

Do Property Rights Really Influence Forest Conservation and Management in Western Ghats of India?

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Abstract

(Keywords: Property Rights, Deforestation, National Park, State Property, Sacred Groves, Community Property, Plantation Area, Private Property, Western Ghats)

The failure of market in conservation and management of forest resources is well established by many researchers (Pearce and Moran, 1994; Dasgupta, 1997; Perrings, 2000). Forest resources are regarded as CPRs because of their public good nature and their management has become highly intricate and onerous task due to the free riding problem or non-excludability of potential users of an identifiable group of local community from obtaining benefits from the use of forest (Hardin, 1968) Therefore, Hardin observed that unless there is coercion or some other special device to make individuals act in their common interest rational and self-interested individuals will not act to achieve their common or group interests. Individuals independently exercising their various ownership rights influence resource condition in a region. Therefore, existing institutional structures (property rights) significantly affect peoples' behavior towards resources use pattern, ownership over resources, and their transferability, exclusion, encroachment, and deforestation and they also impact on the success of environmental protection programmes and halting deforestation (Bhattarai and Hammig, 2001). The present study, therefore, tries to address both theoretical and empirically how property rights exert a greater impact on the condition of forest resources in Western Ghats of India. In this background, the present study has been carried out in one of the rich biodiversity hotspots of the world, Western Ghats of India. The study uses analytical framework to examine the various factors such as underlying and proximate causes that affect the state of forests, environment and livelihood needs of local community in the study area. How these causes influence local communities'

behavior or attitude towards use and abuse of forest resources in the three different property right regimes viz., State Property (National Park), Community Property (Sacred Groves) and Private Property (Plantation Area) in the context of Kodagu district of Western Ghats of India.

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1. Introduction:

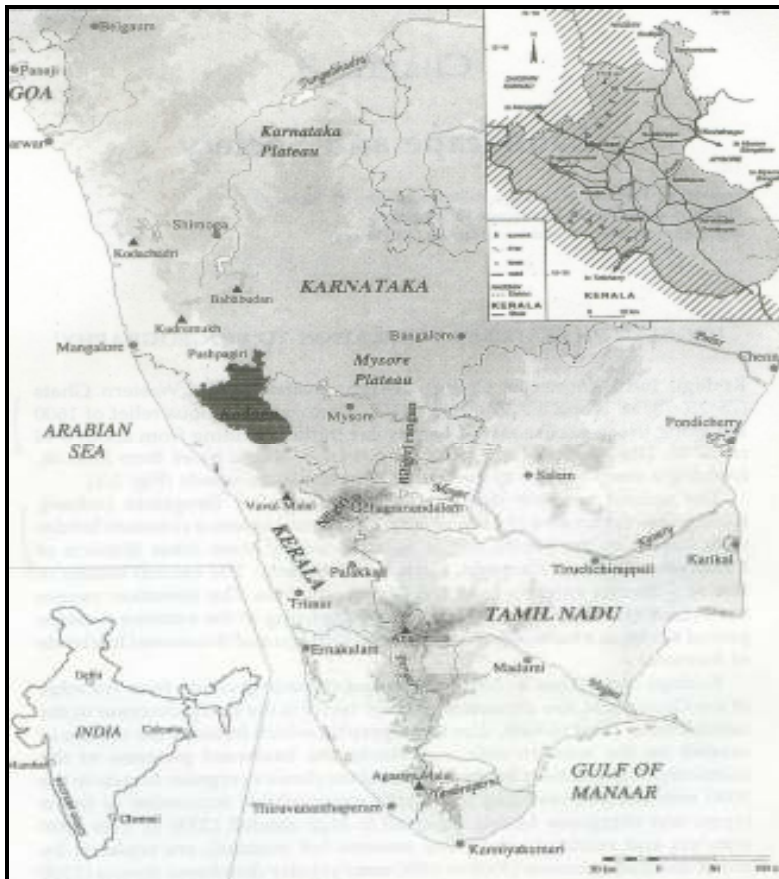
The failure of market in conservation and management of forest resources is well established by many researchers (Pearce and Moran, 1994; Dasgupta, 1997; Perrings, 2000). Forest resources are regarded as CPRs because of their public good nature and their management has become highly intricate and onerous task due to the free riding problem or non-excludability of potential users of an identifiable group of local community from obtaining benefits from the use of forest (Hardin, 1968) Therefore, Hardin observed that unless there is coercion or some other special device to make individuals act in their common interest rational and self-interested individuals will not act to achieve their common or group interests. Individuals independently exercising their various ownership rights influence resource condition in a region. Therefore, existing institutional structures (property rights) significantly affect peoples' behavior towards resources use pattern, ownership over resources, and their transferability, exclusion, encroachment, and deforestation and they also impact on the success of environmental protection programmes and halting deforestation (Bhattarai and Hammig, 2001). The present study, therefore, tries to address both theoretical and empirically how property rights exert a greater impact on the condition of forest resources in Western Ghats of India.

In this background, the present study has been carried out in one of the rich biodiversity hotspots of the world, Western Ghats of India. The study uses analytical framework to examine the various factors such as underlying and proximate causes that affect the state of forests, environment and livelihood needs of local community in the study area. How these causes influence local communities' behavior or attitude towards use and abuse of forest resources in the three different property right regimes viz., State Property (National Park), Community Property (Sacred Groves) and Private Property (Plantation Area) in the context of Kodagu district of Western Ghats of India.

2. The Study area: Kodagu District:

The Coorg district is an integral part of the Western Ghat region of Karnataka State. The Western Ghat is recognized as one of the important biodiversity “hotspots” in the Indian subcontinent. The district lies in the dense tropical belt of steep of Western Ghat mountains between North latitude $12^{\circ} 15^1 - 12^{\circ} 45^1$ and East longitude $75^{\circ} 25^1 - 76^{\circ} 14^1$. Blessed by the Mother Nature, Coorg is endowed with treasure of natural resources, lush vegetation, captivating steep mountains, silent and deep valleys, rivers and waterfalls. Coorg has mountainous topography of high ridges, with mountains varying between 850 m and 1745 m. This district is situated in this environmentally sensitive area. Kodagu is endowed with rich and unique biodiversity and it is referred to, as an “environmentally high potential area”.

Figure 1: The Location of the Study Area - Kodagu District of Karnataka, India



3. Objectives of the Study:

1. To study how root and proximate causes influence local communities behavior towards forest resource condition.
2. To examine the prevailing property rights regimes in Western Ghats of India particularly the Kodagu District.
3. To analyses the impact of existing institutional arraignments (Property Rights) on forest resource condition in the study area.
4. To examine whether different types of property right exert significant influence on different resource related outcomes such as conservation or deforestation.
5. To study the perceptions of local communities related to influence of property rights on their attitude towards forest conservation and appropriation under different property right regimes.
6. To study the different monitoring and enforcement mechanisms in the effectiveness of property rights regime.

4. Hypotheses:

1. Existing ill-defined property rights over forestlands exert positive influence expansion of area under plantation crops causing deforestation.
2. Sacred Groves under community management are better conserved compared to state managed National Park and privately owned and managed plantation area.

5. Methodology:

The research study has been carried out in Kodagu District of Western Ghats region in Karnataka, which is southern part of India. A total of 375 households from three different areas were selected and interviewed. Out of total 375 households surveyed, 175 households from State property (National Park), 100 households from Community Property (Sacred Groves), and 100 households from Private Property regimes (Plantation Area) were chosen for the study. For examining the above issues a thorough and detailed household survey was undertaken for collecting primary data in Coorg district of Western Ghat in Karnataka state representing three different forest

tenure regimes; Nagarhole National Park indicates National Park (State Management); Palur village symbolizes Sacred Grove area (Community Management) and Garvale village specifies Plantation Area (Private Management). The study used both primary and secondary data for interpreting the analysis. Random sampling technique was used in selection of households. The statistical techniques of averages, standard deviation, co-efficient of variation were used in analyzing the data. Chi-square tests were conducted to test hypotheses of the study. Pictorial illustrations are given for clear understanding of the issues.

6. The importance of Forest Resources of Kodagu District:

Forests have profound influence on the economy and environment of the Coorg district. Forest vegetation of Coorg can be classified in to three types, viz., wet evergreen forests, moist deciduous forests and dry deciduous forests, based on gradients of rainfall, length of the dry season and temperature. The evergreen forests are the richest and important types of forest vegetation, which are found largely in the Western part of Coorg. They have the highest species, richness and diversity and contain a large number of endemic species” (Ramesh and Pascal, 1997). As observed by Myers (1988) the species richness is highly endangered and this makes the Western Ghat one of the biodiversity hot spots of the planet. Wet evergreen forests comprise a total area of 1358.45 sq km representing 33.57 per cent of the total area of Coorg and 73 per cent of the total forest area. The dense evergreen forests represent 29 per cent of the total forest cover and 13 per cent of the total area. The moist deciduous forests are characterized by lower species richness, low canopy and biomass than the wet evergreen forests. The dense forest cover of this forest type is 48.51 sq km of the Coorg and represents 1.18 per cent of the total area and 2.63 per cent of the total forested area. Table 1 describes areas covered by forest type and dense forests (parentheses) of Coorg.

Table 1: Types of Forests in Coorg District (2000)

Sl.No	Forest Type	Area (sq km)	% Total Area	% Forest Area
1.	Ever Green:			
	A. Low Elevation	429.95	10.62	23.35
	B. Medium Elevation	(296.66)	(7.23)	(16.11)
	C. High Elevation	897.03	22.17	48.71
		(226.85)	(5.52)	(12.32)
2.	Moist Deciduous:	31.47	0.78	1.71
		(7.66)	(0.19)	(0.42)
3.	Dry Deciduous:	188.11	4.65	10.22
		(79.00)	(1.92)	(4.29)
4.	Secondary Moist Deciduous:	198.12	4.90	10.76
		(48.51)	(1.18)	(2.63)
	Total Forest Area	96.80	45.50	5.26
		1841.47	(16.04)	100.00
		(658.65)	2.39	(35.77)

Note: [Figures in parentheses represent dense forest cover in percentage

Source: Ramakrishnan et al, (2000).

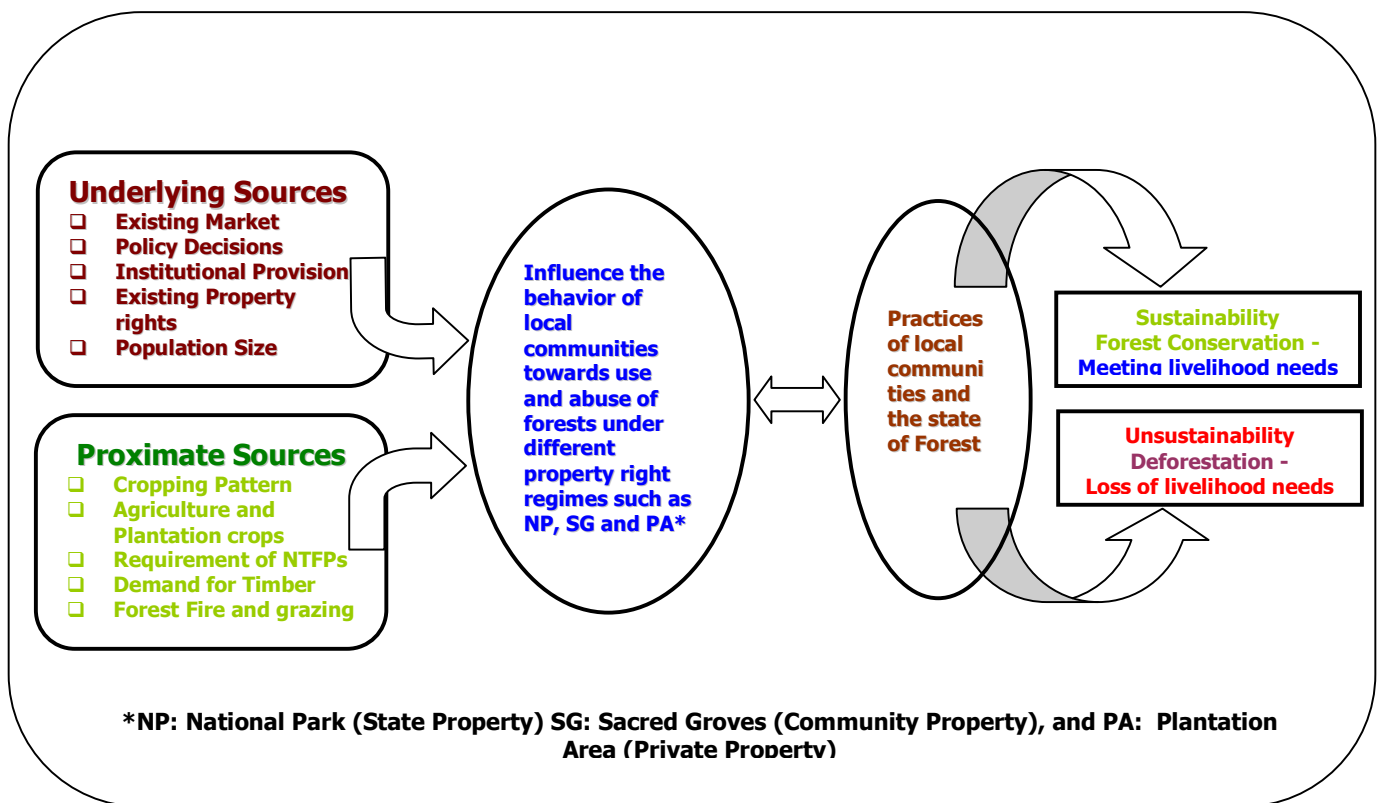
Biodiversity of Coorg is rich and diversified and some important valuable and rare species are present in different type of forest vegetation. As mentioned by Pascal and others (1988) “the species richness in Western Ghat forests has been estimated to be 100-174 species in low elevation evergreen forests, around 90-126 in medium elevation evergreen forests, between 90 and 100 species in high elevation evergreen forests, generally less than 50 species in moist deciduous forests and less than 30 in dry deciduous forests. The species richness relates to all the forests of Western Ghat. The richness of species diminishes from South to North, and Coorg forests are located at an average position in the species richness”. The diversified forest resources of Coorg, therefore, play an important environmental role in the stability of microclimate as well as global climate. Environmentalists have cautioned about the depletion and degradation of these forests at a steady pace in the last few decades.

The unique and diversified biodiversity however, has been to some extent retained in spite of fast degradation and depletion of forest cover owing to various factors. The forest ecosystem in the district is under profound pressure in recent decades. Loss of forest cover in the district is a serious threat not only to economy and livelihoods of local community, who are relying on forest resources for meeting their bonafide needs, but also environmental stability of the region. Deforestation due to unsustainable resource extraction may pose formidable and detrimental effects on economy and environment of this region. In order to conserve the significant mountain biodiversity it is indispensable to identify and understand the underlying and proximate, other socio-economic forces that drive such destruction of resources and lead to fragile resource condition and environment. Property rights are considered to be the important institutional arrangements, which effectively determine the state of forest resources. Forest resources of Kodagu district are managed under different property regimes consequently resource conditions differ from one property regime to other.

7. Theoretical Framework of the Study:

Many research studies (Pearce and Moran, 1994, Perrings, 2000, Dasgupta, 1997 and Repetto, 1997) have established the fact that the extent of forest degradation in a region is influenced by the underlying and proximate factors. Deforestation is however, closely associated with human behaviour and activities hence, it can be checked to a large extent provided, these interfaces are clearly comprehended. In fact, local communities would make decisions about use and abuse of forestlands and forest resources by taking into account the underlying causes. In fact, there are strong linkages among the root and proximate causes, the state of forests and environment and the local communities' behavior towards forest appropriation and conservation in the three property right regimes in the case study area of Coorg district.

Figure 2: Theoretical Framework of the Study depicting how Root and Proximate Causes influence local communities' behaviors which in turn influence resource condition



The study uses analytical framework to examine the various factors such as underlying and proximate causes that affect the state of forests and environment. And how they are influencing local communities' behaviour or attitude towards use and abuse of forest resources in the three different property right regimes viz., State property (National Park), Community property (Sacred Groves) and Private property (Plantation area) in the context of Coorg district (Figure 2). The theoretical framework is designed to clearly analyze how property rights influence resource condition in the study area. It illustrates the interrelationships among forests, environment and local community and how the root and proximate causes influence local communities' behaviour towards forest

resource use (conservation) and abuse (deforestation). The framework further depicts that how forest policies and deforestation undermine and affect different social groups and how local communities respond when their livelihoods are affected by environmental change. The study further analyses how the present decision making process can lead to the breakdown of forest resource management system and environmental degradation and how the new emerging conditions (property rights) affect the local communities' access to forest resources, how local communities' perception differs with the new situation, what solutions can motivate local communities' willingness to participate in the process of conservation and what are the costs and benefits associated with the conservation of forests? These and other important interfaces are analyzed in the study.

Generally the destruction of forests is attributed to underlying and proximate causes as observed by the many environmental economists in their studies (Pearce and Moran, 1994, Perrings, 2000, Dasgupta, 1997 and Repetto 1997). The underlying or fundamental causes are on the one hand rooted in the distortion of market, institutional failure, property rights failure, policy intervention and growth of population. Expansion of agriculture and plantation crops, change in cropping pattern, logging and timber exploitation, animal grazing, forest fires and introduction of exotic species are some of the important proximate causes of deforestation. Therefore, the framework, for analyzing deforestation in Coorg district, is designed for clear understanding of the problem and these causal relationships are highlighted in Figure 3.

Figure 3: The Conceptual Model of Root and Proximate Causes of Deforestation and Their Effects on Forest Resource Use Pattern, Deforestation and Environmental Effects in Kodagu District:

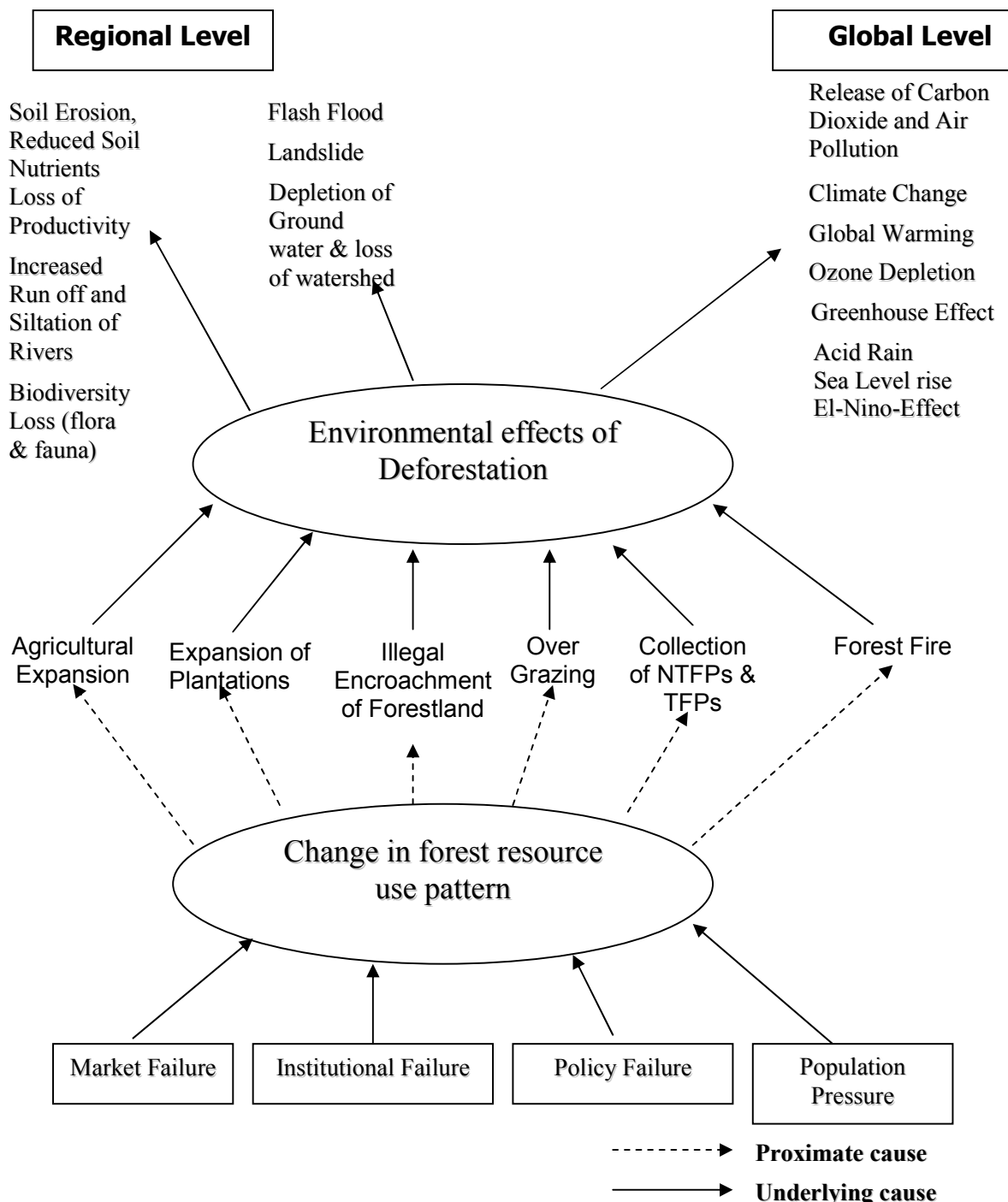


Figure 2 depicts the conceptual model of the root causes and proximate causes of deforestation and environmental degradation in the context of Coorg District. The underlying or root causes and proximate causes are symbolized by the **solid arrows** and **dotted arrows** respectively. The local economies are heavily forest resource dependent as the forestland is used for agriculture, raising plantation crops, harvesting timber, collection of various minor forest products as well as non-timber forest products (NTFPs). These proximate causes have been theoretically influenced by fundamental or root causes such as market failure, institutional failure, policy failure, and property rights failure and population pressure. For instance, market fails to assess the total economic value (use and non-use value) of forest resources and this under-valuation and missing market leads to exploitation of resources for direct benefits. Deforestation is caused by these two important root and proximate causes and makes irreversible impact on regional and global environment. At the regional level soil erosion, reduced soil nutrients, loss of productivity, increased run off and siltation of rivers, reduced pollination, depletion of ground water, loss of watershed, landslide and fresh flood etc., pose grave environmental degradation. Also deforestation leads to regional and global environmental problems; they are release of carbon dioxide, air pollution, and climate change such as global warming, ozone layer depletion, acid rain and El Nino effect. Therefore, forest resources of Coorg district are certainly under the influence of root and proximate causes. These causal relationships ultimately influence the behavior of local community towards appropriation of forestlands by taking into account the alternative uses of forestland in terms of opportunity cost.

8. The History of Deforestation in Kodagu District:

The genesis of deforestation in Coorg district was attributed to the British colonization that began in 1854 in erstwhile Coorg state. The history shows that commercialization of forests received a major thrust with occupation of the district by the British. The British interest was mainly in teak, which was needed by the Royal Navy as

English oak was almost entirely depleted before 1800 (Nadkarni, 1989). The rampant forest clearing was started in central part of the Coorg district and coffee plantations began to replace the virgin forest cover. Deforestation was also closely associated with timber exploitation such as teak, rosewood and other important tree species in evergreen forests. These forests were cut down and used chiefly for laying railway sleepers and construction of ships and ports. Railways exerted more demand for sleepers and planks for coach building, and they also facilitated transport of huge forest products to the larger economy. As observed by Gadgil and Guha (1995) "The tremendous diverse tree growth of India's forests was liquidated to build British ships and lay extensive railway lines. Mixed forests were replaced by single species stands of a handful of commercially valued trees such as teak, sal and deodar". With the advent of the British, the status of forestland had undergone remarkable change as the coffee plantation had received importance within two years of the establishment of the first plantation near Madikeri in 1854. Later the coffee plantations had a very deep impact on the forest area. More than 11,000 ha of forest area was cleared and by the end of the century the coffee area had spread to almost 30,000 ha (Suryanath, 1993). Another important factor that contributed to degradation of forests in the district was the introduction of exotic species such as coffee and teak. Gadgil and Guha (1995) aptly remark "the British wanted tropical forest land to produce teak and little else". Timber exploitation backed up by introduction of coffee paved the way for forest degradation and rapid transformation of forest cover. Coffee was planted even on environmentally sensitive areas such as hilly areas by clearing the dense forest cover. Ramakrishnan et al (2000) rightly remark, "Timber exploitation transformed the floristic composition and structure of the forests. Evergreen forests were rapidly degraded and in some areas, they irreversibly changed into moist deciduous forests as evergreen species were replaced by highly light tolerant deciduous species. In other areas most deciduous forests were changed into dry deciduous forests". Another important cause for deforestation was that the land tenure system practiced during the regime of Rajas (Kings) led to misappropriation of forestland. The Coorg State during the pre-colonial and colonial period distributed forestlands to various communities, joint families and individuals. These insecure and ill-defined property rights regimes had resulted in

appropriation, overexploitation and illegal encroachment of forestland. From the above analyses, it is proved that the genesis of deforestation in the district is not a recent process but it was started long back. Several policy decisions taken during the colonial period in granting property rights over forestlands have several implications on the state of forestland and environment in the district even to date.

9. The root causes of Deforestation:

9.1. Market Failure:

The fundamental cause for deforestation is “missing market” for environmental resources such as forests. The market failure is caused by inability of existing markets to capture the ‘true’ value or total economic value of forests and other natural resources. “Markets frequently do not accurately reflect the social value of the environment. Some uses for a resource are marketed but others are not, as with tropical rain forests, where timber is marketed but watershed protection is not. The non-marketed benefits are frequently ignored, while other uses of the resource are over exploited” (WB, 1992). The market for forest resources therefore, is either distorted or missing and this has in fact resulted in emergence of negative externalities such as deforestation, loss of flora and fauna, soil erosion, depletion of underground water table, climate change, etc. Forest resources of Kodagu district are the victims of market failure and they are not exceptional to the underlying cause of local market failure since timber exploitation, land conversion and encroachment are mainly due to the prevalence of distorted market.

9.2. Policy Failure:

Another fundamental force behind influencing deforestation is intervention failure or government policy failure. Pearce and Warford (1993) have observed that “government policy that deliberately or indirectly encourages deforestation”. Two types of policy failures are identified viz., (Wood, 2000).

1). Perverse government policies provide incentives for environmental degradation. For example, experience in many countries shows that agricultural incentive policies, resettlement, taxation and trade policies are frequently more influential in determining land use than forest sector policy.

2). Government policies, which interfere in the operations of market institutions, fail to incorporate environmental values of biodiversity, into decision-making. Government deliberately intervenes in the workings of market to internalize externalities caused by market failure.

India's forest resources are over exploited beyond their regeneration by the forest-based industries owing to government soft concessional policy, which has allowed these industries to plunder forest resources senselessly. Local communities who directly depend on forest usufructs were deprived of their livelihood needs, employment opportunities and collection of MFP as a result of depletion of forest cover. A dynamic change in land utilization pattern, expansion of plantation crops and timber exploitation in the Kodagu district are the clear evidence of deforestation and they are caused mainly due to shortsighted government policies such as export promotion for plantations crops like coffee, subsidized agricultural policy and market intervention. These inappropriate policy decisions have in fact, had far reaching implications on the forest resource condition and environment of the district.

9.3. Institutional Failure:

Institutional failure is indeed, another important underlying cause of deforestation and environmental degradation. Dasgupta and Maler (1997) have observed that environmental resource degradation has been traced to inappropriate government policies and market failure. Taken together they reflect institutional failure. Institutions are defined as follows: John. R. Commons defined an institution as "collective action in restraint, liberation and expansion of individual action" (Bromeley, 1989). Another definition by Schmid (1989) is that "Institutions are sets of ordered relationship among people which define their rights, exposures to the rights of others, privileges and responsibilities". In India, traditional institutions have been conserving and managing India's green wealth for ages based on traditional environmental knowledge. The break down of these traditional institutions has in fact, enhanced deforestation. The paradigm shift in the ownership of forest has changed hands from local community to the colonial regime and later government of independent Indian state. "The traditional de-facto

ownership of local community was now replaced by the de-jure ownership of the state, which ultimately led to the exploitation of forests with total disregard for the needs of the local economy” (Fernandes, 1988). The break down of traditional institutions in Kodagu district in protecting forest and environment through application of the traditional environmental knowledge is mainly owing to the failure of government to recognize these institutions.

9.4. Property Right Failure:

Property right failure is another root cause of resource degradation and which is a severe problem in the developing countries. Pearce and Barbier (2000) rightly point out that “Institutional failure such as lack of property rights, inefficient and corrupt governance, political instability and the absence of public authority or institutions compound to environmental degradation. The result is economic development that produces excessive environmental degradation and increasing ecological scarcity”. Property rights, which are ill defined therefore, provide perverse disincentives against forest conservation (Sharma, 1996). Property right regime may be defined as a set of institutions and rules governing ownership and access to the natural resources (Pearce 1998). “Property rights are entitlement defining the owner’s rights privileges and limitations to use of a resource” (Pearce and Barbier, 2000). Broadly four types of property rights regimes exist and they are defined as follows:

- **Private Property:** Resource rights and ownership are conferred on an individual, group of individuals or a corporation, so that the owner has the right to exclude others from use of the resource and to regulate its use.
- **State Property:** Resource ownership is vested exclusively in the government, which determines and controls access and regulates use.
- **Common Property:** Resource ownership and management are in the hands of an identifiable community of individual, who can exclude others and regulate use of the resource
- **Open Access:** Access for resource use is effectively unrestricted; it is free and open to all (Pearce and Barbier, 2000).

Property right failure arises mainly because of the prevalence of ill defined or unassigned property right regimes where rights of ownership over resources are not clarified. Hardin observes that “The tragedy of commons” mainly arises when property rights over natural resources are non-existent or unenforced by any authority. When there are no clearly defined property rights, resources are termed as “open access” where no individual bears the full cost of resource degradation. However, there is no institutional mechanism for regulating the use of resources. This has resulted in over exploitation and further it leads to deforestation.

Forest resources are prudently conserved and managed by the local community in India. In recent decades government has nationalized forestlands with an aim of in-situ conservation by undermining the local communities’ dependence on forest and importance of these communities in conserving forests. The deresponsibilisation of local community has resulted in over exploitation of government forestland and consequent deforestation. Public ownership and management have often led to over exploitation of forests by local community has been proved (WB, 1992). Economic incentives such as clarifying property rights therefore, play an important role in resource use and abuse. Clarifying rights of ownership over forests and natural resources would certainly encourage local community to adopt some strategies to utilize and manage these resource in a sustainable way.

10. Forest Tenure in Coorg District:

Forest tenure regimes prevailing in Coorg district seem more complex, ill defined, and non-enforceable in nature. Coorg people inherited various rights and privileges of land and forest tenures from the Coorg State of pre-colonial and colonial period. Today there are more than 17 types of land tenure regimes in the district (Srinidhi and Lele, 2001). Even to date the administrative authority is in the grip of lack of information about the prevailing complex forest tenures and their evolution, tenorial security, constitutional provision, geographical distribution and extent. The information asymmetry about forest tenure regimes has resulted in failure of government in imposing rules and regulations over misappropriation of land by encroachers. “Land policies in the Coorg district seem

to have been ineffective in checking encroachment” (Ramakrishnan et al, 2000). The insecure land tenure regime however, has contributed to illegal encroachment and land appropriation by encroaches, logging and timber extraction by timber Mafia, forest fire lit by smugglers, overall loss of biodiversity in the district. Forest tenures of Coorg district such as redeemed land and unredeemed land are the clear case of property right failure. For instance, redeem lands, which are assigned in coffee plantation area, have virtually given right to exploit forest by planters. However, unredeemed lands are found in evergreen forests in which planters do not have any right to exploit trees. Secure ownership of land therefore, encourages farmers to make investment on land and land value in fact, will be higher and vice versa.

10.1. Land and Forest Tenure Regimes:

Land and forest tenure regimes of Coorg were very complicated and ill defined and they were granted to the natives of Coorg by Rajas and the British during their regimes. There was more than 14 types of land tenures granted to various local communities. As rightly observed by Surendra (2003) complicated land tenure system is in existence in the Coorg district. Several types of tenures existed under Kings and later under the British, which are continued to the present day. Land tenure regimes prevailing in Coorg may be classified into two categories viz.,

1. Land tenures conferred by the state through the “**Land Grants**”.
2. Land tenures conferred based on “**Lease System**”.

These land tenures are briefly analyzed below:

The first category of land tenures are the many privileged “**Service Tenures**” which were “**Granted**” to those who rendered their services to military as soldiers and palace guards by the princely state and the British. They are called *Jamma, Jahgir, Sagu, Umbali, Gaudumbali, Nayimannu, Sarvamanyapa, Jodi* and *Battamanya*.

10.1.1. Service Tenures:

A) *Jamma* Land Tenure:

Jamma land constitutes the most important and major privileged system of land tenure. *Jamma* lands were 'granted' to various local communities who served in military and other palace services, during the regimes of Rajas (Kings) and the British administration in order to ensure and safeguard the interest of *Janma* land holders and the latter had to concentrate on the military services. *Jamma* lands are wetlands under rice cultivation and coffee plantation (Arabica). These lands are also attached unassessed dry lands called *bane*, *barike* and *hithal manedala*. *Bane* is high forestland (uncultivated) located on the slopes of the valley adjoining to *jamma* land. *Bane* is attached mainly to supply *Jamma* landholder the required timber, firewood and green manure for the maintenance of productivity of *Jamma* land. The *barike* (Pastures) is a low swampy land used mainly for grazing animals. *Hithal manedala* is a place where the holder of *Jamma* land has his dwelling place. The main privileges and rights conferred to holders of *Jamma* land are, *Jamma* land is restricted for sale; it is purely hereditary land tenure and the rights over land is declared and bonded slaves were attached and forced to cultivate the land by the rulers. *Jamma* holders were to render free services in lieu of land granted to them. They did not have any right to partition and mortgage of land without approval of the government as per the Coorg Land and Revenue Regulation Act (CLRRA) of 1899. However, an amendment was made to the Coorg Land and Revenue Act (CLRA) of 1964. The new Act made provisions for holders to claim absolute ownership rights over *Jamma* lands that enable the holder to alienate land without permission of the government. But very interestingly, the *Jamma* landholders refused this offer by expressing doubts over alienation of their property. Another prestigious reason behind the refusal of act was that they would lose privileges of exemption from Indian Arms Act (IAA) that enables them owning guns without license. Later *Jamma* holders made a request to state government to grant permission to mortgage their *Jamma* land to avail loans and also claimed the rights on *bane* lands. The state government has, however, refused to consider the request to mortgage land and stated that *bane* landholders have no right over the land except privileges of timber

and green manure. The *Jamma* holders challenged the order of the government in the high court of Karnataka in 1988. Consequently government declared that the holder would get proprietary rights as and when the land was assessed. But the regulation was changed in 1998 and *jamma* holders are allowed to sell their land and mortgage the same to avail loans. The debate on the ownership of *jamma* land still continues although, some adhoc changes in the system were made from time to time.

B). Jahgir: *Jahgir* lands were assessment-free lands mainly granted to persons who rendered extraordinary services during the administration of Rajas (Kings).

C). Sagu: *Sagulands* belonged to *Jamma* holders who had freed themselves from the obligation of service to the palace.

D). Umbali: *Umbali* lands were granted for extraordinary services rendered in the suppression of the insurrection in Dakshina Kannada.

E). Gaudumbali and Nayimannu: These lands were service *inam* lands granted respectively to the village headman (*Gowda or patel*) and *Kulvade or Talavara* (watchman).

F). Sarvamanya and Jodi: These lands were granted to religious establishments for carrying on religious activities. Lands held free of all assessment were called *Sarvamanya* and lands held on half the assessment were called *jodi*.

G). Bhattamanya: Grants and endowments of land made available to Brahmins for the performance of certain religious ceremonies.

10.1.2. Lease Tenures:

The second category of land tenure regimes prevailing in Coorg is based on "**Lease System**". These include *Jamma malais*, *geni malais*, *coffee saguvali malais*, *devarakadus* and *Uruduves*.

A). Jamma Malais: *Jamma malais* are the forestlands, which were leased to tenants to cultivate only cardamom during Rajas period. These *malais* are evergreen forests situated in the northwest tracts of Coorg districts to a height of about 4000 feet. The leaseholders of these *malais* had the hereditary rights over forestland to cultivate

cardamom by making payment after the assessment of average price of the produce. The extent of Jamma malais is around 3460 ha and 50 families own these lands.

B). Genimalais: *Geni malais* are the forestlands leased out annually to leaseholders. Later ten years lease term was granted from 1846 to 1907. Since 1907 the lease period is fixed as 21 years.

C). Coffee saguvali malais: These malais are the private properties consisting of coffee estates on which the cultivation of coffee has been abandoned.

D). Devarakadus: *Devarakadus* or Sacred Groves are the God's forest, which are assigned to the deity of village.

E). Uruduves: *Uruduves* are village forests or community forest, where local communities have easy access to free grazing, collection of firewood, timber and green leaves for agricultural purposes.

Forest tenure regimes of Kodagu district are inextricably interwoven with land tenure. Lands were granted and leased out to the Coorg people along with forest vegetation on them and in some cases without forests. Presently there are about 17 different forest tenure regimes prevailing in Coorg district. They can be grouped into four broad categories on the lines of popular and sophisticated classification of resource rights regimes that are presented along with sub regimes. They are as follows:

1. Largely State Controlled (State Property)

- A). National Park (NP)
- B). Wild Life Sanctuaries (WLS)
- C). Reserve Forests (RF)

2. Largely Open Access (Open Access)

- D). Protected Forests (PF)
- E). Paisari (Wasteland)
- F). Hullugavalu (Pasture)

3. Largely Community Controlled (Community Forests)

- G). Devarakadu (Sacred Grove)
- H). Uruduve (Village Forests)

- I). Ambalas / Uruambale
- J). Devaramandu / Urumandu
- K). Social Forestry

4. Largely Privately Controlled (Private Property)

- L). Kuruvas / Gerekadu
- M). Sagu bane
- N). Amma bane
- O). Hittal manedala
- P). Jamma malai
- Q). Genimalai

Table 2 gives details about various forest tenure regimes, their controlling department, products harvestable for consumption and sale, rights to cultivate, other rights over forest, rights to convert to patta (title), alienability of land, responsibilities of assignee, assignment criteria and quantity, land revenue payable, de-facto situation, total extent of these tenures etc., in each of the 17 regimes of broad four categories of forest land tenures.

Table 2: Forest Tenure Regimes in the Coorg District: Characteristics and Distribution

Broad Category	Largely State Controlled			Largely Open Access		
	National Parks (NP)	Wildlife Sanctuaries (WLS)	Reserve Forest (RF) Excl. NP, WLS, & MF	Protected Forest (PF) /District Forest / Minor Forest	Paisari	Gomaals / Hulugav alu/ Danagali ge
Regime numbers	1	2	3	4	5	6
Controlling Department	Wildlife wing of Forest Dept.	Wildlife wing of Forest Dept.	Forest Department	Forest Department (earlier RD)	Revenue Department	Revenue Department
Products Harvestable for self-consumption	None	Regulated grazing	Dead twigs and fodder by locals	Fuel wood & fodder	Fuel wood and fodder	Fuel wood & fodder
Products Harvestable for sale	None	MFP by FD or contractors/ lessees	MFP, timber and dead and fallen by FD or contractors / lessees	MFP, timber and dead and fallen by FD or contractors / lessees	MFP by RD or contractors / lessees	MFP by RD or contractors / lessees
Right to cultivate	No	No	No	No	No	No
Other rights/notes on rights	Entry, for study research , tourism, photography at discretion of wildlife warden	Entry for study, research, tourism, photography and MFP harvesting at the discretion of the WL warden	Felling of natural trees suspended since 1983; some usufruct to neighboring villages	Ban on green felling since 1983	--	--
Right to convert to patta (Pvt. Holding)	No	No	No	No	After Darkhast	No
Alienability of Land to which rights	NA	NA	NA	NA	NA	NA

assigned						
Responsibilities of assignee	Ecosystem/wildlife/biodiversity conservation	Ecosystem/wildlife/biodiversity conservation	Production and conservation; local people must help put out fires, report offences	FD; to protect trees; RD; to protect land ownership; local people; fire control, report offences	RD: to protect the land ownership of Govt.	RD: to protect the land ownership of Govt.
Assignment criteria and quantity	Any land considered essential for wildlife conservation	Any land considered essential for wildlife conservation	Land with dense natural tree growth, or historically declared as RF	Assignment criteria not clear	Waste or unassigned lands left after settlement	Assigned to all villages at approx. 30 acres per 100 cattle in the village
Land revenue payable	NA	NA	NA	NA	NA	NA
De facto situation	May contain tribal and even non-tribal settlements within its boundaries	May contain tribal and even non-tribal settlements within its boundaries	May be open access in certain areas, also subject to some encroachment for cultivation	Rights may be curtailed in FD plantations; FD may fell timber; fuel wood is harvested by head loaders	Historically, Government has auctioned or granted parcels for cultivation; fuel wood head loading to town is common	Dense forest; open savanna, degraded scrub; now many SF or MPM plantation; much illegal cultivation
Extent of forest tenure in Kodagu (Sq km)	643	389	41	27	1364	178

Broad category	Largely Community Controlled				
Elements of tenure regime	Devarakadu	Uruduve	Panchayathi mandu / ambalas / uruambale	Devara mandu/ Urumandu	Social Forestry (SF)
Regime number	7	8	9	10	11
Controlling Department	FD	FD	FD	FD	FD
Products Harvestable for self-consumption	Fuel wood, fodder, MFP and timber for temple in the Devarakadu	Fuel wood, fodder, MFP with prior permission from the FD	Fuel wood and fodder	Fuel wood and fodder	Fuel wood, fodder, MFP and timber
Products Harvestable for sale	MFP and timber by FD	MFP and timber by FD	MFP by RD or contractors / lessees	MFP by RD or contractors / lessees	Fuel wood, fodder, MFP and timber
Right to cultivate	No	No	No	No	No
Other rights/notes on rights	Ban on green felling since 1983;	Ban on green felling since 1983	Conducting village assembly/meeting	Conducting festival for goddess Bhagavathi /Huttari festival	Sharing of profit between FD and community
Right to convert to Patta (Private Holdings)	No	No	No	No	No
Alienability of land to which rights assigned	NA	NA	NA	NA	NA
Responsibilities of assignee	FD; to protect timber growth; local people must help put out fires, report offences	FD; to protect timber growth; local people must help put out fires, report offences	RD; to protect the land ownership of Govt.	RD; to protect the land ownership of Govt.	Protection and sustainable use of forest
Assignment criteria and quantity	Assigned to village deity or temple; area is determined by custom	Assigned when no Baane lands in the village; no specific proportion	Historical	Historical	In lands like Gomaal, C&D, canal sides, road sides, etc.
Land revenue payable	No	No	No	No	No
De facto situation	Declared as reserved forest after 1985, but customary	Some encroachment for cultivation	Some encroachment for cultivation	Some encroachment for cultivation	Mostly failure due to lack of coordination between FD

Table Continued.....

Table Continued.....

Broad category	Largely Private Controlled		
Elements of tenure regime	Kuruvas	Sagu Bane	Jamma Bane
Regime number	12	13	14
Controlling Department	FD	RD	RD
Products Harvestable for self-consumption	Fuel wood, fodder, MFP and timber	Fuel wood, fodder, MFP and timber	Fuel wood, fodder, MFP and timber
Products harvestable for sale	--	Fuel wood, fodder, MFP and timber	--
Right to cultivate	Horticultural/ dry crops	Horticultural/ dry crops & coffee	Horticultural/ dry crops & coffee
Other rights/notes on rights	--	--	--
Rights to convert to patta (Pvt. Holding)	No	Yes, almost automatic	Yes
Alienability of land to which rights assigned	Goes with corresponding agricultural land	Special permission required	Could not be sold prior to 1997
Responsibilities of assignee	Maintain reserved trees	Maintain reserved trees	Maintain reserved trees
Assignment criteria and quantity	Strip along edge of wet land; 16-30' wide	Assigned to sagu holder in ratio 2ac to 300ac per acre of sagu (Pvt. Wetland)	Assigned to Jamma holders in ratio 2ac to 300ac per acre of jamma
Land revenue payable	No	Coffee rates if area cultivated > 10ac	Coffee rates if area cultivated > 10ac
De facto situation	Location of these grants is unclear	Most of the Baanes have been converted in to coffee plantation	Most of the Baanes converted in to coffee plantation; clandestine sale of land is common
Extent of forest tenure in Kodagu (Sq. km)	NA	894	711

Table Continued.....

Broad category	LARGELY PRIVATELY CONTROLLED		
ELEMENTS OF TENURE REGIME	Hittala mane dala	Jammamalai	Genimalai
Regime number	15	16	17
Controlling dept.	RD	FD	FD
Products harvestable for self consumption	Fuel wood, fodder, MFP and timber	Fuel wood, fodder, MFP and timber	Fuel wood, fodder, MFP and timber
Products harvestable for sale	Fuel wood, fodder, MFP and timber	Cardamom	Cardamom
Right to cultivate	Horticultural/dry crops	Cardamom	Cardamom
Other rights/notes on rights	Same privileges as in Bane	--	Rights as in RF
Right to convert to patta (Pvt. Holdings)	Yes	No	No
Alienability of land to which rights assigned	Goes with corresponding agricultural land	No	No
Responsibilities of assignee	Maintain reserved trees	Maintain reserved trees; help put out fires	Maintain reserved trees; help put out fires
Assignment criteria and quantity	Portion of bane land allotted for dwelling places and farm yards	140 parcels assigned to 60 persons by the Coorg Rajas	Short-term lease initially given in 1886 for 21 years but always renewed
Land revenue payable	Sagu rates, if area cultivated > 1AC	Yes	Yes

De facto situation	Mostly converted to coffee plantation	As per Kodagu working plan condition and composition of tree cover in Jammamalai is deteriorating very fast	As per Kodagu working plan, these areas are damaged severely due to bad management
Extent of forest tenure in Kodagu (Sq. km)	NA	32	14

**Notes: FD-Forest Department, RD- Revenue Department, NA- Not Applicable, MFP-Minor Forest Produce, WL-Wildlife
Source: (Shrinidhi and Lele, 2001)**

11. Expansion of Area under Plantation Crops and Deforestation:

Plantation crops have occupied a prominent place in the Coorg district. The ghat region with high humidity throughout the year is most favourable for these crops. The major plantation crops of the district are coffee, tea, cardamom, pepper, orange, rubber, cashew nut, areca nut, coconut, ginger, banana, tobacco etc. Coffee is the major plantation crop of the district. There are two prominent species of coffee viz., Arabica and Robusta. Two methods of coffee cultivation are adopted in Coorg district. First, clear and burn the entire forest and then plant suitable trees, which provide shades along with the coffee plant. Second, clear and burn the under wood and a certain portion of forest trees leaving the remainder for shade. Exotic species like silver oak are specially introduced as the most suitable and fast growing tree in order to obtain shade in the coffee plantation. The area under coffee plantation has increased considerably in recent years. According to Ramakrishna et al (2000) "Coffee plantations have increased by 14 per cent over the last 20 years, thus covering one-third of the total area of the district".

Table 3: Area under Coffee in Kodagu, Karnataka and India

Area	Area in (ha) (1999-2000)	Percentage of Total Cropped Area	Production (in tones) 2000-01
Kodagu	82,619	20.11	72,851
Karnataka	1,92,100	15.60	2,09,100

India	3,40,300	01.76	3,01,000
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Source: Compiled from Various Sources

Table 3 shows the area, percentage of total cropped area and production of coffee in Coorg, Karnataka and India respectively. The Coorg district shares 43 per cent of the coffee plantation area of Karnataka and 24 per cent of the coffee plantation area of India during 1999-2000. Another distinction of the Coorg district is that, it alone produces 23.20 per cent or one-fourth of coffee produced in India and 34.84 per cent of the coffee produced by Karnataka. The complicated and ill-defined property rights including forest tenures have however, resulted in encroachment and extension of plantation crops on forestlands.

The dwindling forest cover in Coorg district is due to the dominance of plantation crops over the years. The natural composition of rich forest biodiversity has been disturbed beyond its carrying capacity. The forest ecosystem of Coorg district has become environmentally sensitive and it is perceived as one of the biodiversity 'hotspots' of the world (Myers, 1988 and Ramakrishnan et al, 2000). The spread of plantation crops and timber logging by settlers are the obvious reasons for the present state of environment in the district. Defective agricultural policies sponsored by the state have played a catalyst role in accelerating the expansion of area under plantation crops. Vast tracts of evergreen forests have been heavily denuded to make way for plantation crops, which are unsuitable for the area after the surge of coffee prices in international markets.

In recent years, high-density forest canopy has been displaced by the introduction of fast growing exotic species such as silver oak, eucalyptus, areca nut etc into the region. Forest clearance for plantation crops such as coffee, tea, cardamom and timber logging, unauthorized cultivation by encroachers, state patronage and regularization of forest land have caused loss of forest ecosystem and this process has indeed had a profound effect on the present economic and ecological status of the Coorg district.

Pascal, (French Institute of Pondichery) has carried out 'vegetation map' study of the Coorg region by using satellite images (Land Sat in 1977 and IRS-IC 1997). Further

forest types are described based on 'bio-climatic parameters through carrying out field work to verify the satellite imageries'. The maps of satellite imagery, enclosed in the following pages describe the loss of forest cover and spread of plantation crops in the district between 1977-1997 (Ramakrishnan et al, 2000). Figure 4 describes the state of forest in Kodagu district in 1977 and Figure 4 reveals the depletion of forest cover in the district due to expansion of forest cover between during 1977-1997.

Table 4: Expansion of Area Under Plantation Crops and Deforestation in Kodagu District (1977-1997)

Forest Type	Area 1977 (Sq km)	Total Area %	Area 1997 (Sq km)	Total Area %	% Change
	A	B	C	D	E (B-D)
Wet ever green:					
Low elevation	451	11	430	10	-1
Medium elevation	1275	31	897	22	-9
High elevation	37	1	31	1	0
Moist deciduous	304	7	188	5	-2
Dry deciduous	272	7	198	5	-2
Secondary moist deciduous	227	6	97	2	-4
Coffee plantations	615	15	1197	29	14
Tea plantations	2	0	4	0	0
Miscellaneous plantations (teak, rubber, softwood, cardamom, eucalyptus, sandal)	218	5	239	6	1
Water bodies	1	0	19	0	0
Non-forested agricultural areas	705	17	806	20	3
Total	4106	100	4106	100	0

Source: Ramakrishnan et al, (2000)

Large scale conversion of open access forest lands such as permanent pastures, land under miscellaneous tree crops, groves and cultural wasteland and other village and grazing forest tracts to agriculture and plantation purposes is recklessly growing mainly due to an unrestricted property rights. Further, frequent regularization and private appropriation of encroached CPRs are the main reasons for the decline of forestland.

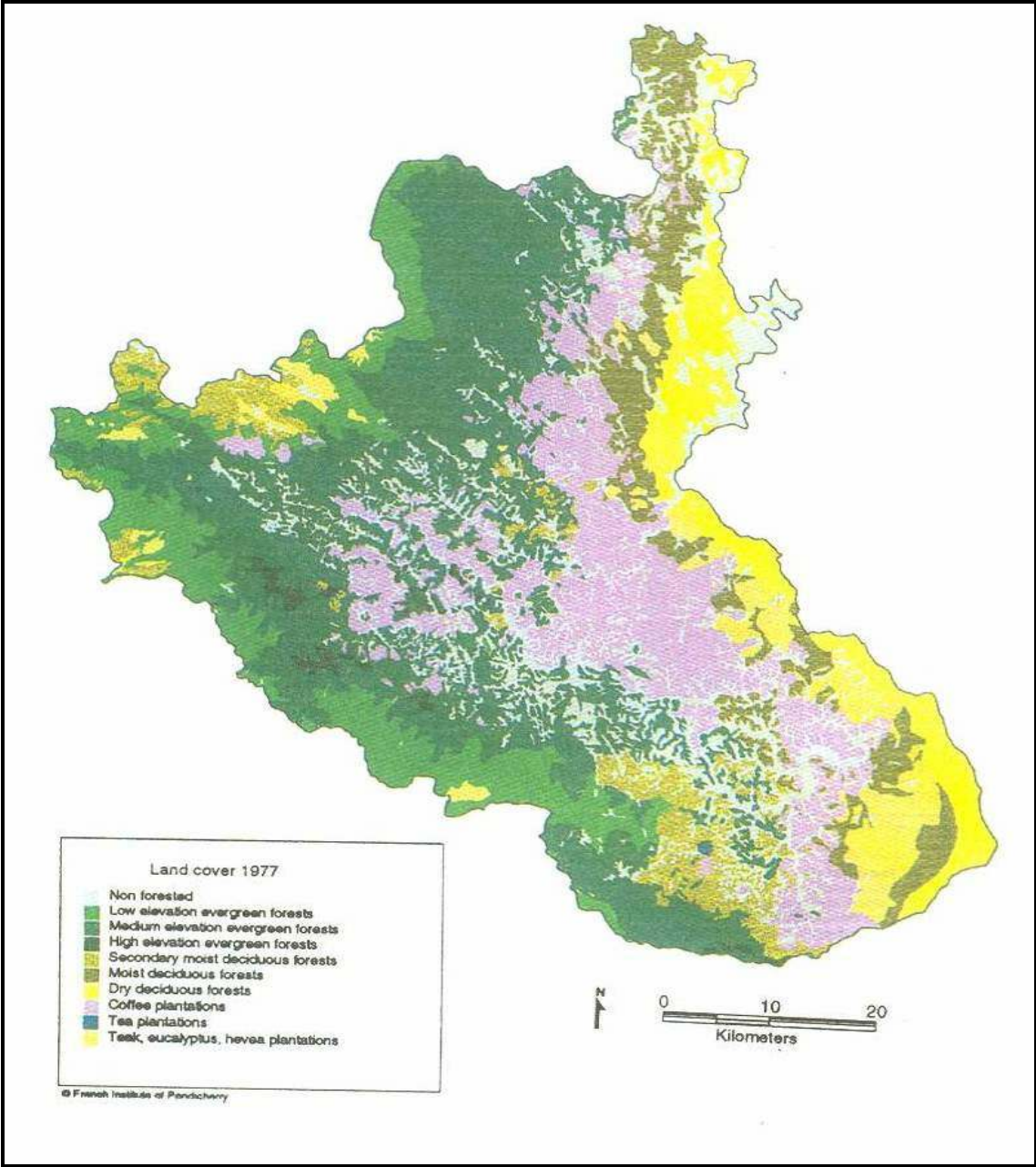


FIGURE 4: Forest Cover in Coorg District in 1977

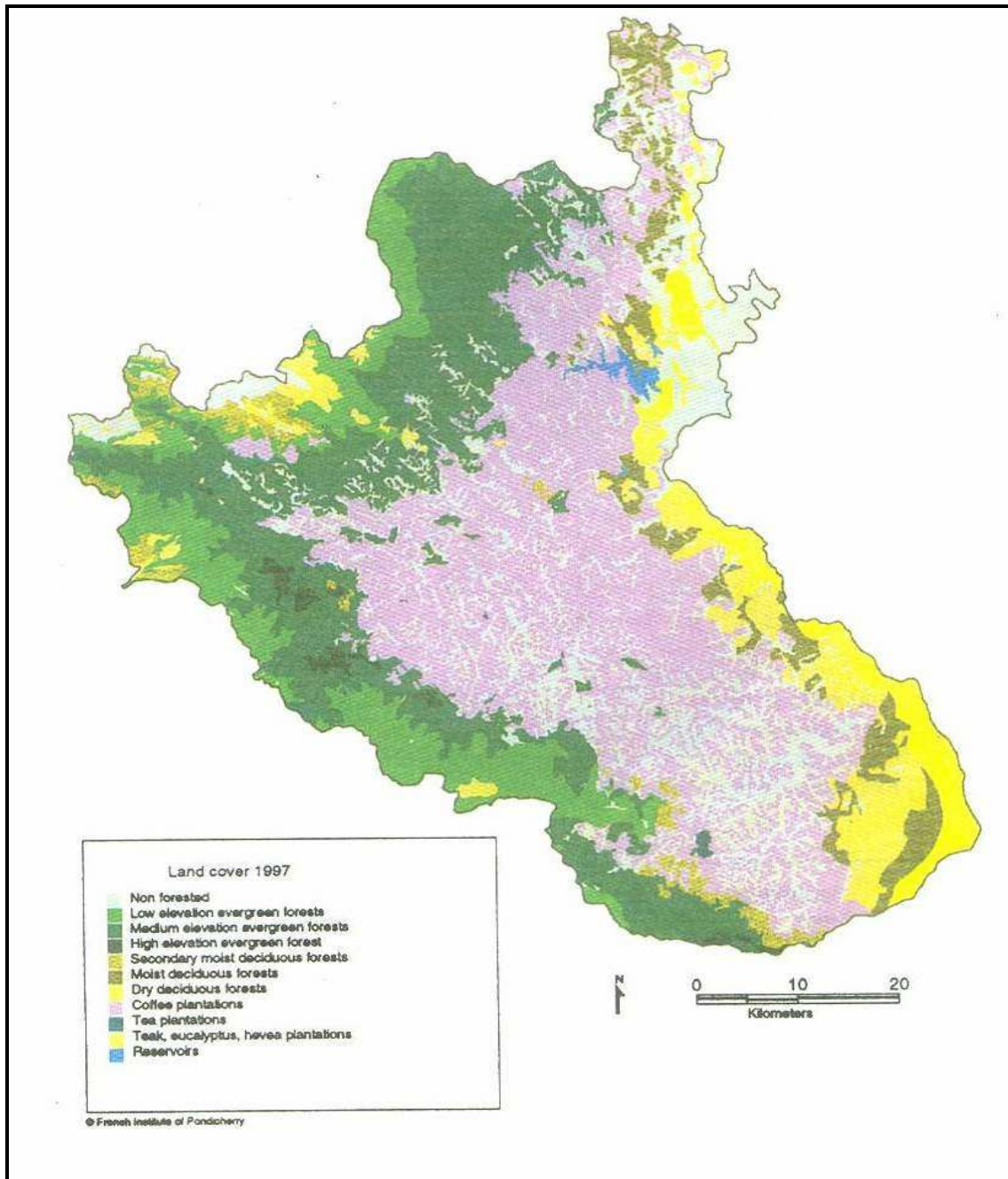


FIGURE 5: Decline of Forest Cover due to Extension of Plantation Crops in 1997

Table 5 gives details about the landscape change due to expansion of area under plantation crops and consequent deforestation. The area under coffee plantation crop was 15 per cent to total area in 1977 and it almost doubled in two decades i.e. it expanded to 29 per cent in 1997. Other plantation crops constituted 5 per cent in 1977;

they increased marginally to 6 per cent in 1997. However, non-forested agricultural lands have experienced 3 per cent surge from 17 per cent in 1977 to 20 per cent in 1997. The forest cover during the two decades (1977-1997) has witnessed about 18 per cent reduction to the total area. Loss of area under forest cover occurred in the medium elevation forest type, which decreased by 9 per cent of the total area. Low elevation evergreen forest shrank by 1 per cent of the total area and moist deciduous forests by 2 per cent of the total area. The loss of forest cover in the secondary moist deciduous forests and dry deciduous forests accounts for 4 per cent and 2 per cent of the total area respectively. It is evident from the above data that forest cover has decreased by 18 per cent to the total area during 1977-1997, from 62.50 per cent to 44.84 per cent. The data clearly shows the extension of plantation crops has led to the destruction of forest ecosystem in the district.

Table 5: Loss of Forests in Kodagu and Other Districts of Western Ghats, Karnataka

Name of the District	Area	Extent of Forests and Scrub				Loss of Forest for the Purpose of (Per cent to total loss)		
		1920		1990		Agriculture	Coffee and Tea	Reservoirs
		Area	Per cent to Total	Area	Per cent to Total			
Chikamagalur	7184	5068	71	2500	35 (36)*	55.8	42.0	2.2
Hassan	6818	2205	32	721	11 (21)	81.0	18.3	0.7
Kodagu	4098	3622	88	1464	36 (52)	28.0	71.5	0.5
Shimoga	10556	6330	60	4637	44 (16)	93.1	0.0	6.9
Uttar Kannada	10251	9134	89	7806	76 (13)	92.6	0.0	7.4

Source: Menon and Bawa, (1998) and EEU, (1999)

*(Figures in parentheses indicate loss of forest in percentage between 1920 and 1990)

Table 5 shows the loss of forest cover for various purposes especially for agriculture and plantation crops such as coffee and tea in the Coorg and other districts of Western Ghat region of Karnataka between 1920 and 1990. The Coorg district has lost 52 per cent of forest cover during the last 70 years. The forest lost was mainly

ascribed to plantation crops and agriculture. However, 71.5 per cent of forest was lost to plantation crops while 28 per cent and 0.5 per cent of forest cover has been lost to agriculture and reservoirs respectively. On the contrary, other districts of Western Ghat region viz., Chikamagalur, Hassan, Shimoga and Uttara Kannada have lost 36, 21, 16 and 13 per cent of forest cover respectively during the same period.

Fisher and Hanemann (1997) state, "One example of the more intense form of forest destruction, might be commercial agriculture, which involves presumably irreversible conversion of forests. Commercial agriculture includes both plantation farming and livestock production". This observation is found true for Coorg as well. The FSI in 1988 had undertaken a study for assessing deforestation in Coorg district in the period of 1980-1986 the study used Land Sat data from NRSA to assess the extent of deforestation. The study reveals that during the period 1980-86 the loss of vegetation cover has been significant. About 5.6 per cent of the permanent vegetation cover has been lost. In absolute term the loss amounted to 186.37 km (Lal et al, 1990). The FSI (2003) in its state of forest report has revealed that forests of Coorg district have been depleted by 331 sq km from 3339 sq km to 3008 sq km (The Hindu, Dated 16th July, 2003). From the above analysis, it is clear that there is a positive association between expansion of plantation area and deforestation due to existence of poor, ill defined and un-enforced property rights in the study area.

12. Encroachment on Common Property Resources:

Unauthorized encroachment of forestland and the government's policy of frequent regularization, owing to the political lobby by planters, agriculturists, landless and local politicians, have led to indiscriminate deforestation. These regularization policies of government indeed, are highly influenced by private interests. Large-scale appropriation of forestland has taken place due to (when Government of India (GoI) has made) the policy that "tiller will be made the owners of land" (Suryanath, 1993). A study by Ramakrishnan et al (2000) indicates that "uncultivated public lands (UPLs) in Coorg include reserved and protected forests, wildlife and game sanctuaries, government waste lands (Paisari), SGs (Devarakadus) and village forests (Uruduves). Devarakadus

have been under the widespread encroachment by the adjoining coffee planters, as the demarcation of boundaries is not yet carried in several devarakadu areas by the FD. *Paisari* lands are government wastelands, under the control of Revenue Department since 1905. About 1580.1 ha of these lands are already under encroachment. The state government has sent another proposal for central government to regularize encroachment prior to April 1992 and these encroached forestlands account for 40,000 ha (Ramakrishnan et al, 2000). '*Bane*' lands in the district are under privatized access and they have all been converted to coffee plantations in the district (EEU, 1999). According to the report on the encroachment of forestland in Western Ghat of Karnataka around 1,505 sq km of forestlands have been under encroachment and the state government has ordered to evict the encroachers due to recent Supreme Court's verdict (The Hindu, Dated 10th December, 2002). The next sections deal with empirical investigations undertaken in the three property regimes.

13. Sacred Groves (Community Property) Case Study-1

The study area, Palur, (village) is situated in Madikeri taluk of Coorg district. The main reason for selecting Palur village is that the village has an historical Mahalingeswara temple and Sacred Grove is attached to the temple for the task of conservation and management. The SG is even today worshipped annually despite large extent of encroachment. The remaining island of the Mahalingeswara Sacred Grove is under the management of Kodagu District Temple Fund Committee. Forestlands of Coorg district are largely managed and controlled by the four institutional arrangements. First, the FD manages national parks, sanctuaries and reserved forests (RF). Secondly, SGs are the community forests (CF) managed by the local communities through formation of village committees (VC) or temple fund committees (TFC). However, property rights rest with either Revenue Department (RD) or FD. Thirdly, the village communities manage village forests (VF) and open access forests, but property rights rest with the RD. Lastly, Private Forests (PF) are owned and managed by individuals. Mahalingeswara SG of Palur is under the control and management of the Kodagu District TFC or *Muzzarai Illakhe*. Other SGs in the district are either managed by the VCs or are under the jurisdiction of the Revenue or FD. Local communities

dwelling in the vicinity of SG have attached more importance to conserving it on account of its religious significance.

SGs are the par-excellent practice of conservation of forest resources by the local community through the application of their age-old traditional environmental knowledge (TEK) in India. This unique system of biodiversity conservation has prevailed in Kodagu district since time immemorial. The district has the unique distinction of maintaining and conserving at least one SG in every village in India (Chandrakanth and Nagaraja, 1997). Devarakadu or pavitra vana, literally meaning forests devoted and protected in the name of God, is an institutional mechanism of indigenous people embodying traditional lifestyle to conserve forest resources. TEK also known as 'people's science' relates to community based nature conservation practices. They may include religious and cultural appreciation and historical attachment to forest ecosystem. "SGs-tracts of virgin forests are vestiges of an ancient practice in which people protected forests to avoid the wrath of its resident god"(CSE, 1994). Devarakadus have been an integral part of the socio-cultural ethos of Coorg people (Reddy, 1994). They range in size from a few trees or small patches to dense, virgin forests of hundreds of ha (Ramakrishnan, 1996). A mention was made long back by Richter about the SG of Coorg. To quote him: (Gazetteer of Coorg, 1870) "Besides, the many groves set apart in each Nad, for some objects of worship but chiefly for Ayappadevaru, there are some extensive forests called devarakadu which are un-trodden by human foot and superstitiously reserved for the abodes or hunting grounds of deified heroic ancestries" (Chandrakanth and Nagaraja, 1997). Devarakadus of Coorg district are regarded as islands of biodiversity to indicate that these forest tracts are repositories to many endangered flora and fauna. Poor or ill defined property rights exert influence on local communities consequently in recent decades these SGs have turned out to be "the hotspots of biodiversity", as a result of encroachment for cultivation of coffee and other plantation crops. These ancient forest reservoirs are continuing to shrink at a threatening rate with the weakening of religious beliefs. Local communities are now in danger of losing this monumental tradition of forest conservation.

Table 6: Status of Devarakadus (ha) in Coorg District (1900-1992)

Name of the Taluk	Before 1900			After 1992			Percentage Change
	Number	Area	Average Size	Number	Area	Average Size	
Somvarpet	143	405.2	2.83	138	247.6	1.79	39
Madikeri	230	2502.4	10.88	60	567.2	9.45	77
Virajpet	382	1229.6	3.21	148	858.8	5.80	30
Total	755	4137.2	5.47	346	1673.6	669.44	59.5

So

Source: Chandrakanth and Nagaraja (1997)

Table 6 reveals the status of the Devarakadus between 1900 and 1992. The area under SGs was about 4137.2 ha in 1900 and it has shrunk to 1673.6 in 1992 in the district. The number of Devarakadus has declined from 755 to 346 and the area of SGs has reduced in all the three taluks. About 59.5 per cent of the area has been reduced over the last century. The largest reduction in the area is about 77 per cent in Madikeri taluk. At present there are 346 Devarakadus in the district covering an area of 1673.6 ha with an average size of 669.44 ha.

Table 7: The Status of Sacred Groves (ha) (1905-1991)

Taluk	1905	1980	1991	Percentage Change (1980-1991)
Virajpet	-	861.66	791.26	8
Madikeri	-	527.81	489.28	7
Somvarpet	-	1130.36	1098.34	2.8
Total	6202.4	2519.83	2378.88	5.5

Source: Forest Department, Madikeri (2003)

But the survey carried out by the FD in 1991 gives a slightly different data as shown in Table 7. The area of SGs in 1905 was about 6202.4 ha which declined to 2519.83 ha in 1980 and further to 2378.88 ha in 1991. From the above tables it is clear that gradual conversion of the SGs for other economic activities has taken place in the district over in the last one century mainly due to weakening of traditional institutional arrangements.

14. National Park (State Property) Case Study-2:

The Coorg district is known for well preserved National Park and Sanctuaries. Nagarahole National Park (NNP) comprises an area of 643.39 sq km spread over Coorg and Mysore districts. The game sanctuary was constituted in July 1955 by the erstwhile Coorg state covering an area of 284 sq km of reserve forests of Southeastern forests of Coorg. With the effect of Wildlife (Protection) Act 1972, the Karnataka government has declared the sanctuary as a National Park in 1983 for the purpose of wildlife protection. In 1988 the area was increased to the present 643.39 sq km and the park was renamed as the Rajiv Gandhi National Park in May 1992.

NNP has also housed aboriginal tribal people since time immemorial. There are over 1550 tribal families and 6145 persons living in 54 tribal settlements or haadies inside the park and 25,855 tribals are living on the periphery of the park. In order to give due representation to households living inside and outside (fringe) the national park, four hadis from inside the national park (INP) viz., Gaddehadi, Siddapura, Gonigadde and Murkal were chosen and three hadis viz., Chandanakere, Bommadu and Karekandi were selected from out side or periphery of the national park (ONP) for the study. Total 175 households from both INP and ONP were interviewed.

Since its inception NNP has been afflicted with many significant pressures on its biodiversity. The important pressures on the park area are identified as frequent forest fires, illegal poaching and logging by timber mafia, encroachment on peripheries of the park, livestock grazing, collection of NTFPs, man-animal conflicts, conflicts between local stakeholders and park authorities etc. Frequent forest fires are the major threats to biodiversity of the NNP. "Forest fires are set intentionally for timber harvesting, land conversion, or shifting agriculture and also in the course of disputes over property and land rights" (WRI, 2000-01). Forest fires in NNP have become a regular feature during summer period and the following major forest fires have caused catastrophe to both flora and fauna. The controversy over the killing of a tribal youth led to destruction of over 35 sq km of forests in 1990. But Indian Remote Sensing (IRS) satellite picture has revealed that about 18,000 ha or 180 sq km of forests, shrubs, herbs, undergrowth grass and unknown number of animals and birds were worst affected in 1990 (The Hindu Survey on Environment, 1992). In 1992, 2000 ha or 20 sq. km. of the forest area

was burnt to ashes. Relentlessly in 1996 forest fires once again destroyed almost 1000 ha or 100 sq km of forests. In 1997, 250 ha or 2.5 sq km. forest went up in flames. In 1999 according to the IRS picture, an area of 9008 ha or 90.08 sq. km. of forest area was affected due to the forest fire (Madhav, The New Indian Express, Dated 5th August, 1999 and Sharma, Frontline, 4th June, 1999).

Apart from wildfire, timber smuggling by timber Mafia and illegal poaching by wildlife traders are on the rise in recent years. Recently wildlife group has discovered large-scale tree felling inside the National Park in which over 500 stumps of sandalwood and teak have been found (Jayasri, 2002). Poaching of wild animals is however, flourishing in National Park. 'Jaw trap' poaching of tiger and other wild animals by inter-state poachers was unearthed in May 2002. This incident shows that the park is amenable to poaching activity in spite of Rs.2 crore spent every year by FD for the protection and management of the park. Wild Life First (WLF), a voluntary organization reported deaths of 77 elephants in Nagarhole National Park. The report further stated that around 44 tuskers were killed by poachers (NIE, 2003). Planters have encroached forest areas around the National Park to grow agricultural and plantation crops. Planters are given the right to own guns to protect themselves from animal menace and other risks and animals become victims if they stray into the plantation areas. Animal grazing within and around the park is said to be another threat to the biodiversity of the park. According to the World Bank's Eco-Development Report (1996) agriculture inside the park has threatened wildlife as swamps are drained and converted into fields. About 5000 heads of cattle graze inside the park, mostly in outer buffers zone, leading to habitat degradation (WB, 1996). The collection of food, fuel wood, MFP and other NTFPs by the local community is viewed as another important pressure on the peaceful existence of wild animals and also on biodiversity at large (WB, 1996).

15. Plantation Area (Private Property) Case Study-3

The genesis of private forest management regimes in western ghat region is traced to the reason of providing an assured source of biomass to the farmers for maintaining productivity of agriculture and livestock. In Coorg district, plantations occupy

33 per cent of the total land area. Coffee plantation area in the last forty years witnessed a significant growth (Ninan, 2001). Deforestation in the district is attributed mainly to prevailing complex and ill-defined land tenure system where local communities enjoy different types of tenures such as granted tenures (privileged) and leased tenures. Land under plantation crops is continually increasing, almost inevitably, as a consequence of increasing per capita income, significant rise in coffee and timber prices and population growth. The virgin and high evergreen forests have largely degraded and depleted due to encroachment by the planters.

Garvale village is situated amidst lush evergreen forest and coffee plantation areas of Somvarpet taluk of Coorg district. The village is located at a distance of 20 km away from the district headquarters Madikeri. The purpose of choosing the village is that the village, a predominantly plantation area with large tracts of forestlands (falling under *bane* category) has been illegitimately encroached by local communities and 53 households had already submitted Form No.53 to the office of Deputy Commissioner (DC), Madikeri for seeking regularization of encroached forestlands. About 100 households are selected for the study from the plantation area.

16. Peoples' Perception about factors responsible for Deforestation:

Local communities of the district are aware of deforestation and hence their perceptions regarding causes of deforestation have been explored. Different causes of deforestation were grouped into seven categories and households were asked to state their first preference with respect to important cause for deforestation and only their first choices are taken for analysis (Table 8).

Table 8. Households' Perceptions towards Causes of Deforestation in Three Property Regimes (%)

Perceptions	NP	SG	PA
Insecure Titles/Uncertain Property Rights over Land and Forestland	52 (29.71)	42	61
Encroachment and Government Regularization	40 (22.85)	25	20
Expansion of Area under Plantation Crops	32 (18.28)	17	10
Forest and Wildlife Conservation Policies	20 (11.42)	0	04

Nexus among Forest Officials, Politicians and Smugglers	17 (09.71)	03	05
Non-participation of Local Communities	09 (05.14)	13	00
Conflicts between FA and Local Communities	05 (02.85)	0	00
Total	175 (100)	100	100

Note: (Figures in parentheses represent percentages to the total)

Among seven causes of deforestation, majority of households (30 per cent) from NP, (42 per cent) SG, and (61 per cent) PA perceived that an insecure title/uncertain property right over land and forestland is the main cause for deforestation. However, according to majority of households interviewed, the second important cause of deforestation is unrestricted encroachment on forestlands and frequent government regularizations. The third factor responsible for deforestation in the district is due to expansion of area under plantation crops such as coffee, tea and cardamom etc.

17. Policy Suggestions:

Forests of Coorg district underwent dramatic changes in the last five decades. Therefore, deforestation has to be effectively checked by prudent policy decisions. Agricultural policies extending subsidies, export promotion for plantation crops and market intervention policies should not encourage deforestation in the district. Property rights over forestlands and agricultural lands need to be clarified legally at the earliest to prevent further encroachment. Government regularization of encroached forestlands should be stopped; otherwise there is a possibility of further encouragement to encroachment. Unauthorized expansion of plantation crops on virgin forestlands has to be checked with administrative regulation. Wastelands of the district should be leased out to local communities for afforestation and conservation purpose on a co-operative management basis. Forest resources of the district should be brought under different participatory management mechanisms in order to check deforestation effectively. This participatory and decentralized approach can pave the way for responsabilizing and empowering local communities in realizing forests for the people and by the people. Community management of SGs with TEK needs to be further strengthened by setting up more village committees. More afforestation programmes need to be undertaken in

SG areas with diverse plant species with the financial support of the government. Since local communities have rich knowledge about biodiversity, documentation of traditional environmental knowledge will serve the long-term purposes including forest conservation, boost to the emerging biotechnology sector, and to acquire intellectual property rights or patents over bio-resources and this will also in turn help in preventing biopiracy. People's participation has to be recognized as an effective method of forest conservation as the state policy has failed to conserve forest resources. For the protection of reserved forests, JFM needs to be implemented. Further, conservation of forest needs to be linked with meeting the bonafide needs of local communities.

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