b>	<b>Function</b>	<b>Sub-function</b>
<b>a. Regulation</b>		<b>a. Regulation</b>	a.1 Gas regulation a.2 Climate regulation a.3 Disturbance prevention a.4 Water regulation a.5 Water supply a.6 Soil retention a.7 Soil formation a.8 Nutrient regulation a.9 Waste treatment a.10 Pollination a.11 Biological control
<b>b. Habitat</b>		<b>b. Habitat</b>	b.1 Refugium b.2 Nursery
<b>c. Production</b>	c.1 Domestic uses c.2 Energy/ Materials  c.3 Medicine/ Health/Survival  c.4 Decorative/ Personal Aesthetic  c.5 Economic Uses	<b>c. Production</b>	c.1 Food c.2 Raw materials  c.3 Genetic resources  c.4 Medicinal resources  c.5 Ornamental resources
<b>d. Information</b>	d.1 Recreation d.2 Spiritual/ Traditional values	<b>d. Information</b>	d.1 Aesthetic d.2 Recreation d.3 Cultural and artistic d.4 Spiritual and historic d.5 Science and education

#### 4. DISCUSSION AND CONCLUSIONS

Kodagu's population and in the present study Virajpet taluk, are dependent on primary economic sector mainly based on agricultural practices. Hence, the area is entirely immersed in the commercial crops production as coffee, pepper and paddy. People in the area are directly related to these circumstances since, generally, individuals living in small villages and towns own the lands and tribal communities' members work on them as labours.

Government has established lots of restrictions within the land uses as well as the increasing declaration on Protected Areas and Wildlife Sanctuaries. This has lead to a conflict between Natural Resources and Environmental Services uses by local communities in the area and its wildlife, especially in tribal communities situation, which in most cases have been expelled from their original birthplaces.

One of the main findings in the present study is related to NNRRs and Environmental Services disparities on perceptions. As initially stated it was thought that NK's perception was going to vary according to people's settlement, without no apparently distinction between NNRRs and Services. On the contrary, the hypothesis was achieved in the second case but not in the first one.

NNRRs were almost entirely perceived in the same manner by all of the respondents, independently of their residency settlement, opposing to what was initially settled. When examining the answers pattern and its functions there was a tendency to state commercial crops in the first positions. This propensity is

<sup>6</sup> This list has been constructed according to what is been observed during the fieldwork period and the free-listing results.

<sup>7</sup> This list has been taken from most completed version between Costanza's and de Groot's lists, in order to reunite as much information as possible

clearly influenced by the fact that it is an agricultural area. People perceived NNRRs as a path towards subsistence and with economic purposes. Thus, production function, especially domestic and economic uses, entirely monopolises NNRRs' functions. Even tribal settlements stated commercial crops in the first positions since in the last few years their situation has changed and most of them live amongst seasonal harvesting in the fields, being its economic basis. Their access to the forest has also been modified as most of them have been displaced. Thus they are not so dependent on it and their perceptions about NK have apparently been adapted. This might have changed its idea of nature as a way of subsistence.

Environmental Services stuck better to what hypothesized in the first, since items listed experimented a considerable change from one settlement to the other. When perceiving Services tribal people seemed to have a tendency to list items when referring to "why we need nature?" as "to lead a life" and "to have a shelter" so establishing nature as a part of their more basic and primary needs. Small villages and towns listed air and water in the first positions, mainly as environmental functions focused on regulation and as a survival, thus their perception about these nature services converges more into their own existence. The three groups stated items related to recreation functions, which gives an idea of how nature might be seen as a path to satisfaction and gladness.

Generally it is observed that NNRRs are seen as an economic and domestic source, all focused on production functions and with nearly no distinguishing between settlements while on Services perception tends to be less material but as a source of wellbeing and satisfaction with several disparities according to respondents settlement.

Another finding in the present study related to one of the objectives has to do with the comparison in NK's lists between what has been observed in the field and what the authors have stated about it. Within authors classification on NK's functions some disparities might be seen when comparing what local communities in this specific area perceived. Production function was clearly the most listed function, moreover for NNRRs perception, where it almost captured 100% of the respondents' answers. Within this specific function domestic uses were the most cited. This might indicate that respondents see nature as a path for subsistence in their every day's life. When talking about environmental services still production function appeared as the main one but without monopolising the uses. Regulation and information functions did also play an important role. The first of them mainly referred to air as a part of a natural process, which made it possible for human to breath. Although people did not specifically know about the procedure itself, they could notice and perceive that nature played an important role when regulating processes which made people be able to survive. The second one referred to recreation (as no significant traditions and religious purposes were found); the usually positive feeling one has when looking at the landscape and its components. This demonstrated a sense of belonging to their own homeland and being a part of nature itself.

To conclude, I would like to emphasize the value it has to measure NK's perception with local communities who live so close to nature and depend on it in a more direct way than in other settlements located far away from the rural areas. Findings of present research demonstrate that nature might be perceived in a different way by local communities, thus direct users, from what it is stated in bibliography and it can be done differently according to settlement, even if in the same rural area. People's perception on nature seems to adapt to their own needs.

Hence, I think its perception constitutes an interesting topic to look through, even if situation has been changing in the last decades and further research on this topic would constitute a positive path to public policies elaboration in the area.