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

- Karnataka, India-

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ADVERTISEMENT

The present research is mainly focused in the perception about Natural Capital (divided into Natural Resources and Services) in local communities and how its functions might be compared with what some authors have stated about it.

This aim has been possible to reach because of people who agreed to participate in the study and demonstrated a great sense of warmness and love to their land.

Because of government restrictions and land uses' complex policies, even if population was generally helpful and predispose when carrying out the surveys, some reluctance was shown when asking more conflictive questions related to the income and the land. Furthermore, being foreign did not put things easier since lots of interviewees associated me with the government or international organizations making process more complex and, even if answering, their confidence was not completely absolute.

Thus, as it was said to the respondents, it is not my wish that anybody uses this research in order to harm and prejudice the people from the area since it is positive to promote participation processes for future research in the area making them feel comfortable and self-confident with their owns thoughts and believes.

The commitment of this research is not damaging anybody but bringing knowledge about local communities' perceptions on nature services and how do they use them. This could give an idea of the natural capital's management, which might be applied to public policies in the area.

I hope this research helps to reach a better and positive understanding about people in the area and their perceptions about its own homeland.

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I. 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 are 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 principal objective on this research is to evaluate natural capital's perception on the area and see if it varies according to respondent's settlement as well as comparing its uses with what has been said by some authors in the literature.

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). Data was collected during an almost three month period of participatory observation between December and March 2009.

II. LITERATURE REVISION

1. Natural Capital Origins

If one wants to make an approximation to natural capital concept, it is basic to understand the context in which it was formulated and where and why did it make its appearance. Capital itself is defined as "a stock that possesses the capacity of giving rise to flows of goods and /or services" (Etkins et al, 2002), according to classical economy. It identifies three types of capital stock: land, labour and human-made capital; two last were those in which much neo-classical economists focused, leaving land capital apart. Although this concept appeared with capitalism in Europe in XVI Century, it was not till XVIII Century when the physiocrats (translated as nature's school) affirmed the existence of a natural law in which the economic system would be well assured without the intervention of the government. Even if some aspects about physiocrasism were criticised by classical economists, classical authors such as Malthus and Mill expressed their concern about growth limits as the earth had a tendency to be in a stationary state. Still Karl Marx accepted some ideas such as the conception of nature as a source of material wealth (Marx, 1891). The origins of ecological economy rely on economists such as Georgescu-Roegen or, afterwards, Herman E. Daly.

Within XX Century and specifically in the 70's, ecological consciousness suffered a positive change, demonstrating some restrictive factors in classical economy when considering limits to economic growth and when assuming ecological decline.

The development of ecological economy contributed to understand the conflict between economy growth and ecosystem physical/biological limits due to the fact that economy's environmental load increases with consumption and demographic growth. Some basics on environmental economy would make reference to these limiting factors to material growth, nature as an imperative hold for humankind and integration of economy within cultural and social systems, thus nature, economy and society co-evolve (Inge, 2004)

Within this context and the appearance of these new conceptions, awareness has been increased in the role that environmental resources play in production, to the point that some production functions have been extended including energy and material inputs (Jorgenson, 1993). However, this affirmation has some drawbacks having something to do with substitutability and scarcity. According to what has been said, capital stock is disaggregated into four categories (Ekins, 1992): manufactured, human, social/organisational and natural (can be also called environmental or ecological) capital. Within Natural Capital our categorisation will be between natural goods (natural resources) and ecosystem services, although other classifications could be taken on account.

2. Natural Goods and services

2.1 Natural resources

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.

Formally, NNRR are divided into two clear categories: Renewable and non-renewable according to its disposal throughout time, its tax generation and the consumption rhythm. Although lots of bibliography makes reference to this categorisation, we will not get deeper into it as it is not consider relevant for the research.

2.2 Ecosystem services

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, a part from the immediate ones average human being would think of, as aesthetic and recreation ones. Although further on we will analyse these values deeply, some examples will be given in this section; water's cycle, plague control, CO2 as a drain and bee's pollination would be perfect cases. Logically, ecosystem services depend directly on ecosystem functions and its biodiversity, as when they suffer from degradation its services experience depletion too.

The definition given at the beginning of this paragraph has been criticised by some authors. Many ecosystem services are almost unnoticed by the vast majority of people (Costanza, 2009). So, one thing might be what services people do obtain from ecosystems and a completely different topic would refer to what do they perceive and understand about them.

According to Wallace, in ecosystem service terms we might find two "parts": the means and the ends. The first of them belonging to ecosystem processes while the ends corresponding to the ecosystem services. He also points out that both must not be considered in the same decision-making context as, in textual words, it might lead to lost opportunities and misallocation of priorities in research and management. On the contrary, the idea of splitting means and ends is not generally shared, as ecosystem services might be means them selves, getting to reach an end to human well-being. Instead of distinguishing between means (processes) and ends (services), Costanza proposes to call them intermediate and final services, thus intermediates have also the right to be called services. This way, both, intermediate and final services, contribute to a goal to human wellbeing.

As said, ecosystem services derive from some attribute of the ecosystem's structure or function, but there is not necessarily a direct one-to-one mapping of function to service, as one function can provide many services. The opposite might be also possible, when several functions are combined to produce one service (Edward Jones et al, 1998).

2.3 NNRR/Ecosystem services and sustainable development

One of the main topics attempting to NNRR is related with its conservation throughout time and sustainable development. In 1987, in Brundtland's commission, sustainable development was defined as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". When talking about sustainable development within Natural Capital, and specifically about how much capital stock will be left to future generations we come to think about maintaining total capital stock between generations (Natural Capital + Man-made Capital) and maintain or increase the Natural Capital stock between generations (Edward Jones et al, 1998). The first of the ideas makes reference to weak sustainability, where the Natural Capital's level can decreased as should be compensated by man-made capital. In the second one we make reference to strong sustainability, where man-made capital is not allowed to substitute Natural Capital; thus, the total stock of Natural Capital must be maintained. The statement here might be related to an idea surrounding complementary and substitutability concepts. If goods are complements then they have are more valuable together than separate, so a synergy exists between them. If goods are substitutable then can be replaced each other without a loss of value. (Edward Jones et al, 1998). As Natural Capital is a complex concept, it is difficult to develop it as a whole component (so it differs itself in various categories). Within this categorisation of NNRR inside sustainable development, a new definition might appear: the critical natural capital. Defined by Pearce & Turner, it is the one that, if destroyed, has important damaging consequences.

So, we have to take on account that the use of one function may influence on the availability of other functions (with its corresponding goods and services), so sustainability is a major factor that must be introduced in these interdependencies.

In that context and as previously said, we should be aware of the fact that the relationship between ecosystem processes and services does not correspond to one-to one, since one process may provide various services and one service may come from the interaction between various processes.

3. Natural Capital

3.1 Concept

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). Historically there has been a distinction between "land" and "capital" as the first one is naturally occurring and the second one appears referring to man-made goods. 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. Natural Capital (NK from now on) can be seen into two different perspectives:

- When functions of NK are the basic processes and cycles in the internal functioning of natural systems, thus the responsible for sustaining and maintaining the stability and resilience of ecosystems (Baskin, 1997)
- When functions are directed to human beings; those that provide resources for, and absorb the wastes from, human activities and provide human welfare in other ways.

The first of them plays a role of biological diversity, getting insurance regulatory function of NK. The second one contributes somehow to human welfare, such as in inputs, maintaining human welfare, health...
When both of these conceptions contribute to human welfare, then we can say they do have value.

3.2 Natural Capital and ecosystem goods/services

Ecosystem goods and services are clearly established inside what we human beings have defined as NK, although its classification might not be that simple. Many authors have tried to categorize them and some will be, briefly, exposed here. Pearce and Turner (1990) established environmental functions into source, sink and service. Within that classification, authors as Noel and O'Connor (1998) added other categories as scenery, site and life support functions. Not only environmental functions term has been used to describe that idea but also "Ecosystem goods and services", capturing the same concept. Authors as Daily (1997) and Barbier have defined it. (Ekins et al.)

3.3 Natural capital and people: uses

3.3.1 Authors: De Groot and Costanza

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.

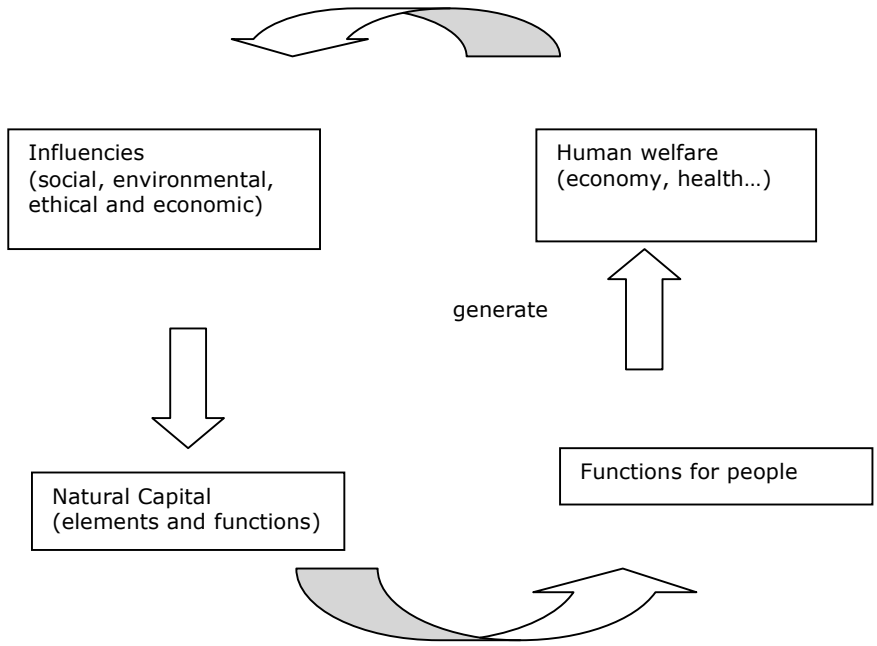
As the authors say, when these functions are clear, then we can define the value they have to human society. So when human values are implied, we will conceptualise and referred to them as "ecosystem goods or services". For instance, the concept of ecosystem goods and services is inherently anthropocentric (so the presence of humans makes possible this translation). De Groot also identifies nine different types of values of environmental functions, grouped under three dimensions of sustainable development:

Ecological (conservation and existence values)
Social (human health, personal, community and option values)
Economic (consumptive, productive and employment values)

Where:

Conservation stands for regulation of life-support functions, existence stands for welfare deriving from people who know environmental functions or part of nature exist, human health, personal values and community values stand for environmental functions contributing to it, option values stands for concerns people have about maintaining environmental functions for future generations and consumptive and productive values stand for derivations from the source and sink environmental functions

Figure II.1: Functions of natural capital and functions for the people
Source: Based on Ekins et al, 2003.



3.3.2 Natural Capital classification and lists

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. Some examples are given for each specific good and service. This is resumed in a table format with three columns. Goods and services included in the classification have to accomplish some requisites as being used on a sustainable basis (so ecosystem functions and processes can be maintained); non-renewable natural mineral resources are not included, neither are energy sources that cannot be attributed to a certain ecosystem type (like wind and solar energy).
When talking about ecosystem functions and services a significant circumstance should be taken on account. Not only we find that one ecosystem service might be the result of two processes or the other way round (as explained above). Furthermore, when proceeding to

analyse ecosystem functions and services different scales have to be considered. First of all the physical scale of the ecosystem function itself as well as the one valued by humans when rating the goods and services provided (de Groot et al, 2002).

On the following table a brief explanation of the 23 different functions will be done, according to what authors say and extracted from the article "A typology for the classification, description and valuation of ecosystem functions, goods and services" by Rudolf de Groot et al.; further on I will compare it with fieldwork uses.

Figure II.2- Ecosystem functions and services

Source- Own elaboration from de Groot's, 2002 classification on environmental functions

REGULATION FUNCTIONS (maintenance of ecological processes and life support systems on earth)	**Gas regulation**	Chemical balance originated by biogeochemical processes. At some scales its value has a complicated measurement.
	Climate regulation	Interaction of global and regional circulation patterns providing a favourable climate for human health and crops.
	Disturbance prevention	Buffering function from nature providing safety
	Water regulation	Maintenance of normal conditions in a watershed
	Water supply	Filtering, retention and storage of water in lakes and aquifers
	Soil retention	Vegetation covering and root system to prevent from compaction and erosion. Important for agricultural productivity
	Soil formation	From rock's disintegration and natural fertilisers contributes to crop productivity
	Nutrient cycling	Continuous recycling of chemical elements in nature contributing to healthy soils
	Waste treatment	Storage and recycle within natural systems
	Pollination	Reproduction of most plants provided by wild pollinator-species
	Biological control	Feedback mechanisms preventing the outbreak of pests and diseases controlled by natural ecosystems
HABITAT FUNCTIONS (living and healthy space for all wild plant and animal species on earth)	**Refugium**	Living space seen as a "storehouse" of genetic information
	Nursery	In coastal wetlands provides breeding and nursery to species that might be harvested somewhere else.
PRODUCTION FUNCTIONS (distinguishing between the use of biotic and abiotic resources and their renewability providing sources as oxygen, water, food, medicine…)	**Food**	From wild plants and animals
	Raw materials	Renewable biotic resources
	Genetic resources	Although biotic resources are obtained from cultivated plants, they still need the support of their wild relatives
	Medicinal resources	Maintenance of human health from plants and animals
	Ornamental resources	Raw materials used for fashion and clothing
INFORMATION FUNCTIONS (Natural Ecosystems provide chances to get spiritual enrichment, mental development and leisure as well as education and research getting in deep touch with nature)	**Aesthetic information**	Gladness of scenery in natural areas and landscapes with a significant economic importance.
	Recreation & (eco)tourism	As relaxation, refreshment and rest
	Cultural & artistic inspiration	As a source of interaction with human being of folklore and culture
	Spiritual & historic information	Ethical and heritage values about understanding human's place in the world
	Scientific & educational information	Research and educational places for nature study

III. CASE OF STUDY

1- Introduction

In this chapter, I describe the studied area. Generally, I compare territorial and social aspects of Kodagu district and, specifically, Virajpet taluk with Karnataka and India's rates. Due to lack of official information, some rates about Virajpet taluk have not been fulfil.
First I provide a description of the environmental importance of the area followed by a description of its environmental and socio-demographic aspects (including demography, regional development, history and economy). Finally a description of Kodagu's people is made, so an approaching to its behaviour can be finished.

2- Environmental importance of the area

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. So, two criteria must be accomplished: an out of range biological diversity and the effects of human depredation. The Western Ghats constitute one of the twenty-five hotspots held in the world, and one of the eight hottest hot spots (Myers 2000). The WG run parallel to the India's western coast and about 30 to 50 km inland. Its cover approaches to 160.000km2 and stretches for 1600km from most southern spot to Gujarat in the North.

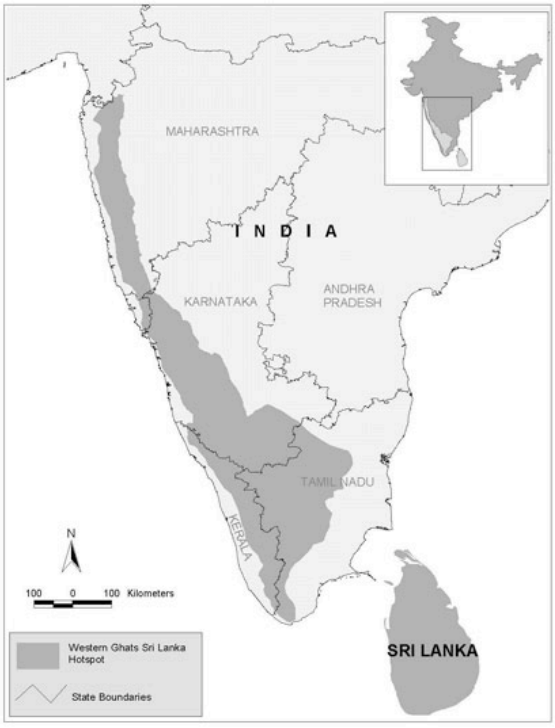


Figure III.1- Western Ghats location in India

The WG intercede with rainfall regime in India by intercepting the monsoon winds coming from the south-western area. As a matter of fact, the western slopes of the mountainous areas suffer from annual heavy rainfall while the

eastern parts are drier. This difference is also notable comparing the northern to the southern area, being the south wetter than the north. The WG hold a significant river system, originated in its mountains, which is used as an important source of drinking water, irrigation and power and drains almost 40% of India (Vijayan et al, 2005). The wide rainfall variation together with the region's complex geography and high-mountain regions generates a great variety of vegetation, formally divided into evergreen, semi-evergreen, dry, moist deciduous and tropical rainforests (Nayar, 1996).

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).

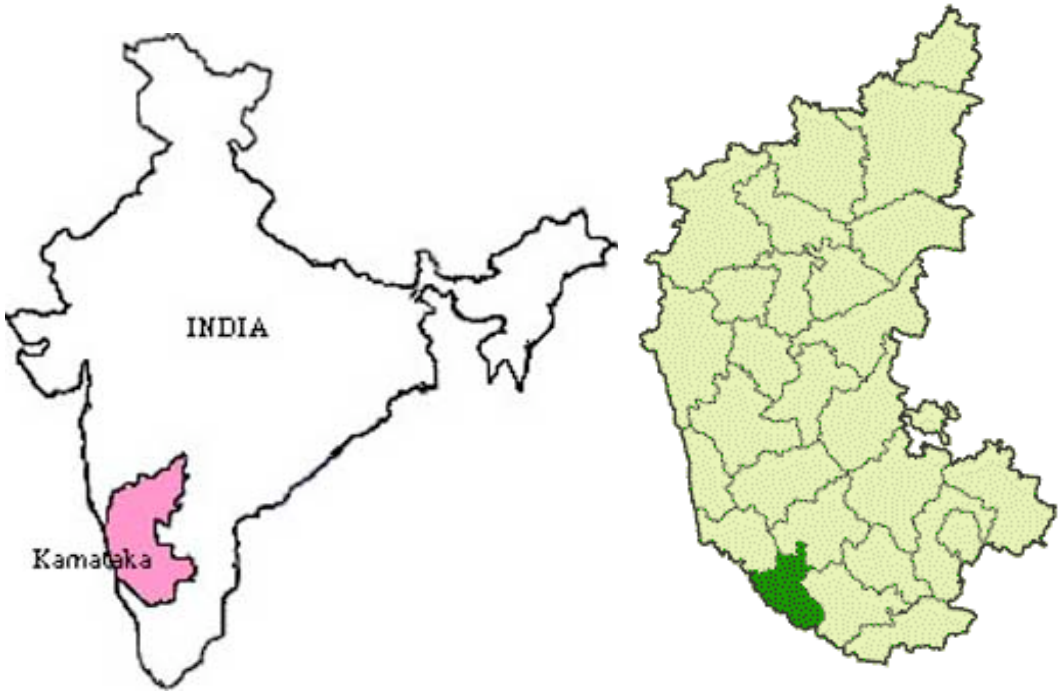
2.1 Bramaghiri WS

Brahmagiri Wild Life Sanctuary, part of Western Ghats, is located in Kodagu district of Karnataka. The eastern point of the sanctuary almost merges with Nagarhole National Park, only a narrow stretch of coffee plantation is between these two. The sanctuary is named after Brahmagiri peak whose height is 1607 m. The vegetation that can be found at Brahmagiri Wild Life Sanctuary is based on evergreen and semi evergreen Forest, grasslands with shola forests (stunted evergreen trees) at greater heights and bamboos with Bambusa bamboo, which are most predominant. The species of animals found in the sanctuary are gaur, elephant, tiger, leopard, jungle cat, leopard cat, wild dog, sloth bear, wild pig, sambar, spotted deer, lion-tailed macaque, Nilgiri langur, slender loris, bonnet macaque, common langur, barking deer, mouse deer, Malabar giant squirrel, giant flying squirrel, Nilgiri marten, common otter, brown mongoose, civets, porcupine and pangolin. It also houses a variety of snakes including python, cobra and king cobra. Avian fauna includes emerald dove, black bulbul and Malabar trogon.

3- Location

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^2 (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). It is bounded by Hassan district on the North, Mysore district on the east, Dakshina Kannada district on the west and Cannanore district of Kerala State in the South.

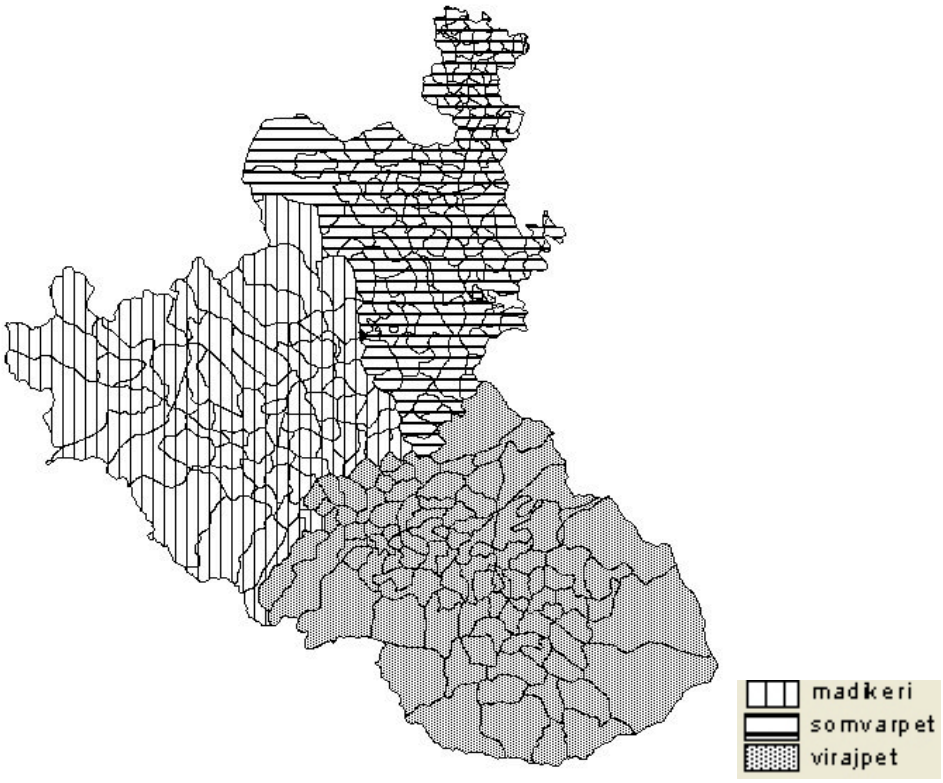
Figure III.2: - India and Karnataka map locating Kodagu



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.

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 Jammamalaias are owned and managed by the Forest Department and constitute 46% of geographical area (Satish et al).

Figure III.3- Kodagu's map divided into three different taluks
Source- Own elaboration



3.1 Virajpet Taluk

As previously said, Kodagu is divided into three different taluks. This study is basically focused on Virajpet taluk, in the southwest of the region (as shown in the Figure III.3) 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 like jenu kuruvas, who dedicate their lifes to honey collecting and processing or beta kuruva, who mainly work with bamboo. 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.

4- Environmental description

4.1 Physic environment

4.1.1 Climatology and geomorphology

Kodagu has an average temperature of 15°C, ranging from 11 to 28°C, with the highest temperatures occurring in April and May. The monsoon (intense rainfall) usually lasts from July to November. The average rainfall is 2718mm (Gov. Karnataka).
The district forms a part of Western Ghats with a high range of mountains successively from north to south, so most part of the area is mountainous. We will find the highest altitude in the Tadiondamol, with 1908m above sea level. The main river in Kodagu is the Cauvery, starting at Talakaveri and located on the eastern side of the Western Ghats. With its tributaries, drains the greater part of Kodagu. Other rivers constitute Kabini, Laxmanathirtha, Ramathirtha and Hemavathi, flowing into the Bay of Bengal. We find reddish brown forest soils, yellowish grey to greyish sandy loam soils and mixed soils (Central Ground Water Board, Bangalore 2007)

4.2 Biotic environment

4.2.1 Flora

In Kodagu we find a great variety of vegetation, formally divided into evergreen, semi-evergreen, dry, moist deciduous and tropical rainforests (Nayar, 1996).
Some of the most important flora of the jungle includes *Artocarpus Dipterocarpus, Calophyllum angustifolium, Canarium strictum*, *Chukrasia tabularis, Michelia champaca*, *Mesua*, *Diospyros*, *Toona ciliata*, *Garcinia*, *Euonymus, Cinnamomum*, *Myristica, Vaccinium, Myrtaceae, Melastomataceae, Rubus*. As bushes we find cardamom, Areca, plantains, canes, wild Black pepper, tree and other ferns, and arums.

4.2.2 Fauna

The main fauna include: Tiger, panther, the Asian elephant, leopard, dhole, gaur, boar, and several species of deer and bear. We also find a large variety of birds, including black eagle, vulture, peacocks, honeybee and jungle owls. Important reptiles are found such as king cobra, python and viper among snakes as well as crocodile and shelled tortoises.

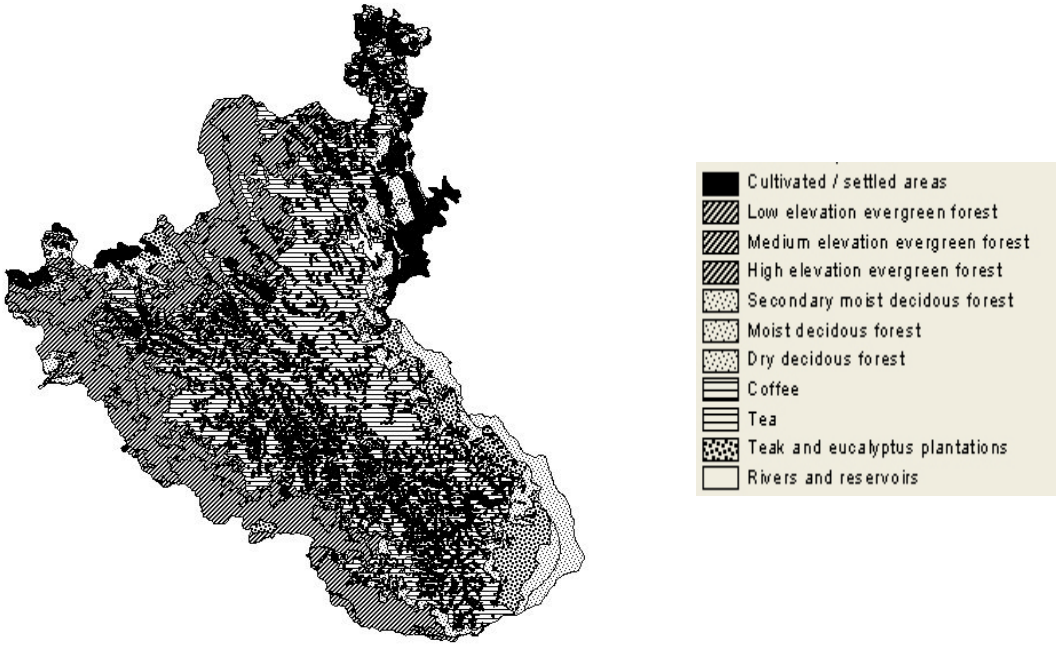
4.2.3 Landscape

Kodagu is on the eastern slopes of the Western Ghats. It is a hilly district with the lowest elevation in the district at 900 meters above sea level. The highest peak, Tadiandamol, rises to 1908 meters above sea level, as previously said. This varies from the highlands in the western extreme to the plans that border Mysore in the eastern part (Mani, 2005).
The rough terrain, the spontaneous growth of vegetation and the availability of water in streams and springs throughout the year are positive factors for the habitat of wildlife in the district. The forests of the district are Tropical moist and dry type. Following are the main categories of forests found in the districts.

1) Moist Tropical Wet Evergreen Forests
2) Moist Tropical Semi-evergreen Forests
3) Moist Deciduous Forests
4) Dry Deciduous Forests
5) Thorn Forests

Kodagu has 75% of its landscape under tree cover (Bhagwat, 2005) and is one of the densest forests in whole India (Moppert, 2000). We find 1345,97 sq. km as a Forest area in Kodagu and 1474,53 sq. km (36%) of net area sown (Central Ground Water Board, Bangalore 2007).

Figure III.4-
Source-



4.2.3 Protected areas

As mentioned, Kodagu is an area considered rich in wildlife. As a matter of fact, we find three different Wildlife Sanctuaries (WS) and one National Park (NP) as follows: Brahmagiri WS (181,29 km2), Talakaveri WS (105,01 km2) and Pushpagiri WS (102,6 km2), and Nagarahole or Rajiv Gandhi NP. (Report on inventory of forest resources of Kodagu district, Karnataka, 1995). The NP and WS widen along the western and southwestern boundaries of the district, occupying about 30% of the area. Plantations and coffee occupy most of the remaining landscape (about 60%) (Bhagwat et al, 2005).

4.2.4 Human interference

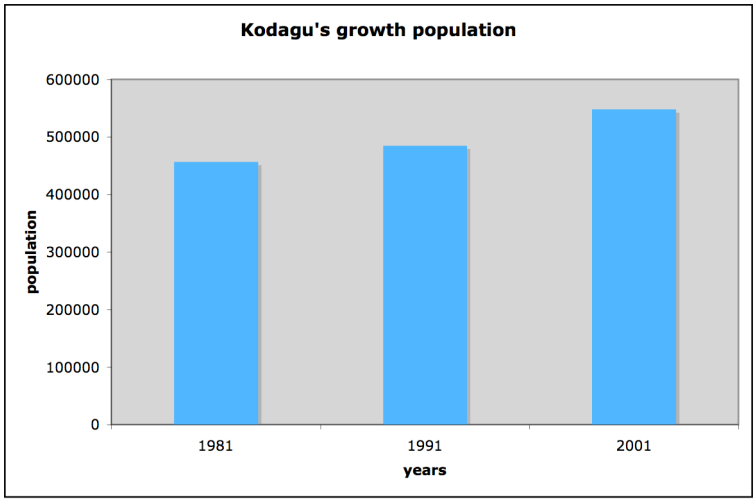
In the last decades, deforestation, plantations, tourism and urban litter have severely affected the biodiversity and ecological balance of the area. These urban indicators have accomplished to establish a fragile ecosystem (Mani, 2006) creating both ecological and physical stresses. Due to the weakening of forest cover and the changes in land use (coffee, paddy, teak plantations) some autochthonous species as rosewood and sandalwood have been replaced. In a long-term situation this might end up as considerable impact on the ecological balance of the area (Kumar et al, 2002).
One of the direct effects of the land being declared as WS and NP is reflected in tribal people, as they are being displaced from its original habitat, although policies for their development and rehabilitation do exist (Chandran, 2005).

5- Regional development

Kodagu is a totally rural area, with 86,26% of its population living in the countryside. According to census 2001, just 12 cities in Kodagu rise above 5000 inhabitants while more than a hundred are less than 1000 inhabitants. 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 NNRRs, throughout the commercialisation of them or directly straight form nature (as some tribal communities do).

There are no towns considered in Kodagu, as all of them appear as villages[1]. According to census 2001, there are 291 villages in Kodagu and 10 of them are uninhabited. So, Kodagu has a high rate of inhabited villages (96,6%). In last years Kodagu has received a This is due to migration from near Urban Agglomerations (as Mysore and Bangalore) to the countryside, looking for peaceful and quietness.

Figure III.5- Kodagu's population growth in last three decades
Source- Own elaboration from Indian Census



[1] Towns and cities are considered for urban agglomerations while villages and hamlets do with the rural ones, according to Census 2001.

6. Land tenures - conflict between local communities and wildlife

6.1 Area Approaches to Conservation in Kodagu

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 India, formal wildlife management belongs to the Indian Forest Service. This is a situation spread all around the country and, specifically, affecting the area of study. 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. We find Jamma agricultural lands (reserved for wet-rice cultivation) hold almost exclusively by Kodavas as it is a hereditary land. Bane, another kind of land tenure, makes reference to Jamma's attached lands (the Hindu, 2004). There is a complexity in Kodagu's land tenures as depending if that is redeemed or unredeemed government will be the one having the tree rights of the land. So, in unredeemed lands the coffee farmer owns the land but the Government owns the right to the trees whereas in redeemed ones coffee farmer owns tree rights as he/she has already paid the fee for felling and selling them. When the land is not redeemed coffee owner might have to apply and obtain permission by paying the required fee (Anbinakudige et al., 2009). These restrictions, being a source of tension between the communities, have also helped to prevent and protect the biodiversity of fauna and flora over the plantations, having halted the replacement of native trees by exotic growing shade trees.

In Kodagu we find "The Kodagu Model Forest Trust", a network that protects and conserves the integrity of forest ecosystems in Kodagu while promoting Sustainable Management of Forest (SMF) in Sacred Grooves (Devarakadu), parks, private holdings and public land. This includes maintaining the quality of land and water, floral and faunal diversity, while promoting socio-economic development, public awareness and education about the importance of community participation in accomplishing the objectives (Mani, 1998). So, active involvement of coffee planters would be essential to reach success in KMFT (Neilson, 2008).

7- Demographic aspects

7.1 Literacy

Kodagu has a literacy rate over India's and Karnataka's one, as well as Virajpet Taluk does, reaching nearly 80% of literates in its population. Still differences between male and female sectors, as in the whole country and Karnataka state, are notorious, locating male's literacy much above than female's one in all cases, especially in India as a country. Differences in Kodagu and Virajpet are less discerning than in the other two cases.

Table III.1- Literacy
Source- Own elaboration from Indian Census 2001

	India	Karnataka	Kodagu	Virajpet
% Literacy of total pop.	64,80	67,04	77,99	74,1
% Males of total pop.	75,30	76,29	83,7	79,2
% Females of total pop.	53,70	57,45	72,26	69,0

7.2 Literacy educational level

As seen before, Kodagu, as well as Virajpet, show a high literacy rate if compared with Karnataka's an India's. Although any data about educational literacy level has been found about Virajpet Taluk, we might focus on Kodagu's rates, as they are higher than the State's ones as approaching to superior educational levels, such as Middle and Higher Secondary.

Table III.2- Educational level
Source- Own elaboration from Indian Census 2001

	India	Karnataka	Kodagu
Total population			373541
% No education	1,95	1,02	0,78
% Below Primary	14,08	14,53	15,16
% Primary	14,27	16,03	19,97
% Middle	8,77	7,22	11,26
% Higher Secondary	11,77	14,59	16,42
% Graduate and above	3,66	4,21	4,51

7.3 Religion

According to 2001 Indian Census, most part of Indian people belong to Hinduism, establishing that with an approximate percentage of 80. Muslims are the second representative religion sector and we find Christians as the third most important religion. In the three cases these values do not have any notorious differences between them. In Kodagu percentages are less disaggregated.

Table III.3- Religion
Source- Own elaboration from Indian Census 2001

	India	**Karnataka**	**Kodagu**
Total population	1.028.610.328	52.850.562	548.561
% Hindu of total pop.	80,46	83,86	82,16
% Muslims of total pop.	13,43	12,23	14,30
% Christians of total pop.	2,34	1,91	3,27

7.4 Scheduled casts and tribes

According to Indian census 2001, SC population appears with similar rates in the area of Kodagu district and, specifically, in Virajpet, although they are still a little lower than Karnataka's and India's one. On the other hand, ST rates show a much more notorious change between Virajpet and Kodagu itself, as well as with Karnataka's and India's one, as in Virajpet tribal population almost doubles India's one, establishing its rate in 14,96%.

Table III.4- SC and ST Casts
Source- Own elaboration from Indian Census 2001

	India	**Karnataka**	**Kodagu**	**Virajpet**
Total population	1028610328	52850562	548561	200628
% SC (Scheduled Cast)	16,20	16,20	12,29	10,40
% ST (Scheduled Tribal)	8,20	6,55	8,41	14,96

8- Economic aspects

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. Paddy is cultivated once a year and most of the agriculture in the district is feed on rain. Horticultural products like oranges, bananas and cardamom are inter-planted in the coffee estates. Other crops cultivated are coconut, arecanut, ginger, and some of the spices. Beekeeping, another environment friendly economic activity, is popular in the district.

Kodagu has the highest per capita income in Karnataka. Kodagu contributes about 30% of the Coffee produced in India (Coorg Institute of Technology, 2006).

According to Indian 2001 census any data in economic aspects has been found on Virajpet Taluk; thus, we will focus on Kodagu's rates. Several things are worth stressing; Kodagu shows a high rate of female workers, if compared with India's, as well as main workers. On the contrary, it has the lowest rate in terms of marginal work, cultivators, agriculturists and household individuals. It also shows, although not so notorious, the lowest rate in non-working population, with 51,44%.

Table III.5- Workers
Source- Own elaboration from Indian Census 2001

	India	**Karnataka**	**Kodagu**
Total workers	**402234724**	**23534791**	**266378**
% Total population	39,10	44,53	48,56
% Males of total workers	51,70	64,74	62,84
% Females of total workers	25,6	35,26	37,16
% Main workers of total pop.	30,40	36,64	45,13
% Marginal workers of total pop.	8,70	7,89	3,43
% Cultivators of total workers	31,65	29,25	7,90
% Agric. Labours of total workers	26,55	26,46	4,31
% Household ind. of total workers	4,22	4,08	0,95
% Other workers of total workers	37,59	40,21	86,84
% Non-workers total pop.	60,90	55,47	51,44

8.1 Primary sector

The agriculture is a developed sector in the area of Kodagu. The main crops cultivated in the area are (in order of importance) coffee, paddy and spices (such as pepper). Historically a great amount of fruits used to be cultivated (sapotas, oranges, limes, guavas, pineapples, bananas) but nowadays just the banana appears as a commercial fruit (Mani, 1998). People depend upon forest for timber, fuel, honey-collection, non-wood forest produce and also for

employment. Forests are also the main source for cattle and manure for their plantation crops. (Report on inventory of forest resources of Kodagu district, Karnataka, 1995)

8.1.1 Coffee

Coffee cultivation started in 19th century with British invasion, becoming a characteristic of the district through the 20th Century. The traditional methods for establishing and maintaining coffee plantations involve placement of young coffee plants under canopy (because hillsides are too steep for growing rice), using the shade of existing forests. Although coffee has been a main source of local wealth (District Administration Website) in the last decade, due to coffee price increase, cultivations did also rise till the cost of natural forested ecosystems (Sathish et al 2005). These implied a major change in the vegetation cover due to intensification of coffee cultivation. Coffee plantations are being managed under diverse land tenure systems. Land tenures, together with tree rights, determine the amount of density and amount of diversity that can be used. There are two popular varieties of coffee cultivated in Kodagu, Arabica and Robusta. Private coffee plantations constitute 29% of the landscape (Satish et al, 2005) and Kodagu produces one third of India's coffee (coffee board 2004). Coffee processing is also becoming a major economic contributor to the local economy (coorg institute of technology, 2006). The coffee plants grown in Coorg can also be used as decoration and play an important part in the handicraft industry of Kutta, which is a nearby township close to Nagarhole Park (coorg.com).

8.1.2 Paddy, pepper and other horticultural products

Paddy is the chief agricultural producer while coffee, cardamom, orange and pepper are the main plantation crops repeated of the district cultivated in the valleys where other agricultural crops are also grown (Report on inventory of forest resources of Kodagu district, Karnataka, 1995). Paddy is farmed once per year and the majority of the agriculture in Kodagu is fed by rain (coorg.com). In terms of area cultivation of pepper it ranks first in the State (Report on inventory of forest resources of Kodagu district, Karnataka, 1995). Horticultural products such as cardamom, bananas and oranges are inter-planted within the estates of coffee. Cardamom, together with pepper and coffee, is a mainstay in the economy. Kodagu's cardamom is highly esteemed and is the crop that gives the best returns. Its harvesting can take up to five months (coorg.com)

Table III.6. Principal crops in the area (ha)
Source- Own elaboration from Central Ground Water Board (Bangalore, 2007)

Crop	Area	Crop	Area
Coffee	83205	Arecanut	1505
Paddy	36106	Coconut	1370
Pepper	15975	Orange	1085
Cardamom	11957	Palm	903
Ginger	4550	Chilly	900
Maize	2382	Vegetable	832
Cashew	2198	Banana	520
Rubber	1926	Tea	490

8.2 Secondary sector

Industrially and in terms of exploitation of mineral wealth, the district ranks amongst the most backward district of the State of Karnataka being forestry the one holding a unique position in the economy of the district (Coorg.com).
Coffee processing is also becoming a major economic contributor for Coorg. Industrial area in Somwarpet taluk near Kushalnagar hosts around 50 Coffee Processing companies. These Companies Curing, Export and also produce Instant Coffee in the area (Report on inventory of forest resources of Kodagu district, Karnataka, 1995).

8.3 Tertiary sector

In recent years tourism has begun to play a role in the economy. One of the growing activities is eco-tourism as plantation buildings houses have been converted to take visitors into outdoor activities. Within these activities trekking has an important relevance as Kodagu has several routes available in the midst of forests and hills. Other activities would be golf, angling and white water rafting.
We also find regular Home stays. What began as an experiment in the mid-1990s, when prices for coffee dropped, home stays at the plantation estates have quickly become a way for the people of Coorg to earn a supplemental income as well as work to maintain the scenic mansions and acres of the plantations. Last year an estimated 70,000 guests made reservations at retreats all across Kodagu (Coorg.com).
Kodagu, as observed in the field and throughout unstructured interviews, generally has local tourism coming from other points of Karnataka (especially nearby big cities as Bangalore) and Kerala, since Kodagu is located in the Karnataka-Kerala border. Within last years international tourism has been increasing as Kodagu regularly appears in the guidebooks.

9. People

In Kodagu 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 (approximately 100.000 out of 545.000) (Karnataka govt, tourism dept.). They are a close-nit social group with recognized martial and agrarian traditions. They usually consider themselves Ksatriya according to the system established in India by Hindu people. As they have a former hunting culture, the Kodavas carry out ceremonies symbolically uniting in marriage the spirits of killed sacred animals with the spirit of the hunter. This fact emphasizes the intimate relationship between Kodava culture and the wildlife living in their forest territory. Sacred groves, locally known as devarakadu (devara= God's and kadu= forest) are still maintained in their natural state surrounded by the coffee plantations (chandrakanth et al 2004). We might find one *devarakadu* per village. Devarakadus are believed to be god's place in which rigorous laws and taboos against felling of trees do exist (Bhagwat et al. 2005). The groves are also an important storehouse of biodiversity in the district (Neilson, 2008). Kodava people, speak a Dradivian language, Kodava thak (Coorg language) with approximately 200.000 speakers in and near the district. Most of its speakers are bilingual in Kannada. It is also home to other languages as Kannada, Malayalam (officially from Kerala), Tulu and Ravula.

Other communities, which are worth pointing out, are the Yerava, who live in Kodagu as well as in adjacent Kerala and who work with agriculture, the Heggades, cultivators from Malabar; the Ayiri (artisan caste); the Medas (basket and mat-makers) and the Binepatta (nowadays agriculturists). All of them speak also Kodava thak and correspond generally to Kodava customs and dress (Report on inventory of forest resources of Kodagu district, Karnataka, 1995). They all live spread in towns and small villages.

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. One of the main examples found within Virajpet Taluk are Kurubas, a caste meaning "warriors" and "trustworthy people". Kurubas are classified in different sub-castes as the betta and the jenu, according to its profession (the first of them dedicates to bamboo while the second to honey). 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.

IV. OBJECTIVES AND HYPOTHESES

1- Objectives

The main goal of this project is based in two general ideas. The first of them is to evaluate NK'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.

1.1 Specific objectives

a.1 Hypotheses: Evaluate NK's perception in different communities in Virajpet Taluk, Kodagu.

a.2 Compare NK's perception with Natural Capital's bibliography on specific authors. Natural Capital functions and services might vary in importance and quantity to what some previously chosen authors have said as I am working with local communities.

2. Hypotheses

a.1 NK's perception will vary according to people's settlement and size, distinguishing between tribal communities, small villages and towns

Rational: Access to NNRRs and natural services is different depending on where one lives and its size, as people's awareness living near nature will differ from people living outside of it. Thus, this implies a variation in people's perception about what nature might provide and consequently what uses can they get from it.

V. METHODOLOGY

Within this section information about the methodology used for data collection and its possible biases are explained. 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.

1. Schedule

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

Table V.1. Research schedule
Source- Own elaboration

October November	December January February March	April May	June
Literature revision and tutoring meetings	Selection of the sample- Study design- Fieldwork- Redaction	Data analysis and redaction	Delivery

The first period (from December to January) was destined to established 1st contact with the area and people living on it and mainly dedicated to logistical issues. Free-listing trials started on mid-December while conducting some informal and semi-structured interviews in order to collect secondary information. Once the selection of the sample was made, the surveys were tested and the secondary data was collected, final Free-listings were carried out. This period last from February till mid-March, when the study area was left. While all the fieldwork was being developed, some redaction was done at the same time. From April till June all the data collected started to be analysed while redacting the memory of the project, which was finally delivered at the end of June.

Table V.2. Fieldwork schedule
Source- Own elaboration

December	January	February	March
First contact Free-listing trials	Free-listing trials Selection of the sample Study design	Free-listing surveys Redaction	Free-listing surveys Redaction

2. Sample

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

These criteria were modified during fieldwork as at the beginning another had been established. 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 and, although its was not shown in the area maps, in the field I could observed it was all surrounded by coffee estates. Last point was to divide the area with administrative boundaries so I could randomly choose the sample. This was done through Revenue Villages (see study area section).

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^2)
- >2000 inhab. totally

Some control variables as access to medicines, school, market or public transport were also taken on account.
Variety within the three of them has tried to be one of the objectives when selecting the sample, as variation has been considered to be better when it comes time to analyse the results. So three different revenue villages within three different towns, four different revenue villages within five small villages and four revenue villages within six tribal settlements have been selected to do so. A table with the details can be seen in the annexes.

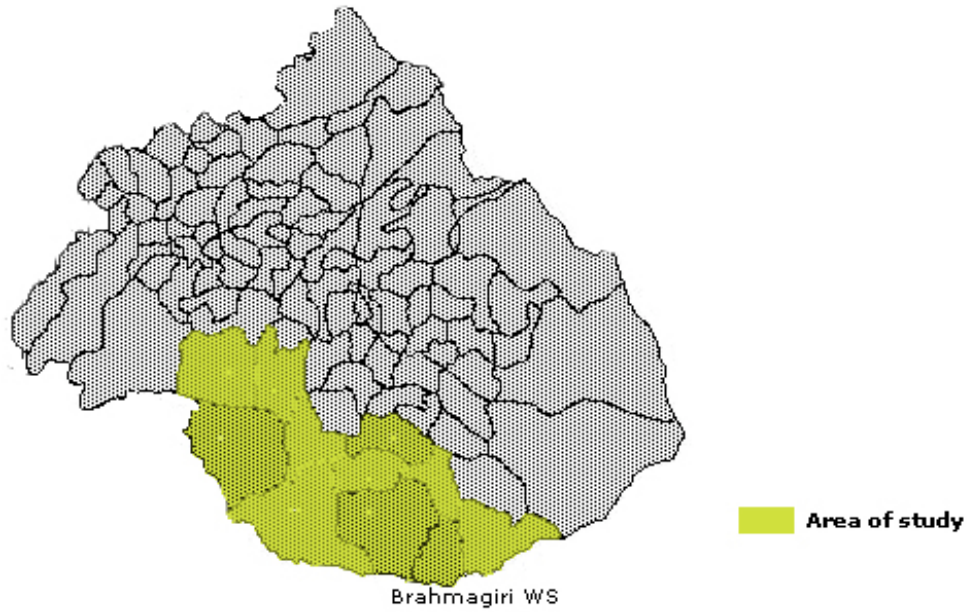


Figure V.I- Area of study in Virajpet taluk, Kodagu
Source- Own elaboration

2.1 Towns

As previously said, three different towns were selected to carry out the free-listing surveys. In Hudikeri 12 surveys were carried out, 17 in Srimangala and just one in Kutta, having a total sample of 30 surveys. Selection was randomly made by asking all the houses found in the whole town as I realised that, due to lack of respondents, if any of the houses were ruled out by flipping a coin I could not reach the necessary number.
The following table shows some important variables about the towns selected for the study.

Table V.3- Sociodemographic town variables
Source- Own elaboration

	Hudikeri	Srimangala	Kutta
Population	2182	1450	6280
Household	603	271	1503
Males	1096		3174
Females	1086		3106
Primary school	√	√	√
Health Centre	√	√	√
Police Station	√	√	√
Post-office	√	√	√
Bank	√	√	√
Public Transport	√	√	√
Market	√	√	√
Electricity facilities	√	√	√
Water facilities	√	√	√

Spaces in blank means no information is available

2.2 Small Villages

In the sample for small villages I chose four revenue villages due to its location and context (as previously said). The same method was used to choose the households, as said in town section. Within this revenue villages one small village was chosen in three of the cases and two in one of them. Things will be clearer with the following table:

Table V.4- Sociodemographic small villages variables
Source- Own elaboration

	B-Shitiggeri RV	**Beeruga RV**	**Kurchi RV**	**Kuttandi RV**	
	B-Shitiggeri SV[2]	**Beeruga SV**	**Kurchi SV**	**Konganna**	**Kuttandi SV**
Population	626	640	962		1299
Household	177	91	202		346
Males					675
Females					624
Primary school	√	√	√		√
Health Centre	X	X	X		X
Police Station	X	X	X		X
Post-office	√	√	X		√
Bank	√	X	X		X
Public Transport	√	√	√		√
Market	X	X	X		X
Electricity facilities	√	√	√		√
Water facilities	√	√	√		√

Spaces in blank means no information is available

[2] Small village

2.3 Tribal Settlements

I interviewed as much tribal people as I could, so no previous selection will be done. This attends to the fact that there are few tribal families and besides, most of them are working in the estates due to the peek of the harvesting season. As a matter of fact, all the families in the Hamlet will be interviewed. This would be usually done on Sunday, as most of them are living in the estates the rest of the week.

Table V.5- Sociodemographic tribal variables
Source- Own elaboration

	Hudikeri RV	**Kurchi RV**	**Kutta RV**		**Kuttandi RV**		
	Hudikeri c.[3]	**Kurchi c.**	**Sincona c.**	**Bercoloni**	**Kuttandi**	**Kongana**	**Katakundi**
Population							50
Household	40	10	250	4	16	7	15
Males							
Females							
Primary school	X	X	X	X	X	X	X
Health Centre	X	X	X	X	X	X	X
Police Station	X	X	X	X	X	X	X
Post-office	X	X	X	X	X	X	X
Bank	X	X	X	X	X	X	X
Public Transport	√	√	√	√	√	√	√
Market	X	X	X	X	X	X	X
Electricity facilities	√	X	X	X	√	√	√
Water facilities	√	√	√	√	√	√	√

Spaces in blank means no information is available

[3] Colony

3. Methods of data collection

3.1 Participant observation

It consists on a qualitative research method, which was carried out by the researcher of this study during 10 weeks in the study area. The method of participant observation describes and explains people's behaviour in their everyday basis. Participant observation is validly useful for several reasons. By experiencing people's daily lives, it can help the researcher to formulate effective questions to them as well as establishing closer relations. This might be fundamental for obtaining valid data as people are more opened with the researcher (Bernard, 2002). By learning common knowledge about the people and its surrounding environment the researcher might formulate appropriate questions that would make sense to people. It is also possible to develop a better understanding about people's culture so data collected will seem more familiar when analysed, reaching consistent conclusions (Angrossino, 2002). Participant observation was useful in this particular case as it helped to have a clearer idea about the conformation and distribution of the study area and how to apply different methods, as selecting households or choosing the right terminology when formulating questions to participants.

3.2 Face-to-face interviewing

A face-to-face interview is the method most widely used in the research of any topic and based on a direct meeting between interviewer and interviewee. By personal communication it is possible not only to obtain much more information, but also to use visual materials to encourage response. A face-to-face interview does not bore a respondent and can ensure full and accurate data. According to Russell Bernard in its book "Social research methods", there are 6 advantages for using this kind of methodology, including that you can use it with people with difficulties, the capacity to have more interaction and intuition with the respondent, the ability to apply several data collection methods and an upper duration, among other reasons.

3.2.1 Semi structured and unstructured interviews

In this study, semi structured interviews were used to apply for information in different institutions, as following:

- Lamb society
- Gram-Panchayent for B-Shitigeri/ Ponnampet/ Srimangala/ Hudikeri/ Bittangala/
- Coord Society (Coorg organisation for rural development)
- Forest department in Bangalore
- Madikeri Forest department
- College of forestry (Ponnampet)

The interviews last between 20 minutes and 120 minutes and usually in most of the cases the respondents dominated most part of the conversation promptly interrupted by simple questions or just assenting from the interviewers. Some of them were recorded in order to analyse information given afterwards and in most part of the cases a translator was needed, as the respondent did not speak fluent or any English. In these occasions, information was lost in the way, as explained in the biases section. In order to correctly choose the person to have the interview with, most part of them were previously arranged by telephone contact.
The interviews were carried out in order to obtain socio-economic data about the study area, to get an approximation to Indian castes system, religion and culture, try to understand tribal communities' livelihood and have a global idea about natural product commercialisation. Interviews with the corresponding forest departments were destined to obtain permits to enter into reserve forest, so its aim was merely bureaucratic.

Some unstructured interviews were also spontaneously carried out when situation was adequate to do so. Throughout these interviews some topics about the area were better understood as the people's behaviour living on it or just some feelings about discrepancies with some organisations, as the forest department.

3.2.2 Structured interviews

In this study one kind of structured interview was used: the free-listing technique. 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 from it. Some I will look at (and the main ones) will refer to frequency and position of mention of the items across the list. When both conditions are combined, we will get into the following formula:

$$\text{Free-list salience of an item} = \frac{\text{Sum of the item's percentile ranks}}{\text{Total number of lists}}$$

This outcome will make reference to a 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 our 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 NNRRs 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

		Number of items		
		Tribal	**Small Villages**	**Towns**
NNRR	**Original list**	42	61	72
	Gathered list[4]	23	38	44
		Number of items		
		Tribal	**Small Villages**	**Towns**
Ecosystem services	**Original list**	31	48	45
	Gathered list	30	45	45

Looking at the table above one can see how NNRRs lists differ more between them than the Services one. This is due to the fact that when listing NNRRs more specific items were said (different kinds of fruits, animals and plants) while when talking about services people tended to be more global and less items could be grouped. Criterion followed to group them was based on the uses of every item. Hence, air and oxygen could initially seem a good example to be grouped, but some respondents named them in the same list with different uses, since their perception about each item was distinct. Perfect examples to reflect the grouping task would be fruits, plants and trees. Birds and animals were put apart as two different groups, as its uses had a propensity to be different, being birds a way towards recreation and beauty and animals not only for this purpose but also with a domestic and survival component. Hen, although biologically belonging to bird's classification, were grouped as animals. Gathered and original lists can be seen in the annexes for further information.

[4] Where some NNRR have been put into more general groups (fruits, vegetables, animals…). This is the list used for the final analysis.

4. Biases and limitations

4.1 Data collection biases

4.1.1 Translators

To proceed to data collection a good translation was essential to make the respondents understand the exact target of the question and put it backward to the interviewers. This is usually a big source of bias since none of the subjects, neither the translator nor the interviewer were expressing themselves in their mother tongue language.

Since Kannada language diverges from English in some grammar structures, to construct an accurate question was tough and trying to distinguish (giving a real example) between "Why people need nature?" and "Why is nature important?" was tricky. Furthermore, because the translator spoke Indian English and the researcher used British method, some structures were not familiar one to the other and some additional work had to be done about it.

In order to check the authenticity of the questions translated in Kannada, the "translation and back translation" methodology was used with another very trustable translator foreign to the research. I also told both of our translators to interpret the questions from English to Kannada and compare between them. Even if all these precautions were taken and lots of awareness was given, I could see how translators gave some clues to respondents when asking them about NNRR and services lists and how some respondents gave answers (as I had heard them so many times I could understand some Kannada words related to Nature) and the translators did not write the down. Some trouble was also focused on the writing list order, since it is especially important in free-listing technique, although it was told and repeated day after day. When one of the respondents did not speak Kannada, the survey was not carried out. Since not so many cases like that were found, I did not used a second translator to do so.

Written translations were also a real problem since one of our translators did not write good English and we had to do some extra work with him. I had two translators in total and although they tried to be helpful and nice some of the days did not appear having a justification to do so and slowing the fieldwork. So, as each of the translators introduced their personal biases, the accuracy level of the questions was in the end not 100% trustable; at any rate, as the bias were mainly systematic, they might not influence the results in a significant dimension.

4.1.2 Peek harvesting season

Within the time the final version surveys were carried out (from February to March) the main coffee harvesting season was being prepared. This had an important bias affecting first the respondent's nature and secondly the answer itself.

I generally found women in the households as men were mostly working in the coffee estates, having some rejections to answer, as the patriarch was not in the house. Some of the female respondents did not know about some land and income data, giving approximate information in some cases and none in others. Peek season did also influenced in a negative

way with tribal communities, as during the week they were not living in their households but in the coffee estates (neither women nor men) and I had to wait for festival days and Sundays to proceed to the surveys in these settlements. When carrying out the surveys all the community was there and in some cases they might hear other's answers, although I tried to evict this situation by correctly explaining them the nature of our study.
The answer was also affected by this concrete peek season as, although commercial crops appeared as the most important NNRR in the study, coffee turn out as the main one, for the three settlements.

4.1.3 Timetables

Interviews were usually carried out from 10 am (since I arrived to the corresponding place) till 16 pm. Due to this situation most respondents were housewives and retired people while the rest were working or simply not in their houses. Although lunchtime was used in most cases to evict that situation, some people were eating and said they were busy while others were really kind and did not mind about it. Period after 4 pm was impossible to be used as it got dark quite early and had to come back to our place by motorbike and leave the translators, which was usually more than one hour way. Staying in the fieldwork place was finally necessary to be done, especially with tribal communities, who did finish work after 6pm.

4.1.4 Acceptance of respondents

As the surveys were all carried out in a rural area and besides, in some cases, with tribal communities, being a foreigner was a considerable bias when giving longer lists, specially in this last group. Although a very understandable explanation was given to translators in order to correctly introduce us for giving respondents a clear idea about us, and our study, some people were still afraid and did not entirely trust our aims and goals. Still some interviewees dare to ask for further information, making this situation more comfortable for both parts, while others just politely accepted to proceed with the interview without convincement, especially women. This tended to happen when asking the main two questions (were, due to awkwardness, people seemed to give shorter lists than they could have) and about the income (some people told us there was a real problem with taxes and government), as they tended to say less than they did actually make (this could be realised throughout material goods).

5.Attached studies

Present study has been part of two different researches, one of them being a PhD programme from a Spanish University and the other a whole research called POPULAR carried out by IFP (French Institute from Pondicherry), in Tamil Nadu, India.

4.1 PhD Research: Natural Capital and Human Wellbeing

As previously said, present study has been part of a PhD programme supported by UAB (Universitat Autònoma de Barcelona). In the study the general hypotheses focuses on the idea of how NK might assess Human Wellbeing within indigenous and rural communities in Kodagu district (Karnataka). During the fieldwork task and selection of the sample both studies were brought together and part of data collection, even if with different analyses, was shared. Both researchers could receive support from each other and methodology process was more easily constructed.

4.2 POPULAR Project

POPULAR project (Politiques publiques et gestions paysannes de l'arbre et de la forêt / Public Policies and Traditional Management of Trees and Forests) coordinated by different institutions, looks for the global approaching of local management practices for NNRRs within public policies so they can work together to reach a sustainable development. This project is being carried out throughout different countries all over the world such as France, Morocco, India and Cameroon. In our case I was included within POPULAR project through the IFP management.

VI. RESULTS

1. Socioeconomic description of the sample

1.1 Socio-demographic characteristics

About half of the sample, or 57,6% of the respondents, were women and the average age was 41,4 years. There were no significant differences in the socio-demographic characteristics of respondents on the three types of settlement. 33,4% of respondents had completed Secondary education, whereas 19% of respondents were illiterate. However, there were differences between settlements. 42% of respondents in small villages but only 6% of respondents in tribal settlements had superior studies. Similarly, only 6% of the interviewees from small settlements and 31% of respondents in tribal settlements were illiterate. Average family size is about four members per house. In tribal communities the rate is almost five people per house while three in Small Villages. The average number of languages spoken fluently by respondents was of four, making a little difference in tribal communities, where it does not go over three. People have a mean residency time of 27 years in the same place with no significant difference between settlements. The clearly dominant religion of respondents in the sample was Hinduism, with more than 90% of the respondents belonging to it. Muslims are situated with a 3,2% and Christian represent 2,1% of total respondents. Rates having to do with religion are practically equal in the three settlements. Within cast system coorgis (a high caste) appear as the main group for Small Villages (72,72% including ammacoorgis, vegetarian) and towns (50%). Other outstanding castes would be lingayiths, brahmin and gowdas. In tribal communities Yaravas, Kurubas (jenu and betta) and SC are the main ones.

Table VI.1- Socio demographic variables within socio-demographic characteristics
Source- Own elaboration from fieldwork collected data

Socio demographic variables	Virajpet taluk n=92		Tribal settlements n=29		Small Villages n=33		Towns n=30	
	Value	SD	Value	SD	Value	SD	Value	SD
Female (%)	57,6		51,7		63,6		56,7	
Mean Age (years)	41,4	16,3	37,6	18,2	43,2	16,2	43,2	14,4
Educational level (%)								
- Illiterate	19,0		31,0		6,1		20,0	
- Primary	23,4		44,8		12,1		13,3	
- Secondary	33,4		20,7		39,4		40,0	
- Superior	24,2		3,4		42,4		26,7	
Mean family size (n)	3,9	1,6	4,6	1,5	3,2	1,2	3,9	1,6
Mean Languages (n)	3,9	1,6	3,0	1,3	4,2	1,6	3,9	1,7
Mean residency (years)	27,0	17,6	30,0	21,6	24,0	14,6	27,0	15,9
Religion (%)								
- Hindu	93,3		93,1		90,0		96,7	
- Muslim	3,2		3,4		3,0		3,3	
- Christian	2,1		3,4		3,0		0,0	
- Others	1,0		0,0		3,0		0,0	

Thus, we can notice that people living in tribal settlements tend to have a lower education level than people living in towns and small villages as well as a minor number of fluently spoken languages. Small Villages have the uppermost educational level as the superior level is surprisingly the highest rate of them and the illiterate constitute just 6% rate. A remarkable aspect would point out the fact that tribal settlements have more people per house and their residency permanence is the highest one, although not so many disparities are seen in this last point. Not so many differences would be appreciated in terms of religion.

To conclude, small villages present a better educational level, living in households with fewer members and are capable of speaking a higher number of languages than the other two settlements.

1.2 Economic characteristics

Most of the respondents in our sample work on the primary sector; the main ones are the labours (tribal people working in the coffee estates/paddy fields per hour) and agriculturists/farmers (considered as the land owners, but developing farming practices themselves). Women working in the household also constitute a high proportion of the sample, especially in small villages, where the percentage almost reaches half of the respondents. Some occupations, as the one referring to secondary sector are very rare in the study area. We differentiate between occupations (where occupation does not necessarily mean source of income) and sources of income (where source of income does not necessarily mean job, as it can come from a pension or a propriety). Most of the households depend on a unique source of income for subsistence. We can remarkably point out the fact that 100% of people living in tribal settlements have one source of income, while 21,2% and 23,3% of people living in small villages and towns respectively have more than one source of income. In all cases period committed to work is almost yearly, especially in tribal communities.

Total annual income per household was highest in small Villages, as more than 40% of households receive more than 100.000 Rp/year. Respondents from tribal settlements reported the lowest incomes, as any of them gets higher than 100.000 Rp/year.

Even if nearly no tribal people have an agricultural income (employment is the main source for them), it constitutes a high percentage in towns and especially in small villages, with about 85% of its respondents. Most tribal households (69%) are landless whereas only 15,6% of the households on small villages do not have any land properties (being the wealthiest area). All the households in small villages and in towns with land property, also have coffee lands.

Families living in towns and small villages have domestic facilities and most part of them own their house. In tribal communities more than half of the households live in government housing and none of them have access to its own water pump. Respondents from small villages have the highest percentage of motor vehicle in terms of car and respondents from towns in terms of motorcycle. In tribal communities no respondents have a car and just 7% have motorcycle at their disposal.

To sum up, agricultural practices (especially coffee estates) are the main source of income for people living in Virajpet Taluk. Families living in small villages have a higher number of land and material properties, thus a larger income; although almost 80% of them just have one source of subsistence.

Table VI.2- Socio demographic variables within economic characteristics
Source- Own elaboration from fieldwork collected data

Socio demographic variables	Virajpet taluk n=92 Value	Tribal settlements n=29 Value	Small Villages n=33 Value	Towns n=30 Value
Main Job (%)				
- Housewife/husband	31,4	20,7	**46,9**	26,7
- Student	3,2	3,4	6,2	0,0
- Primary sector	**46,5**	**65,2**	34,4	**40,0**
- Secondary sector	2,2	0,0	0,0	6,7
- Service sector	11,1	10,3	6,2	16,7
- Government	1,1	0,0	0,0	3,3
- Pensioners	4,3	0,0	6,2	6,7
Families with more than one occupation (%)	5,4	3,4	**9,4**	3,3
Families with more than one economic source (%)	14,8	0,0	21,2	23,3
Mean time dedicated to main job (months/year)	11,2	11,7	11,2	10,6
Yearly income in Rp (%)				
- <10000	14,8	17,2	3,0	24,1
- (10000-20000]	21,3	34,5	12,1	17,2
- (20000-100000]	**37,1**	**48,3**	42,4	20,7
- (100000-500000]	18,4	0,0	24,2	**31,0**
- >500000	12,6	0,0	**18,2**	6,9
Yearly income in agricultural practices in Rp (%)				
- No income	54,5	**96,6**	15,2	51,7
- <10000	2,1	0,0	3,0	3,4
- (10000-100000]	20,8	3,4	**42,4**	16,7
- >100000	22,3	0,0	39,4	27,6
Land property in acres (%)				
- Landless	42,0	69,0	15,6	41,4
- <5	23,4	27,6	21,9	20,7
- (5-20]	27,1	3,4	**46,9**	31,0
- >20	7,5	0,0	**15,6**	6,9
Land coffee property in acres (%)				
- Landless	46,5	82,8	15,6	41,4
- <3	20,0	13,8	18,7	27,6
- (3-10]	13,1	3,4	18,7	17,2

- >10	20,2	0,0	**46,9**	13,8
Domestic properties (%)				
- Water pump	30,2	0,0	60,6	30,0
- Gas	55,8	27,6	69,7	70,0
- Own house	65,4	44,8	84,8	66,7
Motor vehicle properties (%)				
- Motorcycle	13,4	6,9	15,2	30,0
- Car	25,1	0,0	48,5	26,7

2. Natural Capital's perception towards settlement

2.1 Introduction

One of the objectives of this research is to determine whether perception on NK varies according to respondent's settlement. As explained before, on the concept of NK we differentiated between NNRRs and services.

A list of different items was given for each of them and divided into two categories (one belonging to NNRR's perception and the other to Service's perception), as previously mentioned.

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.

So, the inventories presented in table VI.4 (top-ten one) are constructed from longer records where all NNRRs and ecosystem services mentioned by respondents are listed (see methodology section)

Hence, in table VI.4 a summary of the top-ten NNRR and services mentioned by respondents are sorted, indicating the percentage of respondents who said the item, its mean rank within the total list and the frequency of answering of an specific item.

The NNRR list comes from the question: " What are the Natural products people use in (the corresponding area)" trying to capture all NNRR people would use in a certain area while to get the services list it was done throughout "Why we need nature", which might give a more general idea of nature as a component of life trying to get more global and deep values.

At the beginning of each list rang of its corresponding Smith's Saliency has been indicated.

Nevertheless, in the following table a simple classification of items according to its Saliency is presented, sorted by low saliency (0,01<Saliency<0,1), medium saliency (0,1<Saliency<0,5) and finally high saliency (>0,5) (Reyes, 2009), to get a more comprehensive idea. This classification comes from the gathered list (see methodology section).

Table VI.3- Index Saliency
Source- Own elaboration

	NNRR			**Ecosystem Services**		
	Tribal	**SV**	**Towns**	**Tribal**	**SV**	**Towns**
Low Saliency (0,01<S<0,1)	16	31	34	27	39	38
Medium Saliency (0,1<S<0,5)	6	6	10	3	5	7
High Saliency (>0,5)	1	1	0	0	1	0

2.2 Free-listing top-ten lists

A list of the top-ten NNRR resources and Environmental Services is here presented, as previously mentioned in the introductory chapter. Afterwards an explanation and description of the table will be given to, finally, proceed to analyse the results obtained testing out if them correspond to initially formulated hypotheses.

Table VI.4- NNRRs and Services top-ten
Source: Own Elaboration

NATURAL RESOURCES TOP TEN[5]											
	TRIBAL COMMUNITIES (0,05 <saliency<0,6)				**SMALL VILLAGES (0,06<saliency<0,8)**				**TOWNS (0,1<saliency<0,5)**		
Items	**% of resp.**	**Freq.**	**Rank**	**Items**	**% of resp.**	**Freq.**	**Rank**	**Items**	**% of resp.**	**Freq.**	**Rank**
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
ECOSYSTEM SERVICES TOP TEN[6]											
	TRIBAL COMMUNITIES (0,05<saliency<0,2)				**SMALL VILLAGES (0,07<saliency<0,6)**				**TOWNS (0,09<saliency<0,5)**		
Items	**% of resp.**	**Freq.**	**Rank**	**Items**	**% of resp.**	**Freq.**	**Rank**	**Items**	**% of resp.**	**Freq.**	**Rank**
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

2.2.1 NNRR

[5] and [3] 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.

Respondents of the three areas perceive coffee appears as the most salient natural resource in the area. About 70% of respondents from tribal communities and people living in towns listed coffee as an important natural resource. Nearly 95% of respondents in small villages listed it. Within three cases, paddy, pepper and fruits are variably ranked into the second, third and forth position being fruits perceived as a more important item for towns, paddy for small villages (although pepper has a higher frequency, paddy is better-ranked, thus has a higher Saliency Index) and pepper for tribal communities. Although fruits are said by 80% of town respondents and 24 times, they occupy second position in the list, as their rank is lower than coffee's one. Some other NNRR tend to appear in the three settlements, with remarkably frequencies though. Firewood, even if appearing in the lists of the three places, comes out as an important NNRR in towns (with a 33% rate) while just 15% and 10% in small villages and tribal settlements respectively, contrary to one might think in the first. Respondents in the three areas also mentioned trees and vegetables, being trees more salient for towns and tribal communities (17%) than for small villages, and vegetables for people living in towns (50% against around 18% in small villages and tribal settlements). Another interesting point would be focused on water, listed as a top ten item for small villages and towns but not for tribal communities[7] (its is ranked in fifteen position). In towns we also find air and plants but not in the other two. Other resources exclusively said in one settlement would be cardamom for small villages and bamboo for tribal people.

Examples as vegetables and firewood are shared in the three lists, with similar Smith's Saliencies.

To sum up, 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 where carried out during coffee peak season (see Biases section). 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.

2.2.2 Services

Air and water appear as the most salient items in small villages and towns with very similar rates though air standing out with an approximate rate of 60% of respondents. In tribal communities it is to lead a life the most important service nature brings, closely followed by rainfall. For them air is still in the top ten but just 7% of the respondents gave that answer within the questionnaire. On the other hand 10% of them answered atmosphere in the fifth position. As said, rainfall is highly salient by the three of them, listed in second position for tribal communities and forth for small villages and towns. Food is also an important topic as it coincides in the three of them even if in the last positions in the top-ten. No more services are shared by the three settlements, as trees appear in small villages and towns but not in

[7] When saying not appearing or just said it does not make reference to the original list but to the top ten one.

tribal settlement, as well as natural goods. Only tribal people make allusion to fruits, animals, shelter and atmosphere (understood as sky) included as environmental services. For small villages exclusive aspects would be "enjoying nature", environment (listed as the third one and understood as nature in good conditions, without pollution) and oxygen (as a part of nature cycle and different from air). In towns two aspects are exclusive being nature's function a "healthy life" and sunlight.

One aspect worthy remarkable is the fact that tribal people have a very low frequency answering environmental services comparing to the other two settlements, listing much less items than both of them. Their mean frequency for did not even reach 2 items/person (1,93). As previously said, 16 people said more than one item and the services gathered list was 30 items. In terms of environmental services a different conception from NNRR appears. Within services it looks like nature is perceived as a source of satisfaction since items as "healthy life", air and animals appear in the lists.

2.3. Natural' Capital's perception towards other Control Variables

When evaluating NK's perception we focus on disparity according to settlement. Even if they have not been taken on account to develop our research, it is worth looking through some control variables that might contribute to understand the respondents better. Sex, age and income will be considered.

2.3.1 Sex

NNRR in men and women are similar in the first positions as they share coffee, pepper, paddy and fruits. Water and vegetables appear as more important for women rather than for men. Some NNRR not appearing in both lists would be ginger for women and honey for men, although both of them appear as the tenth resource. Thus, no significant disparity is seen due to sex's respondents. In Services, even though similarity between both lists is obvious (as it has six items in common) a modest variation is noticed. Some services as atmosphere, firewood, oxygen and fruits are exclusive for men, while environment, "lead a life", plants and natural goods are just mentioned by women on the top-ten lists.

2.3.2 Age

Age has been divided into three different groups according to sample's criteria. So, groups from 18 to 30, 31 to 50 and more than 50 have been established. The three of them share eight same items from the NNRR's list practically in the same positions (top-ten items list can be seen in the annexes) being coffee, pepper, paddy and fruits in the first four positions. Trees and plants are exclusive items for 18-30 people, ginger and soap-nut for 31-50 and cardamom and honey for people over 50. Thus, as in sex division, no considerable inequality

is observed in the three NNRR's lists. In Services four items are shared by the three lists (air, water, and rainfall in the first positions and food more important for people between 31 and 50). Two of the lists share some items, since animals are not included for people over 50 and the youngest group does not consider "healthy life". We also find exclusive items for each group. Some remarkable examples would be "to lead life" just salient by people from 18 to 50 as well as birds, fruits for middle-aged people and sunlight, environment and oxygen for the elder ones. For further information on this topic see annexes section.

2.3.3 Income

Income has been divided into five different groups, distinguishing between less than 10.000 Rp/year, 10.000 to 20.000 Rp/year, 20.000 to 100.000 Rp/year, 100.000 to 500.000 Rp/year and people who had a more than 500.000 Rp/year income. Within NNRRs, coffee is equally set up in the first positions regardless of their income as well as pepper, paddy and fruits. People with less income say items like vegetables, bamboo and plants while cardamom, honey, wheat, milk and manure are just remarked by people with more than 100.000 Rp/year (high income). In Services air is remarkably said by all of them almost in the first position. People with less income declared trees as an important service while people with high earnings stated oxygen and weather. Although water is important for everybody, it appears as more significant for medium and high-income people since it is listed in the first positions.

2.4 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.
Thus, when analysing the list of NNRRs and ecosystem services we will look throughout the different uses people from every settlement list for each natural resource and ecosystem service. To begin with, our own vision applied to what is been observed during the field work period will be related to De Groot's and Costanza's function's classification (original function's list De Groot and Costanza's list can be seen in the annexes).

Figure VI.1- Natural Capital's function classification

Source- Own elaboration based on Costanza's and De Groot's classification

Function	Sub-function	Definition
Regulation		Explains different processes some NNRR and services are involved in, in order to regulate them. Getting rain from trees or breathing due to the presence of air would be clear examples.
Habitat		Some NNRR and services might be perceived as an scenery for other living-creatures (including human being) as rivers for animal living.
Production	**Domestic uses**	NNRR and services that are mainly destined as feeding products as well as bathing and drinking.
	Energy/ Materials	NNRR and services nature gives that are destined as raw materials such as firewood for cooking, bamboo for ladders or trees to construct a house.
	Medicine/ Health/Survival	These NNRR and services are perceived with a component of healthiness and even as a survival (as "air", in some cases, and food).
	Decorative/ Personal Aesthetic	Some NNRR and services might be used with a decorative and aesthetic purpose. Some examples would be based on flowers.
	Economic Uses	NNRR and services that are mainly means of economic support, basically related to the main crops (coffee, paddy and pepper).
Information	**Recreation**	Some NNRR and services have the skill to recreate human being just by looking at them. Wild animals, mountains and greenery would be perfect examples.
	Spiritual/ Traditional values	NNRR and services, which have an influence in traditional/Religious rituals, might be in this category.

The four categories resemble to de Groot's and Costanza's ones with some disparity adapted from fieldwork answers, in order to make a more applied classification. Thus, regulation, habitat, production and information functions are established as the authors do but within sub-functions some adjustment has been made, as there is no distinction in regulation and habitat functions due to respondent's character and cultural context. Within production function some categorising has been done trying to collect and cover all the main uses mentioned by respondents and adapted to the area and circumstances. A similar situation occurs with information function, where its sub-functions have been reduced to two of them, basically focusing on recreation and spiritual values. Original function lists can be seen in the annexes.

According to the settlement, the different NK uses have been classified following patterns from figure VI.1 (above), applying the same model for NNRR and Ecosystem Services. 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.

Table VI.5- Natural Capital rate uses according to settlement
Source: Own elaboration

Function	Tribals				Small Villages				Towns			
	NNRR		Services		NNRR		Services		NNRR		Services	
	N[8]	%[9]	N	%	N	%	N	%	N	%	N	%
Regulation	0	0,00	17	29,82	4	1,51	4	32,88	13	4,21	55	41,04
Habitat	0	0,00	2	3,51	0	0,00	5	3,42	4	1,29	1	0,75
Production	192	99.48	29	50,88	258	97,36	71	48,63	287	92,88	72	53,73
Information	1	0,52	9	15,79	3	1,13	22	15,07	5	1,62	6	4,48

Four main findings emerge from table VI.5. I) In the three types of settlement, NNRR are mostly value for their production function. Listing of NNRRs for their regulation, habitat, and information function is rare or inexistent in the three types of settlement. II) 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. III) 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%). IV) Habitat function is not relevant for informants in the sample.

I) With NNRR, tribal communities completely focus their attention into production functions, specially having to do with domestic uses which constitutes 54,69% within production functions. Medicine/health/survival functions have a 10,94% while economic represents almost 30% of it. Small Villages, also displaying an important rate of production functions (97%), concentrate on domestic uses too, being 59,39% its rate. Economic uses play an important role, with more than 24%. In towns we find a similar situation although all four-function categories are mentioned. As in the other two-settlement, production function is the mostly said. Regulation, information and habitat functions are referred although with a much lower number of NNRR. Within regulation functions (more than 90%), domestic one constitutes 61%, while economic aspect appears as the second most important, with a rate of 23%. Energy/materials and medicine also play a role although they do not go over 8%.

[8] N is the number of NNRR and services, respectively
[9] % is the percentage of NNRR and services, respectively

Table VI.6- Natural Capital rates on production functions
Source- Own elaboration

Production Function	Tribals				Small Villages				Towns			
Uses	**NNRR**		**Services**		**NNRR**		**Services**		**NNRR**		**Services**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Domestic	105	54,69	20	68,97	155	60,10	23	32,39	170	61,37	17	23,61
Energy/ Materials	8	4,17	3	10,34	18	6,98	17	23,94	20	7,22	16	22,22
Medicine/Health/Survival	21	10,94	0	0,00	17	6,59	24	33,80	19	6,86	29	40,28
Decorative/ Aeesthetic	1	0,52	0	0,00	5	1,94	1	1,41	4	1,44	2	2,78
Economic	57	29,69	6	20,69	63	24,42	6	8,45	64	23,10	8	11,11

II) Referring to environmental services, we find more function diversity in the answers the respondents give, though still being production the most mentioned function. In tribal communities production and regulation appear as the most stated, with approximate rates of 50% and 30% respectively. Within production, still domestic has the highest rate with almost 70% of the services. Economic issues do also play an important task, with 20%. In small villages all the uses are also indicated, being production the top one again, with almost half of the NNRR listed in it. In this case medicine/health/survival appears as the most stated one, with more than 33% and closely followed by domestic uses, with 32%. Energy and materials are also in a good consideration, nearly 24%. Information functions constitute 15%, basically focusing in recreation use. More than 33% of the services make reference to regulation function. To end with, rates in towns have to do mainly with production and regulation functions. Within production the most stated use belongs to medicine/health/survival uses, with more than 40% of the services and followed by domestic and energy/materials uses, with around 23% rates. The economic issue plays a minor part, with an 11% rate.

III) Within information function, we can observe how small villages and tribal communities give more importance than towns. In tribal communities 100% of information functions refers to recreation values as well as in small villages, where just one respondent out of 22 made reference to spiritual/traditional values while the rest focused on recreation. In towns just six people considered information functions as important values, all converging on recreation.

IV) Habitat function rarely appears mentioned by respondents neither in NNRR nor in Services. No mentioned in NNRR for Tribal and Small Villages was made, while just four respondents referred to it in towns. In Services the rate was a little bit

higher for tribal people and small villages nor for towns, where just one respondent considered it as a natural value.

To sum up, regulation function appears as the most important use perceived by respondents, being magnified in the NNRR's perception. Within that, domestic use has the highest percentages in all settlements having to do with NNRR's perception, and in tribal communities in Service's perception. Habitat function is the less perceived by respondents in general.

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 NK 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. To proceed to compare their classification with the one built according to the fieldwork a comparison of the functions categorization will be shown in the following table:

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

RESEARCHER'S CLASSIFICATION[10]		**COSTANZA'S AND DE GROOT'S CLASSIFICATION[11]**	
Function	**Sub-function**	**Function**	**Sub-function**
a. Regulation		**a. Regulation**	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. Habitat		**b. Habitat**	b.1 Refugium b.2 Nursery
c. Production	c.1 Domestic uses c.2 Energy/ Materials c.3 Medicine/ Health/Survival c.4 Decorative/ Personal Aesthetic c.5 Economic Uses	**c. Production**	c.1 Food c.2 Raw materials c.3 Genetic resources c.4 Medicinal resources c.5 Ornamental resources
d. Information	d.1 Recreation d.2 Spiritual/ Traditional values	**d. Information**	d.1 Aesthetic d.2 Recreation d.3 Cultural and artistic d.4 Spiritual and historic d.5 Science and education

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. When entering in detail, major changes might be noticed.

[10] This list has been constructed according to what is been observed during the fieldwork period and the free-listing results.
[11] 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

3.1 Regulation function

Author's classification: Within the author's lists regulation appears as a very important and segregated function, with all its sub-functions focused on ecological processes and complex relationships between natural components. These functions appear as a main since they are defined as life support systems on earth. Some of them could easily be identified by human's perception, as "a.1" and "a.2", while others such as "a.9" and "a.11" are not so simply observed.

Researcher's classification: 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, as previously said in "Natural Capital uses" section, 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.

3.2 Habitat function

Author's classification: In the author's classification habitat is divided into two different groups, refugium and nursery as one seen as a living space storing genetic information and the other providing a nursery and breeding function.
Researcher's classification: 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. A few respondents said soil and paddy as services while others referred to grass, plants and trees when talking about NNRRs.

3.3 Production function

Author's classification: Authors make a distinction between five different sub-functions such as food, raw materials, genetics, medicinal and ornamental resources. They basically focused on this category as a way to get provisions of sources such as oxygen, water, food or medicines.
Researcher's classification: In this research 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. The same occurred for small villages and towns, where both rates exceeded 90%. 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. Specific rates can be seen in table V.6 (production function) being domestic the most cited along with medicine (for small villages and towns) and economic for NNRRs in the three settlement as a significance of subsistence and economic basis takes place.

3.4 Information function

Author's classification: Authors divide information functions within five different categories as aesthetic, recreation, cultural and artistic, spiritual and historic and science and education. They state this function as a chance to get to spiritual enrichment and mental developing and at the same time proportioning a sense of education and a place for research, getting in touch with surrounding.

Researcher's classification: 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.

VII. 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 NNRRs 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 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.

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IX. ANNEXES

Index of annexes

1- Natural Capital lists

2.1 Costanza's classification

Figure 1.1: Costanza's classification
Source: Costanza, 1997

	Ecosystem functions	Examples
Gas regulation	Regulation of atmospheric chemical composition	CO2/O2 balance, O3 for UVB protection, and SOx levels.
Climate regulation	Regulation of global temperature, precipitation, and other biologically mediated climatic processes at global or local levels.	Greenhouse gas regulation, DMS production affecting cloud formation.
Disturbance regulation	Capacitance, damping and integrity of ecosystem response to environmental fluctuations	Storm protection, flood control, drought recovery andother aspects of habitat response to environmental variability mainly controlled by vegetation structure.
Water regulation	Regulation of hydrological flows	Provisioning of water for agricultural (such as irrigation) or industrial (such as mill) processes or transportation.
Water supply	Storage and retention of water	Provisioning of water by watersheds, reservoirs and aquifers.
Erosion control and sediment retention	Retention of soil within an ecosystem	Prevention of loss of soil by wind, runoff, or other removal processes, storage of stilt in lakes and wetlands.
Soil formation	Soil formation processes	Weathering of rock and the accumulation of organic material.
Nutrient cycling	Storage, internal cycling, processing and acquisition of nutrients.	Nitrogen fixation, N, P and other elemental or nutrient cycles.
Waste treatment	Recovery of mobile nutrients and removal or breakdown of excess or xenic nutrients and compounds.	Waste treatment, pollution control, detoxification.
Pollination	Movement of floral gametes.	Provisioning of pollinators for the reproduction of plant populations.
Biological control	Trophic-dynamic regulations of populations	Keystone predator control of prey species, reduction of herbivory by top predators
Refugia	Habitat for resident and transient populations	Nurseries, habitat for migratory species, regional habitats for locally harvested species, or overwintering grounds.
Food production	That portion of gross primary production extractable as food.	Production of fish, game, crops, nuts, fruits by hunting, gathering, subsistence farming or fishing.
Raw materials	That portion of gross primary production extractable as raw materials.	The production of lumber, fuel or fodder.
Genetic resources	Sources of unique biological materials and products	Medicine, products for materials science, genes forresistance to plant pathogens and crop pests, ornamental species (pets and horticultural varieties of plants).
Recreation	Providing opportunities for recreational activities	Eco-tourism, sport fishing, and other outdoor recreational activities.
Cultural	Providing opportunities for non-commercial uses	Aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems.

1.2 De Groot's clasification

Figure 1.2- Rudolf's de Groot classification
Source- De Groot et al, 2002

Table 1
Functions, goods and services of natural and semi-natural ecosystems

	Functions	Ecosystem processes and components	Goods and services (examples)
	Regulation Functions	*Maintenance of essential ecological processes and life support systems*	
1	Gas regulation	Role of ecosystems in bio-geochemical cycles (e.g. CO_2/O_2 balance, ozone layer, etc.)	1.1 UVb-protection by O_3 (preventing disease). 1.2 Maintenance of (good) air quality. 1.3 Influence on climate (see also function 2.)
2	Climate regulation	Influence of land cover and biol. mediated processes (e.g. DMS-production) on climate	Maintenance of a favorable climate (temp., precipitation, etc) for, for example, human habitation, health, cultivation
3	Disturbance prevention	Influence of ecosystem structure on dampening env. disturbances	3.1 Storm protection (e.g. by coral reefs). 3.2 Flood prevention (e.g. by wetlands and forests)
4	Water regulation	Role of land cover in regulating runoff & river discharge	4.1 Drainage and natural irrigation. 4.2 Medium for transport
5	Water supply	Filtering, retention and storage of fresh water (e.g. in aquifers)	Provision of water for consumptive use (e.g.drinking, irrigation and industrial use)
6	Soil retention	Role of vegetation root matrix and soil biota in soil retention	6.1 Maintenance of arable land. 6.2 Prevention of damage from erosion/siltation
7	Soil formation	Weathering of rock, accumulation of organic matter	7.1 Maintenance of productivity on arable land. 7.2 Maintenance of natural productive soils
8	Nutrient regulation	Role of biota in storage and re-cycling of nutrients (eg. N,P&S)	Maintenance of healthy soils and productive ecosystems
9	Waste treatment	Role of vegetation & biota in removal or breakdown of xenic nutrients and compounds	9.1 Pollution control/detoxification. 9.2 Filtering of dust particles. 9.3 Abatement of noise pollution
10	Pollination	Role of biota in movement of floral gametes	10.1 Pollination of wild plant species. 10.2 Pollination of crops
11	Biological control	Population control through trophic-dynamic relations	11.1 Control of pests and diseases. 11.2 Reduction of herbivory (crop damage)
	Habitat Functions	*Providing habitat (suitable living space) for wild plant and animal species*	Maintenance of biological & genetic diversity (and thus the basis for most other functions)
12	Refugium function	Suitable living space for wild plants and animals	Maintenance of commercially harvested species
13	Nursery function	Suitable reproduction habitat	13.1 Hunting, gathering of fish, game, fruits, etc. 13.2 Small-scale subsistence farming & aquaculture
	Production Functions	*Provision of natural resources*	
14	Food	Conversion of solar energy into edible plants and animals	14.1 Building & Manufacturing (e.g. lumber, skins). 14.2 Fuel and energy (e.g. fuel wood, organic matter). 14.3 Fodder and fertilizer (e.g. krill, leaves, litter).
15	Raw materials	Conversion of solar energy into biomass for human construction and other uses	15.1 Improve crop resistance to pathogens & pests. 15.2 Other applications (e.g. health care)
16	Genetic resources	Genetic material and evolution in wild plants and animals	16.1 Drugs and pharmaceuticals. 16.2 Chemical models & tools. 16.3 Test- and essay organisms
17	Medicinal resources	Variety in (bio)chemical substances in, and other medicinal uses of, natural biota	Resources for fashion, handicraft, jewelry, pets, worship, decoration & souvenirs (e.g. furs, feathers, ivory, orchids, butterflies, aquarium fish, shells, etc.)
18	Ornamental resources	Variety of biota in natural ecosystems with (potential) ornamental use	
	Information Functions	*Providing opportunities for cognitive development*	

Table 1 (*Continued*)

	Functions	Ecosystem processes and components	Goods and services (examples)
19	Aesthetic information	Attractive landscape features	Enjoyment of scenery (scenic roads, housing, etc.)
20	Recreation	Variety in landscapes with (potential) recreational uses	Travel to natural ecosystems for eco-tourism, outdoor sports, etc.
21	Cultural and artistic information	Variety in natural features with cultural and artistic value	Use of nature as motive in books, film, painting, folklore, national symbols, architect., advertising, etc.
22	Spiritual and historic information	Variety in natural features with spiritual and historic value	Use of nature for religious or historic purposes (i.e. heritage value of natural ecosystems and features)
23	Science and education	Variety in nature with scientific and educational value	Use of natural systems for school excursions, etc. Use of nature for scientific research

Adapted from Costanza et al. (1997), De Groot (1992), De Groot et al. (2000).

2- Free listings

2.1 Survey

Natural Capital Free-listing

Location
Revenue Village (RV)
Revenue Village's Name _____ Code: _____

Social group (SG)
Tribal / Forest dwellers ☐ Small Villages ☐ Towns ☐

Cluster/Village/Town (C/V/T)
Name _____ Code: _____

Individual (Ind)
Name _____ Code: _____

Questions:
1) a) Can you think about the natural products that people use
b) Can you tell me which are these natural products?

Natural Product	Why?

2) a) Can you think about why we need the nature?
b) Can you tell me why we need nature?

Answer	Why is important?

I. Control variables

a) Individual attributes

i) How old are you? _____ years old

ii) Sex _____

iii) What is your Education level?

- Formal education level:_____
- If respond does not have formal education, ask:

  Do you know to read? (yes / no) _____

- How many languages do you speak? _____

iv) How long have you lived in this village? _____ year

- If the residence is less than age, ask:

Where did you live before coming to this Village?

Please, indicate the Village: _____

v) Follow table captures the primary, secondary, and third occupation or employment, and their periods. First, to complete column A and, then, column B.

A	**B**											
What is your _____ occupation?	In which months do you do each occupation or employment?											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st)												
2nd)												
3rd)												

vi) What is your Religion? _____

vii) What is your Caste? (please, to write the full name (Jatti))

_____

b) Household attributes

i) About your Income

What is your average Total Income per year? _____ Rp

What was your income last month you worked? _____ Rp

How much do you obtain through:

Agricultural practices _____ Rp

Commercialization of Natural Products _____ Rp

Employ _____ Rp

Others (e.g. rent, pension) _____ Rp

ii) About your household size

- How many members are living in your Household? _____
- How many members are Men: _____ and woman: _____?
- How many members are more than 15 years old? Men _____ and Women_____

iii) About manufactured goods in the households

- Do you have (Yes/no):

  Motorcycle ☐ Car ☐ Water pump ☐

  Cooking stove ☐

iv) Properties

- Does your family own a house? (Yes/No)_____

- Does your family have any land property? (Yes/No)_____

If yes:

- How many acres do you have? Total _____ (acres)
- How many acres of them correspond to:

  Constructed (e.g. House): _____ Acres

  Kadu _____ Acres

  Coffee plantations: _____ Acres

  Rice plantations: _____ Acres

  Ginger plantations: _____ Acres

  Cardamom plantations: _____ Acres

  Other crops (e.g. bananas) _____ Acres

v) Licenses and permissions.

- Have you got license for collecting natural products? (yes /no)_____

- Have you got any land tenures?

Land Tenures

Bane	☐	Jaghir	☐	Krishiyethara	☐	Umbli	☐
Barike	☐	Jamma	☐	Paisari	☐	Vyavasaayethara	☐
Bidukulas	☐	Jamma Malai	☐	Paraadheena	☐	Vaanijyodhyama	☐
Hithlu	☐	Kaigaarika	☐	Personal Usufruct	☐	Warg	☐
Hullugavalu	☐	Kuraavu	☐	Sagu	☐		☐

- Your land is:

Redeemed ☐ Unredeemed ☐ None ☐

Doesn't know ☐

- Have you got tree rights?

Yes ☐ **Not** ☐

Absolute rights ☐

Only for personal usufruct ☐

Receiving part of the net value of the sale consideration ☐

vi) Are you participating in any social group? If yes, which are?

Write:

1) 4)

2) 5)

3) 6)

- If the people said that don't participate or don't respond, to suggest the fellow programs:

Self-helps groups	☐	LAMPS	☐	Youth Club	☐
Adivasi Solidary Council	☐	Rotary club	☐	Women Society	☐
Temple Committee	☐	Lions Club	☐	Planters Club	☐
Others:	☐		☐		☐

vii) Are you participating in any program carried out by NGOs or local Government?. If yes, which are?

Write:

1) 4)

2) 5)

3) 6)

- If the people said that don't participate or don't respond, to suggest the fellow programs:

Facilities of electricity	☐	Facilities in water	☐	Education	☐
Facilities of construction	☐	Training to honey collecting	☐		
Others:	☐		☐		

viii) Location in the village

- How many Kms and time is your house from:

Main road (where you can take a bus):	_____	Km
	_____	Time
Kadu	_____	Km
	_____	Time
Forest Reserve:	_____	Km
	_____	Time
Brahmagiri W.S.	_____	Km
	_____	Time

2.2 Sample divided by specific settlement

Table 2.2- Total sample divided by settlement
Source- Own elaboration

	Name	Revenue Village	Number of respondents
Towns	Hudikeri	Hudikeri	12
	Srimangala	Srimangala	17
	Kutta	Kutta	1
Small Villages	B-Shittigeri	B-Shittigeri	4
	Beeruga	Beeruga	4
	Kurchi	Kurchi	15
	Kuttandi village	Kuttandi	6
	Kongana	Kuttandi	4
Tribal settlements	Hudikeri colony	Hudikeri	8
	Kurchi	Kurchi	6
	Kutta	Kutta	11
	Baradi Kadu	Kuttandi	1
	Chenagadu	Kuttandi	2
	Kutakundi	Kuttandi	1
TOTAL			**92**

2.3 Free-listing divided by settlement

2.3.1 Towns

Table I - Free-listing results for NNRRs, of a sample of 30 respondents in three different towns

NNRRs reported by town's respondents				
Items	**Frequency**	**% of respondents**	**Rank**	**Smiths**
Coffee	20	67	3,250	0,498
Pepper	15	50	4,000	0,315
Paddy	15	50	3,800	0,313
Firewood	10	33	3,000	0,252
Water	8	27	2,375	0,223
Vegetables	12	40	4,500	0,218
Fruit	10	33	5,000	0,170
Plants	6	20	4,333	0,123
Coconut	10	33	6,800	0,122
Banana	6	20	4,167	0,118
Mango	5	17	4,000	0,109
Trees	5	17	4,000	0,105
Air	4	13	3,250	0,102
Honey	4	13	5,250	0,095
Orange	6	20	5,500	0,081
Cardamom	6	20	5,667	0,080
Arecanut	5	17	5,000	0,076
Milk	4	13	6,500	0,067
Soap nut	2	7	1,500	0,063
Bamboo	4	13	6,750	0,062
Manure	2	7	1,500	0,060
Ginger	6	20	8,333	0,052
Wheat	3	10	6,333	0,050
Sunlight	3	10	6,000	0,044
Cotton	2	7	4,500	0,042
Tea	3	10	6,000	0,038
Egg	2	7	3,500	0,038
Goua	3	10	6,000	0,038
Ragi	2	7	6,500	0,035
Pineapple	2	7	5,000	0,034
Grapes	1	3	1,000	0,033
Food	2	7	7,500	0,033
Roots	2	7	5,000	0,033
Birds	1	3	1,000	0,033
Apple	1	3	2,000	0,031
Lemon	2	7	8,500	0,029
Rosewood	1	3	3,000	0,029
Animals	1	3	3,000	0,028
Teakwood	1	3	4,000	0,026
Cocoa	1	3	3,000	0,026
Oil	2	7	8,000	0,026
Potato	2	7	6,500	0,026
Pig	1	3	4,000	0,025
Jackfruit	3	10	7,000	0,025
Mulangi	1	3	6,000	0,022
Cat	1	3	5,000	0,022
Salt	1	3	3,000	0,022
Anthorium	1	3	4,000	0,022
Grasshats	1	3	6,000	0,021
Leaves	2	7	5,000	0,021
Timber	2	7	7,500	0,021
Rabbit	1	3	6,000	0,019
Gobergas	1	3	7,000	0,019
Sapota	2	7	9,500	0,019
Turmeric	2	7	10,500	0,019
Cabbage	1	3	8,000	0,018
Stones	1	3	6,000	0,017
Pothert	1	3	8,000	0,017

Chicken	1	3	4,000	0,017
Beans	1	3	9,000	0,016
Flowers	1	3	6,000	0,015
Fuel	1	3	10,000	0,013
Coliflower	1	3	10,000	0,013
Chapati	1	3	4,000	0,013
Sand	1	3	5,000	0,011
Onion	1	3	5,000	0,011
Grass	1	3	11,000	0,011
Electricty	1	3	8,000	0,010
Human bodies	1	3	8,000	0,007
Soil	1	3	9,000	0,004
Chilly	1	3	12,000	0,003
Butterfruit	1	3	15,000	0,002
Total/Average	**238**	**7,933**		

Table II - Free-listing results for Services, of a sample of 30 respondents in three different towns

Services reported by town's respondents				
Items	**Frequency**	**% of respondents**	**Rank**	**Smiths**
Air	18	60	2,167	0,460
Water	12	40	2,583	0,244
Trees	9	30	2,889	0,172
Rain	7	23	2,143	0,167
Plants	5	17	2,600	0,109
Natural goods	3	10	1,000	0,100
To live	3	10	1,000	0,100
Healthy life	4	13	2,250	0,097
Food	4	13	2,500	0,090
Sunlight	5	17	3,000	0,089
Oxygen	2	7	1,500	0,058
Climate	3	10	3,333	0,057
Seasons	2	7	2,000	0,044
Vegetables	2	7	2,500	0,039
Weather	1	3	1,000	0,033
Mountains	1	3	1,000	0,033
Civilization	1	3	1,000	0,033
Sounds	1	3	1,000	0,033
Coffee	1	3	1,000	0,033
Animals	2	7	3,500	0,030
Money	1	3	2,000	0,027
Atmosphere	1	3	2,000	0,027
Firewood	2	7	4,500	0,026
Shelter	2	7	5,000	0,025
Pepper	1	3	2,000	0,025
Bamboo	2	7	5,000	0,023
Silveroak	1	3	2,000	0,022
Protection	1	3	2,000	0,022
Shade	1	3	4,000	0,021
Birds	1	3	3,000	0,020
Specific environ.	1	3	2,000	0,017
Wealth	1	3	3,000	0,017
Fire	1	3	4,000	0,017
Crops	1	3	2,000	0,017
Nice	1	3	3,000	0,017
Fruits	2	7	4,500	0,015
Flowers	2	7	4,500	0,015
Maintain processes	2	7	4,500	0,015
Soil	1	3	4,000	0,013
Ginger	1	3	4,000	0,013
Forest	1	3	3,000	0,011
Freshness	1	3	7,000	0,008
Leaves	1	3	5,000	0,007
Grass	1	3	7,000	0,005
Walking	1	3	8,000	0,004
Total/Average	**117**	**3,900**		

2.3.2 Small Villages

Table I- Free-listing results for NNRRs, of a sample of 33 respondents in different small villages

NNRRs reported by small villages' respondents				
Items	**Frequency**	**% of respondents**	**Rank**	**Smiths**
Coffee	31	94	2,516	0,752
Paddy	18	55	2,722	0,411
Pepper	23	70	4,217	0,382
Arecanut	13	39	4,154	0,195
Coconut	12	36	4,917	0,188
Mango	11	33	5,182	0,176
Orange	9	27	4,444	0,166
Banana	12	36	5,833	0,143
Cardamom	7	21	3,286	0,118
Vegetables	5	15	3,600	0,105
Fruits	5	15	4,400	0,094
Water	4	12	2,750	0,088
Firewood	5	15	4,600	0,071
Sapota	4	9	4,500	0,066
Honey	3	9	3,667	0,059
Trees	3	6	5,000	0,052
Soapnut	2	9	2,000	0,052
Animals	3	12	4,667	0,051
Ginger	4	12	5,250	0,049
Manure	4	6	6,750	0,039
Lemon	2	6	5,000	0,033
Milk	2	3	4,000	0,031
Wheat	1	3	1,000	0,030
Oil	1	3	1,000	0,030
Doubts	1	3	1,000	0,030
Jackfruit	3	9	8,000	0,030
Papaya	3	9	5,333	0,030
Goua	3	9	6,000	0,030
Grapes	1	3	2,000	0,027
River water	1	3	2,000	0,027
Ragi	1	3	3,000	0,026
Musamb	1	3	2,000	0,026
Plants	1	3	2,000	0,026
Apples	1	3	3,000	0,024
Rampala	1	3	3,000	0,022
Insects	1	3	3,000	0,022
Tea	1	3	5,000	0,022
Hens	1	3	4,000	0,020
Goosberry	2	6	7,500	0,020
Butterfruit	2	6	5,000	0,019
Forest	1	3	5,000	0,018
Fruit juice	1	3	6,000	0,018
Bamboo shoots	1	3	4,000	0,017
Medicine plants	1	3	4,000	0,017
Pigs	1	3	5,000	0,017
Flowers	2	6	7,000	0,016
Chilli	2	6	10,500	0,016
Powder	1	3	7,000	0,015
Timber	1	3	7,000	0,012
Lime	1	3	10,000	0,011
Coconut feathers	1	3	6,000	0,009
Tomato	2	6	10,000	0,008
Dupa	1	3	8,000	0,007
Beans	1	3	8,000	0,007
Tamarindo	1	3	12,000	0,006
Grains	1	3	5,000	0,006
Pepper dust	1	3	6,000	0,005
Food	1	3	7,000	0,004
Cotton	1	3	7,000	0,004
Wild leaves	1	3	8,000	0,004
Brinjal	1	3	12,000	0,003
Total/Average	**232**	**7,030**		

Table II- Free-listing results for Services, of a sample of 33 respondents in different small villages

NNRRs reported by villages' respondents				
Items	**Frequency**	**% of respondents**	**Rank**	**Smiths**
Air	21	64	2,143	0,511
Water	13	39	2,692	0,256
Environment	8	24	2,375	0,195
Rainfall	8	24	2,500	0,176
Trees	10	30	3,600	0,159
Oxygen	5	15	3,000	0,111
Firewood	5	15	2,600	0,097
Food	5	15	3,000	0,097
Natural resources	4	12	1,500	0,096
Enjoy nature	3	9	2,667	0,073
Animals	7	21	5,714	0,063
Weather	3	9	2,667	0,062
Fruits	3	9	3,667	0,053
Sunlight	3	9	3,000	0,050
Birds	3	9	5,667	0,044
Healthy	2	6	2,000	0,040
Atmosphere	2	6	2,500	0,037
Soil	2	6	3,000	0,033
Mushroom	1	3	1,000	0,030
No pollution	2	6	3,500	0,030
For plantation	1	3	1,000	0,030
Soapnut	1	3	1,000	0,030
Leaves	2	6	4,000	0,029
Fish	1	3	2,000	0,028
Shade	2	6	4,500	0,023
Orange	1	3	2,000	0,023
Spoiling nature	1	3	2,000	0,020
Cleaniness	1	3	2,000	0,020
Plants	2	6	7,000	0,018
Flowers	1	3	6,000	0,015
Scenery	1	3	2,000	0,015
Temperature	1	3	4,000	0,015
Paddy	1	3	3,000	0,015
Shelter	1	3	3,000	0,015
Snakes	1	3	5,000	0,013
Grass	1	3	4,000	0,012
Hens	1	3	8,000	0,011
Greenery	1	3	5,000	0,010
Living things	1	3	3,000	0,010
Doubts	1	3	3,000	0,010
Petrol	1	3	6,000	0,009
Honey	1	3	9,000	0,008
Corrent facilities	1	3	4,000	0,008
Coffee	1	3	4,000	0,008
Wax	1	3	10,000	0,006
Diesel	1	3	7,000	0,004
Medicine plants	1	3	9,000	0,003
Daily cycle	1	3	11,000	0,003
Total/Average	**163**	**5,621**		

3.2.3 Tribal settlement

Table I- Free-listing results for NNRRs, of a sample of 29 respondents in different tribal settlements

NNRRs reported by tribal' respondents				
Items	**Frequency**	**% of respondents**	**Rank**	**Smiths**
Coffee	20	69	2,100	0,575
Pepper	19	66	3,053	0,436
Sapota	8	28	2,500	0,220
Coconut	10	34	4,500	0,188
Paddy	8	28	3,250	0,175
Ginger	8	28	4,250	0,133
Arecanut	6	21	5,167	0,121
Banana	9	31	5,444	0,118
Orange	8	28	5,275	0,115
Mango	8	28	5,250	0,115
Goua	4	14	3,750	0,098
Trees	4	14	3,750	0,080
Butterfruit	3	10	4,667	0,071
Fruits	3	10	2,667	0,071
Bamboo	2	7	1,000	0,069
Jackfruit	3	14	6,500	0,066
Vegetables	2	10	3,333	0,063
Firewood	3	10	4,000	0,057
Cardamom	3	10	4,667	0,048
Soapnut	2	7	3,500	0,044
Roots	2	7	3,500	0,044
Papaya	2	7	5,000	0,041
Fish	2	7	5,000	0,038
Tomato	1	3	1,000	0,034
Nothing	1	3	1,000	0,034
Wheat	2	7	5,000	0,034
Water	2	7	5,000	0,033
Tura	1	3	2,000	0,030
Honey	1	3	3,000	0,025
Passion fruit	2	7	8,500	0,024
Tea	1	3	5,000	0,023
Mutton	1	3	7,000	0,014
Flowers	1	3	6,000	0,013
Fishes	1	3	3,000	0,011
Cocokai	1	3	9,000	0,009
Palm tree	1	3	7,000	0,009
Hens	1	3	7,000	0,009
Brinjal	1	3	5,000	0,007
Dupa	1	3	7,000	0,005
Pigs	1	3	8,000	0,004
Tamarind	1	3	11,000	0,003
Cashew	1	3	13,000	0,003
Total/Average	**141**	**4,273**		

Table II- Free-listing results for NNRRs, of a sample of 29 respondents in different tribal settlements

NNRRs reported by tribal' respondents				
Items	**Frequency**	**% of respondents**	**Rank**	**Smiths**
Lead life	4	14	1,000	0,138
Rainfall	4	14	1,500	0,115
Does not understand	3	10	1,000	0,103
Atmosphere	3	10	1,667	0,080
Fruits	3	10	1,667	0,080
Firewood	3	10	2,000	0,074
Shelter	2	7	1,000	0,069
Food	2	7	1,000	0,069
Plants	2	7	1,500	0,062
Animals	3	10	2,667	0,060
Air	2	7	1,500	0,057

Coffee	2	7	1,500	0,052
Trees	2	7	1,500	0,052
Goods	2	7	1,500	0,052
Birds	2	7	3,000	0,037
Health	1	3	1,000	0,034
Hens	1	3	1,000	0,034
To see it	1	3	1,000	0,034
To get crops	1	3	1,000	0,034
Sunlight	2	7	2,000	0,034
To breathe	1	3	1,000	0,034
Eat	1	3	2,000	0,023
Bamboo	1	3	3,000	0,021
Stones	1	3	3,000	0,021
Timber	1	3	2,000	0,017
Paddy	1	3	2,000	0,017
Come and go	1	3	2,000	0,017
Irpu falls	1	3	2,000	0,017
Every use	1	3	3,000	0,011
Mountains	1	3	5,000	0,007
Beauty	1	3	5,000	0,007
Total/Average	**56**	**1,931**		

2.4 Free-listing divided by other control variables: sex, age and income

Figure 2.4- Top-ten NNRRs and Services sorted by sex, age and income
Source- Own elaboration

	SEX		AGE			INCOME				
NATURAL RESOURCES	**MEN**	**WOMEN**	**18-30**	**31-50**	**>51**	**<10000**	**10001-20000**	**20001-100000**	**100001-500000**	**>500000**
	coffee	coffee	coffee	coffee	coffee	paddy	coffee	coffee	coffee	coffee
	pepper	fruits	fruits	pepper	pepper	coffee	pepper	fruits	pepper	pepper
	paddy	pepper	pepper	paddy	fruits	pepper	fruits	pepper	paddy	paddy
	fruits	paddy	paddy	fruits	paddy	firewood	paddy	paddy	fruits	fruits
	arecanut	water	water	vegetables	arecanut	fruits	water	vegetables	firewood	arecanut
	firewood	vegetables	firewood	arecanur	water	vegetables	arecanut	trees	cardamom	manure
	cardamom	firewood	trees	firewood	firewood	water	firewood	arecanut	honey	honey
	vegetables	arecanut	vegetables	ginger	cardamom	bamboo	vegetables	ginger	arecanut	water
	water	trees	arecanut	soap nut	honey	plants	soap nut	cardamom	water	wheat
	honey	ginger	plants	water	vegetables	ginger	bamboo	water	trees	milk
SERVICES										
	air	air	air	air	air	air	rainfall	air	air	air
	rainfall	water	water	rainfall	water	trees	air	trees	rainfall	water
	water	trees	trees	water	sunlight	coffee	lead life	water	water	oxygen
	food	rainfall	lead life	trees	rainfall	food	trees	natural goods	food	rainfall
	trees	environment	rainfall	food	environment	plants	to live	rainfall	oxygen	sunlight
	atmosphere	lead life	natural goods	plants	natural goods	firewood	firewood	animals	weather	animals
	firewood	plants	birds	fruits	firewood	fruits	atmosphere	food	atmosphere	vegetables
	oxygen	food	animals	firewood	oxygen	animals	water	shelter	natural goods	weather
	animals	NNRR	plants	healthy life	food	water	plants	environment	firewood	healthy life
	fruits	animals	food	animals	healthy life	vegetables	sunlight	plants	trees	environment