Local Perception in Dandeli Wildlife Sanctuary
- Karnataka, India –

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The present work focuses in the perception about protected areas of people living within or adjacent to protected area borders.

We are very thankful to all the people from Dandeli and especially from the villagers in and around Dandeli Wildlife Sanctuary (DWS), who have shared their experience and knowledge with us and have answered all our questions.

It has been difficult to accomplish this project because our questions relate to a latent conflict between people and protected areas, so sometimes people were reticent to share information with us.

People working for organizations in the area asked for legal permissions to help us. These legal problems make impossible for us to access part of the studied area during two months. Lots of villagers were very frightened of being expelled from their own houses because of DWS, so they were very prudent with us. Those difficulties were aggravated for the fact of being foreign, what made some villagers to associate us with the government or with international organizations working in the area so they initially rejected to answer us.

Because of all this barriers it was so difficult to get local residents confident enough to answer our questions and share their true feelings with us.

In order to correspond the confidence given by the villagers, it is not our wish that anybody uses this study against the people of the area, especially against the rights of villagers. We are convinced that without really participative and democratic processes, the conservation of biodiversity will always affect the rights of the people living in those areas of high biodiversity. Consequently, the conflict between conservation and poverty alleviation will not disappear unless democracy and real participation inspires the implementation and management programs.

The commitment of present research is to bring knowledge about the perception that these local inhabitants have of DWS, in order to advance towards better systems of maintaining the dynamic equilibrium between human beings and the ecosystems they are living in.

We hope this research will be helpful on that in DWS area. We also hope our findings make managers of other protected areas carefully think before taking decisions that will affect the ecosystem as well as the population.

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Acknowledgments

I. Introduction

Tropical forests play essential roles in ecological, climate, and biogeochemical processes and are the direct basis for the subsistence of many human populations, but are threatened by human activities (Primarck, 2006; Bruner, Gullison and Fonseca, 2003).

Main current strategy to preserve tropical forests and their ecological functions is the establishment of a mosaic of natural protected areas in regions of high biodiversity and endemism (Brandon, Redford & Sanderson 1998; Terborgh & van Schaik 2002). Although in general protected areas have been successful in maintaining biodiversity (Bruner, Gullison and Fonseca, 2003; Oliveira and Asner, 2007), researchers debate whether the establishment of protected areas in low income nations generates costs (Ferraro, 2002) or benefits to local residents (Wittemyer et al., 2008) and which kind of effect is more important. Governments and donor organizations recognize that the success of protected areas partially depends on the support of rural communities adjacent to them (Molnar, 2005). If people perceive that protected areas produce social, ecological, or economic costs to them, then we should see local rejection to this conservation strategy. Accepting this principle, it seems very important to understand local population perceptions towards protected areas. Despite this importance, there is scant empirical research on the topic (West et al., 2006) (see Allendorf, 2006 ; Allendorf et al., 2006 & 2007, Sah and Heinen, 2001; Kodeghesho, Roskafta and Kalrtenborn, 2007 for some exception).

Here we contribute to fill the gap by analyzing urban and rural resident's perception, trying to answer which are the factors that build resident's perception towards their neighbouring protected area. Our principal objective is to identify and evaluate the diverse relations and interactions between Dandeli Wildlife Sanctuary and its local residents.

Our principal objective is to identify and evaluate the diverse relations and interactions between Dandeli Wildlife Sanctuary and its local residents.

To achieve the objectives we use a body of primary data – both quantitative and qualitative – collected among urban and rural populations living in the vicinity of the Dandeli Wildlife Sanctuary (Karnataka, India). Data was collected during a three month period of participatory observation between March and June of 2007.

II. Literature revision

1 - Biodiversity loss

Current research suggest that the lost of biodiversity due to anthropogenic changes on ecosystems has been higher since the middle of 20th century than in any other period of human history. For example, between 1970 and 2003 the global population of wild vertebrate species (mammals, birds, reptiles, and amphibians) shrunk by 29%, and between 10 to 30% of their present population is threatened with extinction (Millennium Ecosystem Assessment, 2005; Living Planet Report, 2006). About 35% of the area covered by mangrove – ecosystems of high biodiversity – has been lost in the last 50 years (Millennium Ecosystem Assessment, 2005). Furthermore, forest cover has reduced in half during the last 8,000 years, but most of it has occurred in the last 30 years (Bryant, Nielsen, & Tangley, 1997). Between 1990 and 1997, the tax of humid tropical forest lost was 5.8 million hectares per year with an added tax of 2.3 million hectares per year of forest degradation (Achard et al., 2002).

Because of the importance of biodiversity for ecological and social processes (Millennium Ecosystem Assessment, 2005), the loss of biodiversity is of great concern to researchers, policy makers, and the public in general.

2 - Protected areas as biodiversity conservation strategy

Since the sixties, the loss of biological diversity has been used as the main argument for the creation of protected areas (Chape et al., 2003) (Figure II.1). The creation of protected areas has followed decisions taken at the international level and supported by international organizations such as the United Nations (UN), the United Nations Environmental Panel (UNEP), the World Bank (WB), and by conservation networks such as the International Union for the Conservation of Nature and Natural Resources (IUCN). The creation of protected areas has become the main strategy for biodiversity conservation, from spices diversity to ecosystems functioning (Smith and Widhnie, 2000).

The number and surface of protected areas has increased on an extraordinary rate since the sixties. Figure II.1 shows the evolution of the surface and number of protected areas since 1962 in 10 years intervals. On 2003, the total surface of protected areas was 7,8 times higher than in 1962, taking 12% of earth's terrestrial surface (18,8 millions of Km^2) (Chape, 2003). In 2003 number of protected areas was 11-fold the number of protected areas in 1962, reaching a total of 102.120 officially recognized protected areas worldwide (Chape, 2003).

Recent research suggests that protected areas have been successful in maintaining biodiversity. For example, on his study of tropical protected areas, Bruner and colleagues (2003) found that most of the tropical protected areas studied were successful at stopping land clearing, logging, hunting, and grazing. Using satellite images, Oliveira and colleagues (2007) found that between 1999 and 2005 only 1 to 2% of all registered forest disturbance in Peruvian Amazon occurred within protected areas. Hence protected areas seem to be affective in stopping forest disturbance and biodiversity loss associated to it.

World's protected areas number and surface
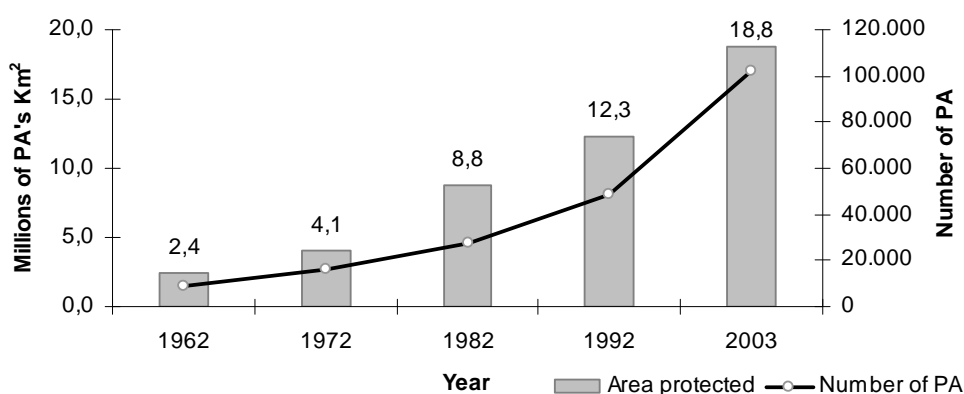
Figure II.1 – Protected areas surface and number since 1962 in 10 years intervals. At 2003 number of PA were 11 times higher, and surface 7,8 times than at 1962.
Source – Own realization with data from United Nations List of Protected Areas (Chape, 2003).

3 - People & protected areas

3.1. The overlap

It has been argued that currently one of the main problems of protected areas is their geographical overlap with local populations. In 1995 more than 1,1 billion people (nearly 20% of world population) were living within the 25 biodiversity hotspots (Cincotta et al., 2000). It is estimated that 240 million people live in forested areas and 1,3 billion people live on environmentally fragile lands. Nearly half of the 17.000 largest protected areas worldwide have agriculture within their boundaries, and at least one third of the protected areas in developing countries overlap with indigenous' traditional homelands (Molnar, 2005).

3.2. History of the relation between local residents and protected areas

Historically there have been different views of protected areas functions and relation with local residents. On its origins, the creation of protected areas was only promoted by

conservation organizations and followed biological criteria, as opposed to social or political ones (Chapin, 2004).

During the 1970's and 1980's, international organizations devoted to conservation did not deal with local community issues nor with the presence of indigenous or rural people inside or arround protected areas (Chapin, 2004). The situation started changing at the end of the 1980's. For example, in 1989, the COICA (Confederación de Organizaciones Indígenas de la Cuenca Amazónica) presented a declaration calling for an alliance "in defence of our Amazonian homeland". COICA's declaration had such a great impact that there was a wave of new conservation approach with diverse names, "community-based natural resource management," "community-based conservation," "sustainable development and use," "grassroots conservation," "devolution of resource rights to local communities," and "integrated conservation and development programs". To simplify, hereafter we will refer to ICDPs to refer to this trend in conservation. Notice that no one of those names were made by indigenous or local people (Chapin, 2004).

Almost three decades after this trend in conservation, researches consider that the application of ICDPs has been a general failure (Chapin, 2004; Berkes, 2004). Researchers have suggested that the three main reasons for the failure of ICDPs are (a) the difficulty (or the impossibility) to match the agendas of conservationists and local people, (b) the different meanings that conservationists and local people give to the words "integrated", "development" or "community-based", and (c) the focus of those new approaches to the economic impacts of protected areas, rather than other social or cultural impacts. The emphasis on economic impacts is surprising, since most conservationists do not know about economic issues as they mostly come from biological backgrounds. Lack of relevant multidisciplinary training may explain the failure of ICDPs projects aiming at the economic development of people living in or around protected areas (Chapin, 2004; Ferraro, 2002).

The absence of great outcomes from those, more expensive, new conservation approaches, joined with the increasing need of strong financial support, lead the three largest organizations on biodiversity matters, World Wildlife Fund (WWF), Conservation International (CI), and The Nature Conservancy (TNC) to switch into a new scale approach. The present large-scale conservation approach is based on the declaration of huge areas of earth surface as priority areas on the international conservation agenda (i.e., hotspots (CI) or ecoregions (WWF) (Chapin, 2004). This new approach is based on the consideration that poverty issues and conservation are separate policy realms, as a reply to previous focus of ICDPs, that considered poverty alleviation and conservation as someway related policy issues (Adams, et al., 2004), and thus –again- take the discussion of the relation between biodiversity and local peoples out of the conservationist agenda.

3.3. Characteristics of the people living in protected areas

Research suggests that people living in areas of high biodiversity share the following four socio-cultural characteristics: (a) they are *rural poor, (b) they are highly dependent on the environment, (c) they have high population grow rates, and (d) they are highly culturally diverse.*

a. Rural poor

Recent research suggests that there is a geographical overlap between poverty and biodiversity. On his study of the overlap between human poverty and biodiversity hotspots, Fisher (2007) concludes that "overlap between severe, multifaceted poverty and key areas of global biodiversity is great" (Fisher & Christopher, 2007).

The long history of forest evolution explains that the livelihood modes of people living on forested areas tend to end with the exchange of the forest land use to agricultural and pastoral uses, provoking the total disappearance of the forest (Sunderlin, et al., 2005). Places where this evolution have not happened and economy is forest-based face the greatest poverty in the world (Sunderlin, et al., 2005). Further more, open access to forests acts as a magnet for poor people from non-forested areas as these ecosystems with great biodiversity offer them a safety net to overcome times of struggle (Sunderlin, et al., 2005).

The growing population pressure and the increasing scarcity of arable land on that scene, brings out that marginal people from that rural areas may choose to move forward to fragile lands, and more remote locations (Hulme & Shepherd, 2003). These forested remote locations are used as a refuge during conflicts or war time (Sunderlin, et al. 2005). As an example, in India, 84% of "tribal" ethnic minorities live in forested areas, which are considered *less-favoured* areas on the basis of agro-ecological and socioeconomic conditions (Mehta & Shah, 2003). The World Bank has also observed that a large share of people suffering from extreme poverty live on "fragile" lands that includes forest but also arid zones, slopes, and areas with poor soils (Bojo and Reddy, 2003). This remote locations are relatively untouched by rapidly changing socio-economic system, so indigenous people in particular have felt more comfortable and less disturbed by the socio-economic forces, living on those remote areas with a remaining high biodiversity (Sunderlin, et al., 2005).

Summarizing, conversion from poverty to a high standard of living is a cause of forest destruction, but the opposite can also be true: the destruction of forests can have adverse effects to the livelihood of the people living in them (that tend to be poor). In other words, poverty can undermine biodiversity, and biodiversity loss can exacerbate poverty (Sunderlin, et al., 2005; Perrings and Gadgil, 2003).

b. Highly dependent on the environment

People living in areas of high biodiversity are also *highly dependent on the environment*, as they have forest-based economies.

Some research suggests that on forest-based economies exists a positive feedback between poverty and ecosystems degradation often described as a vicious cycle:

ecosystem degradation affects local residents livelihoods in a negative way so people increase resources exploitation that leads to further degradation, and so on (Fisher & Christopher, 2007). Other research suggests that when ecosystem degradation is due to contemporaneous economic forces (i.e. international demand on raw material) local poor people sometimes protest and resists against this ecological impacts, not for ecological sensibility, but for the destruction of their livelihood bases' and in demand for social justice (Martinez-Alier, 2004).

Sunderlin (2005, p. 1388) classify people with forest-based economies in three categories with not rigid boundaries.

1. Traditional/indigenous minorities living in their ancestral lands.
2. People who have long lived in a given forest area, but are not considered traditional or indigenous.
3. People who have been displaced in the course of rapid modern social change and have migrated to forested areas.

Other relevant livelihood modes that are not reflected on this classification, but are also forest-dependent livelihoods, are smallholders, specialized on the cultivation of domesticated forest products, urban fuelwood sellers and timber or dam company workers that have remained in the area after the construction of the dam (Sunderlin, et al., 2005; Hegde, 2003).

Forests provide a wide variety of goods and services that are often the base of the livelihood of forest dwellers. For example, forests provide timber and non-timber forest products for use or commercialization. Products such as timber, fuelwood, charcoal, rattan, game, fruits, medicinal herbs, and many others are expensive and hard to substitute (Karanth, 2007). Forest products can be used to fill seasonal gaps in food or income derived from other activities, for example, during the interval between agricultural harvests and can also provide a valuable "safety net" during times of hardship, when crops have failed, an economic crisis has hit, war or conflict has broken out, or when floods have washed away homes (Sunderlin, et al., 2005). Forest also provide other important provisioning services such as clean air and water source, as well as cultural services that allow spiritual and religious demonstrations, of great importance for indigenous traditions (Millennium Ecosystem Assessment, 2005).

c. High population growth

Another characteristic of people living in high biodiversity areas is their *high population growth*. The clear effect of population growth in protected areas has not been determined, but the population growth rate in the hotspots (1995-2000) is 1.8% yr^{-1}, substantially higher than the population growth rate of the world as a whole (1.3% yr^{-1}) and above that of the developing countries (1.6% yr^{-1}) (Cincotta et al., 2000). A recent study of population growth on the border of 306 protected areas in 45 countries in Africa and Latin America concludes that protected areas attract human settlement around them rather than

repel them (Wittemyer, et al., 2008), finding that population growth inside and in the border of protected areas is higher than the average rural growth of the various countries studied.

d. High cultural diversity

Last, people living in high biodiversity areas display a *high cultural diversity.* Ten out of the 12 megadiverse countries also figure amount the top 25 most linguistically diverse countries (Maffi, 2005). Researchers suggest that there has been a coevolution between cultural and biological diversity, which would explain the current overlap (Maffi, 2005).

3.4. The impact of people on protected areas

People living inside and around protected areas can have great impact on the ecosystems that are set to be protected, resulting on a loss of biodiversity (DDAA, 2005; Karanth, 2006). This section describes some of the main impacts of people on biodiversity in general, and in Indian protected areas in particular.

Habitat fragmentation is one of the most common human impacts on biodiversity. Habitat fragmentation is due to the estabishment of settlements and services related to human settlements (Karanth, 2006). Water pipes, electricity lines or roads create fragmentation (Menon and Bawa, 1997) and increase the level of disturbance that can drastically alter, for example, the herpetofauna assemblage (Vasudevan, 2001; Ishwar et al., 2001).

Collection of fuelwood, grazing, and fodder removal also seem to be an important cause of forest degradation in some protected areas (DDAA, 2005). In India, for example, demand of firewood generally comes from rural human settlements in the area but also from urban places like Delhi (Agarwal and Narain, 1985). Cattle owned by people living inside but also people living around protected areas compete for grazing in forest areas. As a result, there is less biomass for the wild species. Reduction on biomass available joined with the illness that cattle transmit to wild animals can provoke the declination of the wild population of grazers (DDAA, 2005). In India, demand of green fodder and grazing land is increasing year by year (MoEF, 1999) not only due to a rise in livestock numbers, but also because pasture lands have been taken over for various purposes including irrigated cultivation, plantations, and urbanisation (DDAA, 2005). Yet another source of impact is the transmission of diseases from domestic to wild populations. For example, Bhadra Tiger Reserve and the Mudumalai Wildlife Sanctuary have lost huge numbers of *gaur* due to anthrax (Srinivasulu, 2003).

Poaching is another source of biodiversity lost because it can result on the decline of the population of the poached species. In India, hunting bans were imposed in 1972, but several species are still badly affected by poaching (DDAA, 2005). Poaching can be done for household consumption but also for commercialization in the national and international market. Commercialization is the most important reason for poaching as increasing market forces penetrate in rural villages. The effect of poaching for self consumption is

controversial. In some places it seems not to affect in great amount the population of most of large mammal's species but in other places where there has been loss of traditional rules, which has lead to overhunting certain spices (i.e. tiger), even when they are poached by traditional or indigenous people (Madhusudan and Karanth, 2002).

Forest fires due to human actions have also been noticed as an important threat for protected areas (DDAA, 2005). Fires can damage ecosystems beyond redemption and bring vulnerable species to threat situations. Sometimes fires are intentional to facilitate the recollection of non timber forest products (NTFP) or the entrance of cattle on protected areas for grazing (Hegde, 2003).

Other huge threats for protected areas come from development projects like dams, electricity projects, mining or government granted oil prospection (DDAA, 2005). Seventy Indian protected areas are under threat from ongoing or proposed mining within or adjacent to their boundaries. For example, mining activities in Kudremukh National Park in Karnataka have had great damage in flora and fauna of the National Park, as well in the Bhadra river nearby. In the same way, Koin river pollution has had great affectation to elephant's habitat in Bastar (DDAA, 2005). Nearby Dandeli Wildlife Sanctuary, our study site, Dandeli Mini Hydel Project in Kali river threatened river forest so after hard opposition of an environmental organization in favour of Kali river, it was cancelled (Kali Bachao Andolan, 2003).

Some times there are disasters associated to those development projects such as mine or dam bursts or flash foods caused by sudden releases of water from dams. For example, in Ranganithittu Sanctuary, Karnataka, hundreds of birds have been swept away twice due to sudden releases of water from Krishnarajasagar dam (DDAA, 2005). There are other human induced accidents associated to development projects, like electrocution from high-tension power lines that in Periyar Tiger Reserve, have killed four elephants in 2001.

Introduction of alien or exotic species into a natural ecosystem seems to be the cause of an important number of the wordwide extinctions (Groombridge, 1992). Protected areas are also affected by those introductions and have to deal with the problems derived of them (DDAA, 2005).

In the protected areas with accute human-wildlife conflicts sometimes there is a lost in the tolerance to the wild animals and, for example in Gir Sanctuary, three lions were intentionally electrocuted in the first six month of 2000 year (Gureja, et al., 2003).

Tourism is also an important threat for biodiversity conservation. The physical and biological impacts of tourists inside protected areas can provoke imbalances of energy in the ecosystem, resulting a lost of biodiversity (DDAA, 2005; Kutty, 2001).

3.5. The impact of protected areas on people

But protected areas also impact local people's livelihood. Present research shows that the introduction of protected areas has provoked important impacts on the livelihood

of people living in and around them. Those impacts are usually categorized as economic, social, and cultural. These categories are a simplification of the complex reality and their boundaries must not be seen as static.

a. Economic impacts

Research suggests that spatial, social, and temporal distribution of benefits and costs of conservation projects are not equally distributed. The reduction or elimination of the income from goods and services from the protected area, (e.g., timber and NTFPs, or agricultural lands) results in a loss of the utility of the area, which is perceived as a cost by local people (Ferraro, 2002). There is an obvious opportunity cost for local people, not being able to use the protected forest resources nor land under protection for cultivation.

Human-wildlife conflict, defined as instances where the actions of wild fauna cause damage to human beings or their property (Guerja, 2005), takes different forms and is one of the biggest challenges of biodiversity conservation in developing countries. Diverse studies try to quantify the impact of wildlife incursions on human life and their costs on human activities. Wild animals can destroy fields and crops, can damage or kill cattle and livestock, domestic animals and even human beings. In India, the greatest human-conflicts occur with big animals like tigers, leopards, lions, bears or elephants. An estimation of the amount of crop's damaged by wild animals in Madhya Pradesh, India, shows that the cost of losses by wild animas can be as much as 930 thousand rupees per year (Pabla, 2002). In another study, researchers report that in just one year (2001-2002) there were 196 human deaths due to elephants (DDAA, 2005).

The creation of protected areas can also have indirect impacts on the health of local residents, either by decreasing the nutritional composition of diet or their access to medicinal plants traditionally used by household members to overcome disease (Ferraro, 2002).

Some researchers argue that the influx of alien land uses (like tourism resorts or intensive agriculture) substitutes the lost of access to protected area resources (Wittemyer, 2008). This new economic opportunities, that also include agriculture intensification, can temporally increase the benefits of the people living around the protected area, but after a while, if there are no technological changes, the high population growth of those areas will provoke a reduction in the fertility, a loss of secondary forest products and services, and a reduction of the effectiveness of protection that will –again- generate costs to the local population (Ferraro, 2002; Wittemyer, 2008, West, et al., 2007).

b. Social impacts

The establishment of protected areas can also affect social relations, including gender relations, and power structures (West et al., 2006).

For example, the establishment of protected areas can change the social and economic position of women by building alliances with other social, political, and economic actors that had never been in contact before. Protected areas, for example, can provide

new opportunities to work outside their immediate family (West et al., 2006). Researchers have pointed out the leading role of women in social and political conflicts about resources in the household and villages (Martinez-Alier, 2004).

Through the establishment of protected areas there can be changes in power structures due to changes on the land use rights and the restriction on the diversity of possible uses. These changes can create an alienation of the local people from their own land, giving the chance to other actors to benefit of them. Additionally, it is well known that in rural communities of the developing world, local elites tend to capture the benefits from conservation-development projects, resulting on a less equitable distribution of power and assets. Those changes in the distribution of resources reinforce the alienation and increase the historical and contemporary elite control of resources like land or water (West et al., 2007; Berkes, 2004).

Displacement is one of the most complex and controversial impacts of protected areas on people. Displacement involves social, economic and cultural issues. Protected areas generate resettlements in those cases were the model for conservation favors the idea that nature should be preserved on a pristine form, without any human presence. This policy tends to exclude all activities inside the protected area hence the displacement of its population to other places. Although displacements entail many economic, social, and cultural livelihood changes (i.e. loss of land tenure, erosion of traditional uses of land, etc.), the topic has been poorly documented (West et al., 2006). Some researchers have underlined cases of partial success, like the study case of the resettlement of several household from 11 villages in Bhadra Wildlife Sanctuary in Karnataka, India (Karanth, 2007). The resettlement was considered a success by the government, some international and local NGOs and many relocated people, although there were critiques of some of the relocated people because of the absence of alternatives to forest resources like NTFP, fire wood, fodder and grazing land (Karanth, 2007).

c. Cultural impacts

Even though globalization is common known for it's technological and economic aspects, the context where conservation have been thought and developed, mainly through international organizations with Western roots, and the empirical observation of its impacts towards local people, have taken some studies to say that protected areas are a form of globalization (West et al., 2006). Globalization is materialized through protected areas by the introduction of the western dichotomy between nature and culture. This introduction have had a great cultural impact on rural traditional people and on indigenous people with other ontologies, defined as *systems of properties of the existing beings, who act as point of anchorage in cosmological ways and models of social link* (Descola, 2003:35), in other words, they way of understanding the present reality, its creation, and the diverse type of possible relations with it.

The ethic reasons for conservation differ within the different ontologies. The animist and toteism ontologies, consider that there is a continuity between humans and no humans in their "interiority" so they consider trees, rocks and animals inside the social relations, so they have relationships with them (Descola, 2003). Animist and toteist people will have different ethic reasons for the conservation of trees or animals, which will entail other mechanisms of conservation than the ones thought from the western naturalist ontology. The naturalist ontology considers a material continuity between humans and no humans, but there is a different "interiority" reflected on the cultural aptitude of human beings (Descola, 2003). Naturalist people have created the dichotomy nature-culture, and it is inherent in mostly all the science, included the biology of conservation, that is the theoretical base of conservationism.

The introduction of the western dichotomy through the creation of protected areas can result on a loss of the traditional relationship in the animist ontology people. This will erode the traditional mechanisms of conservation. For example, for the Maori ethnic group in New Zealand, "…*Earth's bounty is considered to be a gift, necessitating reciprocity on the part of human users in order to maintain sustainability*" the introduction of human-nature dichotomy serve to alienate them from their stewardship responsibilities (Berkes, 2004), resulting on a big difficulty to enhance conservation, that will probably create a conflict between the local people and conservation.

On a more practical aspect, the establishment of protected areas can affect the culture of local population by making illegal ancestral uses of land (West et al., 2007; Chapin, 2004). Traditional practices are criminalized and at best the protected areas restrictions are controlled by local guards and at worst, by military agents that easily use contusive violence methods against the traditional users (Neupane, 2007; Jana, 2007). Thus, lots of times protected areas are seen by local people, as a foreign appropriation local nature (Richard, 2001).

4 - The conflict between people and protected areas

In sum, despite efforts to conciliate the overlap between people and biodiversity, there is still a conflict between human welfare and biodiversity conservation. The conflict can be summarized as the need to mitigate the poverty that people living in high biodiversity areas is suffering and the need to conserve the biodiverse ecosystems they are living in.

Adams et al. (2004) have developed a typology of the different ways of looking at the connections and disconnections between poverty and conservation. The four categories they have developed are:

1. *Poverty and conservation are separate policy realms*: poverty elimination and conservation are quite different problems comprising distinct sectors of policy concern. Conservation is a legitimate objective that can be pursued independently of any benefits in poverty reduction (and vice versa).

2. *Poverty is a constraint on conservation*: poverty limits conservation success to a sufficient degree that biodiversity conservation will fail if it does not successfully address poverty elimination. Poverty reduction will be simply undertaken as a means to achieve more effective conservation.

3. *Conservation should not compromise poverty reduction*: in pursuing their conservation goals, conservation agencies should, at a minimum, not increase poverty or undermine the livelihoods of the poor. It recognizes that conservation action can be sustained despite negative social impacts.

4. *Poverty reduction depends on living resource conservation*: financially poor and socially and politically marginalized people depend on living species in biodiverse ecosystems for livelihoods and ecosystem services, and their livelihoods can be improved through appropriate conservation activities. Conservation is therefore a tool for achieving poverty reduction.

This typology is helpful to understand the different position of the diverse actors that are working on conservation issues.

5 - Understanding the conflict between people and protected areas

As we just reviewed, previous research has looked at local people's relation with protected areas by examining the economic, social, and cultural costs generated by protected area. The assumption of this previous research is that higher costs will lead to higher rejection of the protected area by the local population. But this previous research does not examine how people *perceive* the costs and benefits generated by the protected area. It is possible that people acceptance or rejection of protected areas and the protection restrictions depends on people's perception of nature, the relations between humans and nature, and the perceptions of costs and benefits associated to the establishment of the protected area, more than on the real costs generated by protected areas. In this research we examine how people perception of the cost generated by protected area affects people's attitudes towards it.

Previous research on local residents attitudes towards protected areas shows that – in general – local residents agree with the importance and value of wildlife and the need to protect them (Allendorf, et al., 2006), but even when local residents agree with the overall objective of conservation, they do reject concrete actions derived from this overall conservation objective. For example, in Selous Game Reserve, Tanzania, Gillingham and Lee (1999) found that the absence of democratic participation spaces on the management of the protected area, and the inequitable benefits distribution made local residents to held negative views of the conservation project (Gillingham and Lee, 1999).

Previous research on people's attitudes towards protected areas also points out the importance of the level of education, wealth, resource use (Kodeghesho, 2007; Arujan et al., 2005, Sah and Heinen, 2001), and the benefits distribution, as social factors that help explain in local residents' attitude toward protected areas (Gillingham and Lee, 1999). Allendorf and colleges (2006), have found that positive attitude was related with perception of different types of benefits (Allendorf, et al., 2006). On the present research we focus on those benefits but also on problems perceived by local residents of Dandeli Wildlife Sanctuary, Karnataka, India.

III. Case of study

1 - Introduction

In this chapter it is provided the social, economic and ecological background of the study area. The study area is Dandeli Wildlife Sanctuary (DWS) located in the Western Ghats, in Karnataka. For the data analysis the case of study has been divided in three areas: municipalities inside Dandeli Wildlife Sanctuary, Dandeli City, and the municipalities around Dandeli Wildlife Sanctuary (DWS) excluding Dandeli City. In this chapter there is explained the differences between the three areas, although in some parts of the explanation it is only provided more general information since it has been impossible to find concrete information.

Firstly, there is a description of the ecological importance of the area, followed by an explanation about the most important environmental policies affecting the area over the last decades. Then, there is information on the history, regional development, demography, and economy of the area.

2 - Environmental importance of the area

India is one of the twelve megadiversity regions of the world and contains two of the world's twenty-five biodiversity hotspots. One of these two biodiversity hotspots in India is the Western Ghats, considered as one of the eight global hottest hot spots of the world (Myers et al., 2000).

Western Ghats (WG) are one of the six biogeographic zones of India (Rodgers *et al.*, 2002), and run more or less parallel to the west coast and take up a length of 1,600 km, starting in Maharashtra and ending in Tamil Nadu, including Gujarat, Goa, Karnataka and Kerala states (Lakshminarayana *et. al.*, 2001). The WG cover an area around 130,000 km^2, a 4.03% of the India's land area. The rivers that flow in the WG provide 20% of the utilizable water available in India (Sahyadri Ecology Forum, 2002). The varied rainfall along the WG has given them a wide variety of forest systems, including evergreen, semi-evergreen, moist, dry deciduous and subtropical hill forests. These forests are rich in biodiversity, with 10,000-15,000 different species of microorganisms, plants and animals; including 4000 species of flowering plants that represent nearly 27% of the total flora in India (Nayar, 1996). Of all these flowering species, nearly 40% are thought to be endemic (Mackinnon and Mackinnon, 1986). It is important to note that Karnataka State itself has a variety of wildlife habitats including wet evergreen forest, semi evergreen forest, moist deciduous forest, dry deciduous forest, dry thorn scrub forest, as well as riverine, mangrove and other wetland vegetations.

3 - Environmental policies

A number of factors, mostly related to human activity, have caused a decrease of Indian's biological diversity in the last decades (extinction of some wild species, and some domesticated plant varieties and animal breeds) as well as a decrease of Indian's forest cover. While at the beginning of the 20th Century a 40 percent of India was forest, nowadays, Indian's forest cover represent less than seven or eight percent of Indian surface (DDAA, 2007).

Table III.1 – Summarize of relevant Indian Acts, lows and policies related to environment issues since 1972. Source: Own elaboration from information from DDAA, 2005 and http://www.india.gov.in

Act Name	Year	Purpose
The Wild Life (Protection) Act (WLPA)	1972	Makes mandatory to select areas to be declared as Sanctuaries and National Parks Makes mandatory to establish measures to be taken for harmonising the needs of tribal people and other forest-dwellers with the protection and conservation of wildlife It banned hunting of determinate wild animals.
Project Tiger	1973	Project to maintain a viable population of tiger in India and to preserve the areas where they live
Western Ghats Development Programme	1974-1975	To develop WG considering conservation of the area and livelihood of the people living in the area
The Forest (Conservation) Act	1980	To stop deforestation It imposes restrictions on the de-reservation of forests and use of forest land for non-forest purposes.
Environment (Protection) Act	1986	It empowers the Central Government to take all the measures that will be necessary to improve and protect the environment quality
National Forest Policy	1988	It focuses in forests conservation stating that the direct economic benefit has to be subordinated to the environmental stability and promoting the social justice in the forest management.
Joint Forest Management (JFM)	1990 2000 2002	To regenerate and sustainable use forests Guidelines on JFM to all states Guidelines on JFM to all states
Ecodevelopment around National Parks and Sanctuaries including Tiger Reserves	1991-1992	To reduce biotic pressure from grazing, fuel wood, fodder and collection of various non-timber forest products (NTFP) in the PAs, by providing alternatives to the villagers.
National Conservation Strategy and Policy Statement on Environment and Development	1992	It establishes guides to integrate environment considerations into India's development.
Biological Diversity Act	2002	It gives local communities the right to participate in the decisions about their resources admitting their traditional knowledge about protection.
Wildlife (Protection) Amendment Act	2002	It promulgates thinking about a future with higher conservation with public participation.
National Biodiversity Strategy and Action Plan (NBSAP)	2003	To help conserve India's vast biodiversity, orient utilisation of biological resources towards sustainable directions, and ensure that decisions regarding access to such resources and the benefits accruing from them are taken democratically and equitably.
National Environment Policy	2006	To protect and conserve critical environment areas To do a sustainable use of environment, considering it in the economic and social development To give an equitable access to environment for all society sections (with especially emphasis in the poor).

India biodiversity riches was first seriously damaged in the early 19th century by the British policy, which encouraged agriculture as well as extractive activities like mining or timber exploitation, at the expense of forests. Since its independency, the Indian government has made several legislative efforts to conserve wildlife and biodiversity, specially establishing Protected Areas (National Parks and Wildlife Sanctuaries). Table III.1 summarizes some of the most outstanding measures related with the conservation established by the Indian government.

Though several PAs were established before 1970, most protected areas were established after the promulgation of the Wild Life Protection Act (WLPA) in 1972. There were 65 PAs in India in 1970, 101 in 1975, 854 in 2000, and 582 in 2003. The total protected area occupies 156,000 km^2 including 493 Wildlife Sanctuaries and 89 National Parks (see Annex 1.1- Indian protected areas for more information).

As part of the NBSAP, since 2004, the state of Karnataka possesses a strategy and an action plan to conserve, use in sustainable way, and promote equitable sharing of benefits from the use of biological diversity resources. It is called the Karnataka State Biodiversity Strategy and Action Plan (KBSAP). Karnataka possesses five National Parks (NP) and 21 Wildlife Sanctuaries (WS), which cover an area of 1.27% and 2.03% of State's surface respectively (see Annex 1.2- Indian protected areas divided by states for more information). Most of these protected areas are situated in Western Ghats region (Roshini *et al.*, 2001). In fact, the Western Ghats contain 56 PA (13 NP and 43 WS), occupying 10% of its area, making WG the biogeographic zone with the biggest percentage of land protected in India after the Indian biogeographic zone called Islands, in the insular part of the country (DDAA, 2005) (see Annex 1.3- Indian protected areas divided by biogeographic region for more information).

 Uttara Kannada district (10,247 km^2) is the highest forested district in the WG with 81% of the district area being forest (Gadgil, 2004). Uttara Kannada district has rich flora (with more than 3,000 plant species) and fauna (with more than 400 bird species) and it harbours most of forest types found in the WG. In Uttara Kannada there are only three protected areas, Dandeli Wildlife Sanctuary is the biggest, with 475.02 Km^2 followed by Anshi National Park with 250 Km^2, both protected areas were established in 1987. Lastly, there is the Attiveri Wildlife Sanctuary that is the more little one, with only 2.23 Km^2 and the youngest one also, established in 1994.

4 - Location and administrative organization

DWS is located in the North of Uttara Kannada district, (see Figure III.1), occupying an area of 475.16 km^2 (Hegde, 2003). Administratively, the DWS is divided in two sub-districts or taluks: Supa and Haliyal. The biggest city close to DWS is Dandeli, located 7km away from the protected area.
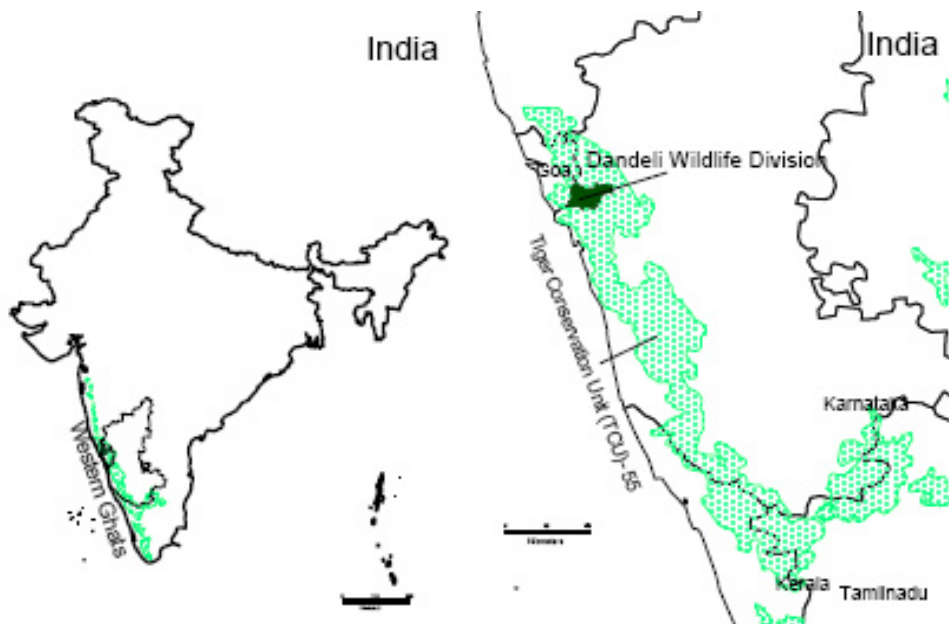
Figure III.1 – Location of Dandeli Wildlife Division in two scale maps. Left map approximate scale 1:500·10^5 and right map approximate scale 1: 100·10^5 .
Source – Hegde, 2003

DWS is limited in the east, south-east and south by Kali River, in the south-west by Anshi National park, in the east by Goa State and in the north by a vast reserved forest including diverse villages.

DWS is administratively part of Dandeli Wildlife District (DWD) jointly with Anshi National Park (ANP) and also part of Kanara Forest Circle. DWD has five ranges (Anshi, Kumbarawada, Kulgi, Phansoli and Gund Wildlife Ranges), and is administrated by a Deputy Conservator of Forests, two Assistant Conservator of Forests (one for ANP and another for DWS) and five Range Forest Officers (see Annex 2.1 - DWS administrative structure and Figure III.2).
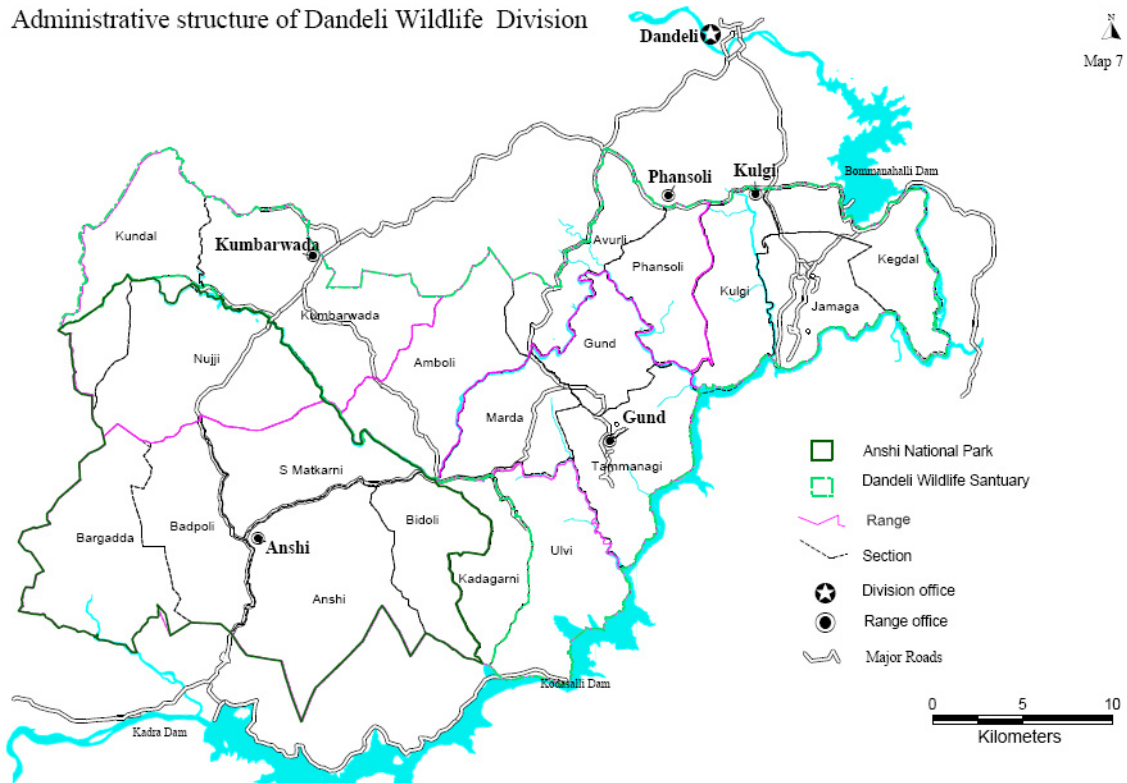
FigureIII.2 – DWD administrative division with Dandeli Wildlife Sanctuary and Anshi National Park and its ranges and sections.
Source – Hegde, 2003.

5 - Environmental description

The continuity of the environment and the similar uses given to all the area make difficult to find differences between DWS and the reserved forest around it. Most of the information given below is specific of DWS or DWD but can be expanded to all the rest of the area with slightly differences.

5.1. Physic environment

Western Ghats are majority formed by pre-Cambrian rocks: quartz-sericite-schist, metavolcanoes, pink phyllite, banded magniferrous and ferruginous quartzites, gneissic granite, dolorite dykes. The rocks have undergone laterization to varying degrees. It is important to point that the economically important ores that are found in this area are: iron, manganese, bauxite, limestone and clay.

In the area soils are mainly lateritic soils, very few fertiles due to they lack of nitrogen, phosphoric acid and calcium. However, in the Dandeli area, the soils are rich and fertile.

In DWS temperature varies from 16 to 37ºC, whereas in Dandeli city varies from 11 to 41ºC. Summer goes from February to May, the rainy season from June to September, and winter from October to January. In DWS, temperature and humidity changes can be

observed from east to west. In the west humidity is higher and temperature softer, consequently we find evergreen forest in the west and deciduous forest in the east. The mean rainfall at DWS is 2,157 mm per year. Most part of it is received from June to September, although there are some rains in April and May.

The average elevation of the area is 473 metres (minimum 40 m in Kali River, maximum 943 m in Dhavarli temba).

The Kali River and its tributaires (Nagazari Halla, Satkhanda Halla, and Shivapur Halla) originate in DWS. The Kali River is one of many rivers that flow in the Western Ghats. It is 184 km long and flows into the Arabian Sea.

5.2. Biotic environment

DWD is linked to six other protected areas in the neighboring states of Goa and Maharashtra (see Figure III.3). All these protected areas together form a continuous forest of about 5000 km^2 with pockets of intact prime habitat for tigers and other estenoic wildlife species. This area is part of the high priority tiger conservation unit and is in the northern part of the Tiger Conservation Unit Level 55 and also supports a small isolated population of elephants.

a. Flora

The area of study is majority covered by moist deciduous and tropical semi-evergreen type of forests. Concretely, 61% of the DWS area is covered by moist deciduous forest, 33% by evergreen forest and 6% by teak plantation (see Figure III.4). The DWS forest type is described as *Lagerstroemia microcarpa-Tectona grandis-Dilenia pentagyna* (Pascal, 1984) with a very abundant population of bamboo (*Bamboo sp)*.

There are more than 200 species of forest trees belonging to 44 families in the area of study. The commonly found trees species are *Tectona grandis, Terminalia tomentosa, Terminalia paniculata, Grewia tiliafolia, Lagerstromia lanceolata, Dillenenia pentagyra, Dalbergia latifolia, Mimosops elengi, Canarium strictum, Calophyllum tomentosum* and *Cinnamonum zeylanicum*(Deputy Conservator of Forests. Wildlife Division, 2008).

b. Fauna

The fauna found is of typical South Indian type. Numerous species are found in the area, mostly carnivorous. including forty mammal species. Apart from the tiger *(Panthera tigris)*, wild dog (*Cuon alpinus*), elephant (*Elephas maximus*), sloth bear *(Melursus ursinus)*, gaur *(Bos gaurus)* and some rare species like Black Panther (Panthera pardus) are found in the area. (see Annex 1.5- DWS mammal species for more information)

More than 272 bird species belonging to 45 families are found in the area of study. Of these, 155 species belonging to 38 families are found in DWS, including the Great Pied Hornbill *(Buceros bicornis)* (Karthikeyan *et al*, 1995)*.*

According to Daniels et al. (1998) 26 reptile species are found in DWS, including the Marsh Crocodile *(Crocodylus palustris),* King Cobra *(Ohiophagus hanna),* and Indian Rock Python *(Python molurus).*
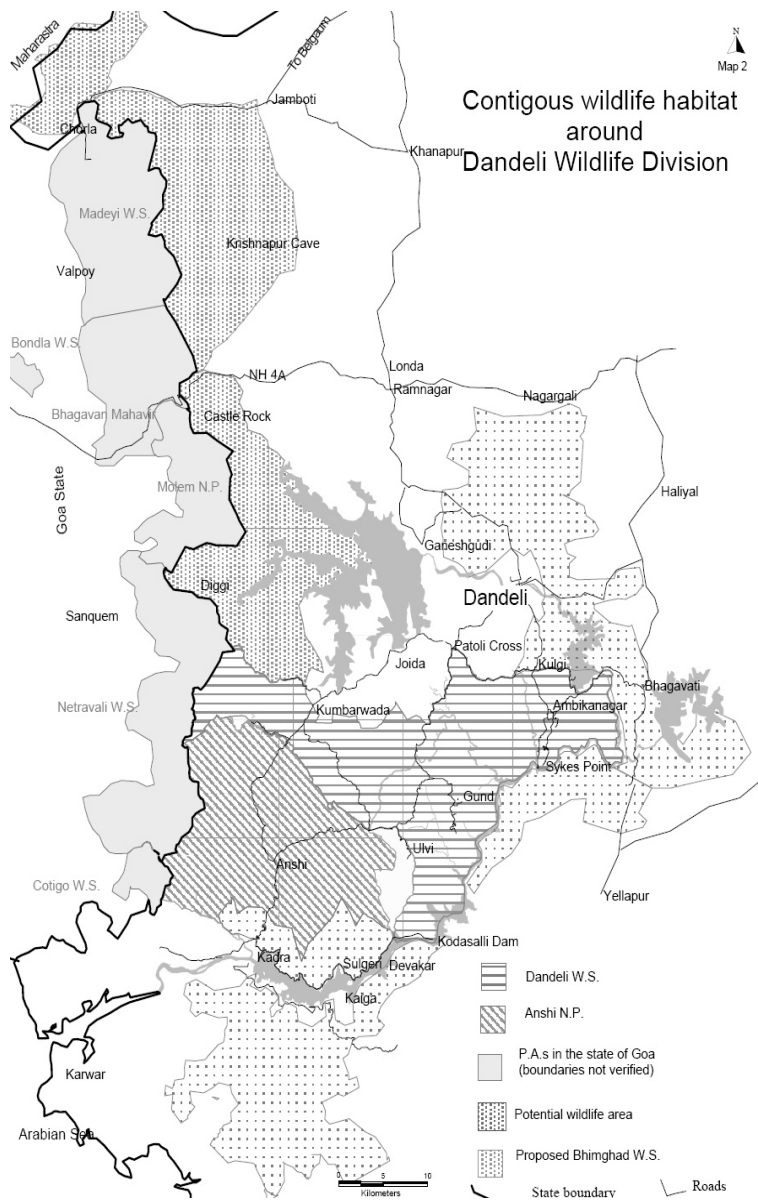
Figure III.3 – Contiguous wildlife habitat around Dandeli Wildlife District
Source – Hegde, 2003

Figure III.4 – Vegetation map of
Dandeli Wildlife Division. Green lines
establish DWS and ANP orders.
Source – Hegde, 2003
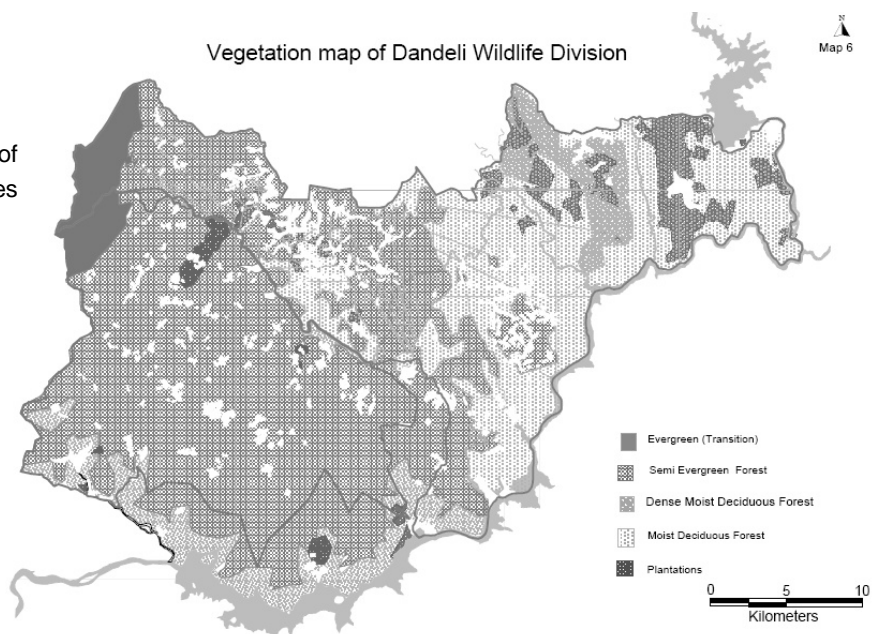
6 - History

6.1. DWS

DWS was originally declared as a game sanctuary on 10th May 1956, covering an area of 127.71 km[2.] In 1975, the area was declared as a wildlife sanctuary and it was expanded to 5,729.07 km[2]. In 1987 the wildlife sanctuary was divided into two protected areas: ANP and DWS, reducing the area of DWS to 834.157 km[2].

Although theoretically the area under National Park has a higher level of protection than the area under Wildlife Sanctuary, in 1991 DWS gained protection and got a restriction level similar to the National Park, where all the activities are banned unless specific permission. Before 1991 in DWS all activities were permitted unless specific prohibition. In 1994, DWS was reduced again to 475.018 km[2]. Present boundaries were issued on 1998.

Finally in recent 2007 DWS was proposed as a Tiger Conservation Unit, with an associated Tiger Project that, in the moment of writing the present work, is still in process of acceptation (*verb. com.*). This inclusion inside Tiger Conservation Units will also represent the unification of DWS and ANP in a unique protected area.
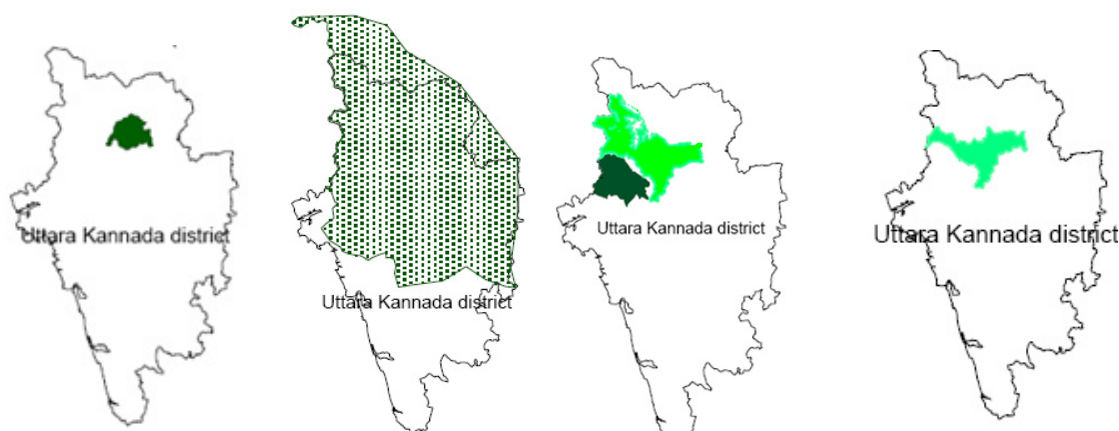
Figure III.5 – Evolution of DWS limits. From Leith to right: 1956, 1975, 1987, 1994 and 2008 limits.
Source – Hegde, 2003.

6.2. Human and industrial settlements

Tribal people living scattered in the jungle constitute the traditional human settlements of the area. However, Dandeli city history began with settlements of industries in the area attracted by the accessibility to natural resources (especially for the wood from the thick forest existing in the area, the perennial availability of water from the river Kali and the mines existing before in the actual DWS area), the assured power supply, and the vicinity of rail and road linkages. It is important to point that all these incentive given by the

State Government of Karnataka during forty and fifty decades were argued with the aim to mitigate the fire problem existing in the area.

The establishment of industries in Dandely city generated migratory movements to Dandeli and the construction of industrial colonies. Nowadays increasing forest protectionmakes it difficult to access to natural resources and the industries viability has decreased.

In 1940 mining activities started inside the actual DWS area with around 10000 workers. In the same year, The Indian Plywood Manufacturing Co.Ltd. (IPM) was established in Dandeli, with 400 workers, as well as its sister industry of glue with 35 workers. These two industries had the same owner and used timber and glue to produce plywood. The timber was gotten from the forest around Dandeli city and DWS future area of forest through Forest Department concessions.

In 1955 Dandeli Ferro Alloys Ltd. (DFA) industry was established in Dandeli, employing around 700 people. DFA produced Ferro alloys requiring big amounts of energy. It used electricity from the network and also from boilers of coal but during 1970´s electricity price started to increase step by step and in addition, in1990's the coal price attained very high prices so production became less rentable.

The same year, in 1955, The West Coast Paper Mill (WCPM) was established in Dandeli but did not start working until 1958, using the bamboo widely available in the area as the main source of the raw materials to produce different types of paper.

In 1973 The Karnataka State Forest Industries Corporation Limited (KSFICL) was created, corporation managed by Government of Karnataka. There is one unit of KSFICL in Dandeli called Sawmill.

At 1986 Forest Department concessions for IPM were cancelled and in 1989 all the bamboo cutting licenses were cancelled, including the WCPM one. IPM started importing material from Malaysia, but there was a devaluation of the rupee in front of the dollar and the importation became not economically rentable. This situation, added to the increase of electricity price caused the industry closure in 1995 and, consequently, the closure of the brother glue industry. The majority of the workers were dismissed, but their disagreement with the compensation given, started a fight to get a better one. Around 100 of workers are still living inside IPM colony only paying the electricity.

After cancelation of bamboo cutting licenses, WCPM changed the technical processes to be able to use other kind of materials like Eucalyptus, Casuarina, Subabul and other hardwood so it stopped using bamboo. Consequently, the WCPM became and is still dependent on his own plantations and private cultivators to get the raw material.

In 1993 Shreyas Paper Mill was established close to Dandeli city, concretely in Kerwad village, two kilometres south-east of the city. This industry use waste paper as row material to produce hard paper for packages and wrapping.

In 1997, a Supreme Court resolution established that the mines activity inside DWS had to stop. Although the economic difficulties, between 1997 and 2001 DFA continued

working but finally in 2001 it stopped the activities and dismissed all the workers except 12 people from administrative and manager responsibilities.

In 2006 the workers not dismissed from DFA were relocated in a new industry, INSWOOL.

6.3. " Developmental" projects

In the area around DWS there are two development projects: the Kali hydroelectric project and the Kaiga nuclear power project.

The Kali hydroelectric project includes six dams, three tunnels and three hydro-electrical power generation units. These six dams submerged over 32,000 acres of forest and produce 1,200 MV of electricity (Bhat, Magurran, 2007). The dams are: Supa dam (25km far from Dandeli city), Kadra dam, Kodasalli dam, Bommanahalli pick up dam, Tattihalla dam and Kaneri dam. Supa, Kadra and Kodsalli dam and Kaiga Nuclear Station are four of the fifth major power generating sources in Uttara Kannada (Kali Bachao Andolan, 2003). The hydro-electrial power generation units are located in Kadra dam, Kodasalli dam and Supa dam. In Ambikanagar city there is a power distribution plant.

Kaiga nuclear power plant is located in the south of DWS (see Figure III.6).

The construction of the seventh dam in Kali river was proposed at 2,000 but finally rejected because of its ecological impacts on the area.
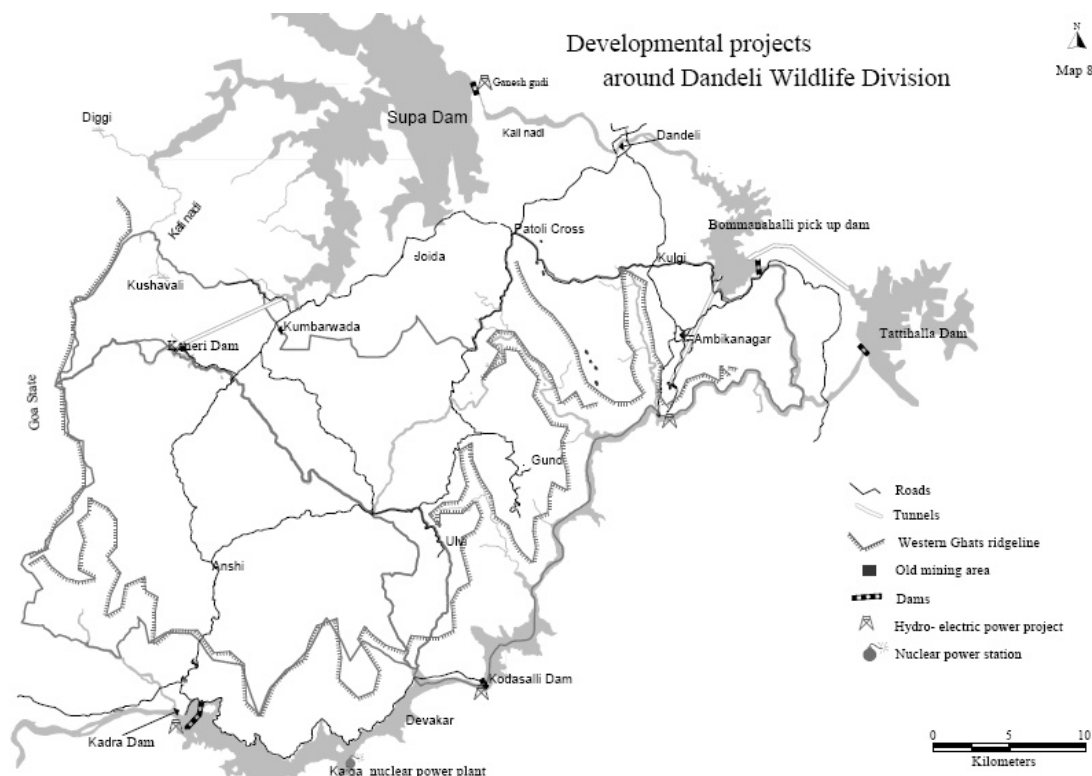
Figure III.6 – "Developmental" projects location
Source – Hegde, 2003

7 - Regional development

DWS and its surrounding is a totally rural area, with the population depending completely on terrestrial and aquatic resources for its food, health, shelter and for their diverse livelihood systems (Bose, 2001). In DWS there are only seven households for square kilometre, what is extremely low comparing to Uttar Kannada, Karnataka or India household densities. Only one of the municipalities is considered a town (Ambikanagar), the others 43 are villages[1]. This distribution of municipalities' types resembles the distribution of Karnataka and India. However, the most outstanding data is the percentage of inhabited villages. In DWS 88.37% of the villages are inhabited, what is slightly less than in Uttar Kannada, Karnataka or India This can be understand knowing that it is an area with regional development problems, with population leaving its villages and migrating to other municipalities. It is also important to point that household size is outstandingly high, with a mean of ten people per house.

In contrast, Dandeli city is a totally urban environment. In fact, Dandeli city is the third biggest city of Uttar Kannada, with 4% of the district total population. (see Table III.2).

The area around the Wildlife Sanctuary is a rural area, with high number of villages.

Table III.2 – Regional development comparative table. Household data is concrete about Haliyal and Supa sub-districts without DWS and Dandeli city.
Source – Self creation from http://www.censusindia.gov.in and verbal communications.

		India	Karnataka	Uttara Kannada	DWS	Dandeli city	Around (Haliyal + Supa)
Rural vs. Urban	% Rural	72.20	66.00	71.34		0.00	83.52
	% Urban	27.80	34.00	28.66		100.00	16.48
Municipalities (villages + towns+Urban Aglomerations)	Total number of municipalities	644,141	29,700		44	-	
	% of villages of total	99.14	99.01		97.73	-	
	No of inhabited villages	593,731	27,481	1,246	38	-	
	% inhabited of total villages	92.97	93.45	93.54	88.37	-	
	% of towns of total	0.80	0.91		2.27	-	
	% of UA of total	0.06	0.08		0.00	-	
Households	Households	249,095,869	13,830,096	273,422	3,412	11,121	16,013
	Nºhousehold/square kilometre	75.78	72.11	26.57	7.18		
	Household size (per household)	5	6 to 8	5	10	5	5

[1] In 2001 India Census, the unit to classificate is "town" in urban areas and "village" in rural areas. The definition of urban area is: (a) All statutory places with a municipality, corporation, cantonment board or notified town area committee, etc. (b) A place satisfying the following three criteria simultaneously: i) a minimum population of 5,000; ii) at least 75 per cent of male working population engaged in non-agricultural pursuits; and iii) a density of population of at least 400 per sq. km. (1,000 per sq. mile).

8 - Demographic aspects

DWS has a population of about 16,000 inhabitants, distributed in villages of 1,300 inhabitants or less and one town with around 4,900 inhabitants. Data should be taken with caution,as DWS demographic data vary according to sources, (see Table III.3. Annex 2.3- DWS demography for more information).

According to India Census, in 2001, there were around 3,400 households inside DWS (see Table III.3). This population gives a density of 34.13 inhabitants per square kilometre, density very low comparing it to Uttara Kannada, and India. Contrary, gender distribution is really similar to the India general one with 51.06% males and 48.88% females, where only one quarter of the municipalities have slightly more females than males.

Dandeli, is the third most populated city of Uttara Kannada, with 53,287 inhabitants according to 2001 India census. Nowadays population, according to Dandeli Municipal Council, is around 49,000 inhabitants *(verb. com.)*. In the slam areas of Dandeli live 4,222 people, or the 8% of the Dandeli population, distributed in 798 families. The gender distribution of Dandeli city is very similar to DWS one. Contrary, the density is extremely high, with more than 6,000 inhabitants per square kilometre. Despite not having information about demographic changes over the last decades, ethnographic information suggests that Dandeli city has lost around 6,000 inhabitants in the last decade.

About the population around DWS there is not demographic data available.

Table III.3 – Population, gender distribution, density and population growing comparative table.
Source – Self creation from http://www.censusindia.gov.in, Hegde, 2003 and information given by Forest Department. All the Around data is about Haliyal and Supa sub-districts without DWS and Dandeli city. The India population growing is between 1991 and 2003.

	India	Karnataka	Uttar Kannada	DWS	Dandeli City	Around (Haliyal+Supa)
Population	1,028,737,436	52,850,562	1,353,644	16,217	53,287	85,261
Male	532,223,090	26,898,918	686,876	8,281	27,249	
%males total population	51.74	50.90	50.74	51.06	51.14	
Female	496,514,346	25,951,644	666,768	7,927	26,038	
% females total population	48.26	49.10	49.26	48.88	48.86	
Sex ratio	932.91	964.78	970.73	957.25	955.56	
Density	313.00	276.00	131.54	34.13	6269.06	
% population growing (1991-2001)	21.30	17.50	10.90	-8.59		

8.1. Literacy

Despite getting information about DWS literacy has been impossible, we can say that DWS is located in a district with a higher percentage of literates than India main value (76.6% of literates in Uttara Kannada versus 65% in India, see Table I.3). It is also outstanding to say that this higher percentage is reflected in males as well as in females.

The information available of Dandeli city shows higher levels of literacy, with a literacy rate of 83%.

In contrast, the area around DWS there is a literacy rate very low, only 35.83% of the population knows to read and write (see table III.4).

Table III.4 – Comparative table of literacy data.
Source – Self creation from information from http://www.censusindia.gov.in. Around data is about Haliyal and Supa sub-districts without Dandeli city

	India	Karnataka	Uttara Kannada	DWS	Dandeli City	Around (Haliyal+Supa)
% persones literates of total persons	65	66.6	76.6		83	35.83
% males literates of total males	63	76.1	84.5			
% females literates of total females	45	56.9	68.5			

8.2. Scheduled casts and tribes

According to 2001 India Census, the percentage of ST in DWS, Dandeli City and the area around DWS is similar (all of them between 1.30 and 2.40%), whereas the the percentage of SC is quite different. Dandeli has the highest percentage of Sheduled Castes of the three with 8.82% and DWS has the lowest one with 4.95%.

It is also important to point that all these percentages are similar to Uttara Kannada ones but very low compared to India and Karnataka ones (see table III.5).

Table III.5 – Comparative table of scheduled caste and tribe population
Source – Self creation from information from http://www.censusindia.gov.in. Around data is concrete of Haliyal and Supa sub-districts without DWS and Dandeli city.

		India	Karnataka	Uttara Kannada	DWS	Dandeli City	Around (Haliyal+Supa)
% scheduled	Castes	16.20	16.20	7.53	4.95	8.82	6.67
	Tribes	8.20	6.55	1.76	1.69	2.36	1.32

9 - Economic aspects

There is no information about DWS workers[2].

The most important economic activity of people living in Dandeli city is industry. Around 25% of the population work in WCPM, 7% is government employees, around 3% works in Shreyas Paper Mill, 2% in tourism and 63% in service businesses as taxis, autorickshaws or shops (*ver. com.*). Dandeli city has an outstanding low percentage of workers (only 29.78%), even comparing it to the country one (39.10%) is extremely low. Apart of it, the gender distribution of the workers is very unbalanced, with 84.05% of males and 15.95% females considered workers. This distribution is more unbalanced than the India, Karnataka or Uttara Kannada ones.

The area around DWS has a percentage of workers remarkably high, 57.58%. It is higher than India, Karnataka and Uttara Kannada and nearly double than Dandeli City one(see Table III.6).

Table III.6 – Worker population. Comparative table.
Source – Self creation from information from http://www.censusindia.gov.in. Around data is about Haliyal and Supa sub-districts without Dandeli city

	India	Karnataka	Uttara Kannada	DWS	Dandeli City	Around (Haliyal+Supa)
Total workers	402,234,724	23,534,791	581,278		15,869	58,433
% workers of total population	39.10	44.53	42.94		29.78	57.58
% males workers of total workers	51.67	64.74	68.10		84.05	
% females workers of total workers	25.62	35.26	31.90		15.95	
% main workers of total workers	77.82	82.28	78.33		86.14	81.53
% marginal workers of total workers	22.18	17.72	21.67		13.86	18.47
% cultivators of total workers	31.65	29.25	24.66		0.11	
% agricultural labourers of total workers	26.55	26.46	14.55		0.09	
% household ind of total workers	4.22	4.08	2.24		1.93	
% others of total workers	37.59	40.21	58.54		97.87	

9.1. Primary sector

The information gotten through field work shows that the most important economic sector for the people living inside DWS is agriculture, especially paddy cultivation, followed by cattle-breeder, especially coxes and cows breeder (see table III.7). In fact, there are 12.547 heads of cattle inside DWS, what means that there is the high proportion of 0.8

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[2] Worker is defined in 2001 India Census as the person who participates or have partipated in the last year in any economically productive activity with or without compensation, wages or profit. Such participation may be physical and/or mental in nature. Work involves not only actual work but also includes effective supervision and direction of work; part time help or unpaid work on farm, family enterprise or in any other economic activity; and engagement in cultivation or milk production even solely for domestic consumption.

heads of cattle per person (see Annex 1.6- Primary sector in DWS for more information). The community with the most outstanding role in this field are gowlis, a semi nomadic population that rear cows and buffaloes inside the DWS for dairy purposes (Hedge, 2003), gowli women are occupied in animal husbandary as well as agriculture (Singh, 2003). Despite of these primary sector activities, they have direct relation with markets, because they sell milk, milk products and sometimes buffaloes, which are known for their strenght (Singh, 2003).

Table III.7 – Cattle census for DWS
Source – Information from Forest Department

	Cow	SheBeffallo	Dog	Hen	Total
Total	4.802	1.912	1.582	4.251	12.547
Mean	154.903226	61.6774194	51.0322581	141.7	285.159091

However, with the increase of forest protection and the pollution of the river it has become more difficult to survive only with agriculture. River pollution has also increased cattle deaths, making more difficult to live (Kali Bachao Andolan, 2007). Consequently, a lot of people leave some parts of the year to Dandeli or, specially, to Goa, to do temporary jobs (called "kuli").

9.2. Secondary sector

However, Dandeli city is having one of the largest number of unemployed people in the region (Deputy Conservator of forests, 2008).

Of all big industries that were established in Dandeli in the twentieth century, only the West Coast Paper Mills is improving and growing. WCPM has increased gradually the production until the last data that has been found, the increase has been of 894% in 48 years (from 1959 to 2007 has increased the production from 18000 MT to 178871 MT), with exportations currently representing around 2% of the total. Nowadays, WCPM is expanding to double its production building new installations.

By contrast, INSWOOL industry has few workers and they get alloys from the waste product of previous activities, they re-melt it and sell it again. Similarly, the IPM is slowly starting again the activity, but producing cheap wood buying the row materials to private providers.

A part from that, KSFICL has continued its activities and nowadays is undertaking logging work of Forest Department, supplying firewood to the weaker sections of society at subsidized rates (including Dandeli New Township, Dandeli Ambewadi and Old Dandeli as three of the 68 depots of firewood) and pulpwood, bamboo and timber to the public and industries. KSFICL also has an industrial unit in Bangalore, which supples all kinds of furniture and material to manufacture perfums and incense sticks.

There has been and still there is a demand to reopen the IPM and DFA from the major part of the population and some politicians who have promised to. But from other sectors as Forest Department and ecological associations is claimed the impossibility of this reopening due to this industries dependency on the natural resource. These groups present tourism as the best alternative for economic development in the area.

Instead from that, the small industrial units are growing little by little in Dandeli city. Some of the small industrial units that exist now in Dandeli are chemical as Bahety Chemicals & Minerals (a familiar industry that produces alum that is used to filtrate and precipitate the impurities of the water); furniture industries that improve because Dandeli teak is famous or metallurgical industries as Wrought Iron industries (a four years old industry with 30 workers that is growing quickly).

9.3. Tertiary sector

Tourist businesses are whose are improving and growing more in Dandeli city. Dandeli and the area around has become a tourist attraction, with the main visitors being Indians (especially from Goa, Bangalore and Pune), but thanks to the proximity of Goa there are also foreign people doing tourism in the area.

The activities that are done outside DWS are: rafting (the main attraction for the tourism), rapelling, kayaking, canyoning, natural jacuzzi in rapids, mountain biking, moonlight boat ride, star gazing and seeing tribal dances. The activities that are done inside DWS are: jungle safari, visiting Kavala Caves, bird watching, rock climbing, river crossing, crocodile watching, visiting Synthery Rocks, trekking inside DWS, river side fishing and croc trek.

Tourist businesses have been developed mainly for Dandeli city inhabitants, establishing the businesses offices in Dandeli and developing the activities in DWS or the area around. Special mention has to be done for the rafting, taking place in the Kali River, using Ganeshgudi village as a starting point.

Tourist businesses can be divided between whose that just do booking but do not have any direct service and whose those directly offer some services. Some of the tourist business offering services are: Bison River Resort, Dandeli Homestay – Firdose (run by INWOOL), Dandeli Jungle Camp (since 1995), Dandeli Rafting (since 2007), HornBill River Resort, Jungle Lodges and Resorts (since 1997), Kali Rafting, Kulgi Nature Camp, Shree Ganesh Groups Tours and Travels (since 1995), Stanley's farmhouse, WildRiver Adventures and White Water Resort. Some of the business that offer services only indirectly are: Dandeli Wild Adventures and Tours, dandeli.com (since 2006), Apart from that, there is also one little business that offers services to Dandeli people that want to go abroad (Ujwal Tours and Travels). IPM managers are also thinking about establishing a tourism resource using the bosses houses inside the colony, nearby the river Kali (see Annex 1.8- Tourism sector in Dandeli City for more information).

10 - Human relation with the environment

10.1. Human impacts to the environment

As it is explained in "Chapter IV – Literature Revision" people living in and around PAs can affect the conservation of the area. In concrete, recent human impacts have been reflected more heavily in the northern Western Ghats forests than in the southern ones, because the climate has rendered the rainforests of the northern area more fragile than that in the south (DDAA, 2005). Apart from the general impacts set down in "Chapter II – Literature revision" that also affect DWS, the concrete impacts in DWS exposed by Hegde (2003) are:

Kali hydroelectric generation project, Kaiga nuclear power project and large industries like WCPM and IPM that have fragmented the area. Several government departments still carry on development activities in the area (see Figure III.6).

Daily activities of population of the area (cultivation and feeding of the cattle)

Local communities and also people from Goa and from other parts of the plains poach wildlife for meat, recreation and to sell it.

Fires heavily affect DWS due to its vegetation characteristics (see Figure III.7).

Around 353 ha were mined inside DWS and now restoration efforts are undertaken by the forest department through extensive afforestation programs.

7. Exotic plant species are planted in DWS by forest department and Teak *(Tectona grandis)* monoculture plantation is carried out inside the reserve.

8. Several temples, religious sites and tourist destinations are located inside DWS, which also creates pressure on the habitat of wildlife.
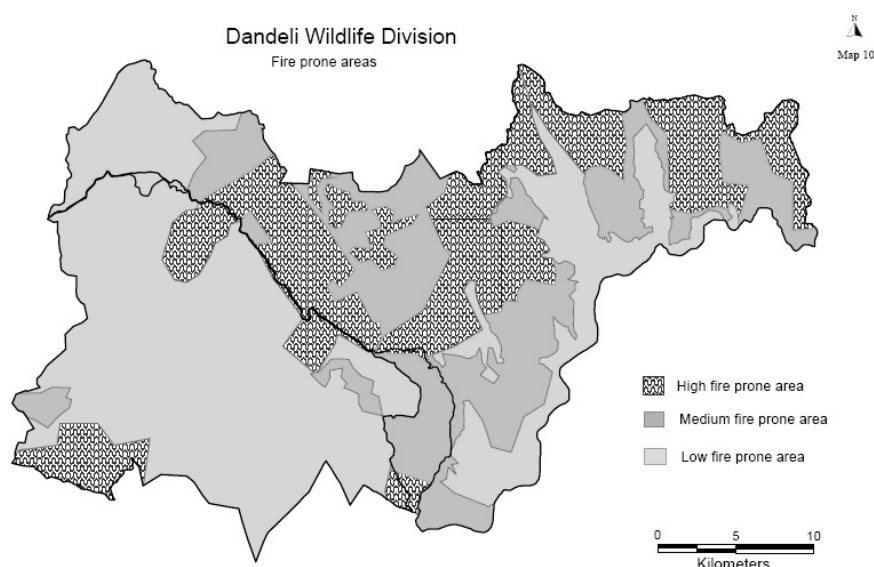
Figure III.7 – Fire prone areas in DWD
Source – Hegde, 2003

Apart of this, scientific studies and NGOs announce other impacts. For example, local ONGs have reported illegal sand mining on the banks of the river as well as in the Supa dam area with consequences on the river's ecology. Scientific studies point out Kali

river pollution, with consequences on agriculture, dairy farming, fisheries and human health (Kali Bachao Andolan, 2003).

In conclusion, the area of study is Dandeli Wildlife Sanctuary, located in Karnataka, India. This area is of reach biodiversity at the same time that heavily populated. Historically population of the area have used the resources of this area for economic development and nowadays conflicts to equilibrate economic development and conservation are a latent conflict in the area.

IV.Objectives and hypotheses

1 -   Objectives

The main goal of this research is to assess the socio-economic and perception correlates of local resident's knowledge and gladness towards a protected area. For the case study we selected Dandeli Wildlife Sanctuary and populations living in and around the protected area, as well as a nearby local city.

1.1. Specific objectives

a. Our main goal is to assess the socio-economic and perception correlates of local resident's knowledge and gladness towards a protected area. Our specific aims for this goal are:

   a.1. To assess the socio-economic characteristics associated to local residents' knowledge of the Dandeli Wildlife Sanctuary's existence.
   a.2. To assess the socio-economic characteristics associated to local residents' acceptance of the Dandeli Wildlife Sanctuary.
   a.3. To assess the economic, social and ecological perceptions associated to local residents' acceptance of the Dandeli Wildlife Sanctuary.

2 -   Hypotheses

We will assess specific objective through the test of four testable hypotheses with quantitative data.

Objective a.1

H1 – Knowledge about the establishment of the protected area would be associated in a positive way with education level.

Rational: Residents with highest education have access to more information (they can read newspapers and panels) and the education centres are likely to be places with high levels of in environmental information, as environmental is an important issue in the academic scene.

Objective a.2

H2- Acceptance of the protected area will be positively associated with high scores of education, wealth and distance to the protected area.

Rational: Previous research has found that education significantly correlates with positive attitudes towards protected areas. Education is likely to be important to better

understand conservation importance and is the key to better opportunities for employment and creation of new livelihood strategies.

Objective a.3

H3 – Acceptance of the protected area will be negatively associated to individual perception of the economic costs generated by the protected area.

Rational: Previous research shows that the establishment of protected areas generates economic costs for local residents (Ferraro, 2002). If local residents do perceive those economic costs, and relate them to the establishment of the protected area, then they would likely reject the protected area. Social and cultural costs tend to be less material than economic cost hence less perceptible and more difficult to deal with the creation of the protected area.

V. Methods

This section provides information on the methods of data collection and data analysis, and discusses possible methodological biases.

The methods used to get both qualitative and quantitative data were face-to-face interviewing and participant observation. Participant observation was important to interpret data results, due to the information and confidence gotten by these field work methodology. We conducted unstructured and semistructured interviews to gain a background understanding of the situation in the area. Structured interviews consisted in free listing and surveys. Free-listing data and information from unstructured and semistructured interviews were used to generate questions for the survey. Surveys were used to get the quantitative data to assess socio-economic and perception correlates of local resident's knowledge and gladness towards a protected area.

Figure V.1 provides an overview of the methods of data collection used in relation with the goals of this work.

Methodology structure
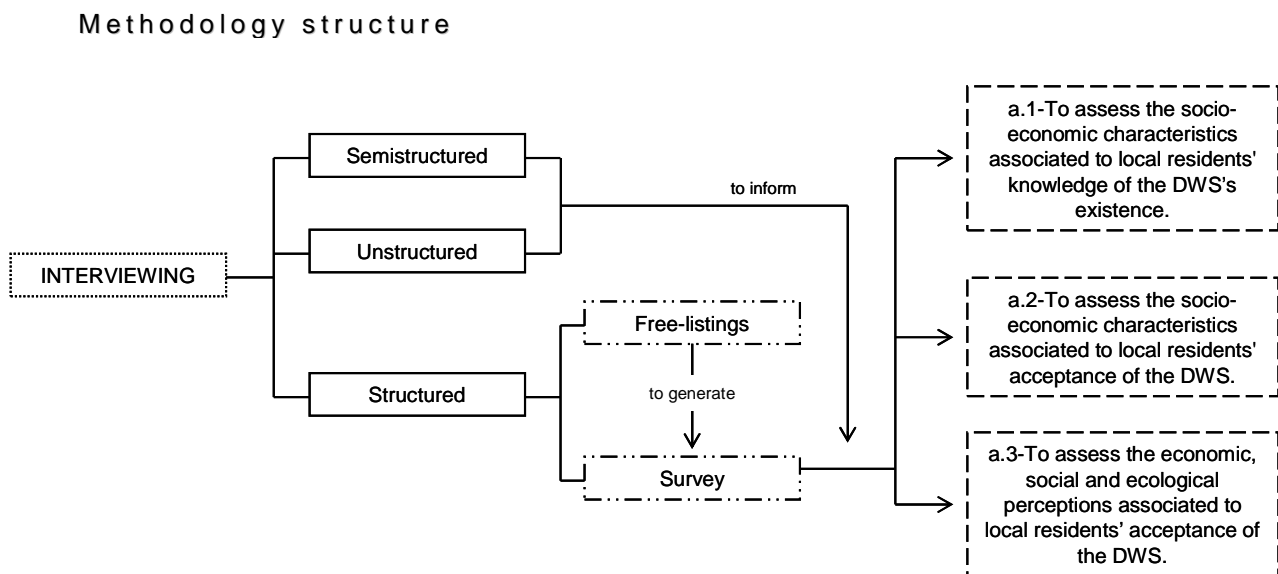
Figure V.1 – Structure of the methodology and relation with the objectives. Objective *a* is acquired by semistructured an unstructured interviews. Objective *b* is obtained by Free-listing and Individual-level surveys.
Source – Own elaboration.

1 - Schedule

This project was realized from February to September of 2008 (Table V.1). The work started in February with a review on the literature on conflicts between local residents and protected areas and local residents' perception about protected areas. February was also devoted to the study design and the selection of the studied area.

Table V.1 – Monthly schedule of the research period. Study design was realized in February. We conducted field work during March, April, May and half June. Rest of June, July and half August were devoted to data analysis and redaction. The memory was delivered in first week of September.
Source – Own elaboration.

Februrary	March	April	May	June	July	August	September
Literature revision & Study design	Study design - Field work - Redaction				Data analysis & Redaction	Vacations & Final redaction	Delivery

On March we moved to the studied area for the first contact (see Table V.2) and the onset of field work. During the second and third week of March we conducted some informal interviews to get general information about the area, the interviews provided information for the structured interviews. After free-listings started, more interviews were done to key informants. During May we conducted surveys on the three selected area. The lasts weeks in India were used to do the last interviews, sort data, and start writing.

With the field work finished, last two weeks of June and July were time for data analysis and redaction, that was completed during August. In first week of September, we delivered the memory of the project.

Table V.2 – Weekly schedule of the field work period.
Source – Own elaboration.

Month	March				April				May				June	
Week	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
Work	1st contact	Intervievs	Intervievs	Free-listing	Interviews & Free-listing	Interviews & Free-listing	Revision & Rest-time	Surveys	Surveys	Surveys	Interviews & Surveys	Interviews & Surveys	Interviews & Writting	Writting

2 - Sample

The study population consisted on the adults (18 years of age and older) living in the city of Dandeli, 23 villages around DWS and 10 villages inside DWS. The total estimated population of the three areas is about 80,000 inhabitants (Dandeli City about 48,000, DWS about 16,000, and villages around DWS about 20,000).

We classified the population in three categories: 1) people living in villages inside DWS, 2) people living in villages around DWS, and 3) people living in Dandeli city itself. We selected people from Dandeli city as a distinctive category because Dandeli was an industrial city with about 60 years of existence. There were agricultural activity, and the relation of its population with the forest and DWS is very weak. Villages inside DWS and outside DWS were in different categories because – although they shared many socio-economic characteristics – they faced different restrictions in the type of access to their immediate forest. People living outside the DWS could use NTFPs from nearby forest to develop family craft workshops, this was not allowed inside the wildlife sanctuary. The use of firewood or dry wood for building purposes was also prohibited inside the DWS while households outside could provide themselves from the nearby non-protected forest. Despite the restrictions regarding the collection of NTFPs within protected areas, in application of recent Tribe rights act, traditional DWS residents had the right of maintaining their previous amounts of agricultural land and their houses.

Next paragraphs are devoted to explain the procedure for selecting the sample of each of the three categories.

2.1. Dandeli city

Dandeli city was divided in 30 areas. Two hundred-sixty surveys were distributed among these 30 areas. In each area we conducted between two and 31 surveys depending on its population. We discarded four surveys, thus our final sample for Dadeli city was of 256 surveys.

In each area we randomly selected houses for interview. The random selection of houses in every particular city area started in the furthest point from Dandeli centre. The streets were selected by flipping a coin to select the direction to take in the crosses and the side of the street, in order to choose them randomly.

In the selected side of the street, from every nine houses one was selected. When possible, the surveys were carried out with the person who opened the door. If the person opening the door did not had time, or was a child, the survey was conducted with the person with most availability or will to answer the survey.

2.2. Around DWS

Map of Dandeli city
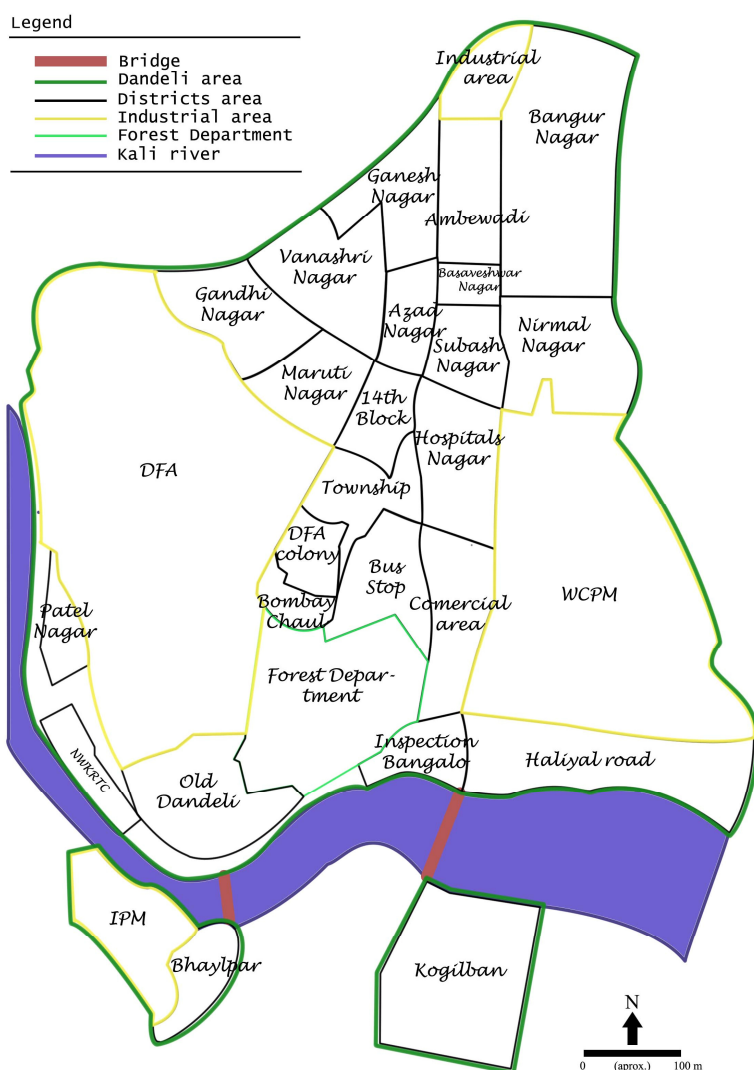
Figure V.2 – Map of Dandeli with the different districts. For an enlarged version see Annex 3.2 –Digitalizated map of Dandeli city .
Source – Self creation with base map from Dandeli municipal council (Annex 3.2).

We worked in all the 23 villages within seven kilometres from the north-east border of DWS. This area is called *border area*.

We conducted 146 surveys in the 23 villages in the border area. Four surveys were discarded, so our sample for this area was of 142 surveys. Between one and seven surveys were realised in each village, except in the village of Joida, which had a higher population, and where we conducted 46 interviews.

The random selection of the houses started at the centre of the village or at one of the entrances. As in Dandeli city, we used a coin to select the streets. One of every five houses was selected and the personal survey conducted to the person who opened the door or had more availability or will to answer our questions.

2.3. Inside DWS

Access to villages within the DWS was initially denied by the personal of the Karnataka Forest Department. By the end of the research, we obtained the requested permit, but we could only work under specific conditions (i.e., restricted timing or forest department guides) that make very complicated to get a large or random sample. Therefore, our sample for this third area is considerably smaller that the sample for the other two areas.

We choose 10 villages inside DWS using criteria of accessibility and distance from the main roads.

Forty-five surveys were conducted using a similar sample as the one used in the villages of the border area. Five surveys were discarded so 40 were correctly conducted inside DWS. Between one and nine surveys were conducted in each village.

3 - Methods of data collection

3.1. Participant observation

Participant observation was used by both researchers who lived more than 11 weeks in the study area in a situation of cultural immersion and constant interaction with the local people, getting close to locals and making them to feel comfortable. Participant observation was a fundamental part of the study, because as Bernard (2006) says, it makes possible to access information and to collect data, it reduces the problem of reactivity, it helps to ask sensible questions, and it gives an intuitive understanding of what is happening allowing the researcher to analyze the data with confidence.

The most helpful aspect of our participant observation was the use of local knowledge on the location of villages and neighbours to distribute our research in the three selected areas. This local knowledge, far from being used for participatory mapping as Chaplin (2006) or Herlihy (2003) use and explain, was used to locate ourselves during field work in the maps that we already had.

3.2. Face-to-face Interviewing

In this research we interviewed people using face-to-face interview for six reasons. Firs, face-to-face interviewing allowed us to include people who could not provide information using other methodologies, due to its location, illiteracy, or older age. Second, if there was any doubt about the questions that arise during interviews, we could reframe the meaning of the question to the interviwee. Third, when there were doubts about the reliability of an answer, we asked for more data to verify the answer. Fourth, we only provide one question at a time to the respondents and they could not flip to see next questions without answering the previous ones, so their answers were not influenced by future questions. Fifth, face-to-face interviews allowed to complete interviews, where all or nearly all the questions in a particular interview were answered. Last, in face-to-face interviews we could know exactly who was answering the questions (Bernard, 2006).

a. Semistructured & Unstructured interviews

We interviewed 40 people using unestructured and semi-structured interviews. Interviews lasted between 20 and 140 minutes, representing around 40 hours of interviews (see Table V.3 for more information about the semistructured people interviewed and the length of each interview). The techniques used to stimulate respondents were the Uh-huh probe with expressions like "Uh-huh", "Yes, I see", "Right" or "OK"; the Tell-Me-More probe with questions like "Why do you say that?" or "How did you do that?"; and the probing for

leading with expressions like "What do you think about...?". These techniques were used depending on the interviewed person attitude in front of each question.

a.1. Semistructured interviews

We conducted 35 semi-structured interviews to gain a general understanding of the creation of the DWS and its historical evolution (Table V.3). We also collected information about 1) the economic activities of companies working in the area, 2) the situation of the tourist sector, 3) restrictions and management issues affecting the DWS, and 4) the personal opinion of some knowledgeable persons of the area, about DWS' management situation, the general affectation of forest use restriction brought by DWS and the further development possibilities for the area.

We selected individuals for the semistructured interviews using snow-ball sampling combined with our own criteria about the relevance of interviewing each person. When it was possible the interviews were arranged before hand. We did not record interviews, but took notes. All the semistructured interviews were done in English.

Table V.3 – Relation of semistructured interviews. The name, the organization or company working for, and the charge developing on it are written down, as well as the date and duration of the interview.

		Interviewed person	Organization - Company	Charge	Date(s) of interview	Duration (min)
MARCH	1	Naveen Jha	Desphande Foundation	Program officer	11 March 2008	30
	2	Arun	Wildlife Conservation Society	Watcher	14 March 2008	80
	3	Manoj Kumar	Forest Department	Dandeli Forest Officer	27 March 2008	20
	4	Mahendru Kumar	Green India	President	25 March 2008	120
APRIL	5	Gopal Naik	Shree Ganesh Tour & Travels	Owner	8 April 2008	30
	6	Ulhas S.Bhat Vernekar	Ujwal Tours & Travels	Owner	8 April 2008	30
	7	Jerome D'Souze	Dandeli Ferro Alloys	Manager	9 April 2008	120
	8	S.D. Mankikar	The Indian Playwood Mfg.Co.Ltd	Deputy General Manager	9 April 2008	60
	9	Gangadhar Kallur	Friends of Ecology & C.G.E	Member	9 April 2008	120
	10	Sanjeev Kulkarni	Friends of Ecology & C.G.E	Member	9 April 2008	40
	11	Satish Kulkarni	Bangur Nagar Degree College	Professor	12 April 2008	90
	12	Nyla Cohelo	Pariyavarani Volunteer Group	Co-Founder	12 April 2008	140
	13	Darmesh Patel	Dandeli Jungle Camp & Resort	Owner & General Manager	13 April 2008	40
	14	Mahendru Kumar	Green India	President	13 April 2008	40
	15	Darmesh Patel	Dandeli Jungle Camp & Resort	Owner & General Manager	14 April 2008	60
	16	Pramod Naik	Jungle Lodges & Resorts Ltd.	Outdoor-activities manager	14 April 2008	40
	17	S.D. Mankikar	The Indian Plywood Mfg.Co.Ltd	Deputy General Manager	18 April 2008	60
	18	Manoj Kumar	Forest Department	Dandeli Forest Officer	21 April 2008	60
MAY	19	Shivram Vithal Savaril	WCPM Employees Union	President	19 May 2008	30
	20	K.L. Chandak	The West Coast Paper Mills Ltd	Executive Director	20 May 2008	40
	21	Manoj Kumar	Forest Department	Dandeli Forest Officer	20 May 2008	20
	22	Mohamed	Dandeli Rafting	Owner	20 May 2008	30
	23	A.V.Sthalekar	The West Coast Paper Mill Ltd.	Public Relations Officer	20 May 2008	30
	24	A.B. Garag	Shreyas Papers Private Limited	Personnel Manager	24 May 2008	30
	25	Dhananjay Gadgil	White Waters Resort	Co-Owner	24 May 2008	40
	26	Jacob	Hornbill River Resort	Assistan General Manager	24 May 2008	90
	27	Rajesh	Bison River Resort	Outdoor-activities manager	24 May 2008	60
	28	Manoj Kumar	Forest Department	Dandeli Forest Officer	27 May 2008	80
	29	Maranna	Bamboo cutter	Contractor	30 May 2008	40
	30	John Pollard	Jungle Lodges & Resorts Ltd.	International Rafting Expert	31 May 2008	120
JUNE	31	Ravikumar Nayak	Wild River Adventures	Co-Owner	5 June 2008	40
	32	Stanley	Stanley's Farm	Owner	5 June 2008	40
	33	Balachandra Hegde	Wildlife Conservation Society	Research Associate	6 June 2008	60
	34	U.D. Naik	Forest Department	Kulgi Ranger	6 June 2008	45
	35	Leo F. Saldanha	Environment Support Group	Coordinator	13 June 2008	60
		TOTAL			**35 interviews**	**2035**

a.2. Unstructured interviews

Through our stay in the area, we conducted some informal interviews when the situation with the interviewed person was favourable and without previous arrangements. These interviews allowed us to better understand the social and economic situation of the area, as well as to know deepest personal feelings about topics related with Dandeli Wildlife Sanctuary. Most of these interviews were realised in English, but in some cases, epecially with rural or tribal people, we needed some oral translation.

b. Structured interviews

The structured interviews were of two kinds: free-listings and surveys. Both were realized by two interviewers and, usually, one or two translators for each interviewer. No translator was used when the person interviewed was English speaker. One English-Kannada and Kannada-English translator was used when the person interviewed was Kannada language speaker. When the person interviewed was non-Kannada speaker, one or two translators were used depending on the translator's knowledge of the third language.

It was very important to ensure complete understanding and codification of question by both interviewers and by all translators. To ensure inter-coder reliability and the understandability of the questions, pretesting of free-listings and surveys was realized with both interviewers and translators. After each pretesting, all the team conducted an evaluation of the tested method with "to detect mistakes and solve them".

To do the translations it was used the "Translation and Back translation" methodology (Bernard, 2006). We first wrote the questionnaire in English, then it was translated into Kannada by a bilingual Kannada native speaker, for finally be translated back into English by another bilingual Kannada native speaker.

b.1. Free-listing

Free-listings are used to get a list of items that belong to a single cultural domain as an answer to an indirect question. In our case the cultural domain was "benefits and problems due to DWS creation".

We conducted two free-listings:*(1) what are the **benefits** that the creation of DWS has caused to your village?* And (2) *what are the **problems** that the creation of DWS has caused to your village?*

The ranking of items was analysed to get the frequency of response of every item, the percentage of people who had mentioned it, the average ranking where it was mentioned and the Smith's value, that is the result of the combination of the three other parameters and represents the global importance of every item in a rang between 0 and 1 (Smith 1993).

Before getting the final version, three different versions of the free-listing questions were tested with about six persons. In total, 45 free-listing were conducted to a stratified sample of gender, age, wealth, and education in order to get the widest points of view and

get the longest lists of benefits and problems. Twenty-two of them were carried out in Dandeli, ten in Joida, and ten more inside DWS. Nine of the 45 were discarded so finally 36 free-listing were correctly conducted.

In Dandeli, four areas of the city where selected according to economic and social parameters. Once in the area, from every five houses one was selected, and the free-listing conducted to the person who opened the door if he/she was in consonance with the stratified sample. When there was no consonance with the sample, somebody with the characteristics of gender and age needed was requested in the same house if possible. If no person of the requested characteristics was available, we moved to the next house. In the villages inside and around DWS, the people were selected directly in the streets.

The results of the free-listings of each area were ranked by the Smith's value and classified in three categories: economic, social, and ecological issues.

b.2. Survey

The survey had 60 questions divided in six sections: 1) socio-demographic characteristics, 2) economic characteristics, 3) DWS knowledge, 4) relation with DWS, 5) acceptance of the DWS, and 6) perception of costs and benefits generated by DWS.

Four different versions of the survey were tested to an average of six people for each version to make sure that all the questions were understood and relevant. We tested the written translation not one, but twice to get the final version of the survey of each category of villages. The written translation was of vital importance in the context of so many translators. The final versions of all the surveys can be revised in Annex 4- Surveys.

The duration of the survey was about 15 minutes when one translator was used and about 25 minutes when two translators were required. Surveys were realized from Monday to Sunday, from 9am to 2 pm and from 4pm to 7pm. The questions were closed-ended (with fixed choices) or open-ended (without choices) depending on the survey section.

In the top of the page date, coder, translator, subject number and the name of the village were written.

The first two sections were devoted to the social and economic parameters with open-ended questions. Previous research shows that social and economic parameters affect people's perception of protected areas, so in this research we use them as control variables.

1) Socio-demographic characteristics

Individual socio-demographic information included sex (observed), age, education, tribal group, religion and cast (reported by the interviewee). Other information in the household level section included the number of family members, their previous place of residency, if any, and the reason for changing it.

The questionnaires of the three areas had the same socio-demographic questions.

2)   Economic characteristics

In the economic section, we collected data on main occupation, income, number of vehicles, cattle, and land property. We also asked about the economic activities that provided higher cash income to the household..

Land property was not an indicator of economic level in Dandeli city, but it was in the areas around and inside DWS, so the extension of land property was also asked on those areas.

3)   DWS knowledge

This section was used to assess the subject's knowledge on the existence of DWS because previous knowledge of the protected area is related to the protected area perception. To assess interviwee's knowledge of DWs, three questions were made. One direct question: *Do you know what DWS is?* And two more questions about forbidden activities in DWS, and the distance from their village to DWS border. This two more questions were made in order to check the validity of the first answer. We combined responses to the three questions to create an overal index of DWS knowledge.

After these three questions, we provided information about the real location and forbidden activities in DWS to all the people, whether they knew or not about DWS existence. We did so to level the knowledge before we asked the questions about perception. The explanation read as follows:

"DWS is a Protected Area. It includes small towns like Kulgi, Kumbarwada, Gund, or Ambikanagar. Some of the important places of DWS are Syntheri Rocks or Kavala Cave. DWS is a natural habitat for wildlife so cutting of timber, firewood and bamboo is not permitted".

4)   Relation with DWS

Following the little explanation about DWS, the next section was devoted to get the degree of relation of the individual with DWS and the frequency of visits to DWS, with an open-ended question.

5)   Acceptance of DWS

To get information on the level of acceptance over the creation of DWS for the individual, the following closed-ended question was asked:

-   *Are you glad DWS was created?*

To answer the question, respondents could chose between five options: *(a) very glad, (b) glad, (c) indifferent, (d) disappointed, (e) very disappointed*.

6)   Perception of costs and benefits generated by DWS

This section was used to get the perception of the people towards different aspects around DWS. To select the topics for the questions in this part of the survey, we selected the items with a highest Smith's value from free listing. We add to the list some topics that previous research suggests matter. As the results from free-listings differed among the three areas (Dandeli, around DWS, and DWS) we used different items to build the perception questions for each area.

We asked between eight and sixteen (depending on the area) closed-ended questions about the importance of general benefits and problems created by DWS. All the questions had a similar structure: *How important is "problem/benefit" for your family?* With a multiple response of four options: *(a)A lot, (b)Medium, (c)Little, (d)Nothing.* This general structure was slightly adapted in function of the translation and the concrete topic, in order to make the question more understandable.

4 - Methods of data analysis

To test our hypotheses, we ran two multivariate probit models using socio-economic characteristics as control variables, and perception index as explanatory variable. Dependent variables used were gladness and knowledge about DWS (Table XX).

We also used bivariate analysis, with t-test and X^2 test, to compare general socioeconomic characteristics of respondents. Comparisons were also made among areas for respondents who knew about DWS existence and for respondents with positive acceptance of DWS.

Statistical analyses were done using STATA 9.1.

5 - Biases and limitations

5.1. Study and survey design biases

This section is devoted to the description of the potential biases introduced in the design of the methodology and the survey.

a. Ignorance of DWS existence

While testing the surveys it was surprisingly realized that a big amount of the people did not know about DWS. It was decided to test the knowledge on the existence of the area as an objective of the research and three questions about it were added to the survey. As some people did not know about DWS, as explained above, a little explanation about DWS was written in the survey and always explained to all the surveyed people. Even though after the explanation some people realized what was DWS, some other people had very little idea of what it was so their answers may introduce a big source of complacency bias, as explained in next section of this part.

b. Change of question scale

Free-listing questions were: (1) what are the benefits that the creation of DWS has caused **to your village**? And (2) what are the problems that the creation of DWS has caused **to your village**? Those questions were used to gain understanding of the benefits and problems perceived by the local residents, and we had planned to use responses to construct the survey. But questions on the survey refered to the household, not to the

village. This change of scale may have generated confusion when the importance of some collective problem/benefit (i.e. increase of rain, better climate…) were asked at the househodl level. Context bias explained on next part is moderately influenced by this change of scale.

5.2. Data collection biases

This section is devoted to describe the biases that researchers might have introduced while surveying. Although we were aware of the following common sources of bias and we tried to minimize them, we can not be sure that they have not introduced bias in our data

a. Sample selection bias

Size of the sample, selection of the villages and individuals, and the time of doing the surveys are the main factors of sample selection bias.

Time had played an important role on the determination of the number of surveyed people. Three main difficulties delayed our work: to find good and stable translators, to obtain an accurate digital written translation of the survey, and to resolve the legal issues of conducting a survey in a forested area.

The way of selecting the villages of each area of study was not random due to legal and economic reasons. The number of surveys done at each area of Dandeli city was neither done completely random due to absence of basic demographic data on the area. The selection of the interviewed houses was mainly random in Dandeli, but in the rural villages it was very difficult to follow completely random criteria due to the irregularity of the distribution of the houses some times widely scattered in the forest.

Surveys were conducted from 9am to 2pm and from 4pm to 7pm, so there can be an overestimation of women and non active population. We also conducted surveys on Sunday to minimize this component of the sample bias.

b. Surveyed people attitude bias

Strategy attitude, complacency, acquiescence, and social desirability are some of the biases generated by the attitude of the surveyed people and affect the results of the surveys. Those biases seem to be important due to the controversially of the topic of the survey and the existence of a cultural norm that discourages relating with foreign people.

In strategy attitude, the interviewed person behaves in a specific way trying to affect the results of the research in function of his/her personal interests. Some people conducting illegal activities in the forest may not answer sincerely to some questions due to fear of having problems with the government.

As about half of the population did not know about DWS before the realization of the survey, some of the questions may cause indifference to them, so they were answering just trying to please us, but with no real knowledge or interest in the answers. This is the complacency bias and could be the reason of part of the big amount of people that did not know about DWS and said that they were very glad of its creation, as we will see in the results section.

The social importance of the conservation of nature, for example, may have generated a social desirability bias as the people answered in function of what they thought it was more acceptable in the community level.

Acquiescence bias is an important issue in India, where giving a negative answer is considered rude. So people were more desirable to answer in a positive way than in a negative one.

c. Context perception bias

This biases have significantly importance because it is quite possible that interviewed people was thinking about the protection of nature in general when the context was only about a concrete protected area, the Dandeli Wildlife Sanctuary. In the same way, questions refer to the family of the interviewed, but it is also quite possible that lot of the people interviewed was thinking in the village level or state one, rather than the household one.

d. Translation bias

Translation bias potential comes from two sources, researchers and interviewers not comunicating their mother tongue, and the use of translations from local languages of Karnataka into English. Not working in the mother tongue may create biases in the accuracy of some word used in the construction of the survey and creates a big barrier in the semi structured interviews.

The need of translation is a big source of biases. Kannada language differs from English (i.e. how much or how many are written and spoken the same way), so the possibilities of translation for the same sentence, were quite diverse. A related difficulty is the differences in the English grammar between the researchers and the Indian translators. Indian English has different structures and expressions that researchers did not know and researchers used English structures that Indian translators where not used to, so accurate communication was difficult in the initial moments of the survey construction.

It was very difficult to get good written translations of the survey questions. Even though translation were tested and retested with the "translation and back translation" methodology, during the survey we realized that two questions did not had the same precise meaning in English than in Kannada, so the English version had to be revised, without any really meaning alteration, but this is an example of the written translation problems.

Oral translations required to conduct the survey might have been a big source of biases. Mainly six different translators were used to complete all the surveys. Despite the accurate explanation of the meaning and the reasons involving each question, the language difficulties and the Indian cultural characteristics, made that some translators did not get the exact meaning of some questions, introducing their personal bias.

In some rural areas two translations where needed as the local language was not known by the principal translator. The training of those second translators was not as deep as the principal ones so more bias might have been introduced.

Even though there were important sources of biases, it should be said that most of them were systematic bias, so all the sample was similarly affected by them. Thus, in a relative aspect, they should not affect so much the results of the surveys.

e. Codification bias

To codify the answers of the respondents into specific categories is a source of bias itself. Present research has used two different coders so the interpretation of the answer and the codification may differ from one two the other despite the intense work in the clarification of each category and the prevision of different possibilities of answer. Once in the field, there were always unexpected answers without a clear category. The personal bias of the coder might have been introduced by the codification itself but also by those unexpected situations.

VI.Results

1 - Socioeconomic description of the sample

1.1. Socio demographic characteristics

Among respondents, 50,2% were female. The average respondent was 38 years old. There were no significant differences in the sex or age composition between the three study areas. The average household size was of 5,57 persons/household, but with significant differences (p<0,001) between households living in the city of Dandeli (4,9 persons/household) and households settled around and inside DWS, with 6,28 and 7,25 members per family respectively (Table VI.1).

Table VI.1 – Description of the sample's socio demographic variables.

Socio demographic variables	All three areas n=438		Dandeli city n=256		Around DWS n=142		Inside DWS n=40	
	Value	±S.D.	Value	±S.D.	Value	±S.D.	Value	±S.D.
Female (%)	50.2		51.6		48.6		47.5	
Mean Age (years)	38.2	14.6	37.4	14.3	38.5	14.7	42.9	15.2
Mean family size (members)	5.6	3.4	4.9	2.4	6,28*	5.9	**7,25***	3.4
Education (%)								
Illiterate	**22.4**		14.5		**28.9**		**50.0**	
Primary not finished	16.4		10.2		25.4		25.0	
Primary	16.7		16.8		16.2		17.5	
Secondary	19.6		**27.3**		9.2		7.5	
Preuniversity or more	24.9		31.3		20.4		0	
Religion (%)								
Hindu	**75.3**		**62.5**		92.3		97.5	
Muslim	14.4		23.8		1.4		0	
Cristian	10.1		13.3		6.3		2.5	
Others	0.2		0.4		0.0		0	
Tribal ethnicity (%)	17.6		4.3		28.2		65.0	
Tribal ethnicity diversity	7		6		3		3	
Place of origin (%)								
Other place in Karnataka	**39.7**		44.1		38.7		15.0	
Dandeli city	27.6		**45.3**		2.1		5.0	
Around DWS	16.4		0		**50.7**		0	
Other States in India	8.5		10.6		4.9		7.5	
DWS	7.8		0		3.5		**72.5**	
Born in present residence (%)	48.9		45.3		50.7		65.0	

* t-test p<0,001

School achievements were significantly different between respondents from the three study areas. Fifty percent of respondents living inside the DWS were illiterate and a 25% had not completed the primary education, whereas 31% of respondents living in the city of Dandeli had finished preuniversity or university studies and 27,3% had finished secondary level.

Most respondents in the sample (75,3%) were from Hindu religion, followed by Muslims (14,4%) and Christians (10,1%). Muslim and Christian populations were more common in Dandeli city (23,8% and 13,3%) than in the other two areas.

Only 17,6% of respondents in the sample were from tribal ethnicity. Tribals were mostly found inside (65%) and around (28%) DWS. Diversity in tribal ethnicity was higher in Dandeli (six different tribes) than inside and around DWS, with just three different ethnic tribes.

Most respondents from the area around and inside DWS lived in the villages where they were born, whereas 54,7% of the respondents from Dandeli city had migrated to their current area of residency from places outside the study area. Most respondents (51,1%) had moved their home at least once.

In sum, although sample distribution was similar in age and sex categories in the three areas, we found important differences in other socio-demographic caracteristics of the population. The population of Dandeli was better educated, lived in households with fewer members, had a higher share of migrants, and revealed more balanced proportion of religions, than the population from villages around and inside DWS. The populations from villages around and inside DWS presented similar socio-demographic characteristics one to each other.

1.2. Economic characteristics

Most households in our sample (54,6%) depended on a unique source of income for subsistence, although we found differences between households in the three areas. Inside DWS only 32,5% of the households depended on a unique source of income whereas in Dandeli city as much as 64,8% of the households had a unique source of income. The secondary and tertiary (service) sectors were the principal sources of occupation for respondents in Dandeli city, while the primary sector was the most common occupation around (27.5%) and inside (52.5%) DWS. Other common occupations in this area were temporary daily workers for the industry, agricultural, or forest jobs (kuli) (Table VI.2).

Our data suggests huge monthly personal income differences between respondents. Personal monthly incomes varied from 50 to 30.000 Rp. Differences were less important inside and around DWS. The proportion of women with a remunerated job was more than two-fold in DWS (79%) than in Dandeli city (30,3%), but overall 80,54% of respondents without any personal income were women. Women in villages around or inside DWS reported working in the family's farm, but they did not report personal income in the survey.

Most households in the sample were landless (72,5%), with important differences among areas; 87,5% of the households in Dandeli city were landless, while only 42,5% of respondents of villages around DWS were landless. Inside the wildlife sanctuary 27,5% of households had more than 3 acres of land, (1 acre is 0,40 hectares) compared with a 17,6% of households around the wildlife sanctuary.

Fifty percent of the households living around the DWS reported livestock ownership, compared to 80,2% of the households within DWS.

The absence of motorized vehicle is the general pattern among the three areas, as 69,9% of the households did not own any motor vehiche. As much as 92,5% of the households in DWS did not own a motor vehicle. (Table VI.2).

In sum, households in Dandeli city mostly relied in a unique source of income, mainly from the secondary or tertiary sectors. We found high differences in the monthly personal income of households in Dandely city, and a prevalence of men (not women) formal employment..

Households around and inside DWS were mainly devoted to activities on the primary sector, complemented with unstable occupations like kuli. Those households registered important but less monthly income differences than househodls in Dandely cities, and women reported working in household farms'.

Household in Dandeli city were mostly landless but owned some type of motored vehicle, compared with the household with land tenure but no motor vehicles living around and inside the wildlife sanctuary.

Table VI.2 – Description of the sample's economic variables.

Economic Variables	All three areas n=438 Value	Dandeli city n=256 Value	Around DWS n=142 Value	Inside DWS n=40 Value	Economic Variables	All three areas n=438 Value	Dandeli city n=256 Value	Around DWS n=142 Value	Inside DWS n=40 Value	
Families with just one job (%)	54.6	64.8	42.3	32.5	Monthly income range	50	125	50	300	*min*
Occupation (%)						30,000	30,000	16,666	5,000	*max*
No job	5.0	6.3	3.5	2.5	No personal income	19.5	20.9	15.2	20.0	*Male (%)*
House wife/husband	**27.9**	**34.4**	21.8	7.5		80.5	79.1	84.8	80.0	*Female (%*
Primary sector	13.9	0.4	**27.5**	**52.5**	Land property in acres (%)					
Secondary sector	11.4	**19.1**	0.7	0	Landless	**72.5**	**87.5**	**54.2**	**42.5**	
Kuli	11.2	3.9	19.7	27.5	< 3 acres	14.7	4.7	28.2	30.0	
Service sector	11.0	14.5	7.0	2.5	More tan 3 acres	12.8	7.8	17.6	27.5	
Turism	7.5	6.3	10.6	5.0	Cattle property (%)					
Student	5.7	7.8	3.5	0	[0] animals		--*	**50.0**	17.9	
Pensionsit	4.6	6.6	2.1	0	[1 - 4] animals		--*	21.1	42.9	
Government	1.8	0.8	3.5	2.5	More than 5 animals		--*	28.9	**39.3**	
Women with a remunerated job (% of total women)	40.5	30.3	49.3	79.0	Motor vehicle property (%)					
Monthly income in Rp (%)					No motor vehicle	**69.9**	**64.1**	**73.9**	**92.5**	
No personal income	**42.2**	**50.4**	**32.4**	25.0	One	25.3	29.7	22.5	7.5	
< 1200 Rp	12.6	8.6	16.9	22.5	More than one	4.8	6.3	3.5	0	
(1200 - 2400] Rp	17.6	10.2	26.8	**32.5**						
(2400 - 6000] Rp	16.2	16.4	14.8	20.0						
> 6000 Rp	11.4	14.5	9.2	0						

* No data

2 - Creation and description of variables of knowledge

2.1. Dependent variable

One of the objectives of this study was to explain the socio-economic factors associated to the knowledge of DWS for the population living in and around the Wildlife Sanctuary. Therefore, we ran a multivariate model where the dependent variable was the respondent's knowledge of the DWS, and the explanatory variables were the socio-economic characteristcs of the respondent.

To assess individual knowledge about DWS, we asked three questions. First, we included a question evaluating whether the person **knew something or have ever heard about DWS (Q1)**. Following there were two questions to evaluate the real knowledge of the person about DWS (**Q2 about forbidden activities in** DWS and **Q3 about distance between village and DWS**) (see Chapter V-Methodology for more information about concrete questions).

For the multivariate model, we constructed a variable that captured whether the person knew or not DWS taking into account responses to the three questions. We considered that a person knew about DWS if the respondent answered in a correct way Q2 and Q3, independently of their answer to Q1. We considered that the person did not know about DWS if the respondent answered in a wrong way Q2 and/or Q3.

As it can be seen in Table VI.3, most of the 438 people surveyed persons did not know about DWS. Only 25.11% of the informants in our sample knew about DWS, and 74.89% could not provide correct answers about the Wildlife Sanctuary.

Table VI.3 – Frequency and percentages of knowledge of DWS (n=438)

Variable	Definitions		n	%
Knowledge	Subject's knowledge of DWS	Know	110	25.11
		Doesn't know	328	74.89
Total			438	100

2.2. Independent variables

a. Explanatory variables

In this study we hypothesized that level of education would help to explain variation in knowledge about the existence of the protected area. We expected that, in general, education would be positively associated with individual knowledge of the protected area.

The schooling level of the person was measured through a closed question about maximum educational level finished. Of the 110 respondents who knew about DWS, 38.18% had completed preuniversity or a higher educational levels, 14.5% had completed the secondary level, 11.82% had completed primary education, 20.91% had started but not completed primary education, and 14.55% was illiterate. The distribution is disimilar for the sample of people who did not know about DWS. Among the 328 adults participating in

the study who did not know about DWS, 20.43% had completed preuniversity or more educational levels, 21.34% had completed secondary, 18.29% had completed primary and only 14.94% had not finished primary education, and the high percentage of 25% was illiterate (see Table VI.4).

These percentages show that, as hypothesized, no schooling (as illiterates) is related with negative knowledge of DWS, while high schooling level (as preuniversity or more) is linked with positive knowledge of DWS.

Table VI.4 – Descriptive statistics of explanatory variables for knowledge in regression analysis

Variable	Definition		Know		Doesn't know	
			n	%	n	%
Education	Maximum educational level finished	Illiterate	16	14.55	82	25
		Primary not finished	23	20.90	49	14.94
		Primary	13	11.82	60	18.29
		Secondary	16	14.55	70	21.34
		Preuniversity or more	42	38.18	67	20.43
Total			110	100.00	328	100.00

b. Control variables

Control variables to be considered in the association between education and knowledge of the protected area include: area of residency, gender, age, cast, family size, origin, job, income, land, motor vehicles, visits to DWS, and income from DWS. Of the 110 surveyed people who knew about DWS, 38.18% were from Dandeli City whereas of the 328 surveyed people who did not know about DWS, 65.24% were from Dandeli City. By contrast, on the area around and inside DWS there was included 61.82% of the people who knew about DWS and only 34.76% of the people surveyed that did not know (X^2=24.84, p<0.05) (see Table VI.5).

Some people did not know their exactly age in years, so they were asked to estimate their age. The average age of the 110 adults surveyed who knew about DWS was 42.05 years (sd=14.27), whereas the average age from the adults who did not know DWS, the average age was 36.90 (sd=14.46).

Another control variable included in our model was the current job of the subject. While 22.73% of the people who knew about DWS were farmers, 20.91% were people with temporary jobs or "kulis", 18.18% were working in the tertiary sector, 16.36% did not have any remunerated job, 7.27% were working in the industry or construction, and 14.55% had other jobs. For the surveyed people who did not know about DWS, 38.41% did not had a remunerated job, 18.60% were working in tertiary sector, 12.80% were working in the secondary one, 10.98% were farmers, 7.93% were kulis and 11.28% had other jobs. The differences between both groups are statistically significant with X^2=35.70 and p<0.05. These variations can be due to the different relations that the jobs kinds establish with the protected area.

Income and land property were frequently just an approximation done by the surveyed person, who was not certain on the information. The differences between the average income for the sample of people who knew about DWS and the average land surface for the people who did not, are not statistically significant, due to the big standard deviations in both cases.

One of the other categorical variables used as control in our multivariate regression model were visits to DWS and income from DWS. For the surveyed people who knew DWS, 61.82% visited DWS between yearly and less than daily, 25.45% visited it less than once a year and 12.73% went to DWS daily or more than once per day. For the people who did not know about DWS, 52.44% visited the DWS less than once a year, 45.12% went to DWS between once a year and less than once a day, and only 2.44% visited DWS daily or more. Differences in the frequency of visits caused by the DWS acceptance area statistically significant with $X^2=35.15$ and $p<0.05$. These differences are also due to different relations established between the respondent and the protected area.

Table VI.5 – Descriptive statistics of control variables for regression analysis (n=438). Chi2 and T-test comparison of control variables where * means $p<0.05$ and ** means $p<0.10$

Variable	Definitions		People who knows (n=110)				People who does not know (n=328)				Chi2	T-test
			n	%	mean	SD	n	%	mean	SD		
Area	Area where the subject lives	Dandeli City	42	38.18			214	65.24			24.84 *	
		Around and Inside DWS	68	61.82			114	34.76				
Gender	Subject gender	Male	78	70.91			140	42.68			26.25	
		Female	32	29.09			188	57.32				
Age	Subject age in years, for people over 18		110		42.05	14.27	328		36.90	14.46		-3.24 *
Cast	Subject's pertenacence to a tribal, cast or outcast grup	Tribal	21	19.09			56	17.07			21.98 *	
		Scheduled Cast	2	1.82			11	3.35				
		Cast but not scheduled	77	70.00			162	49.39				
		Outcast	10	9.09			99	30.18				
Family size	Size of subject's family		110		5.56	4.54	328		5.57	3.84		0.01
Origin	Place where the subject was born	DWS	13	11.82			21	6.40			30.11 *	
		Around DWS	26	23.64			46	14.02				
		Dandeli	9	8.18			112	34.15				
		Karnataka	50	45.45			124	37.80				
		Other states in India	12	10.91			25	7.62				
Job	Current job of the subject	Any/housewife	18	16.36			126	38.41			35.70 *	
		Kuli	23	20.91			26	7.93				
		Primary sector	25	22.73			36	10.98				
		Secondary sector	8	7.27			42	12.80				
		Tertiary sector	20	18.18			61	18.60				
		Others	16	14.55			37	11.28				
Income	Subject monthly income in rupees		110		3767.05	5306.94	328		1694.40	2731.33		-5.29 *
Land surface	Family land property in acres		110		2.29	7.14	328		1.11	3.29		-2.35 *
Motor	Family motor vehicles		110		0.65	0.89	328		0.27	0.51		-5.35 *
Visits to DWS	Frequency of subject's visits to DWS	Less than once a year	28	25.45			172	52.44			35.15 *	
		From daily to yearly	68	61.82			148	45.12				
		Daily or more	14	12.73			8	2.44				
Income from DWS	Frequency of income received from DWS	Never	80	72.73			290	88.41			18.05 *	
		Always	8	7.27			5	1.52				
		Sometimes	22	20.00			33	10.06				

3 - Comparison of knowledge about DWS between areas

In this section it is compared the main variables of respondents who knew DWS among areas. Throw this comparison we try to visualize the differences between the rural and urban areas of the study.

As it can be seen in Chapter III- Case of study, Dandeli City is a municipality located about seven kilometres from the protected area of DWS and the main economic activity in Dandeli City is industry. Dandeli City inhabitants only go to DWS for recreation and the main relation they have with the protected area is passing throw it to go to other places. In contrast, people from around and inside DWS are mainly dedicated to agricultural activities, which are more directly related with the environment, so these people have more relation with DWS.

3.1. Dependent variables

Table VI.6 shows a breakdown of the variable that proxies for knowledge of the DWS acording to area of residency 83.59% of the people living in DWS does not know about DWS; 61.27% of the people who live around DWS does not know about DWS; and as much as 67.50% of the people who live inside DWS does not about its existence. These differences are statistically significant (X^2=25.48 with p<0.05). The differences in knowledge between around DWS and inside DWS are little, so if it is considered the area around and inside the DWS (A&I DWS, abbreviation that it will be used in the following section to denominate the area around and inside DWS) as a unique one, it is seen that the percentage of the sample that does not know about DWS is 62.64%, percentage clearly lower than Dandeli City one and also showing a statistically significant difference with Dandeli City one. The similarities between around and inside DWS areas in knowledge variable will permit us to consider them together in the following sections.

Table VI.6 – Comparison of frequency and percentages of knowledge of DWS between areas. Chi2 test where * means p<0.05 and ** means p<0.10

		Dandeli City (n=256)		Around DWS (n=142)		Inside DWS (n=40)		Chi2 (Dandeli City, Around DWS, Inside DWS)	Around and Inside DWS (n=182)		Chi2 (Dandeli city, Around and inside
		n	%	n	%	n	%		n	%	
Knowledge	Know	42	16.41	55	38.73	13	32.50	25.48 *	68	37.60	24.84 *
	Don't know	214	83.59	87	61.27	27	67.50		114	62.64	

3.2. Independent variables

a. Explanatory variables

In this section there is tested whether the explanatory variables for people who know DWS are significant different between areas located at different distances from this protected area.

It could be hypothesized that people from Dandeli City would show higher education due to larger number of educational facilities. In fact, the respondents' characteristics

support this hypothesis (see Table VI.7). From the people who knew DWS and were from Dandeli City, there were higher percentages of population with high schooling than from the people who knew DWS and were from A&I DWS. For example, from the people who knew and were from Dandeli City, 0.00% was illiterates, in front of the 23.53% from A&I DWS. While from the people who knew and were from Dandeli City, 23.81% had finished secondary in front of the 8.82% of people from A&I DWS. The differences between education between areas are significant, with X^2=35.75 and p<0.05.

Table VI.7 – For people who knew about DWS (n=110), percentage of each area belonging to each education category. Comparison chi2 value of 35.75 with p<0.05

Variable	Definitions	Dandeli City		Around and inside	
		n	%	n	%
	Illiterate	0	0.00	16	23.53
	Less than primary	2	4.76	21	30.88
Education	Primary	3	7.14	10	14.71
	Secondary	10	23.81	6	8.82
	More	27	64.29	15	22.06
	Total	42	100.00	68	100.00

b. Control variables

We also expect control variables to be different between the two areas. In this section, we compare the socio-economic characteristics of people who knew about DWS across the two areas: Dandeli city versus inside and around DWS.

As hypothesized, there are significantly differences in the socio-economic caracteristics of the people who knew about DWS according to the area of residency (see Table VI.8).

Gender data show that from the surveyed people from Dandeli City who knew about DWS, 64.29% were men. While from the surveyed people from A&I DWS who knew about DWS, 75% were men. These differences between males percentages and females percentages between areas are not significant. This may be explained by the different roles that men and women play in Indian society. While men are who work outside the house having contact with more people, women usually spend more hours at home and have a closer relation circle.

In reference to the age, the average age of people who knows DWS in both areas is very similar. A T-test comparing age means showed no significant differences between the two parts of the sample. By contrast, there were significant differences in the average family size of the two areas, A&I DWS had larger families than Dandeli City (p<0.05). This can be due to differences between rural and urban, where in rural areas large families are usual to be able to face up to all the needs that crops and cattle require.

There were significant differences in motor ownership between the two parts of the sample, respondents from Dandeli City had a mean of 1.02 motors, while respondents from A&I DWS had a mean of 0.41 (p<0.05). This may be explained for the differences

Information about frequency of visits to DWS show that from respondents of Dandeli City who knew DWS, 40.48% went less than once a year to the protected area, 52.38%

went more than once a year but less than daily, and 7.14% went daily . In contrary, from respondents of A&I DWS, 16.18% went less than once a year to DWS, 67.65% went between once a year and once a day, and 16.18% went daily or more. The difference is statistically significant, and can be explained to the different character of the visits of the people. While people from Dandeli City usually pass through the area, people from around and inside the area go to the protected area for some concrete purpose, having more relation with it.

Last, from the Dandeli citizens surveyed who knew DWS, 90.48% never got income from DWS managers. While from the A&I DWS citizens who knew DWS and were interviewed, only 61.76% never got income from DWS managers. This difference is statistically significant (p<0.05), possibly because people from Dandeli City get information about DWS from different sources, while people from A&I DWS depend more on the direct relation that they can establish with DWS managers to get information about it.

Table VI.8 - For people who knew about DWS (n=110), percentage belonging to each category. Chi2 and T-test comparison of control variables where * means p<0.05 and ** means p<0.10

Variable	Definitions	Dandeli City n=42				Around and Inside DWS n=68				Chi2	T-test
		n	%	mean	SD	n	%	mean	SD		
Gender	Male	27	64.29			51	75.00			1.44	
	Female	15	35.71			17	25.00				
Age		42		45.45	12.92	68		39.94	14.74		2.00 *
Community	Tribal	3	7.14			18	26.47			12.63 *	
	Scheduled Cast	1	2.38			1	1.47				
	Cast not Scheduled	30	71.43			47	69.12				
	Outcast	8	19.05			2	2.94				
Family size		42		4.10	1.65	68		6.47	5.45		-2.75 *
Origin	DWS	0	0.00			13	19.12			47.59 *	
	Around DWS	0	0.00			26	38.24				
	Dandeli City	9	21.43			0	0.00				
	Karnataka	24	57.14			26	38.24				
	Other states	9	21.43			3	4.41				
Job	Any/housewife	14	33.33			4	5.88			40.07 *	
	kuli	3	7.14			20	29.41				
	Primary sector	1	2.38			24	35.29				
	Secondary sector	7	16.67			1	1.47				
	Tertiary sector	9	21.43			11	16.18				
	others	8	19.05			8	11.76				
Income		42		5369.05	7360.16	68		2777.57	3172.69		2.55 *
Land		42		1.57	3.09	68		2.74	8.75		-0.83
Motor		42		1.02	0.87	68		0.41	0.83		3.68 *
Visits to DWS	Less than yearly	17	40.48			11	16.18			8.67 *	
	From yearly to daily	22	52.38			46	67.65				
	Daily or more	3	7.14			11	16.18				
Income from DWS	Never	38	90.48			42	61.76			17.00 *	
	Always	4	9.52			4	5.88				
	Sometimes	0	0.00			22	32.35				

4 - Results from multivariate analysis of knowledge

4.1. Probit model with knowledge about DWS

We used a multivatiate probit model to predict which respondent's characteristics were associated to knowledge about the existence of DWS (Table VI.9)

Table VI.9 – Probit model coefficients for knowledge of DWS. NS for statistical significance higher than $p<0.10$. (n=438)

Variable name	Coeficient	Std. Err.	p
Area			
Dandeli city	Ref.		
Around & inside DWS	0.582	0.262	0.026
Female	-0.548	0.222	0.014
Age	0.012	0.007	0.073
Education			
Illiterate	Ref.		
Primary not finished	0.777	0.288	0.007
Primary	0.535	0.330	NS
Secondary	0.805	0.353	0.022
Preuniversity or more	1.208	0.342	0.000
Cast			
Tribal	Ref.		
Scheduled Cast	0.515	0.572	NS
Middle & high Cast	0.875	0.272	0.001
Outcast	0.342	0.349	NS
Family size	-0.011	0.023	NS
Origin			
DWS	Ref.		
Around DWS	-0.126	0.326	NS
Dandeli city	-0.892	0.423	0.035
Karnataka	-0.216	0.345	NS
Other states in India	-0.264	0.427	NS
Job			
Any/housewife	Ref.		
Kuli	1.031	0.353	0.004
Primary sector	0.117	0.335	NS
Secondary sector	-0.650	0.412	NS
Tertiary sector	-0.085	0.311	NS
Others	-0.139	0.332	NS
Income	0.000	0.000	NS
Land surface	-0.022	0.028	NS
Motor	0.602	0.156	0.000
Visits to DWS			
Less than once a year	Ref.		
From daily to yearly	0.206	0.186	NS
Daily or more	1.242	0.393	0.002
Income from DWS			
Never	Ref.		
Always	0.862	0.478	0.071
Sometimes	0.135	0.255	NS
Constant	-2.805	0.679	0.000
Log likelihood	-161.013		
Model X^2 (df=27)	171.680		0.000

We found that the sex, the age, and the education level of the respondents were significant predictors of their knowledge about the existence of DWS. Cast and place of origin also bear a significant association with the dependent variable. Last, we also found that the main occupation, the ownership of motorized vehicles, the frequency of visits to DWS area, and the geogrpahical proximity were predictors of individual knowledge about the existence of DWS.

We found that women had a smaller probability of knowing about DWS existence than men (p=0.01).

As it was expected, education was an important predictor of the knowledge of DWS. All levels of education reported a positive relation with DWS knowledge when compared with illiterate respondents (the reference category). Note that the coefficient is larger for the two categories that capture the higher levels of education.

Young respondents had significantly less knowledge of the existence of DWS than older respondents. The finding confirm results from bivariate analysis, where we found that the mean age of respondents that did not know about the existence of DWS was significantly lower than the mean age of respondents who knew about it.

Belonging to middle and high casts was also associated with a higher

knowledge of DWS existence when compared to being a tribal (the reference category). The finding is surprising because most tribals live in the areas in and around the DWS.

Respondents born in Dandeli city had a lower probability of knowing about the existance of DWS than respondents born within the DWS. The association can be explained by the fact that, 95.87% of respondents born in Dandeli city had never moved their residence from Dandeli..

Respondents working in unstable manual jobs – called kuli – had a higher probability of knowing about the existence of DWS existence than people without a remunerated job., None of the other occupations, including work in the secondary sector, show a significant association with knowledge about the existence of DWS, when compared to the reference category.

To live in a household with property of one or more motorized vehicles and to have a larger frequency of visits to the protected area were associated with a larger probability of knowing about DWS, when compared to respondents that had never visited it (the reference category).

Not surprisingly, people who received income from DWS managers had a statistically higher probability of knowing about the existence of DWS than people who never receive income from that source (reference category).

Variables of income and land property were not significant predictors of knowledge of DWS existence.

In sum, we found that the individual caracteristics significantly associated to knowledge about DWS were: gender, age, education level, the residency place and the place of origin, as well as working in manual unstable jobs, and having a motorized vehicle. Receiving income from DWS management and a high frequency of visits the protected area was significantly associated to knowledge about DWS.

5 - Creation and description of variables of gladness

5.1. Dependent variable

The principal objective of this study was to explain the factors that determine the local acceptance of the DWS, here called "gladness". To test our hypotheses, we run a multivariate model using the variable "gladness" as a dependent variable. This variable *gladness* was constructed with information from a closed question in the personal survey.

As it can be seen in Table IV.10 majority of the people answered that they were "Very glad" (48.17%), or "glad" (34.25%) of DWS creation.

After this first analysis, the variable "Categorized gladness" was transformed in a binary variable "gladness" considering "very glad" and "glad" responses of people who think that the creation of DWS was goo,; while "indifferent", "disappointed" and "very disappointed" responses of people who did not think that the creation of DWS was good, were recoded as "not glad" responses. As it can be seen in Table IV.10, this recoding shows that 82.42% of the population answered "glad".

Table VI.10 – Frequency and percentages of gladness with DWS creation answers for people who knows DWS

Variable	Description		n	%
Categorized gladness	Subject's gladness of DWS creation in five categories	Very glad	211	48.17
		Glad	150	34.25
		Indifferent	43	9.82
		Disappointed	18	4.11
		Very disappoint	16	3.65
Gladness	Subject's gladness of DWS creation in two categories	Glad	361	82.42
		Not glad	77	17.58

5.2. Independent variables

a. Explanatory variables

We hypothesized that the perception of economic, social and ecological factors would help to explain people's acceptance of the protected area. The more benefits associated to the creation of the protected area one individual perceived, the higher would be the level of acceptance of the person regarding the protected area.

As explained before, the questions to evaluate the perception were selected using free-listing (see Annex 4-Free listings). Each of these questions evaluated one perception item that was valued for surveyed people between zero and three. All these items were grouped in subgroups in function of their type. There were six subgroups: economic benefits, social benefits, ecological benefits, economic costs, social costs and ecological costs. Each of these subgroups was a continuous variable. These variables were built doing the mean of all the items' values of each subgroup for each respondent, so the values for these variables were from zero to three. For example, if a respondent had a "two" in "Income tourism", a "one" in "Economic development", and a "one" in "Increase of

business and jobs", the value of the variable "Economic benefits" for this respondent would be: (2+1+1)/3=1.33.

After the creation of these variables, they were used to create other variables. Subgroups variables were used in pairs to create group variables in function of their character as economic, social or ecological. There were three groups: Economic perception, Social perception, and Ecological perception. Each of these groups was a continuous variable. These variables were built doing the subtraction between benefits and costs for each group and each respondent, so the values for these variables were from -3 to 3. For example, if a respondent had a "1.33" in "Economic benefits" variable and a "2" in "Economic costs", the value of the "Economic perception" variable for this respondent would be: (1.33-2)=-0.33.

As it can be seen in Table VI.11 Economic and Social perception variables have means under the mean of the possible variable values (1.5) but with standard deviations high. Contrary, Ecological perception have a mean above 1.5 and a low standard deviation.

Table VI.11 – Descriptive statistics of explanatory variables for gladness

Variable	Description	Total population		
		n	Mean	SD
Economic perception	Difference between economic costs and benefits	438	-0.99	1.39
Social perception	Difference between social costs and benefits	438	1.44	1.49
Ecological perception	Difference between ecological costs and benefits	438	2.21	0.98

b. Control variables

In the survey information on area where the subject lives, gender, age, education, cast, family size, origin, job, principal job, income, land surface, motor vehicles, visits to DWS and income from DWS was collected for each surveyed person. As explained before, also information of knowledge was collected in the surveys to be able to evaluate the gladness in function of this variable.

As it can be observed in Table VI.12, of the 361 surveyed people who was glad with DWS creation, 64.82% were from Dandeli City while of the 77 surveyed people who did not know about DWS, only 28.57% were from Dandeli City. These differences between areas are statistically significant (p<0.05).

For knowledge, 22.99% of the people who thought DWS was good, knew about. In contrast, 35.06% of the people who thought DWS was not good, knew it. These differences in the knowledge variable are also statistically significant (p<0.05). It shows that the not knowledge of the protected area, usually makes people to evaluate it as good.

Talking about age, acceptance of DWS is linked with youngest people, with p<0.05. It may be explained for more environmental education received, that makes these individuals to value more the nature protection; and also because these individuals cannot compare the nowadays protection situation with any other situation, because they have not lived any other one.

Current job of the subject is also show stadistically significant differences between population glad and not glad (p<0.05). This can be related with the characterization of each job. For example, of people who is glad 9.97% work in the primary sector but for people who is not glad 32.47% of the population work in this sector. This may be explained for the high relation between farmers and forest, that provide farmers of direct experiences about the effects of DWS creation. Contrary, from people who is glad 13.02% work in the secondary sector while 3.9% of the population not glad work there. This could be explained by the independence that people perceive between industries and nature protection. In this way, industries workers think about DWS as an entertainment area related with spare time and happiness.

Table VI.12 - Descriptive statistics of control variables for regression analysis (n=438). Chi2 and T-test comparison of control variables where * means p<0.05 and ** means p<0.10

Variable	Definitions		People glad (n=361)				People not glad (n=77)				Chi2	T-test
		n	%	mean	SD	n	%	mean	SD		
Area	Area where the subject lives	Dandeli City	234	64.82			22	28.57			34.34 *	
		Around & inside DWS	127	35.18			55	71.43				
Knowledge	Subject's knowledge of DWS	Know	83	22.99			27	35.06			4.92 *	
		Doesn't know	278	77.01			50	64.94				
Gender	Subject gender	Male	176	48.75			42	54.55			0.85	
		Female	185	51.25			35	45.45				
Age	Subject age in years, people over 18		361		37.17	14.64	77		43.01	13.32		3.23 *
Education	Maximum educational level finished	Illiterate	67	18.56			31	40.26			35.92 *	
		Primary not finished	50	13.85			22	28.57				
		Primary	65	18.01			8	10.39				
		Secondary	80	22.16			6	7.79				
		Preuniversity or more	99	27.42			10	12.99				
Cast	Subject's pertenacence to a tribal, cast or outcast grup	Tribal	54	14.96			23	29.87			12.32 *	
		Scheduled Cast	11	3.05			2	2.6				
		Middle & high cast	198	54.85			41	53.25				
		Outcast	98	27.15			11	14.29				
Family size	Size of subject's family		361		5.37	3.81	77		6.52	4.80		2.30 *
Origin	Place where the subject was born	DWS	19	5.26			15	19.48			26.54 *	
		Around DWS	53	14.68			19	24.68				
		Dandeli City	109	30.19			12	15.58				
		Karnataka	148	41			26	33.77				
		Other states in India	32	8.86			5	6.49				
Job	Current job of the subject	Any/housewife	127	35.18			17	22.08			46.53 *	
		Kuli	32	8.86			17	22.08				
		Primary sector	36	9.97			25	32.47				
		Secondary sector	47	13.02			3	3.9				
		Tertiary sector	69	19.11			12	15.58				
		Others	50	13.85			3	3.9				
Principal family job	Activity that provides highest quantity of money in the household	Any or housewife	34	9.42			21	27.27			26.49 *	
		Kuli	78	21.61			23	29.87				
		Primary sector	2	0.55								
		Secondary sector	103	28.53			11	14.29				
		Tertiary sector	109	30.19			19	24.68				
		Others	35	9.7			3	3.9				
Income	Subject monthly income in rupees		361		2174.45	3550.73	77		2404.69	4169.19		0.50
Land surface	Family land property in acrees		361		1.40	4.91	77		1.43	2.62		0.05
Motor	Family motor vehicle property		361		0.39	0.67	77		0.26	0.55	-1.61 **	-1.61 **
Visits to DWS	Frequency of subject's visits to DWS	Less than once a year	173	47.92			27	35.06			4.36	
		From daily to yearly	170	47.09			46	59.74				
		Daily or more	18	4.99			4	5.19				
Income from DWS	Frequency of income received from DWS managers	Never	314	86.98			56	72.73			12.50 *	
		Always	11	3.05			2	2.6				
		Sometimes	36	9.97			19	24.68				

6 - Comparison of gladness towards DWS between areas

6.1. Dependent variables

As it can be seen in Table VI.13 considering the results by residency areas in Dandeli City nearly all the population, 91.41%, consider themselves happy with the creation of DWS. Contrary, population around DWS and inside DWS have percentages lower, 69.78% of the population of both areas consider that the creation of DWS is good. Concretely, a 74.65% of the population that live around DWS is considered thinking that the creation of DWS is good. While only nearly half of the population that live inside DWS, 52.5%, is considered thinking that the creation of DWS is good. Whether the comparisons between Dandeli City, the area around DWS, and the area inside DWS or between Dandeli City, and A&I DWS, differences are significative (p<0.05 in both cases). The similarities between around and inside DWS areas in gladness variable will permit us to consider them together in the following sections.

Table VI.13: Comparison of frequency and percentages of gladness of DWS between areas. Chi2 test where * means p<0.05 and ** means p<0.10

Variables	Definition	Dandeli City (n=256)		Around DWS (n=142)		Inside DWS (n=40)		Chi2 (Dandeli City, Around DWS, Inside DWS)		Around and Inside DWS (n=182)		Chi2 (Dandeli city, Around and inside DWS)	
		n	%	n	%	n	%			n	%		
Gladness	**Glad**	234	91.41	106	74.65	21	52.50	44.90	*	127	69.78	34.34	*
	Not glad	22	8.59	36	25.35	19	47.50			55	30.22		

6.2. Independent variables

a. Explanatory variables

In this section there is tested whether the explanatory variables for positive acceptance of DWS are significantly different between areas located at different distances from this protected area.

Table VI.14 – Means of each area for each explanatory variable and T-test where * means p<0.05

Variable	Dandeli City		Around and inside DWS		T-test
	Mean	SD	Mean	SD	
Economic perception	-1.02	1.47	-0.69	1.15	-2.19 *
Social perception	1.64	1.35	1.38	1.55	1.67 *
Ecological perception	2.17	0.84	2.20	1.23	-0.26

It could be hypothesized that as more closer to the protected area, more costs would be perceived so, consequently, perception variables would get lower values in communities closer to the protected area. Observing Table VI.14 it has to be noticed that the Economic and Social perceptions are statistically significant. In Economic perception for people who was glad of DWS, mean of Dandeli city respondents was lower than the one from A&I DWS. This may be explained for the fact that Dandeli citizens perceive economic costs for other people but not for them, so they continue perceiving the protected area creation as good for themselves. However, people from A&I DWS

perceiving the same costs will feel themselves affectes by them, so they will evaluate the protected area as not good for themselves. In Social perception mean of Dandeli citizens responses is higher than mean of A&I DWS respondents. This may be explained for the consideration of DWS as a lucrative area for Dandeli citizens with the consequently social positive perception.

b. Control variables

We also expect control variables to be different between the two areas. In this section, we compare the socio-economic characteristics of people who knew about DWS across the two areas: Dandeli city versus inside and around DWS.

As hypothesized, there are significantly differences in the socio-economic caracteristics of the people who knew about DWS according to the area of residency (see Table VI.15).

Most economic profitable activity for the household (principal job) differences for people who was glad of DWS were significant (p<0.05). For example from the people who was glad from Dandeli only 13.25% reported kuli job as the principal job for their families but from the people glad from A&I DWS, 37.01% reported it. This can be due to the differences between temporary jobs that people from A&I DWS and Dandeli City realize. A&I DWS people use to work for Forest Department what makes their families relate the DWS with income for their houses, while Dandeli City people use to go to work to other cities and frequently to Goa, what causes their families to make independent the money they earn from the environment protection.

Table VI.15 – For people who was glad of DWS (n=361), percentage belonging to each category. Chi2 and T-test comparison of control variables where * means p<0.05 and ** means p<0.10

Variable	Definitions	Dandeli City (n=234)				Around and Inside DWS (n=127)				Chi2	T-test
		n	%	mean	SD	n	%	mean	SD		
Gender	Male	116	49.57			60	47.24			0.18	
	Female	118	50.43			67	52.76				
Age		234		37.02	14.36	127		37.43	15.19		-0.25
Education	Illiterate	29	12.39			38.00	29.92				
	Primary not finished	23	9.83			27.00	21.26				
	Primary	41	17.52			24.00	18.90			38.33 *	
	Secondary	67	28.63			13.00	10.24				
	Preuniversity or more	74	31.62			25.00	19.69				
Community	Tribal	11	4.70			43	33.86				
	Scheduled Cast	7	2.99			4	3.15			78.28 *	
	Cast not Scheduled	126	53.85			72	56.69				
	Outcast	90	38.46			8	6.30				
Family size		234		4.88	2.27	127		6.27	5.54		-3.36 *
Origin	DWS	0	0.00			19	14.96				
	Around DWS	0	0.00			53	41.73				
	Dandeli City	106	45.30			3	2.36			186.31 *	
	Karnataka	104	44.44			44	34.65				
	Other states	24	10.26			8	6.30				
Job	Any/housewife	93	39.74			34	26.77				
	kuli	8	3.42			24	18.90				
	Primary sector	1	0.43			35	27.56			112.89 *	
	Secondary sector	46	19.66			1	0.79				
	Tertiary sector	48	20.51			21	16.54				
	others	38	16.24			12	9.45				
Principal job	Any/housewife	1	0.43			1	0.79				
	kuli	31	13.25			47	37.01				
	Primary sector	1	0.43			33	25.98			127.64 *	
	Secondary sector	100	42.74			3	2.36				
	Tertiary sector	76	32.48			33	25.98				
	others	25	10.68			10	7.87				
Income		234		2320.82	3896.52	127		1904.77	2798.68		1.06
Land		234		0.81	2.88	127		2.49	7.19		-3.14 *
Motor		234		0.44	0.68	127		0.30	0.63		1.93 *
Visits to DWS	Less than yearly	128	54.70			45	35.43				
	From yearly to daily	103	44.02			67	52.76			26.02 *	
	Daily or more	3	1.28			15	11.81				
Income from DWS	Never	226	96.58			88	69.29				
	Always	7	2.99			4	3.15			67.82 *	
	Sometimes	1	0.43			35	27.56				

7 - Results from multivariate analysis of gladness

7.1. Probit model with gladness about the creation of DWS

We used a probit model to predict which respondent's characteristics were associated with acceptance of DWS. We were especially interested in examining the association between acceptance of DWS and the perception of ecnomic, social, and ecological costs and benefits generated by the creation of DWS (Table VI.16).

Table VI.16 – Probit model coefficients for gladness of DWS. NS for statistical significance higher than p<0.10. (n=436)

Variable name	Coeficient	Std. Err.	p
Area			
Dandeli city	Ref.		
Around & inside DWS	-0.650	0.283	0.022
Knowledge	-0.296	0.213	NS
Female	-0.118	0.200	NS
Age	-0.012	0.007	0.060
Education			
Illiterate	Ref.		
Primary not finished	0.209	0.242	NS
Primary	0.629	0.275	0.022
Secondary	0.904	0.309	0.003
Preuniversity or more	0.780	0.301	0.009
Cast			
Tribal	Ref.		
Scheduled Cast	-0.097	0.519	NS
Middle & high Cast	0.139	0.251	NS
Outcast	0.295	0.313	NS
Family size	-0.029	0.022	NS
Origin			
DWS	Ref.		
Around DWS	0.427	0.311	NS
Dandeli city	0.110	0.386	NS
Karnataka	0.367	0.316	NS
Other states in India	0.319	0.417	NS
Principal family job			
Primary sector	Ref.		
Kuli	0.592	0.305	0.052
Secondary sector	0.185	0.370	NS
Tertiary sector	0.245	0.317	NS
Others	0.838	0.451	0.063
Income	0.000	0.000	0.061
Land surface	0.075	0.046	NS
Motor	0.037	0.182	NS
Visits to DWS			
Less than once a year	Ref.		
From daily to yearly	-0.138	0.185	NS
Daily or more	0.878	0.415	0.035
Economic perception	0.130	0.066	0.049
Social perception	0.083	0.058	NS
Ecological perception	-0.034	0.090	NS
Constant	1.033	0.682	0.130
Log likelihood	-158.979		
Model X^2 (df=28)	88.570		0.000

We had hypothesized that the perception of economic, social and ecologic costs generated by the establisment of the protected area would be associated to less acceptance, whereas the perception of economic, social, and ecologic benefits would be associated with higher acceptance. We found that only the perception of economic benefits was significantly associated with acceptance of DWS. Neither social, nor ecologic perception of benefits and costs generated by DWS were significant predictors of individual acceptance of DWS.

We also found that living around or inside DWS, age, and level of education were significant predictors of individual acceptance of DWS.

The family source of income also seemed to affect acceptance, with people working as kuli, or in government jobs, showing higher probabilities of accepting the establishment of the protected area. By contrast, none of our other measures of economic status (such as land surface or motorized vehicles property) show a significant association with acceptance of the protected area.

Living inside or around DWS was negatively related with acceptance of DWS, when compared to people living in Dandeli city (reference category). People living closer or even inside the protected area are more likely to receive negative impacts from conservation restrictions.

Older respondents had a higher probability of being glad about the establishment of the protected area than younger ones.

Education level was an important predictor of acceptance of the protected area. People who had finished the primary level, or higher education levels had a higher probability of showing acceptance of the protected area than illiterate people (reference category). Knowing to write and read (coded as primary not finished), was not significantly related with gladness. Notice again that higher education levels are associated with higher probabilities of being glad of DWS.

Respondents working as kuli also had a higher probability of expressing acceptance of DWS, as well as students, pensioners and government workers (coded as "Others" category), when compared to respondents working in the primary sector.

Visiting DWS more at least once a day was also a good predictor of acceptance towards DWS.

In sum, economic perception had a significant positive relation with respondents acceptance of DWS, even though, other perception index – social and ecological – did not registered any significant relation with gladness. We also want to notice that people living closer to DWS tend to feel worse towards it, as they might receive more impacts from conservation strategies.

VII. Discussion and conclusions

The area around DWS is immersed in a situation of economic recession. The recent closure of factories has led to a population decline (due to out migration) and a general worsening of livelihood, mostly in Dandeli city. Some Dandeli city residents have turned again into the forest, some trying to illegally extract timber to sell it to the untouched Dandeli familiar furniture production, and some others trying to develop ecotourism thanks to conservation status given by DWS.

Traditional forest residents have lost some of their economic opportunities as their family craft workshops have been prohibited due to restrictions on the use of NTFP within the DWS. Forest residents have lost the opportunity to increase their agricultural lands, while at the same time grassland for pasture have decreased due to wild animals increasing competence. Population growth have pushed people to go for job outside the forest area, but not in Dandeli, were economic conditions are worsening, but to Goa or other tourist sea cost cities.

One important finding of this work is that the perception that the establishment of protected areas generate economic costs, generates rejection for the protected area among local residents.

Overall, we found that people in our sample had the feeling that the protected area had generated more costs than benefits, especially in areas close to the DWS. Multivariate analysis also showed that people who perceived that economic benefits related to the creation of the protected area, were larger than economic costs, registered more acceptance of the area. The same is not true for the perception of social and ecologic costs and benefits, variables that were not significantly associated to acceptance of the protected area. Our findings mesh with findings from previous research. For example, in a research in Community attitudes toward three protected areas in Upper Myanmar (Burma), Allendorf and colleges (2006) found a significant association of economic benefits with positive attitude towards the protected area.

The place of residency seems to play an important role in explaining both knowledge about the existence of DWS and gladness about its establishment. On one hand, and not surprisingly, people living inside and around DWS tend to have better knowledge of the existence of DWS existence than people living in Dandeli city. On the other hand, people living in and around DWS tend to be less glad about the existence of the protected area than people from Dandeli city. Our finding supports findings from previous research on the costs of protected areas for local people (Ferraro, 2002). Local people living within or in the border of protected areas show less satisfaction with the establishment of such protected area probably because they suffer costs generated by the protected area. People with less dependence from natural environment to sustain their livelihood (such as people in Dandeli city), show more appreciation for the protected area because they do not

have to pay any of the costs generated by the establishment of the area. Even though, there was no significant difference between economic perceptions among areas.

Education level was also an important predictor of both, knowledge of the existance of DWS and positive acceptance of DWS. It seems that knowing to read plays an important role to know DWS existence. The finding can be explained because the capacity to read panels, news papers or environmental information is a key issue for awarenes of the existence of DWS. Residents from inside or around DWS have to move to Dandeli city or further areas, what should allow them to take to see other regions and have greater appreciation of their living place.

As said in the socio-demographic description of the sample, more educated people tend to live in Dandeli city, but we also found that Dandeli city residents had higher rates of unawareness of DWS existence. So a possible explanation for the association between education and lack knowledge, but high acceptance of the protected area is that, when asked about acceptance of the protected area, Dandely city residents answered they were glad just because they know conservation is important, not because they had any specific idea of DWS in particular. Thus their answer about acceptance of DWS would be more an statement suporting conservation, but not thinking on the specific costs and benefits of DWS in particular (especially because many did not even know about its existence)

Young respondents seemed to have greater acceptance but worse knowledge than older people. It was easier for older people to have heard something about DWS and their more existence social relation led them to had better knowledge of DWS existence, but as a consequence of the experience of some negative impacts and the absence of environmental education, would lead older people to reject DWS. While younger people have been more affected for environmental education and many of them have born after DWS creation.

It seems logical that unstable manual workers – kuli – had better knowledge and more gladness of DWS. Kuli workers usually work for DWS managers in diverse forest works, so they knew the existence and were getting some benefits from it, so they tend to be gladder about its establishment than people with works not related to the DWS.

To conclude, we would like to emphasize the importance of taking in account local resident's opinion, in protected areas implementation and management. Findings of present research show that perception of economic benefits can generate a positive attitude towards protected areas, but real democratic participation is somehow the way to really attain those economic goals, and avoid generalized failure of ICDP.

Further research on local resident's perception is of vital interest to improve participation methodologies and integration strategies to make possible local residents to work in, otherwise essential, conservation projects.

VIII.   Bibliography

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IX.Annexes

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