Local Community Attitudes towards Reserved forests. A field study in Kodagu, Western Ghats, India

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Preamble

The research reveals local community’s attitudes towards reserved forests, in context of India. This attitudinal study deals with the topic on two novel ways. First, it contributes to the scant literature about attitudes towards less-strict protected areas in India, such as reserved forests. Second, it analyse the influence of the recent pro-tribal policy, Scheduled Tribes and Other Traditional Forest Dwellers Act, as well as institutional attitudes and participation in tribal groups to the attitudes. The paper has a case study approach and discuss the issue of natural resource management on the local community level.

Researcher spent two months learning about methods of attitudinal research and conducting quantitate analysis of the raw survey data. This encompassed learning to work with the statistical software and to conduct various statistical analysis that were necessary to obtain presented results. One more month was needed for detailed literature review about the local community attitudes towards protected areas. Moreover, comprehensive research was conducted in order to understand past and current policies and their effects on the tribal populations in India as well as ongoing discussions about the Forest Rights Act. Last two months were allocated for the analysis of the results and thesis writing. This paper follows the format of the journal of Environmental Conservation.
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Abstract

There is a general scientific agreement that the long-term sustainable management of natural resources depends on local people’s support. Consequently, assessing local people’s attitudes, taking into account their needs and respecting their opinions, should become a management priority. Recently, a new pro-tribal policy, the Forest Rights Act, was enacted in India, but little is known about how this devolution process will affect people’s attitudes toward forests. We analyse associations between attitudes toward reserved forests and knowledge about the Forest Right Act, institutional attitudes, tribal groups, and socio-economic characteristics of mostly tribal forest dwellers in the Kodagu district, Western Ghats, India. Information was collected with a structured questionnaire among villagers (N=250) living under three land tenure types: 1) the fringes of Rajiv Gandhi National Park, 2) reserved forests and 3) coffee estates. The main results of the multivariate analyses show that people are more likely to appreciate reserved forests if they have more knowledge about Forest Rights Act (2006) and if they have positive attitudes towards Forest Department. Socio-economic data (except age and household size) and participation in the tribal groups were not proven to be significant predictors of the overall attitudes to reserved forests. Statistical differences in the attitudes towards reserved forests in different land tenure systems were not found.

Keywords: attitudes, forest dwellers, Forest Rights Act, Western Ghats
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### Abbreviations and acronyms

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<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>CE</td>
<td>Coffee Estate</td>
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<td>FD</td>
<td>Forest Department</td>
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<td>FRA</td>
<td>Scheduled Tribes and Other Traditional Forest Dwellers Act (Recognition of Forest Rights Act)</td>
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<td>JFM</td>
<td>Joint Forest Management</td>
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<td>KFD</td>
<td>Karnataka Forest Department</td>
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<td>LAMPS</td>
<td>Large Scale Adivasi Multi-Purpose Society</td>
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<td>NP</td>
<td>National Park</td>
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<td>NNP</td>
<td>Rajiv Gandhi (Nagarahole) National Park</td>
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<td>PA</td>
<td>Protected Area</td>
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<td>PESA</td>
<td>Panchayat (Extension to Scheduled Areas) Act</td>
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<td>RD</td>
<td>Revenue Department</td>
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1. Introduction

“The gap in perceptions and use of forests by local, state and global actors results in disputes over desirable forest management strategies, with powerful non-local actors including state and scientific entities determining policy on forest use and management. For a paradigm shift to happen in practice requires that ‘old school’ forestry professionals see forest policy as a way to recognise local claims and not as a way to define what forests local people can use and manage as currently policy continues to do.” (Menon et al., 2009: 515)

Governments around the world use policies to intervene and mediate forest access. These policies have often lead to exclusion from forests of the powerless and poor rural communities, especially in tropical countries with colonial legacy (Larson and Ribot, 2007) where complex web of users have different and frequently conflictive interests folded around the multiple forest values.

Apart from a globally important functions, such as carbon sequestration, nutrient cycling, watershed protection and flood regulation, aesthetic and recreational values, forests provide many essential services that are directly needed for the survival of rural populations in low-income tropical countries (MEA, 2005). There are more then 200 million forest-dependent people in India (Forest Survey of India, 2009) and they rely on food, fresh water, medicines, fuelwood, timber, but also spiritual and cultural amenities that forests endow. Furthermore, forest dwellers, that include a high proportion of adivasis (“original inhabitants” or tribal populations), are among the poorest and the most vulnerable groups in Indian society (World Bank, 2006).

With a centralised forest management based on the western scientific principles and aiming at strengthening the control over territory to secure forest supply (Rishi, 2007), ever since the colonial period, the Indian government has denied access to the forest to the ones who have needed it the most: poor and low-income, mostly tribal, communities (see Guha 1983; Guha and Gadgil, 1989; Menon, 2007; Patnaik, 2007). One more important reason for prohibition of access is “the state’s concerns for development (pushed by other social forces)” (Menon, 2007: 2240). Thus, the interests of the state for the “common good” have been mainly prioritised at the expense of poor tribal communities, especially when mega development project or investment needed to be implemented in forested areas (Menon, 2007; Kothari, 2008). Wildlife conservation policies have also played an
important role in this power game. The most strict policies have been implemented on protected areas, such as national parks and sanctuaries (Kothari, 2008), where coexistence of humans and wildlife has not been accepted, traditional resource use has been severely curtailed (collection of forest produce, grazing and similar), numerous forest communities are being dispossessed and many evictions have happened (see Lasgorceix and Kothari, 2009).

All the mentioned issues, framed with unequal distribution of power and benefits, had inevitably led to long-lasting conflicts over the utilisation and control of the forests, also making the management of forest resources a challenging issue (Rishi, 2007).

For the last three decades, the Indian government have passed certain policies to try to change this pattern. Thus, after the 1988 National Forest Policy, a more inclusive forest management started to be implemented - the Joint Forest Management (JFM). This community forestry program has been implemented to alleviate increasingly emerging conflicts between multiple actors over the local use rights, for subsistence, for commercial use and for the preservation of environment (Rishi, 2007). Mentioned changes in Indian forestry have been part of the global trend of decentralisation of top-down resource management towards more participatory practices where responsibilities, benefits, control and decision-making authority has to be shared among local user groups and governmental agencies (Berkes, 2008; Bhattacharya et al., 2010). However, JMF is criticised since the power given to the communities in JFM is limited, participation is inadequate, and the common property rights are unclear. Thus, even with the JFM, FD has substantial control as a decision making body in planing and management, allocation and demarcation of forest lands, control over micro plans and disposal of forest produce (Bhattacharya et al., 2010). Therefore, forest-dependent people of India have to wait more to obtain the legal and equitable access to forest resources and land.

After many years of marginalisation and constant struggle for the use of the forest and for a better livelihood, a recent Act on forest rights is starting to shape a distinct reality for the deprived forest dwellers. If the Scheduled Tribes and Other Traditional Forest Dwellers Act (Recognition of Forest Rights Act) (FRA), enacted in 2006, is to be correctly implemented, adivasis and other forest-dependent people will be empowered and legally accepted within the forests with the endorsement of their communal and individual rights over the forest land and resources.
Researchers and central governments now globally agree that the sustainable, more responsive and long-term management of the forest resources depends on local people’s support (West and Brechnin, 1991; Ferraro, 2002; Triguero-Mas et al., 2010). There is increasing need to understand people’s attitudes towards forests as well as their determinants, in order to improve and adjust management to local people’s needs, to facilitate people’s participation and foster partnerships (Newmark et al., 1993, Fiallo and Jacobson, 1995, Gillingham and Lee, 1999; Allendorf, 2007; Dolisca et al., 2007; Triguero-Mas et al., 2010). Although there is devolution process starting with the new Act on forest rights, little is know how these legal changes can influence attitudes towards the forests. This connections is important since the Act on forest rights applies to almost all forested territory, regardless of protection status. Furthermore, although strict conservation areas are not the only type of managed areas that affect local residents, the less-strict state-managed areas have received less attention in attitudinal studies. For example, the establishment of reserved forests in India has affected tribal communities’ livelihood since colonial times (Guha, 1983; Patnaik, 2007), but we know next to nothing about local resident’s attitudes towards reserved forest (RF). Here we address the topic. Specifically, we are interested in reserved forest, that is a forest managed by the State Forest Department (FD), with restrictions to forest resources access, yet less rigorous than in National Parks and Wildlife Sanctuaries. Research was conducted in Kodagu district in India. The main objectives are to assess the attitudes towards reserved forests and to identify the main factor that determines those attitudes. Additionally, we were interested to see if there are differences in attitudes under three land tenure systems: RF, Nagarahole National Park and coffee estate. This is important because one agency, the Karnataka Forest Department, has a jurisdiction not only over reserved forests and protection areas, but also over the forest patches, residential areas and (in some cases) trees within a private coffee estates in Kodagu (see Uthappa, 2004).
2. Forest dwellers and the access to the forest: a brief historical overview

The battle of forest dependent populations for access to forest resources has deep historical roots. The brief summary of the past forest legislation would make the reader more aware of the current sufferings of the forest dwellers. Namely, the community rights to the forest resources have been progressively (and strategically) curtailed by the various interests, policies and management, by the colonial state first, and by the need to industrialise India later (Guha, 1983). Process of territorialisation, “the creation and maintenance of spatialized zones within which certain practices are permitted based on the explicit or implicit allocation of rights, controls, and authority” (Peluso, 2005:2) has been constantly happening. The consequences of those processes are reflected in today’s marginalisation and poverty of the forest-dependent people in India.

2.1. Colonial India: Establishment of the control over the forests (1800-1947)

In the early stage of its rule, the colonial state was looking at the forests as impediment to the state development since agricultural expansion was major source of the colonial income, and “...[forest] removal would add to the class of land paying revenue” (Guha, 1983: 1883). British rule (through East India Company) was recklessly using forest resources for military purposes and income generation, through teak export. At that time, though, local residents were left to use the forests without interference (Guha, 1983).

The colonial rule started to be concerned with the India’s forest resources for the first time after most oak supplies in England and Western Europe became depleted and the Indian teak was found to be good material for shipbuilding. Thus, in 1806 East India Company acquired royalty rights over teak (Guha and Gadgil, 1989) in one part of South India (Malabar) and the use of this wood was completely prohibited to the local population (Patnaik, 2007). Control over territory and forests resources continued to extend in years to come. In 1857, after the Indian Mutiny, that was a widespread but unsuccessful rebellion against the British rule, India came under the direct rule of the British Crown. As claimed by Guha (1983), the turning point in the history of the forest laws in India was building the railway network to facilitate movement of the troops provoked by the Mutiny as well as for trade purposes. Railway connected ports with the hinterland and facilitate transport of the raw materials towards England and of the finished goods back to the subcontinent. However, these trade pathways caused wide destruction of the forest since the wood was needed for the
sleepers but it was also used as fuel for trains (before coal mines become operative). Moreover, only
teak, deodar and sal were appropriate for the sleepers, and those species were substantially devas-
tated (Guha, 1983).

The huge destruction of the forests galvanised the government. In 1864, the Imperial Forest De-
partment (IFD) was founded after the colonial rule realised that increasing exploitation would de-
plete forest resources. The Forest Department was created because of the growing consciousness of
the need to secure future timber supply and production (Guha and Gadgil, 1989) “ […] through
conservation and plantation establishment, and to a lesser extent providing for villages’ subsistence
needs” (Mahanty, 2002: 3757). Establishment of the FD was also the way to legitimise authority
over the forests and to consolidate governmental control (Patnaik, 2007). Forests became a valuable
growing biological resource (Tiwary, 2003) managed with help of German foresters and with the
application of scientific forestry (Guha, 1983).

After the creation of the IFD, a series of Acts emerged to curtail the previously unlimited forest ac-
cess to the villagers. Those Acts altered rights of the local communities that were seen as a threat to
forests. Thus, the first Indian Forest Act was passed on 1865 and it established colonial rule’s
claims over the forests (Mitra and Gupta, 2009). The second, more exhaustive, Forest Act was en-
acted on 1878 and it strengthen the governmental control over the forests, thus restricting the old
customary-use rights of the local communities. Under the 1878 Forest Act, forests were classified as
Reserved and Protected (Tiwary, 2003). The forest use by the villages shifted from being a right to
be a privilege, and it was assured that valuable forest could be demarcated at any moment. Loss of
control over forests raised revolts of deprived forest communities against the forest administration.
However, the colonial state crushed all the rebellions, that continue to occur frequently throughout
the colonial period in almost all tribal areas (Guha, 1983; Guha and Gadgil, 1989).

The Indian Forest Act from 1927 divided forests in three categories: Reserved, Protected, and Vil-
lage forest. Reserved forests were free of all claims and exclusively for the use of Forest Depart-
ment. Communities had no rights in Reserved Forests except the ones strictly permitted by state
(Mitra & Gupta, 2009). Local communities, however, were able to extract forest resources for
household use from protected forests, and were allowed to freely use products from Village forests
(Mahanty, 2003; Mita & Gupta, 2009).
Demarcation and classification of the forests had multiple consequences. Not only it “defined boundaries of control, access and use, and set up a conceptual distinction between forest and other land use” (Mahanty, 2003) but it also cut the close and profound relationships between people and forests since the tribals were using forest not only for food and shelter, but they deeply integrated forests into their culture and religion (Guha, 1983). The 1927 Act is still operational with the minor additions and corrections (Patnaik, 2007).

2.2. Independent India (since 1947)

After independence, forest policy remained almost the same and forest-depending people did not get their rights over the resources (Patnaik, 2007; Tiwary, 2003; Guha, 1983). Patnaik (2007) divides the post-colonial period into three phases. The earliest phase spanned from 1947 to 1970 and is characterised by the commercial exploitation of forests for the industrial development. At this time, India took the path of the modernist state trying to stir development with industrialisation and commercialisation of forests products. At that time, and based on the 1927 Act passed under colonial legislation, forests could be easily reserved for the needs of the state regardless of prior land claims (Menon, 2007). In the 1948 the Princely States acceded India. The new Indian government demarcated all the Princely State’ lands and the zamindars’ (large landholders) private lands into the state owned Reserved Forests without settlement of rights (Patnaik, 2007; Tiwary, 2003). Within the same period, the 1952 National Forest Act emerged as continuation of the colonial Acts with the aim to maximise forest revenues, prioritising agriculture and forestry (Tiwary, 2003). Native “slow-growing” tree species (that tribals can use for food and fuelwood) were replaced with quick growing industrially useful trees to support immense demand of wood-based industry (Guha 1983). According to Kothari (2008), until the 1980 (and the Forest Conservation Act), more than 4.5 million hectares of forests were officially diverted because of industrial and commercial activities.

The second phase, which originates in the 1970s, was a response to the forest degradation occurring as a consequence of the first phase. In this second phase, the Indian government decided to change the “production forestry” of the fifties and sixties into “conservation forestry”. Consequently, at that period restrictive conservation legislations were enacted. Those legislations include the Wildlife Protection Act (1972) (government has power to declare any area to a sanctuary or NP) and the Forest Conservation Act (1980) (diversion of the forests for non-forest use were constrained). Similarly
to the previous phase, but now in name of the biodiversity protection, forest dwellers were kept ex-
cluded from the forests, as they were considered the ones destroying the forests. They became “en-
croachers” on their own, ancestral, land. The establishment and increase of the Protected Area Net-
works represented an increasing governmental control over the natural resources as well as prohibi-
tions on the use of forest resources and leaded to forced resettlements (Lasgorceix and Kothari,
2009). Understanding the conservation in terms of enclosure (Isa, 2000) and imposing the Western
view of the natural resource management, by excluding the humans from the nature, left deep
wounds on the body of tribal communities in India.

After the 1988 starts the third phase of the India forestry. In this phase the poor local communities
living around the forests are tried to be included into the policies and management. Nevertheless,
these intentions have never fully applied in the practice. The first Act that highlights the need to
“include” local populations in forest management is the National Forestry Act (1988), which con-
sidered forests as local resource and demanded the participation of local people in forest restoration
(Patnaik, 2007). As a continuation of this Act, the Joint Forest Management (JFM) was initiated in
the 1990 and it is mainly restricted to degraded forests. As we already explained, the JFM has
mixed outcomes and the programme performances (see Ravindranath and Sudha, 2004; Bhattachar-
rya et al., 2010).

An important, but largely non-implemented Act passed during this third phase is the Panchayat (Ex-
tension to Scheduled Areas) Act, 1996 (PESA). “PESA mandated the states in peninsular India to
devolve certain political, administrative and fiscal powers to local governments elected by the tribal
communities in their jurisdiction” (Kurup, 2008: 88). Consequently, having authority over the natu-
ral resource management and self-governance, under this Act gram sabhas (village assemblies con-
stituted of all the adults in the village or in a group of villages that elect Panchayat or village coun-
cil) gained many important roles. Gram sabhas were entitled to protect their cultural identity, com-
community resources, modes of dispute resolution, the right to endorse governmental plans within their
jurisdiction. They also have to be consulted prior to the land acquisition for development project in
scheduled area (tribal dominated area) (Menon, 2007). Unfortunately, PESA has been diluted on the
states’ level and obstructed (see: Patnaik, 2007; Menon, 2007), although, together with the recogni-
tion of traditional tribal rights over the community resources, has certainly sown the seeds of the
Forest Right Act.
Apart from few pro-tribal and inclusive legislation attempts, the stringent conservation measures were still present and balance between human rights and nature protection was again shifted in 2002. That year Wildlife protection Act was enacted and it “has made no reference to the Panchayat Extension to Scheduled Area Act (PESA) and has withdrawn continuance of rights even after the final notification of a protected area” (Patnaik, 2007: 4). On 3 May 2002, Indian Ministry of Environment and Forests’ (MOEF) issued order for evictions of “encroachers” from forest lands and this affected thousands of forest adjacent people who had not their rights settled (Springate-Baginski et al., 2009, Patnaik, 2007).

2.3. “Commoning” of the Enclosures

In 2006, Indian government enacted the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act (FRA) that officially started with implementation on 1st January 2008 after the notification of the administrative Rules. This Act represent a change from previous Acts, because it asserts traditional rights over forests resources and forest lands to the tribal population who were in occupation of the land prior to 13 December 2005. Other traditional forest dwellers have to prove their occupation of the forest for the last three generations (75 years). As stated by Patnaik (2007), this Act is very important because it can be understood as the acknowledgement that colonial ways of forest management have failed, especially after India evidenced evictions and criminalisation of the subsistence activities of millions of forest dwellers (Kothari, 2008).

The FRA apply to all forest lands and assign both individual and communal rights. The rights over community forest resource (traditional common forest land within the boundaries of the village, also including protected areas (Patnaik, 2007)) give the tribal people the authority to manage, use and control forests as common property. The Act also include the right to hold and to live in the forest land using traditional cultivation practices. It provides community rights (such as nistar and the ones used in the zamindars and Princely States) and the right to manage community forest resources. It recognises the right of communal ownership and access to collect and use minor forest produce, produces of water bodies, and rights to grazing. FRA gives rights over disputed land; conversion of pattas, leases and grants to titles; right of settlement and conversion of all forest villages into revenue villages; the right to settlement in the old habitation and un-surveyed village; access to biodiversity and community right over intellectual property and traditional knowledge related to
biodiversity and cultural diversity. Furthermore, the Act, gives rights to *in situ* rehabilitation to the illegally evicted or displaced Scheduled tribes and other traditional forest dwellers. A forest area of up to one hectare can also be diverted into land for construction of certain state-governed facilities such as schools, hospitals, roads, telecommunication lines, community centres and similar. Gram Sabha should recommend these development projects.

Many fears and negative critiques emerged before and during the implementation of the FRA and various details of the text have been disputed. For example, Saravanan (2009) argues that the FRA will cause more problems than give solutions, since it will return tribals to the forests, instead of ensuring their development. Also, the problem of alienated land by non-tribal people, that were occupying land in the tribal belts pushing the tribal communities more into hills, becomes justified and legitimised by the Act. Or, as many conservationists NGOs have argued against the enactment, if people are given rights over forest land and produces, this will increase forest degradation and have negative effects to the wildlife (protected by Forest Conservation Act, 1980 and Wildlife Protection Act, 1972 respectively). Finally, non-tribal groups can easily misuse the claims on the tribal rights, especially within the inadequately defined category of “other forest dwellers” (Saravanan, 2009).

Nevertheless, researchers connect poverty aggravation with the natural resources enclosures (of the communal land or the land that used to be in open access regime) (see Robins *et al.*, 2009) and following that argument, FRA can be important for the poverty alleviation since it provides rights over the state land to impoverished forest dwellers, “commoning the enclosures” (Springate-Baginski *et al.*, 2009). This is also confirmed through myriad of attitudinal research (see Section 3) that brought to light substantial number of costs created to the locals living next to enclosed, protected areas, influencing their quality of life.

In the attempt to correct the “historical injustice”, the FRA is of great importance for the tribals and their livelihoods and since all depends on the valid implementation, only time will tell whether this injustice has been rectified.
3. Attitudes towards managed natural areas: literature review

Researchers have studied local residents attitudes towards protected areas (PAs), specially in developing countries, but the analysis of attitudes towards others, less-restricted, categories of protection is scant.

From the literature on local residents attitudes towards PAs, we know that attitudes can be partly determined by individual, household, and community socio-economic characteristics. Previously studied factors include age (Fiallo and Jacobson, 1995; Mehta and Heinen, 2001; Dolisca et al., 2007; Triguero-Mas et al., 2010; Shibia, 2010), length of residence (Newmark et al., 1993; Fiallo and Jacobson, 1995; Heinen and Shrivastava, 2009; Triguero-Mas et al., 2010), ethnicity (Heinen, 1993; Mehta and Kellert, 1998; Ostwald and Baral, 2000; Heinen and Shrivastava, 2009; Triguero-Mas et al., 2010), gender (Mehta and Kellert, 1998; Ostwald and Baral, 2000; Mehta and Heinen, 2001), affluence and income (Infield, 1988; Newmark et al., 1993; Mehta and Kellert, 1998; Heinen and Shrivastava, 2009), education level and literacy (Infield, 1988; Heinen, 1993; Fiallo and Jacobson, 1995; Mehta and Heinen, 2001; Dolisca et al., 2007; Heinen and Shrivastava, 2009; Triguero-Mas et al., 2010, Shibia, 2010), land ownership (Infield and Namara, 2001, Heinen and Shrivastava, 2009; Triguero-Mas et al., 2010, Shibia, 2010), household size (Triguero-Mas et al., 2010), occupation (Infield and Namara, 2001; Heinen and Shrivastava, 2009; Shibia, 2010) as well as distance from a protected area (Shibia, 2010). However, all these attributes show different and inconsistent associations with the attitudes towards PAs.

Previous research suggests that attitudes towards the staff managing the PA and the perceptions of management practices are also influential factors to overall attitudes towards protected area (Newmark et al. 1993; Ormsby and Kaplin, 2005; Allendorf, 2007). For example, fear of resettlements and lack of job provisions (Allendorf, 2007) lead to negative attitudes. The same repercussions have negative interactions with management staff (such as rude behaviour (Ormsby and Kaplin, 2005) and harassment of local people by park rangers (Infield and Namara, 2001))

Research also show that access to the resources is very important for the positive attitudes of local communities. Conflicts with forest managers due to resource extraction, strict rules on forest resource use or complete loss over access to natural resources within the PA have been proven to con-
tribute to negative attitudes of people toward managed area (Newmark et al., 1993; Obua et al., 1998; Silori, 2007; Allendorf, 2007; Heinen and Shrivastava, 2009; Shibia, 2010).

Researchers have also suggested that low level of knowledge or awareness about park, conservation issues and management practices can be associated with negative (Infield, 1988; Fiallo & Jacobson 1995) or ambivalent attitudes (Ormsby and Kaplin, 2005) towards protected area. In contrast, in an empirical study conducted in Asam, Heinen and Shrivastava (2009) have found that high level or regulatory awareness is associated to negative conservation attitudes. Lack of involvement of local community into decision-making process was also found to be one of the important determinants of people’s negative attitudes and the same effect has inclusion in the groups for the forest management (Fiallo & Jacobson 1995; Ormsby and Kaplin, 2005; Silori, 2007 Dolisca et al., 2007, see also Arjunan et al., 2006).

Past research has unveiled that people are more likely to appreciate forests or managed natural areas, if they see the benefits from management scheme and surrounding ecosystem (Infield, 1988; Fiallo and Jacobson 1995; Mehta and Kellert, 1998; Mehta and Heinen, 2001; Ormsby and Kaplin, 2005; Shibia, 2010). These benefits can be obtained through resource extraction (Allendorf, 2007), employment, development and tourism (Fiallo and Jacobson, 1995; Mehta and Kellert, 1998; Allendorf, 2007) as well as environmental preservation (Allendorf, 2007). Some of the authors calculated summary indicator as a proxy for the costs and benefits of managed area, finding that economic costs (Triguero-Mas et al., 2010) and benefits (Dolisca et al., 2007) significantly influenced attitudes, in contrast to other costs, such as environmental and social (Triguero-Mas et al., 2010). In contrast to previous finding and frequently not being emphasised, non-economic benefits, such as recreation and aesthetics, can play important role in the positive attitudes towards PAs (Allendorf, 2007; Silori, 2007).

In general, benefits (regardless of type) have to be adequate to offset the costs to lead to positive attitudes towards managed area (Fiallo and Jacobson, 1995; Shibia, 2010) and if not, perceptions of costs created by PAs lead to overall negative attitudes. Examples of PAs cost on local residents include wildlife damages to crops (De Boer & Baquete, 1998, Infield and Namara, 2001; Heinen and Shrivastava, 2009; Shibia, 2010), livestock depredation (Infield and Namara, 2001; Shibia, 2010) and loss of human life (Shibia, 2010).
4. Study objectives

The aims of the study are 1) to assess local resident’s overall attitudes towards reserved forests and discern main factors that influence those attitudes, 2) to assess level of knowledge about the Forest Rights Act and determine if this is associated with the overall attitudes, 3) to determine attitudes and knowledge about the Forest Department, a main forest agency in the state, 4) to observe the link between people’s participation in a tribal groups and 5) socio-economic attributes with the overall attitudes towards RFs, and 6) to compare attitudes towards RF within different types of forest land tenure systems (protected areas and coffee estates that surrounds the reserve forests).

5. Research questions and estimation strategy

Considering the previous research on local resident’s attitudes towards other types of protected areas, we hypothesised that the level of knowledge of people’s rights and permissions will be associated to overall attitudes towards RFs (H1). We expected people to value forests more, if they are aware of all the benefits that this empowering Act can provide, thereby hampering the costs of living next to the reserved forest. Our second hypothesis is that the attitudes towards the reserved forests will be associated with the attitudes towards the Forest Department (H2). We expect the association to be positive, hence satisfaction with the Forest Department management practices and consequently, good relationship and trust between forest dwellers and FD, will lead to higher appreciation of the reserved forests. Furthermore, participation in tribal and community groups oriented to management (Village Council) or to gaining the profits from the forests (LAMPSs) is predicted to have the same effect (H3). We anticipate that forest dwellers actively involved into these groups, thus with the higher level of knowledge about the management aims as well as with the direct benefits from the forests, will appreciate reserved forest more that people who do not participate in those, as we anticipate, empowering organisations.

Estimation strategy. The following expression gives an estimation of the associations between parameters that we use in empirical research:

$$A_{ihc} = \alpha + \kappa K_{ihc} + \iota I_{ihc} + \gamma G_{ihc} + \epsilon_{ihc}$$
$A_{ihc}$ indicates attitudes towards reserved forest, where $ihc$ stands for individual, household and community. $K_{ihc}$ is the indicator of the knowledge about Forest Rights Act. $I_{ihc}$ stands for institutional attitudes, specifically towards forest department. $G_{ihc}$ denotes local people’s participation in tribal groups. Parameter $\varepsilon_{ihv}$ denotes a random error.

We expect the coefficient of the variable for knowledge ($\kappa$), institutional attitudes ($\iota$) and participation in groups ($\gamma$) to be positively associated with attitudes towards the RF (H1, H2 and H3). We control for a wide range of socio-economic attributes of the person and the household that have proved relevant on previous research on the topic.

In order to retain distinctions of the communities in the data analysis, the model was clustered by settlements. Namely, people from the same tribal colonies are most likely to have more similar perceptions due to the similar experiences with the Forest Department than the inhabitants from the different communities (Triguero-Mas et al., 2010). Moreover, some of the communities from the study are distant from each other both, in terms of location and composition of inhabitants, and this has to be taken into account while building the model.
6. Study background

The study was conducted in Kodagu district, Karnataka, Southwest India (Figure 1). Kodagu is located on the slopes of the Western Ghats, one of the world’s 34 biodiversity hotspots (Conservation International, 2007) and one of the eight hottest hotspots (Myers et al., 2000).

*Figure 1. Villages where data were collected (triangles) in Virajpet taluk, Kodagu district, Karnataka. WLS stands for Brahmagiri Wildlife Sanctuary, NP denotes Nagarahole National park and RF are reserved forests.*

Research focuses on the forested zones of Kodagu, specifically on the tribal colonies settled in areas under different types of land tenures. The area presents an ideal case to study local people’s attitudes of reserved forests for three different reasons:
a) RFs are next to other forested areas (agroforests and protected forests) which allows for a comparison between attitudes among inhabitants living under different types of land tenure systems

b) In each type of forest, locals have a long history of different forest use rights

c) People in the area have traditional ways of forest conservation. For example, local inhabitants, mainly Kodavas, worship and respect the nature and forests as a part of their tradition, considering some forests’ patches as sacred. This attitude can prompt local communities to support conservation projects (Sekhar, 2003; see also Silori, 2007).

6.1. Local population

Kodagu is administratively divided into three taluks (counties): Madikeri, Somvarpet and Virajpet. The majority of the population (86%) in this area is rural (Census of India, 2001). Economy is based on the primary sector and depends on forest products, agriculture and plantation crops (coffee, spices, oranges, etc). Kodagu inhabitants are a mixture of native and permanent migrant communities of agriculturist and dependent workforce (International Model Forest Network, 2008), although the culturally dominant community of the district are the Kodavas (or Coorgs), mainly landowners and cultivators (Neilson and Pritchard 2009). Gowdas are also distinct non-advasis dwellers of Kodagu.

Kodagu’s population also includes various indigenous communities, Scheduled Tribes (ST) (8.41%) and Scheduled Casts (SC) (12.29%) as well as members of Other Backward Castes (OBC). The main adivasi communities in this district belong to Yerava, Betta Kurubas and Jenu Kurubas, where the first two are the most numerous ST of Kodagu (Census of India, 2001). The tribal communities dwelling within the dense forested areas of Kodagu used to practice shifting cultivation, forest products gathering and hunting (Laval, 2008). Nowadays adivasis either cultivate land or engage in wage labour on the coffee estates or in the forests, since their traditional forest rights have been curtailed (Menon et al., 2009). However, some of them, like the Jenu Kurubas, also sustain their livelihoods by selling honey and other minor forest products to Large Scale Adivasi Multi-Purpose (LAMP) societies (sponsored by the government).
6.2. Environmental setting

This hilly district is estimated to have 46% of its territory covered with forests. State owned forested areas, including protected areas, reserved forests, protected and village forests, as well as jammamalaias (portions of the reserve forests with the hereditary right of growing cardamoms (Uthappa, 2004)), are managed by Karnataka Forest Department (Sathish et al., 2007).

Privately owned, shade-grown coffee plantations are also well wooded and they spread on 29% of Kodagu’s area (Sathish et al., 2007). Fields under wet rice paddy and ginger are also present in Kodagu’s landscape. There are also plantations of teak, eucalyptus and rubber, mainly owned by KFD, and plantations of cardamom and small tea areas mainly privately owned (Laval, 2008).

Natural and agroforest in Kodagu all together represent one of the densest forest systems in India and the district is recognised as biodiversity micro-hotspot (Satish et al., 2006). Coffee estates are mainly located in the central part of the district and they are surrounded by forested area enjoying a protected status: evergreen forest and Brahmagiri Wildlife Sanctuary on the West and deciduous forest with Nagarahole National Park and reserved forests on the East (Figure 1). Furthermore, inside the predominantly shade-grown coffee area there are also native forest patches, which, along with coffee plantations, provide multiple ecosystem services such as pollination, carbon sequestration, and water recharge. In addition, forest fragments increase landscape connectivity and serve as a migration corridors for many species (Chethana et al., 2010).

Kodagu produces one-third of the India’s coffee (Coffee Board of India, 2010). Over the last 30 years, coffee estates have steadily increasing in surface and cultivations practices have been intensified due to coffee market liberalisation, trade patterns and plantation economy or in short, global value chain dynamics. Those changes finally result in habitats and biodiversity loss, landscape simplification and diminishing provision of various ecosystem services (Garcia et al., 2007; Cheynier, 2006, Neilson and Pritchard, 2009).

6.3. Institutional arrangements: land tenure systems and resource use rights

A plethora of land tenures and protection regimes coexist in Kodagu (see Uthappa, 2004): from very strict protected areas that include wildlife sanctuaries and national parks, to reserved forests...
and the least stringent community forests with various uses, and to private lands and plantations. In this section I will briefly describe the three main types of land tenures analysed in this study: 1) national park (NP), 2) reserved forests and 3) private estates, mostly devoted to coffee. Each of those land tenure types have a different level of protection, and associated prohibitions and permitted activities and resource use.

NPs are under strict protection and they are state property. In NPs harvesting of forest produce for self-consumption or sale and cultivation practices are not allowed, although settlement of tribal and non-tribal communities within its boundaries is not prohibited (Shrinidhi and Lele, 2001 in Nanjundaiah, 2008). The Wildlife Division of the Karnataka Forest Department manages protected areas of Kodagu, although the PA buffer zones can be managed through participatory management jointly with eco-development committees (Laval, 2008).

Rajiv Gandhi (also known as Nagarahole) National Park (NNP) is located on the western part of the study area. Four of the studied communities are situated on its boundaries. Nagarahole NP covers an area of 644 km$^2$. It was designated in 1955 as game sanctuary (covering area of 285 km$^2$), and got the status of a National Park in 1983. In 1988, its limits were increased to its present size. Apart from moist deciduous forests, about 14% of the NP territory is under teak plantations (Mahanty, 2002) as legacy from the colonial period when forests were managed to secure forest produce (Mahanty, 2003). The NP has a conflictive history with many resettlements or “voluntary relocations” to the forest fringes in the rehabilitation zones of the NP. Relocations have been accompanied by continuos denial of forest access to inhabitants (see Mahanty, 2003). There is an ongoing resettlement process in the Park and 350 families were so far dislocated, but 1000 still live inside its boundaries (see DeFries et al., in press).

The second type of land tenure is reserved forest. These state owned forests have a long history of existence (proclaimed by Indian Forest Act of 1927). During the colonial period they were defined as forests “free from all claims”. The process of making forests reserves at the end of 19th century was the beginning of the tribal sufferings in colonial era, since demarcation negated the customary rights to tribal populations (Saravanan, 2009). In study area, the territorial division of Karnataka Forest Department manages reserved forests. However, some parts of RFs are managed jointly with village forests councils and eco-development committees (Laval, 2008). In these forests, locals have
rights to collect dead twigs and fodder but cultivation practices are prohibited. Only FD and contractors or lessees have the right to collect minor forest products and timber for commercialisation (Shrinidhi and Lele, 2001 in Nanjundaiah, 2008). In Kodagu, reserved forests cover an area of 1259.22 km² or 30% of the district area (International Model Forest Network, 2008).

Private properties include estates with coffee and other crops. Coffee estates were lands originally intended for wet paddy or horticulture and dry crops cultivation (under the local tenure systems of Sagu Bane, Jamma Bane and Hittala mane dala) However, those lands are now being increasingly converted to coffee cultivations (Shrinidhi and Lele, 2001 in Nanjundaiah, 2008). The Revenue Department (the state agency in charge of the assessment and collection of the land tax) is in control of these tenure regimes.

According to Neilson and Pritchard (2009) the recent forest decrease and the native tree cover change is generally happening in the privately owned bane lands and not in state owned property.
7. Methods of Data collection and analysis

7.1. Questionnaire

Data was collected between October 2009 and April 2010 among 20 tribal communities in Kodagu. In each community, based on accessibility criteria, we either a) interviewed all the adult population or b) randomly select a set of households and a random adult in each household to answer survey questions. Our total sample included 250 persons. Data was collected by means of structured questionnaire. The questionnaire was pre-tested, modified and adjusted to suit the situation on the field and to increase the questions’ clarity. The survey included both, open- and close-ended questions. All the interviews were conducted using translators fluent both in English and Kannada (official language in Karnataka) and the questions were always posed on the same way.

The questionnaire had three sections. The first part of the questionnaire was composed of demographic and socio-economic questions. Specifically, we asked about informant’s age, education, caste, gender, income, and household size. Because most of the respondents did not have regular monthly salary, to obtain information on personal income, we asked for the amount of income earned in the two weeks prior to the interview. Community closeness to a forested area (regardless of a tenure system or protection regime) was also noted, classifying the settlements into three spatial categories: inside a forest, on a forest border, and far from a forest (approximately in radius of more than 1km of the forest border).

The second part of the survey included questions on attitudes towards reserved forests. According to Ajzen and Fishbein’s attitude theory (1980), we defined attitudes as a psychological tendency of humans to evaluate attitude objects by favour or disfavour. Attitude is composed of beliefs that are sets of the relations between attitude objects and its various attributes (Ajzen and Fishbein, 1980 adapted from Allendorf, 2007). In our case, the attitude object are reserved forests, so we asked respondents “Do you like or dislike reserved forests?” and rated their attitude with a two point scale (like or dislike). The assumption of this theory is that, in answering to the question, respondents evaluate the attributes to the RF based on their beliefs, expressed in their overall attitude. This section of the survey also contained inquires on attitudes related to the Karnataka FD. Specifically, we asked informants “Are you happy with the management of the forest by the Karnataka Forest Department?” These attitudes are assessed by using a 5-point rating scale, where the value of zero cor-
respond to the lowest level of satisfaction with the management of KFD and the value of four to the highest level.

The third set of the questions aimed at collecting data on individual’s knowledge about the FRA and respondent’s participation in tribal groups. Specifically, to assess the level of knowledge about FRA, we asked informants about knowledge of each right granted in the Act. Similar to the actual rights granted with the FRA, we divided this question into the seven following categories: i) individual property rights; ii) intellectual property rights; iii) access to and control over communal forest land; iv) access to and control over forest products; v) right to protect communal forest land; vi) right to compensation after displacement, and finally, vii) knowledge about the provisions of land for the various facilities, schools, hospitals, electric and telecommunication lines, etc. Information on participation in various tribal groups was obtained by direct questions such as: “In how many groups/associations do you regularly participate?” and “Which one of those groups has activities oriented to conservation of forest and responsible use of natural resources?”

7.2. Statistical Analysis
Data were analysed by combining the descriptive and inferential statistics. Summary statistics were obtained for all the variables. When comparing responses of people living under different land tenures (national park, reserved forest, and coffee estates), Chi square and ordered probit regressions were conducted to assess significant differences between the groups.

A regression model was built to understand and predict which factors are associated with the overall attitude towards RFs. We use a discrete choice Probit model, a regression based on maximum likelihood estimation, for the analysis. Statistical analysis of the survey data and the modelling were carried out with STATA 9.1 software.

Dependent variable. The dependent variable, attitude towards RF, was composed of dichotomous values (taking zero for dislike and one for RF appreciation)

Independent variables. Three independent (explanatory) variables were generated for the regression model: i) Forest Right Act knowledge, ii) institutional attitudes, and iii) participation in tribal
groups. These variables were obtained by codifying the responses to corresponding questions and with some modifications directly included into the regression model.

The variable *Forest Rights Act (FRA) knowledge* was generated by adding the seven dummy variables created for each of the seven forest rights mentioned by respondent. Because only 20 respondents knew more than two rights, we then collapsed this variable into three categories: where “0” means absence of knowledge about FRA, “1” knowledge about one right and “2” indicates that person knows two or more rights.

The variable *institutional attitudes* was generated from the question about attitudes related to Karnataka Forest Department. We retained the scoring from 0 to 4 in the regression model.

For the creation of the *group participation* variable, we used the same procedure as for FRA knowledge indicator. For the analysis, we selected only participation in tribal groups, LAMPSs and Village Councils from the given answers. For each of the forest management group recorded, the dummy variable was created and finally summed into one variable. Summary indicator was divided into 3 subcategories (0, 1 and 2). Score “0” score means that respondent does not participate in any groups, “1” denotes participation in only one group and “2” stands for participation in two or more groups.

**Control variables.** Control variables included into the regression analysis encompassed individual, household and community characteristics. Specifically we include set of socio-economic attributes that, according to the literature, can influence the association between our dependent and independent variables. They were age, gender, tribal origin, education and income level, household size and community closeness to the forest. The variable for education used in the model had a dichotomous response, indicating if the respondent had formal education (taking value one) or no (equal to zero). We coded in a similar way the variable that captures the tribal origin of the informant (taking value one for participants of tribal origin and zero otherwise). Income level for two week period was divided into three categories from 0 to 3, where zero means no cash income, one indicates income range from 1 to 2500 rupees (INR 1 = US$ 0.022, April 2010), two income range from 2501 to 5500 INR, and category three denotes income higher than 5501 INR.
7.3. Potential biases and study limitations

The estimated coefficients might be affected by 1) differences in sampling, 2) measurement error, 3) omitted variables bias, and 4) reverse causality. First, not all data was randomly collected, but rather our sample is composed of two groups. For one group, we interviewed all the available adults in XX villages, while for the second group, we randomly selected adults from a census. Measuring errors can occur due to inconsistency in sample. This can affect both the values of explanatory variables and thereafter, magnitude of the marginal effects in our regression, since the marginal effects vary with the changes in the values of explanatory variable. To avoid measurement error, we can focus on the direction of the marginal effects in the analysis rather than on magnitude of the estimated regression coefficients.

Second, one question with dichotomous response capturing people’s attitudes of the RF might not be sufficient to capture all the dimension of the people’s appreciation of the reserved forests and thus, our model might be inaccurate and limited. Similarly, there might be other influencing variables that would affect the outcome of the regression analysis but those variables were not included or data were not collected in the field. For example, according to previous empirical research on attitudes, benefits and costs created by managed area strongly influence attitudes, however, these data was not incorporated within the model and this can bias our estimations.

Causality effect between in the overall regression model could not be inferred since we did not have instrumental variables to control for the endogeneity of explanatory variables. Consequently, relationship between dependent variable and the model variables is only associative and we are not able to detect if attitudes towards reserved forests influence the explanatory and control variables or this relation goes in opposite direction.

Moreover, we got high percentage of RF appreciation among answers, and this fact can strongly influence our results and estimations because we have low variability in dependent variable. This could be due to complacency bias that is ubiquitous systematic error, since the people tend to answer what they think it is expected from them.
8. Results

8.1. Description of the sample

The respondents’ age ranged from 16 to 85 with an average of 37.9 years (±15.289 SD). There were 146 (58.4%) males and 104 females (41.6%) participating at the survey. Nearly half of the respondents did not have any formal education (48.8%). The vast majority (90%) of the respondents belonged to the Scheduled Tribes out of which 73.8% were Jenu Kurubas, 23.1% were Yeravas and the rest (3.1%) belonged to Betta Kuruba and Girijana tribal groups. In the overall sample, 4% of respondents belonged to Other Backward Castes (OBC) and 6% to Scheduled Castes. Households had between one and fourteen individuals with an average of 5 (± 2.339 SD) individuals per household. Income for two weeks period ranged from 0 to 75000 INR with an average value on 3667.14 INR (±5312.277 SD). Two percent of the interviewees had no cash income during the two weeks prior to survey and 85.6% had reported two weeks income to be up to 5500 INR. Majority of the respondents (73.82%) lived inside the forest, 13.09% inhabited the forest borders, and a similar number of the respondents, 13.09%, lived far outside the forest boarders (Table 1).
Table 1. Summary statistics of the variables included in the multiple regression analysis (N=250). Frequency distributions are listed for the categorical variables. For the continuous variables, table shows mean value with the standard deviation in the parenthesis.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Attitudes towards Reserved Forest (0=dislike, 1=like)</th>
<th>0.90 (± 0.306)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variables</td>
<td>Knowledge about Forest Right Act (no knowledge=0, knows only for one right=1 and knows for 2 and/or more rights=2)</td>
<td>0 = 80.80%; 1 = 5.60%; 2 = 13.60%</td>
</tr>
<tr>
<td></td>
<td>Institutional attitudes (not happy at all=0, very happy with the KFD forest management=4)</td>
<td>0 = 20%; 1 = 8.40%; 2 = 10.80%; 3 = 18.40%; 4 = 42.40%</td>
</tr>
<tr>
<td></td>
<td>Participation in Tribal Groups (not participating=0, participate only in one group=1 and participate in 2 and/or more groups=2)</td>
<td>0 = 82.80%; 1 = 10.80%; 2 = 6.40%</td>
</tr>
<tr>
<td>Control Variables</td>
<td>Age of an informant (in years)</td>
<td>37.90 (± 15.289)</td>
</tr>
<tr>
<td></td>
<td>Tribal Origin (yes=1)</td>
<td>0.90 (± 0.300)</td>
</tr>
<tr>
<td></td>
<td>Gender of an informant (male=1)</td>
<td>0.58 (± 0.494)</td>
</tr>
<tr>
<td></td>
<td>Education (no formal education =0, some level of formal education=1)</td>
<td>0.51 (± 0.500)</td>
</tr>
<tr>
<td></td>
<td>Household size</td>
<td>4.99 (± 2.34)</td>
</tr>
<tr>
<td></td>
<td>Level of income for two weeks period (no income=0, 1-2500 INR=1, 2501 - 5500 INR=2, more than 5501 INR=3)</td>
<td>0 = 2%; 1 = 42.40%; 2 = 43.20%; 3 = 12.40%</td>
</tr>
<tr>
<td></td>
<td>Community closeness to a forest (estimation; inside the forest=1, border=2, far from the forest=3)</td>
<td>1 = 73.82%; 2 = 13.09%; 3 = 13.09%</td>
</tr>
</tbody>
</table>
8.2. Attitudes towards Reserved Forests

The vast majority of the respondents (89.6%) expressed a positive attitude towards reserved forests. When analysing attitudes by land tenure type (Table 2), we found that 94.29% of the inhabitants of the coffee estates expressed positive attitudes towards the reserved forests, while somewhat less positive attitudes had respondents who live in the protected areas (RF and NP). The highest percentage of the negative attitudes towards RF was found in the sub-sample of the reserved forests dwellers (12.8%) while 10.64% of the people living in the Nagarahole NP had negative attitudes. Despite those slight differences, results of the Pearson chi square test did not revealed significant difference in attitudes of people living under different land tenure systems ($\chi^2 = 2.4620, p= 0.292$).

8.3. Independent variables

8.3.1. Knowledge of the Forest Rights Act

Average knowledge of the Forest rights Act was low: 80.8% of the respondents had no knowledge about the FRA at all, while 5.60% knew only one right category out of seven inquired. 13.60% of the referees were familiar with more than one right granted under the FRA (Table 1). The lowest knowledge score was found among inhabitants of coffee estate area (0.13 ± 0.479 SD) where 92.86% of the respondents did not have any knowledge of the FRA (Table 2). The highest knowledge score of the FRA was found among Nagarahole NP dwellers (average indicator value 0.49 ± 0.831 SD). Yet, only 27.66% of those people were aware of their rights. Using an ordered probit model and the same variables as in core regression model, we compared knowledge about FRA from the people inhabiting the three analyzed land tenure types (not shown). We found significant differences in knowledge about FRA between those three land tenure types (NP coefficient=5.05, RF coefficient=2.18, p<0.05).

8.3.2. Institutional Attitudes

Regarding attitudes towards Karnataka Forest Department, 60.80 % of informants stated that they were generally happy with KFD management of the forest, 28.40% were unhappy, and 10.80% were indifferent (Table 1). Most of the NP dwellers (61.70%) where unsatisfied with the Forest Department management; only 21.28% expressed satisfaction with the management practices, and a notable percentage (17.02%) of the respondents expressed indifference (Table 2). 21.80% of RF and 18.57% of CE inhabitants had negative attitudes regarding KFD. Results from an ordered probit
model showed statistically significant differences in the institutional attitudes among inhabitants of the CE and NP (coefficient=-1.114, p=0.001) (data not shown). However, there is no significant difference in attitudes between residents of CE and RF (p=0.2).

8.3.3. Participation in the tribal groups

Participation in the tribal groups was very low (17.2%) (Table 1). Only 10.80% of the surveyed people was participating in one of the groups (tribal groups, village councils or Gram Panchayats, and LAMPSs) and only 6.40% were members of more than one group. The highest number of group memberships was found to be within the territory of reserved forests (one-third of the respondents living in this area) (Table 2). Contrary, within coffee estates there are no memberships found in the sample. Within Nagarahole NP only 3 people reported participation.

Table 2. Summary statistics of the independent variables, attitudes towards reserved forests, knowledge about Forest Rights Act and institutional attitudes by three land tenure systems (The scoring details are explained in the section “Data collection and analysis”)

<table>
<thead>
<tr>
<th>Var. Name</th>
<th>Var. Scores</th>
<th>Coffee Estates</th>
<th>Reserved Forests</th>
<th>Nagarahole NP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Obs.</td>
<td>%</td>
<td>Obs.</td>
<td>%</td>
</tr>
<tr>
<td>Attitudes towards RF</td>
<td>Dislike</td>
<td>4</td>
<td>5.71</td>
<td>17</td>
<td>12.78</td>
</tr>
<tr>
<td></td>
<td>Like</td>
<td>66</td>
<td>94.29</td>
<td>116</td>
<td>87.22</td>
</tr>
<tr>
<td>Knowledge about FRA</td>
<td>0</td>
<td>65</td>
<td>92.86</td>
<td>103</td>
<td>77.44</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1.43</td>
<td>10</td>
<td>7.52</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>5.71</td>
<td>20</td>
<td>15.04</td>
</tr>
<tr>
<td>Institutional attitudes</td>
<td>0 (dislike)</td>
<td>10</td>
<td>18.57</td>
<td>19</td>
<td>21.80</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>18.57</td>
<td>10</td>
<td>21.80</td>
</tr>
<tr>
<td></td>
<td>2 (indifferent)</td>
<td>6</td>
<td>8.57</td>
<td>13</td>
<td>9.77</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>14</td>
<td>72.86</td>
<td>29</td>
<td>68.42</td>
</tr>
<tr>
<td></td>
<td>4 (like)</td>
<td>37</td>
<td>62</td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td>Mean Score</td>
<td></td>
<td>2.93</td>
<td>2.79</td>
<td>1.30</td>
<td>2.55</td>
</tr>
<tr>
<td>Total Sample</td>
<td></td>
<td>70</td>
<td>0.28</td>
<td>133</td>
<td>0.53</td>
</tr>
</tbody>
</table>
8.4. Multivariate analysis

Table 3 shows the results of a probit regression model estimating coefficients as the marginal probability of liking the RF when a categorical explanatory (e.g. institutional attitudes) variable increased by one unit above its mean value. For the continuous independent variables (such as age), the model reports infinitesimal probability changes, but for the dummy variables (e.g. gender), the model reports discrete changes in the probability.

We found a statistically significant and positive association between overall attitudes towards reserved forest and two explanatory variables: knowledge about Forest Right Act (coefficient=0.022) and the institutional attitudes (coefficient=0.065). The increase of the knowledge score for one category over the sample mean of 0.33, was associated with a 6.5% greater probability of expressing positive attitudes towards the RF (p<0.05). The increase in the score of institutional attitudes for one category over the sample mean of 2.55, leads to 2.2% increase in the probability of expressing positive attitudes towards the RF (p<0.05). The participation in tribal groups had not proven to be associated with overall attitudes towards RF.

Socio-economic variables were less powerful in predicting overall attitudes towards the reserved forests. Only age and household size were statistically significant in the model. Age was negatively associated with the attitudes, showing how younger people appreciate more the Reserved forest than older inhabitants. Moreover, ageing of informants can decrease the probability of change towards positive attitudes related to RF for 0.3% (p=0.001) over the sample mean of 38 years. Contrary, household size was positively associated, indicating that people from bigger households appreciate more RF than respondents in smaller households. An additional individual in the household, over the household size mean of 4.98, increases the probability of people liking the RF in 1.2% (p<0.01).
Table 3: Probit model explains factors that are associated with the attitudes towards the reserved forest (N=250). Model is clustered by settlements. Coefficients represent marginal probability. Sign shows a type of association and the asterisk denotes level of significance (* significant at 10%; ** significant at 5%; *** significant at 1%). Robust standard errors are in parentheses. Parameter $R^2$ is a measure of goodness of fit.

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Attitudes towards Reserved Forest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variables:</td>
<td></td>
</tr>
<tr>
<td>Knowledge about Forest Right Act [H1]</td>
<td>0.065 (0.027)**</td>
</tr>
<tr>
<td>Institutional attitudes [H2]</td>
<td>0.022 (0.010)**</td>
</tr>
<tr>
<td>Participation in Tribal Groups [H3]</td>
<td>-0.030 (0.025)</td>
</tr>
<tr>
<td>Control variables:</td>
<td></td>
</tr>
<tr>
<td>Individual level</td>
<td>Age of informant</td>
</tr>
<tr>
<td></td>
<td>Education (yes=1)</td>
</tr>
<tr>
<td></td>
<td>Tribal origin (yes=1)</td>
</tr>
<tr>
<td></td>
<td>Gender (male=1)</td>
</tr>
<tr>
<td>Household level</td>
<td>Household size</td>
</tr>
<tr>
<td></td>
<td>Level of income (for 2 weeks period)</td>
</tr>
<tr>
<td>Community level</td>
<td>Closeness to the forest</td>
</tr>
</tbody>
</table>

Pseudo $R^2 = 0.2035$  
Prob > chi2 = 0.0000

8.4.1. Robustness analysis
To test the consistency of the results, we ran a series of probit regressions (Table 4) with variations in the specifications of the core model (Table 3). In the first model [1], we ran the same regression as for the core model, but we changed the definition of FRA knowledge indicator and its’ scores ranged from 0-7 after the change (counting the number of correct answers for the each seven right inquired, without aggregating into the subcategories). The second regression [2] included a dummy variable for knowledge of FRA instead of aggregated knowledge indicator from the core model. The third model [3] included dummy for institutional attitudes differentiating between individuals that expressed lowest level of satisfaction with the KFD management practices (value 0) and the rest of sample (value 1). In models [4], [5] and [6] we added additional control variables that
showed influence in attitudes towards forests in the previous empirical research. These included individual-level attributes, such as length of residence, occupation and one household parameter, the area of the cultivated land. Model [7] did not include individual- and community-level control variables. Model [8] was ran without clustering by settlements.

Core model proved not to be sensitive to the induced changes and the probability coefficients of the independent variables remained stable with the same sign and significance level.

Table 4. Robustness test: Regressions of attitudes towards RF (dependent variable) against institutional attitudes, FRA knowledge and participation in tribal groups with controls (N=250). Asterisk denotes level of significance * at 10%; ** at 5%; *** at 1%. Robust standard errors are in parentheses.

<table>
<thead>
<tr>
<th>Model</th>
<th>Knowledge about Forest Right Act [H1]</th>
<th>Institutional attitudes [H2]</th>
<th>Participation in Tribal Groups [H3]</th>
<th>Changes made to Table 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Model</td>
<td>0.065**</td>
<td>0.022**</td>
<td>-0.030</td>
<td>No changes</td>
</tr>
<tr>
<td>[1]</td>
<td>0.045**</td>
<td>0.021**</td>
<td>-0.027</td>
<td>Knowledge about FRA score range from 0 to 7</td>
</tr>
<tr>
<td>[2]</td>
<td>0.059**</td>
<td>0.023**</td>
<td>-0.031</td>
<td>Knowledge about FRA score range from 0 to 1</td>
</tr>
<tr>
<td>[3]</td>
<td>0.065**</td>
<td>0.078**</td>
<td>-0.036</td>
<td>Institutional attitudes score range from 0 to 1</td>
</tr>
<tr>
<td>[4]</td>
<td>0.066**</td>
<td>0.021**</td>
<td>-0.029</td>
<td>Added length of residence</td>
</tr>
<tr>
<td>[5]</td>
<td>0.070**</td>
<td>0.023**</td>
<td>-0.034</td>
<td>Added occupation</td>
</tr>
<tr>
<td>[6]</td>
<td>0.063**</td>
<td>0.023**</td>
<td>-0.031</td>
<td>Added area of cultivated land added</td>
</tr>
<tr>
<td>[7]</td>
<td>0.085**</td>
<td>0.029**</td>
<td>-0.041</td>
<td>Included only household-level control variables</td>
</tr>
<tr>
<td>[8]</td>
<td>0.065**</td>
<td>0.022**</td>
<td>-0.030</td>
<td>Clustering by settlements was not applied</td>
</tr>
</tbody>
</table>
9. Discussion

Several important findings emerge from the results. First, there is a high level of appreciation of the reserved forest in the overall sample. Second, positive attitudes towards RFs are associated to knowledge about Forest Rights Act and the institutional attitudes. Third, participation of the local people in the tribal groups is not associated to the attitudes towards RF.

9.1. Attitudes towards Reserved Forests

The first finding is consistent with the previous research done on the topic where rural local communities have substantial level of appreciation of protected area (De Boer and Baquete, 1998; Gillingham and Lee, 1999; Mehta and Heinen, 2001; Triguero-Mas et al., 2010; Vodouhê et al., 2010). Although, in some studies this is opposite (Ite, 1996; Heinen and Shrivastava, 2009). However, we have to be careful with this conclusion due to complacency bias since this appreciation in reality might be lower then reported in our results and this issue is already discussed elsewhere (see de Boer and Baquete, 1998; Triguero-Mas et al., 2010).

Previous studies, have shown that attitudes vary within locations, probably due to different management objectives and history, levels of access to resources, different costs or benefits created by managed area (Ormsby and Kaplin, 2005; Allendorf, 2007; Heinen and Shrivastava, 2009). In the research presented here, however we did not find statistically significant difference when comparing attitudes within different tenure systems: Nagarahole National park, reserved forest and coffee estate. Consequently, for the appreciation of the forests, the locations of the settlements are not so important in our sample. This might be due to small distances within the research locations and similar influences of RFs values to the social actors encompassed by this study. Moreover, in our robustness test (Table 4) when the clustering by settlements was omitted from the regression in Model [8], estimated coefficients remained equal to the ones in the core model, and this result support the aforesaid.

9.2. Reserved forests and knowledge about FRA

Even two years after this Act was implemented (2008), the knowledge level of FRA is still very low (only 19.2% in our sample has some knowledge of the FRA). Plausible reason might be found in low level of education as well as low participation in the tribal groups in the sample, since these
facts hindered the ability of local populations to access the information and apply for claims to the forest land. As shown in the multivariate models, the FRA knowledge (dependent variable) was positively and significantly associated to tribal group participation and education, and negatively associated to household size. The informants from the NNP and RF had higher level of FRA knowledge compared to people from coffee estates. However, none of the respondents living in the coffee estates area did participate in tribal groups in contrast to NP and RF dwellers and these all clearly reflects FRA knowledge scores of NNP, RF and CE populations (Table 1 and 2).

Despite low levels of knowledge, attitudes are found to be associated with the knowledge about the Forest Rights Act. Better knowledge of the FRA increased the likelihood of the positive attitudes towards the RF. This can be explained by the fact that people with the secure land tenure and the legal access to forest that this new Act provides, not bearing all the cost of RF protection regime. Benefits gained by this Act may overcome the hitherto costs of living close to the reserved forest and positively influence people’s attitudes. Those results suggest that rising the level of environmental education and informing the people about their rights would be necessary in order to achieve proper implementation of the Act so they know and completely understand the basis for accessing their rights and claims.

9.3. Reserved forests and institutional attitudes

People do like forests and they rely on them, but they frequently do not approve the management practices (Newmark et al., 1993; Allendorf et al., 2007). However, in our sample, overall satisfaction with the Karnataka Forest Department was 60.8%. Moreover, people were more likely to appreciate reserved forests if they are satisfied with the management staff. This result concur with the previous empirical research that emphasised the importance of the good relationship between local communities and the management staff (Gillingham and Lee, 1999; Mehta and Heinen, 2001; Allendorf, 2007)

Although institutional attitudes are mostly positive in the overall sample, there was variation according to land tenure systems. This finding can be connected with the cost and benefits associated with the different land tenure systems and protection regimes. In addition, multivariate analysis showed that the negative institutional attitudes (dependent variable) are associated with the tribal origin of the respondents and the distance of their settlements to the forest. Respondents who had
the most negative attitudes towards FD are the one living in the territory of the Nagarahole NP. The
closeness to forest and thus, contact of the locality with the forest department were in this protected
area obviously prevalent determinants of attitudes towards managing institutions. This fact is not
surprising since NP dwellers have been exposed not only to bans on resource extraction for their
livelihoods needs, but also they experienced loss of job opportunities and evictions to the park
fringes (Mahanty, 2002). On the other hand, inhabitants of the coffee estates do not have much con-
tact with the FD and consequently, their satisfaction with the FD management is highest (72, 86%).
When compared to two other categories, residents of the RF were moderately satisfied with the
management practices (68,42%). This result can reflect the differences in the resource access.
Namely, NP dwellers have possibility to legally extract some resources and gain more benefits then
the people directly under the NP regime with stricter conservation policy.

9.4. Reserved forests and participation in tribal groups
Connection between RF attitudes and the participation in the tribal groups was not proven to be im-
portant in our sample. However, although not significant, the association was negative and this find-
ing is not as hypothesised. Lower appreciation of the forests associated to the participation in the
tribal groups might indicate that there are deep power structures incorporated in those groups, and
all voices cannot be heard properly, thus the participation in those groups do not finally lead to em-
powering, but instead, lowering the appreciation towards forests since the participants cannot obtain
all the benefits or they are not aware of them. According to Berkes (2008), local elite gain all the
benefits when new managing groups are formed and the structure of society is reflected in the func-
tioning of those groups especially affected by “inequities of class and caste” (Agarwal, 2001: 1645).
Moreover, as Agarwal argues (2001), “participatory exclusions” of certain powerless groups were
observed in “ the many new governance structures being promoted today in the name of decentral-
ised institutional building” (Agarwal, 2001: 1645). Consequently, powerless, marginalised people
are included only in theory, but not in the practice. Nevertheless, more research has to be done to
examine the relation between these issues and local community attitudes towards forests.
10. Conclusion and Policy implications

Results from our research provide insights and a better understanding of people’s attitudes towards the reserved forests in India. Combination of different factors, policies and institutional settings, connected to forest resource use and access, influence attitudes in our study. Our results suggest that the appreciation of the forests is associated with the aims to address social concerns and to give the local communities rights and possibilities to improve their livelihoods. The good relationship with the resource stewards is also necessary for the people’s support of managed areas. Thus, mentioned issues have to be one of the main priorities of the sustainable management of natural resources in multifaceted society such as India. Moreover, participation in various tribal and forest management groups that lead to profit gains or to inclusion in the resource management, was not associated to attitudes towards forests. Reasons for this has to be elaborated in the future research since participation has been seen as panacea and “miracle tool” for resolution of conflicts between different forest users (see Rishi, 2007), but in our study is not found to be relevant.

It is not clear whether attitudes leads to sustainable behaviour (Karanth et al., 2008), and more thorough analysis should be done on this field. Furthermore, future research is needed to monitor if the Forest Rights Act effectively fits the needs of low-income forest-dependent population and what are the further implications of this policy. However, without proper implementation and transparency in application procedure, FRA will not have all its power and long term effects so these issues should be addressed both on the state but also on the local level. The “spatial variability” of knowledge about the Act, as confirmed with this study, is present even on the small distances, so locally adapted plans for awareness rising and environmental education is necessary to achieve positive policy effects on all levels. This is specially important for Indian context, that is a country with the vast biological but also cultural diversity.
11. References


Mahanty, S (2002) NGOs, Agencies and Donors in Participatory Conservation: Tales from Nagarhole. *Economic and Political Weekly*, **37**: 3757-3765


services count for farmers, consumers and the environment, September 17-21, 2007 Turrialba, Costa Rica


