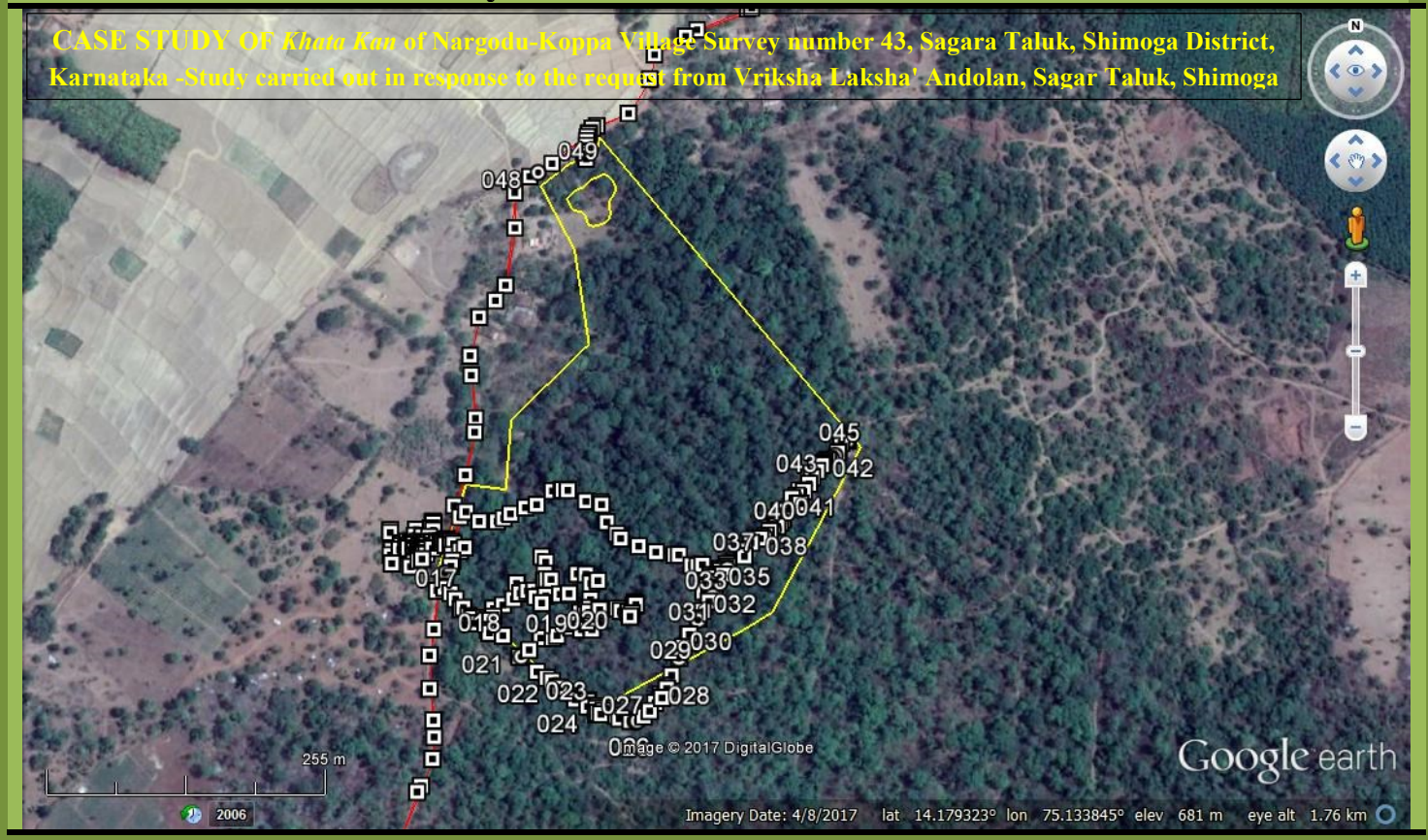
IRRATIONAL ALLOTMENT OF COMMON LANDS - *KAN* SACRED FORESTS IN SAGAR TALUK, SHIMOGA DISTRICT, KARNATAKA FOR NON-FORESTRY ACTIVITIES

T.V.Ramachandra Vinay S Vishnu D. Mukri M.D.Subash Chandran



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Energy & Wetlands Research Group
Centre for Ecological Sciences, CES TE 15
Indian Institute of Science
Bangalore-560012, INDIA

Web: http://ces.iisc.ernet.in/energy/
http://ces.iisc.ernet.in/biodiversity
Email: tvr@ iisc.ac.in; energy.ces@ iisc.ac.in

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(CASE STUDY OF *Khata Kan* of Nargodu-Koppa Village Survey number 43, Sagara Taluk, Shimoga District, Karnataka -**Study carried out in response to the request from Vriksha Laksha' Andolan, Sagar Taluk, Shimoga**

T.V.Ramachandra	Vinay S	Vishnu D. Mukri	M.D.Subash Chandran
Energy & Wetlands Research Group, CES TE 15, Indian Institute of Science, Bangalore 560012			

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Energy & Wetlands Research Group,
Centre for Ecological Sciences, TE 15
New Bioscience Building, Third Floor, E Wing
Indian Institute of Science
Bangalore 560012, India
http://ces.iisc.ernet.in/energy, http://ces.iisc.ernet.in/biodiversity
Email: tvr@iisc.ac.in, energy.ces@iisc.ac.in, envis.ces@iisc.ac.in

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IRRATIONAL ALLOTMENT OF COMMON LANDS - *KAN* SACRED FORESTS IN SAGAR TALUK SHIMOGA DISTRICT FOR NON-FORESTRY ACTIVITIES

RESEARCH HIGHLIGHTS

The *kan* forests of Central Western Ghats of Karnataka, were most often climax evergreen forests, preserved through generations by the village communities. Kans help in sustaining water and ensures food security in the region.

The *Khata Kan* of Nargodu-Koppa Village (Survey number 43), Sagara Taluk, Shimoga District, Karnataka, is facing severe threats from irrational allotment to private parties / land mafia for non-forestry purposes and from conflicting claims of ownership, with the forest department not enjoying adequate power to save these *kans* from *liquidation* of their natural vegetation. The grantees have also done encroachments within this climax forest area of high watershed value. The cutting of the climax forest for raising coffee or any other crop is totally unjustified. We therefore recommend that the Government of Karnataka take immediate action to arrest the degradation of *kan* forests due to irrational decisions by the local decision makers by:

- Proper survey and mapping of boundaries of all *kans*;
- Assign the *kan* forests to the Forest Department for conservation and sustainable management;
- Constituting Village Forest Committees for facilitating joint forest management of the *kan* forests;
- Constituting Village Lake Committees for maintaining and managing lakes;
- Taking speedy action on evictions of encroachers from the *kans*;
- Giving proper importance to the watershed value and biodiversity of the *kans*;
- Taking special care of threatened species and threatened micro-habitats within the *kans*;
- **The HERITAGE SITES Status** to be assigned to **'*kans*' under section 37(1) of Biological Diversity Act 2002, Government of India** as the study affirms that *kans* are the repository of biological wealth of rare kind, and the need for adoption of holistic eco-system management for conservation of particularly the rare and endemic flora of the Western Ghats. The premium should be on conservation of the remaining evergreen and semi-evergreen forests, which are vital for the water security (perenniality of streams) and food security (sustenance of biodiversity). There still exists a chance to restore the lost natural evergreen to semi-evergreen forests through appropriate conservation and management practices.

Now, there is an urgent need to protect native forests (meant for community) from these colonial mindset bureaucrats (whose objective is to exploit and loot natural resources – forests, wetlands, etc. for their individual gains).

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EXECUTIVE SUMMARY

The *kan* forests of Central Western Ghats of Karnataka, were most often climax evergreen forests, preserved through generations by the village communities of Malnadu regions, as sacred forests, or sacred groves, dedicated to deities and used for worship and cultural assemblage of the local communities. Various taboos and regulations on usage of the *kans* were self-imposed by the local communities. In the normal course, trees were never to be cut, but the adjoining villagers enjoyed the privileges of taking care and gathering of wild pepper, that was abundant in the *kans*, and many other non-wood produce, demarcating portions of the *kans* informally between the different families for collection purposes.

The *kans* functioned as important sources of perennial streams and springs used for irrigation of crops and for domestic needs. They moderated the local microclimate favouring the spice gardens in their vicinity, and were also fire-proof being evergreen in nature.

The landscape of pre-colonial times had *kans* forming mosaic with secondary, timber rich forests, grassland and cultivation areas, promoting also rich wildlife.

> *Kans* were characteristic in the traditional land use of Shimoga, Uttara Kannada and Chikmagalur districts specially, and were equivalent to the *devarakadus* of Kodagu region.

With the domination of Central Western Ghats region of Karnataka by the British, the State asserted its control over the *kan* lands, which were in thousands, each *kan* measuring originally from few hectares to several hundred hectares in area. The curtailment of

community rights in the *kans*, including heavier taxation for collection of forest produce resulted in the abandonment of many of them, causing various hardships to the villagers.

Whereas most *kans* of Uttara Kannada got merged with the rest of the forests ensuring the conservation of rare and endemic species of Western Ghats, in Shimoga district the *kans* were not properly documented except in Sorab taluk and to some extent in Sagar and Thirthahalli taluks. Moreover the Shimoga *kans* were brought under either the forest or revenue departments. As communities lost their traditional biomass collection privileges in secondary deciduous forests, in many places they resorted to *kans* for fuelwood, timber and leaf manure, causing their decline.

As the *kans* were not of much timber value due to the growth of easily perishable softwoods in them, the British thought it suitable to keep many such under the control of the revenue department. The revenue authorities started allotting these precious watershed areas and reserves of biodiversity for expansion of cultivation, especially of coffee and garden crops, creating widespread fragmentation of the *kans*. The practice of allotments ranging in area per applicant, individual or organization varied from one or two acres to hundreds of acres each. As the *kans* under revenue department was given more importance as land resources than as forests, the forests were cleared partially or entirely for alternative land uses.

The rampant use of fire for clearing the evergreen vegetation for cultivation areas or creating grassy areas caused change of climax evergreen vegetation to savannas, scrub and secondary deciduous forests with diminished water flow in the streams and rivers, which can be detrimental to the livelihoods of people in malnadu and beyond even in the drier Deccan plains.

Large chunks of *kan* lands were allotted to the Mysore Paper Mills for raising of pulpwood plantations, especially in Shimoga district.

Soil erosion, consequent on the clearance of *kans*, has adversely affected forest regeneration and is also detrimental to cultivation as well as causing siltation of water bodies, resulting in the abandonment of many irrigation tanks adjoining the *kan* lands.

Expressing deep concern on such dismal state of affairs, at a time when forest conservation is of paramount need, the Vriksha-Laksha Andolan, Sagar and local villagers requested us for a status report on the *Khata Kan* of Nargodu-Koppa Village (Survey number 43), Sagara Taluk, Shimoga District, Karnataka, which is facing severe threats from irrational allotment to private parties / land mafia for non-forestry purposes and from conflicting claims of ownership, with the forest department not enjoying adequate power to save these *kans* from *liquidation* of their natural vegetation. The grantees have also done encroachments within this climax forest area of high watershed value. The cutting of the climax forest for raising coffee or any other crop is totally unjustified. We therefore recommend that the Government of Karnataka take immediate action to arrest the degradation of *kan* forests due to irrational decisions by the local decision makers by:

- Proper survey and mapping of boundaries of all *kans*;
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- Taking speedy action on eviction of encroachers from the *kans*;
- Giving proper importance to the watershed value and biodiversity of the *kans*;
- Taking special care of threatened species and threatened micro-habitats within the *kans*;
- **Heritage sites status to '*kans*' under section 37(1) of Biological Diversity Act 2002, Government of India** as the study affirms that *kans* are the repository of biological wealth of rare kind, and the need for adoption of holistic eco-system management for conservation of particularly the rare and endemic flora of the Western Ghats. The premium should be on conservation of the remaining evergreen and semi-evergreen forests, which are vital for the water security (perenniality of streams) and food security (sustenance of biodiversity). There still exists a chance to restore the lost natural evergreen to semi-evergreen forests through appropriate conservation and management practices.

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CASE STUDY OF Khata Kan of Nargodu-Koppa Village Survey number 43, Sagara Taluk, Shimoga District, Karnataka**)**

Sacred Groves (Kans) of Sagara, ಸಾಗರದ ದೇವರ ಕಾಡುಗಳು

I. INTRODUCTION

Most human societies, in the course of millennia of social and cultural evolution, had evolved a variety of regulatory measures to ensure sustainable utilization of natural resources. These measures included family-wise restricted quota of forest biomass, removal of only dead and fallen plants, sharing of natural resources, prohibition on sale of forest biomass to outsiders (all of which are to this day followed in the Halkar village in the outskirts of Kumta town in Uttara Kannada district). The fishing families in the estuarine villages in the Kumta taluk of Aghanashini River had shared among them traditional fishing privileges in the individual 'kodis' or estuarine channels. Traditional hunting was a taboo until Deepavali festival in the forested villages of Uttara Kannada. To quote Madhav Gadgil (1992):

> *For local people, degradation of natural resources is a genuine hardship, and of all the people and groups who compose the Indian society they are the most likely to be motivated to take good care of the landscape and ecosystems on which they depend. The many traditions of nature conservation that are still practiced could form a basis for a viable strategy of biodiversity conservation.*

Protection of forest patches as sacred has been reported from many parts of India and many other countries in the recent decades. Trees were normally not to be cut in such forests as they were dedicated to gods. Such sacred groves still persist in many parts of Asia and Africa (Gadgil and Vartak, 1976; Frazer, 1935; Gadgil, 1987).

Most of Himalayas, the rain forest clad North East India, the Central Indian hills, parts of Rajaputana region, many parts of Deccan and the Western Ghat-west coast regions of India had witnessed through ages the strong tradition of conservation of patches of forests as sacred, especially by village and forest dwelling communities. During the period of British colonialism the government asserted its ownership over common lands, including sacred forests, which the local communities had safeguarded and managed through generations. Sweeping cultural

changes concomitant with industrial and agricultural advancements also changed traditional belief systems in which nature had a central role. Worship of gods associated with natural sacred sites and 'panchabhutas' or the five elements, has in a major scale given way to installing deities in man-made structures, causing neglect and even exploitation of the precious heritage of natural sacred sites. Nevertheless, Malhotra et al. (2001) have made an excellent compilation from the states like Andhra Pradesh, Arunachal Pradesh, Assam, Chattisgarh, Himachal Pradesh, Jarkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Orissa, western Rajasthan, Tamil Nadu, Tripura, Uttaranchal etc., which have more forest wealth than other states, strong evidences of nature conservation tradition, in the form of sacred groves. These sacred forests are known by various names in peninsular India: such as *devarakadu, devarubana* or *kan* in Karnataka, *kavu* in Kerala, *kovilkadu* in Tamil Nadu and *devrai* in Maharashtra.

D. Brandis (1897), the first Inspector General of Forests in India, was one of the first persons to make commendation on the system of sacred groves in the country:

> ***Very little has been published regarding sacred groves in India, but they are, or rather were, very numerous. I have found them nearly in all provinces. As instances I may mention the Garo and Khasi hills which I visited in 1874, the Devarakadus or sacred groves of Coorg....and the hill ranges of the Salem district in the Madras Presidency....These are situated in the moister parts of the country. In the dry region sacred groves are particularly numerous in Rajputana. In Mewar, they usually consist of Anogeissus latifolia, a moderate sized tree with small leaves, which fall early in the dry season....Before falling the foliage of these trees turns a beautiful yellowish red, and at that season these woods resemble our beech forests in the autumn. In the southernmost States of Rajaputana, in Partabgarh and Banswara, in a somewhat moister climate, the sacred groves, here called Malwan, consists of a variety of trees. These sacred forests, as a rule, are never touched by the axe, except when wood is wanted for the repair of religious buildings***

Brandis also referred to a " remarkable little forest of Sal (*Shorea robusta*)" near Gorakhpur being maintained by a Muslim saint, Mian Sahib. The forest was in good condition and well protected. Nothing was allowed to be cut except wood to feed the sacred fire and "this required the cutting annually of a small number of trees which were carefully selected among those that showed signs of age and decay."

1.1 KANS AS SACRED GROVES

Francis Buchanan (1870): Alluding obviously to the system of sacredness of forests in the Western Ghats-west coast of Uttara Kannada, Dr. Francis Buchanan, officer of the British East

India Company, who travelled through Uttara Kannada in 1801, soon after capturing Canara region by the British stated:

> ***The forests are the property of the gods of the village in which they are situated, and the trees ought not to be cut without having leave from the Gauda (headman of the village).... who here also is pujari (priest) to the temple of the village god. The idol receives nothing for granting this permission; but the neglect of the ceremony of asking his leave brings his vengeance on the guilty person.***

Buchanan (1870 continued further: "Each village has a different god, some male, some female, but by the Brahmins they are called *Saktis*, as requiring bloody sacrifices to their appease their wrath"

From these statements may be inferred that the forests were virtually under the control of the village communities with well defined territories and many had sacred values attributed to them. Buchanan's references to the then practice of slashing and burning of forests in the hills for shifting cultivation, indicates the fact that all forests were not sacred, and the sacred forests also bore the name ***kan*** or ***kanu***.

W.A. Talbot (1909): In his monumental floristic work *Forest Flora of the Bombay Presidency and Sind* Talbot referred to the sacredness of *kans*, a rare such remark from a British officer:

> ***In North Kanara and even as far east as the Hangal subdivision of the Dharwar district along the Western Ghats under an annual rainfall of not less than 70", isolated irregularly distributed patches of rain-forest, locally called Kans and Rais are found surrounded by cultivation or monsoon-forest. These are often the mere remnant of larger areas and have in many instances been respected by the natives as the abode of a sylvan deity.***

Talbot's statement makes it clear that even towards the drier east of Uttara Kannada district bordering the Hangal taluk, with rainfall much lower, compared to the mountainous malnadu part of Western Ghats, there existed evergreen forests equivalent to rain forests, the *kans*, which were home to village deities. These *kans* were already on the decline as they were mere "remnant of larger areas.

The special protection given to the *kans* by the village communities of Sorab in Shimoga district had won full praise from Peter Ashton (1988), renown tropical forest ecologist, who considered *kans* as:

> ***Prototypes of a technique currently being promoted as a new approach to forestry: agroforestry. In a region dominated by deciduous forests (Sorab is bordering on the drier Deccan Plateau) that were annually burned, the kans stood out as belts, often miles long, of***

> *evergreen forest along the moist scrap of the Western Ghat hills. Assiduously protected by the villagers, these once natural forests had been enriched by the inhabitants through interplanting of jackfruits, sago and sugar palms, pepper vine, and even coffee, an exotic.*

Ashton (1988) justifies such kind of conservation in India seeking an explanation in its culture:

> *The Indian sub-continent is without doubt the world centre of human cultural diversity... The Hindus have inherited perceptions of a people who have lived since ancient times in a humid climate particularly favourable for forest life. Settled people, they see themselves as one with the natural world, as both custodians and dependents.... Forests of the mountains and watersheds have been traditionally been sacred; springs and the natural landscape in their vicinity have attracted special veneration. The Hindus learned from their predecessors millennia ago, a mythology, sociology and technology of irrigation that has enabled the most intensive yet sustainable agriculture humanity has so far devised.*

In the above remarks, Ashton was referring to culture based conservation in India, and how the veneration of watershed forests in the highlands facilitated "most intensive yet sustainable agriculture humanity has so far devised."

Area under the kans

It is difficult to get a consolidated account of the area under the *kans*, at the time of the establishment of British authority over the forest resources of the malnadu regions of Karnataka. It appears that survey and demarcation of the *kans* was an incomplete work. Several *kans* of Uttara Kannada district got merged with rest of the state reserved forests and lost their special identities. They are to be recognized today by their names, such as Kathalekan, Karikan, Hulidevarukan etc. and also by the relics of primeval vegetation that still might be persisting in them to some degrees. According to the earliest ever survey on the *kans* conducted by Brandis and Grant (1868), Sorab taluk of Shimoga district had 171 *kans* covering a total of 32,594 acres (about 13,000 ha). Halesorabkan, the largest of them covered an area of about 400 ha. The *kans* were different from the secondary forests of deciduous kinds. Such systematic documentation of *kans* was not conducted elsewhere. Cowlidurg (present Thirthahalli taluk) was leading in the number of *kans* (436); Kadur district (present Chikmagalur) had 128 *kans* (Brandis and Grant, 1868).

The Gazetteer of Mysore: Shimoga District (1920) merely refers to the *kans* as evergreen forests of not much value, at a time when the hardwood timber yielding deciduous forests were paid much more attention. *The Gazetteer* states on the *kans* of Sagar taluk:

> *Excepting the great Hinni forest, which lies to the south of the Gersoppa Falls, the remainder are chiefly kans, or tracts of virgin evergreen forest, in most of which pepper grows*

> ***abundantly self-sown and uncared for, but little of the produce being collected owing to the depredations of the monkeys.***

The Gazetteer considers the *kans* towards the summits of ghats as not of much use owing to inaccessibility. It admits to the decline of *kans*; yet had much in praise for the *kans* of Sorab:

> ***The taluk of Sorab abounds with kans, many of which are cultivated with pepper vines and sometimes coffee. The sago palm(Caryota urens) is also much grown for the sake of its toddy. These kans are apparently the remains of the old forests, which appear once to have stretched as far east as Anavatti. At the present day at Anavatti itself there is no wood, and the surrounding country is clothed with either scrub jungle or small deciduous forest....Kans are found also in Sagar, Nagar and other Malnad taluks, but those in Sorab are, from their number, situation and accessibility the most valuable.***

1.2 ROLE OF KAN FORESTS IN PRE-COLONIAL LAND USE SYSTEM

a. **Kans as sacred groves:** While they acted as decentralized, community-based system of biodiversity conservation, these specially preserved forest patches played major roles as important centres of local religion and culture. They, with or without any man-built structures, functioned as abodes of village deities. Today most *kans* are under state ownership; nevertheless their roles continue as centres of worship, as far as the local communities are concerned. When we surveyed the *kans* of 10 villages of Sirsi taluk, which were included in a forest working plan for firewood supply to Sirsi town (Thippeswami, 1963), all of them were associated with sacred spots with deities, where people gathered and worshipped, despite state ownership over the forests. Such is the case with most other *kans* elsewhere too, in which matter, they are comparable to the *devarakadus* of Coorg. Whereas the latter got recognition from the State as sacred forests, and community rights were honoured, the same did not happen in Uttara Kannada and Shimoga districts. Whereas ownership on the former were claimed by the forest department of the Government of Bombay, the *kans* of Shimoga, in the erstwhile kingdom of Mysore district, came under the jurisdiction of either the forest or revenue departments, under the overlordship of the British, after the defeat of Tippu Sultan in 1799.

   Timber felling was a taboo in the *kans* ensuring their preservation through ages as in the *devarakadus* of Coorg, *devrais* of Maharashtra and *kavus* of Kerala. The deities of most *kans* belong to the folk tradition of India and not to the Vedic tradition. To name a few from Karnataka malnadu are Choudamma, Rachamma, Jataka, Birappa, Bhutappa, Hulidevaru (tiger deity) etc. Occasionally are smaller groves called *naagarabanas* dedicated to the serpents.

b. ***Kans* as safety forests:** The *kan* forests, well preserved in pre-colonial landuse system, in many ways ensured safety and integrity of the rural landscapes of Western Ghats. From a landscape ecological point of view these in tact forest patches formed a mosaic with other elements such as secondary forests, scrub, shifting cultivation fallows, grasslands, farms and water bodies to enhance landscape heterogeneity holding highest amount of species diversity. As safety forests they performed the following functions as well:

i. ***Watershed protection:*** The *kans* are often found to be associated with water sources like springs or ponds. The Government of Bombay (1923) highlighted the watershed value of the *kans* of Uttara Kannada:

> ***Throughout the area, both in Sirsi and Siddapur, there are few tanks and few deep wells and the people depend much on springs .... If a heavy evergreen forest is felled in the dry season the flow of water from any spring it feeds increases rapidly though no rainwater may have fallen for some months.***

ii. ***Keeping favourable microclimate***: Wingate (1888), the forest settlement officer for Uttara Kannada noted that the *kans* were of great economic and climatic importance as they favoured the existence of springs, and perennial streams, and generally indicated the proximity of valuable spice gardens, which derived from them both shade and moisture- a scenario, that holds good to this day if the *kan* is good state.

iii. ***Kans for fire protection***: Brandis and Grant (1868), in their report on the *kans* of Sorab observed that during dry months jungle fires swept through every part of the dry forest which was composed of deciduous trees and bamboo. But, "No fires enter the evergreen forest, leaves, branches and fallen trees accumulate and gradually decay, forming ultimately a rich surface layer of vegetable mould." Not aware of the village communities' stakes in preservation of these *kan* safety forests, Brandis and Grant wondered: "why a certain locality should be covered with evergreen, and another in its immediate vicinity with dry forest." The degradation of evergreen *kans* in Shimoga district has increased from the rising threats from forest fires in the recent years.

iv. ***Protection from soil erosion***: Rain forests are considered fragile places, their collapse in highlands and slopes often associated with soil erosion, compaction and rockiness. The *kans* -understood as heavy evergreen forests, the ground covered with "a rich surface layer of vegetable mould" (Brandis and Grant, 1868) with very sharply defined limits, alternating with bare grounds covered with laterite was a common spectacle of malnadu area. "The real cause of this alternation of bare ground and densely wooded patches is to be found in the laterite formation. Wherever the hard bed of laterite is near the surface, wood refuses to grow" (*Gazetteer of Mysore-Shimoga*, 1920). Further "In the kans the

soil is rich and deep, but in most of the taluks (of Shimoga) the soil is hard and shallow, with much laterite" (-ibid-).

v. ***Kans for subsistence***: Despite grain crops and gardens, the malnadu people lived at subsistence level, with much dependence on forests. Dependence on *kans* was mainly for wild pepper, cinnamon (both were traded commodities), edible fruits and seeds, medicinal plants, toddy and palm sugar from *Caryota* palm (bainy) etc. Combined with a regulated form of hunting the common people, by and large, lived in harmony with the rain forests. The landscape heterogeneity of grasslands and forests (including the well preserved *kans*) would have favoured rich wildlife and many people hunted for subsistence. The *kans* would act as buffers especially during times of drought and famines by providing not only water but also various kinds of food from the wild.

vi. ***Biodiversity conservation***: *Kans* ranging in size from part of an hectare to few hundred hectares each and protected from time immemorial, may be considered as the best samples of climax forests of the region. These sacred groves often served as good refuges for arboreal birds and mammals, especially primates, and many other denizens of deep forests. Thus Kathalekan in Siddapur taluk of Uttara Kannada is home to the rare rain forest habitat called *Myristica* swamps with their threatened flora that include *Myristica magnifica, Gymnacranthera canarica, Dipterocarpus indicus, Semecarpus kathalekanensis, Syzygium travancoricum* etc. Karikan in the Honavar taluk of Uttara Kannada has a rare and magnificent stand of the climax forest tree *D. indicus. S. travancoricum* survives today in Mathigar *kan* and in Aralihonda of Siddapur, which are sacred groves, small fragments of around one hectare each, in the midst of otherwise an agricultural landscape. When a 2.5 sq. km area of Kathalekan was surveyed about 35 species of frogs and their relatives were discovered there, a number that is equal to almost the entire amphibian population of Maharashtra State. Katalkean and its immediate vicinity harbor the northernmost population of the Endangered primate Lion-tailed macaque.

vii. **Care of pepper vines in the *kans:*** Black pepper (*Piper nigrum*) was an important item of trade through the west coast port for over 2000 years (Saletore, 1973). Pepper grows wild in the wet evergreen forests of Western Ghats and is also cultivated in the gardens. A 16th century queen of Gersoppa was popularly known as 'Pepper Queen" to the Portuguese (Campbell, 1883). From Buchanan's writings it becomes clear that in at least in some of the *kans* of coastal Uttara Kannada the villagers used to take care of the wild pepper. Buchanan understood these as 'myanasu canu' meaning 'menasu kanu' or *kans* with black pepper. Wild pepper required human attention for better yield. Such *kans* with lofty evergreen trees were seen in the otherwise much denuded coastal hills. The practice of tending to wild pepper in the *kans* may be older to pepper cultivation in the

arecanut gardens (Chandran and Gadgil, 1993). The amount of pepper produced from *kans*, at one time was said to be "very great".

c. **Land tenure:** The village communities of Karnataka malndu enjoyed various kinds of forest privileges in the pre-colonial times. They had as such no rights to claim forest lands as their own. The *kans* were entered in the revenue records as assessed lands held in regular tenure by *wargdars* or landholders in the vicinity. These *wargdars* paid certain taxes or *warg* to the state for use of the *kans* (for mainly collection of non-wood produce). Some of the *kans* of Sorab were 'unoccupied' and yielded no revenue at the time of the survey by Brandis and Grant (1868). They were deserted because of higher taxation by the state, thereby implying that the ownership of *kans* was vested with the state despite the people enjoying traditional privileges. Usually the *kans* had distinct boundaries marked by old trenches or footpaths. Each holder or *wargdar* had a portion demarcated by some lines or footpaths or other identification marks. Captain Someren (1871) found several unoccupied *kans* in the Belandur area of Shimoga.

1.3 DECLINE OF THE KANS

State domination over the forests, beginning in the British period in early 19th century, resulted in the villagers losing their hold over forests, including the *kans*. Following the Indian Forest Act of 1878 the *kans* of Uttara Kannada were mostly brought under the state reserved forests. People's rights in the *kans* of Uttara Kannada were curtailed to certain minor concessions like collection of dry fuelwood as in eastern parts of Sirsi and Siddapur (Government of Bombay, 1923). The *kans* of Shimoga district in the Mysore kingdom came under the jurisdiction of the forest department or revenue department.

a. ***Introduction of contract system*:** Contract system was introduced in the *kans* of Uttara Kannada for collection of non-timber forest produce. The contractors used to extract products like pepper and cinnamon in a destructive fashion, cutting down the pepper vines to collect their produce and hacking down the cinnamon trees for the bark, as for example in Kallabbe *kan* of Kumta (Wingate, 1888).

b. ***Kans for meeting timber and fuel needs:*** Tree cutting in the *kans*, as in any other sacred forests, was considered a taboo. In Uttara Kannada, following forest reservation, communities lost their traditional hold over forests. Though degraded forests around densely populated villages and towns were set aside as 'minor forests' for extraction of especially fuel and leaf manure, as the earlier community centred management system had collapsed, there was rising pressure on these minor forests, leading to their rapid degradation. Yielding to such demand from local people for forest biomass, in eastern Sirsi and Siddapur, villagers were allowed to gather firewood from the *kans*, which

hitherto, the local communities had preserved as sacred places. Collins (1922) reported that in eastern Sirsi and Siddapur the *kans* were getting infested with the shrubby weed *Lantana* because of forest degradation. Similar was the situation regarding the *kans* of Shimoga. Resource shortage faced by the common people after reservations, especially of the timber rich forests, prompted people to fell trees in the *kans* of Shimoga. According to M.S.N. Rao, a forest officer (1919) fellings in the *kans* of Shimoga had disastrous effects, including the disappearance of the water supply. Today we can see scores of canopy gaps in these *kans*, periodical fires burning annually drier patches of woods, inviting once again more deciduous vegetation and bamboo which have become potential fire hazards in otherwise evergreen forests. As the *kans* were getting exposed to more intense sunlight through wider canopy gaps many have turned too dry for pepper-vines, which was once a major product from the *kans*, and a priced commodity for international trade from the dawn of history.

c. ***Logging in the kans:*** During 1940's *Dipterocarpus indicus* from Kathalekan in Uttara Kannada was supplied to the railways and a plywood company. A forest working plan of 1966 for Sirsi and Siddapur taluks included 4,000 ha of *kans* for felling of industrial timbers (Shanmukhappa, 1966). Another working plan for Sirsi included 670 ha of *kans* for selection of firewood species for Sirsi town supply (Thippeswami, 1963). Menasikan of Siddapur was clear-felled and converted into forest monoculture plantation (Chandran and Gadgil, 1993).

d. ***Pressure from developmental processes:*** Towns and villages are expanding into even the kan areas. For eg. In the neighborhood of Sorab a major road is passing through Gundsettykoppakan. The Sorab town itself has expanded into Hiresekunikan of 20 ha.

e. ***Kans turn into coffee estates:*** Coffee introduced into the *kans* of Chikmagalur district apparently made at least some of the local *Wargadars* into estate owners. Because of the Revenue Department ownership of many of the *kans* in Shimoga district, lands within these *kans* were indiscriminately allotted for coffee cultivation, ignoring their ecological significance, sacredness, and village community based management systems. The Forest Department of Shimoga is making fervent efforts to salvage 90 acres of *kan* granted to five persons from Survey no. 27 and 52 acres of *kan* land from Survey no. 29 (both from Kullunde kan of Tirthahalli taluk) granted to three persons for coffee cultivation. Such things have taken place throughout the *kans* of Shimoga district.

f. ***Encroachment of kans:*** *Kan* encroachment in large-scale, especially for cultivation, is widespread throughout Shimoga district. In Uttara Kannada district even *Myristica* swamps associated with some of the *kans* were not spared by encroachers.

g. ***Contract system in the kans:*** The state takeover of *kans* was followed by the introduction of contract system for collection of non-wood produce. The impact in Uttara Kannada, on account of this may be described in the words of Wingate (1888), the forest settlement officer:

> I am still of the opinion that the system of annually selling by auction the produce of the kans is a pernicious one. The contractor sends forth his subordinates and coolies, who hack about the kans just as they please, the pepper vines are cut down from the root, dragged from the trees and the fruits then gathered, while the cinnamon trees are all but destroyed…. I was greatly struck with the general destruction of the Kumta evergreens, they were in a far finer state of preservation 15 years ago.

Kan allotment for leaf manure and conversion into minor forests

Collins (1922) pointed out that as a variation from its policy of strict protection of *kans* the Government of Bombay allotted them in any villages of Sirsi and Siddapur taluks to arecanut farmers as betta or leaf manure forests. In eastern Sirsi 769 hectares of *kans* were added to the minor forests open for exploitation. In Shimoga district several privileges were conceded to the local peoples inside the *kans*, also leading to their degradation. In Sorab and rest of Shimoga as the timber rich deciduous forests were taken over by the Government as state reserved forests the people were given certain concessions, including fuelwood harvests from *kans*, which they had conserved through ages as sacred forests. In Uttara Kannada *kans* (after British domination of the district from 1799, over a period of next 50 years or so, the British consolidated their hold over the forests) contract system was introduced for collection of non-timber forest produce from the *kans*. This system obviously replaced the system of people's management that prevailed earlier. The contractor, being interested more in making short term profits, often resorted to destructive harvest of non-timber forest produce from the *kans*. In the words of Wingate (1888), the forest settlement officer:

> ***I am still of the opinion that the system of annually selling by auction the produce of the kans is a pernicious one. The contractor sends forth his subordinates and coolies, who hack about the kans just as they please,the pepper vines are cut down from the root, dragged from the trees and the fruits then gathered, while the cinnamon trees are all but destroyed.... I was greatly struck with the general destruction among the Kumta evergreens, they were in far finer state of preservation 15 years ago.***

Sacred Groves (Kans) of Sagara - ಸಾಗರದ ದೇವರ ಕಾಡುಗಳು

Sagara taluk (Figure 1) is located in the Shivamogga district of Karnataka state. Extending from 13.8549^{O} N to 14.3427^{O} N and 74.6259^{O} E to 75.2955^{O} E, Sagara taluk has an area of 1933 sq.km. Sagara taluk has numerous lakes and tanks (over 450) and streams which join either River Varada (Tungabhadra) or River Sharavathi (Figure 2).

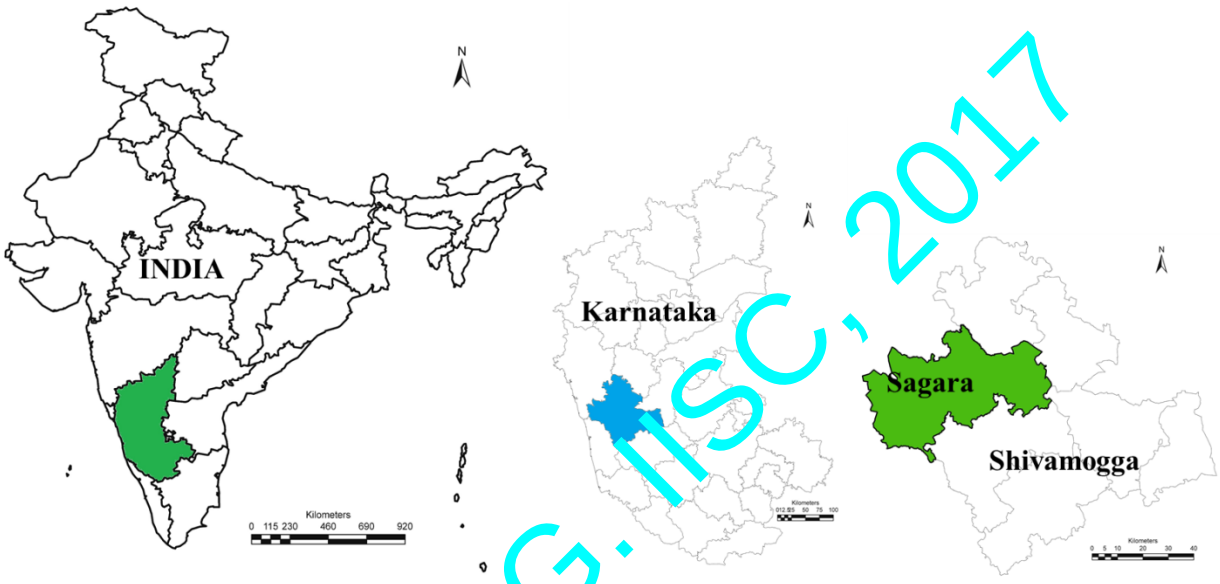


Figure 1: Study area

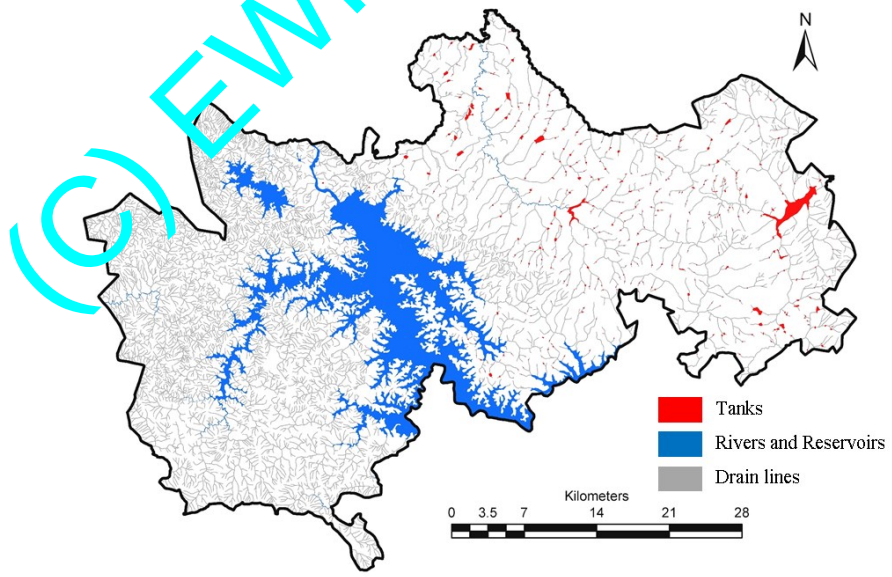


Figure 2: Drainage network in sagara taluk

Rainfall (Figure 3) in Sagara taluk varies from as low as 2000 mm towards the plains to as high as over 4500 mm at the Ghats. Monthly rainfall variation in Sagara is as depicted in figure 4, indicating rainfall is due to the south west monsoons and over 85% occurring between June to September.

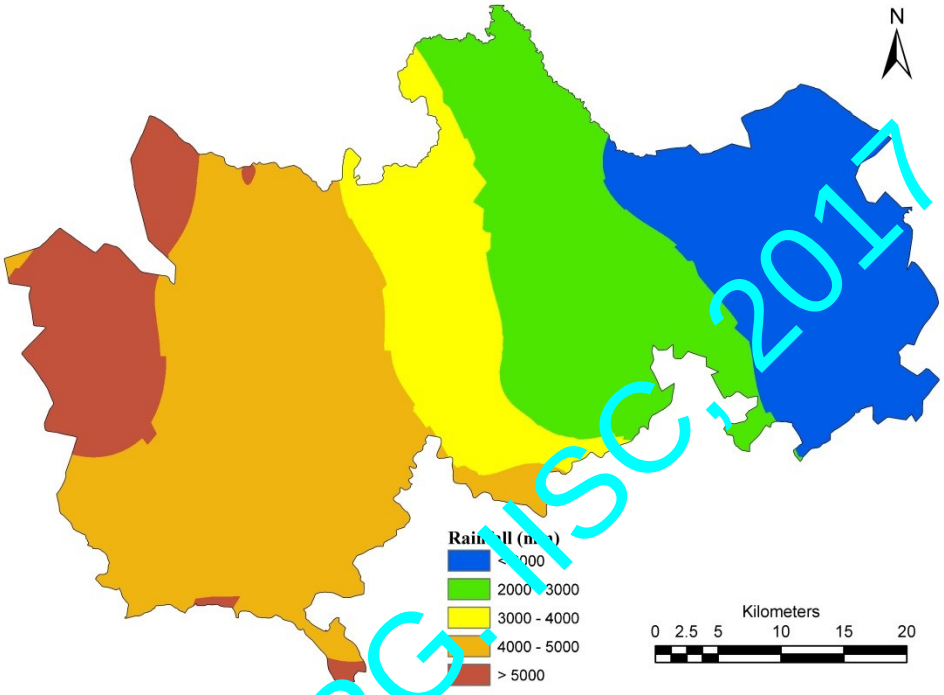


Figure 3: Annual Rainfall (1901 – 2010 average) in mm

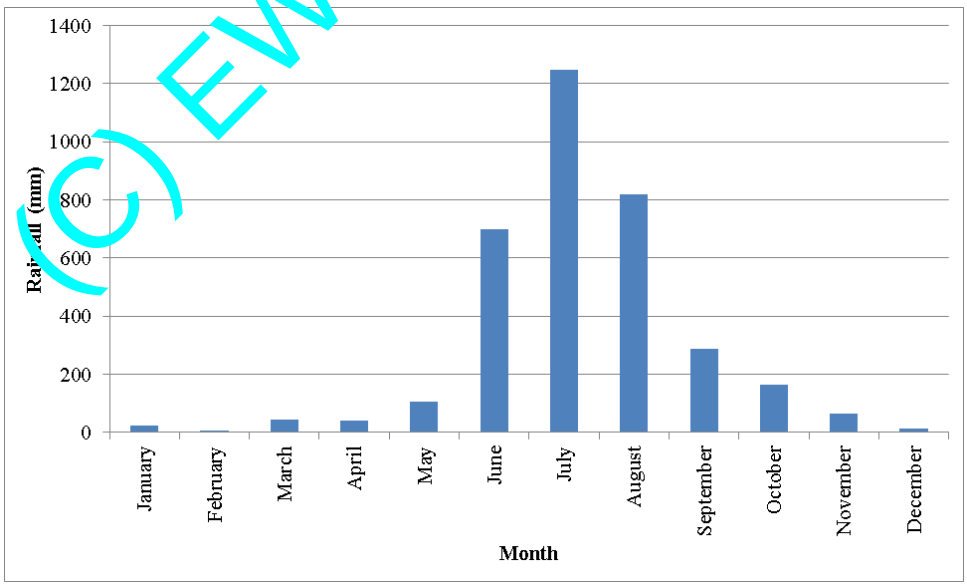


Figure 4: Monthly Rainfall distribution

Temperature (Figure 5) varies from as low as 15 Degree Celsius during the months of December and January to as high as 32 degree Celsius in the months of March, April and May. Potential evapotranspiration (Figure 5) is high in the peak summers i.e., over 5 mm per day, and reduces to 3 mm per day during monsoon which is catered by the intercepted rainfall waters, and is almost constant during winter nearly 3.8 to 4 mm per day.

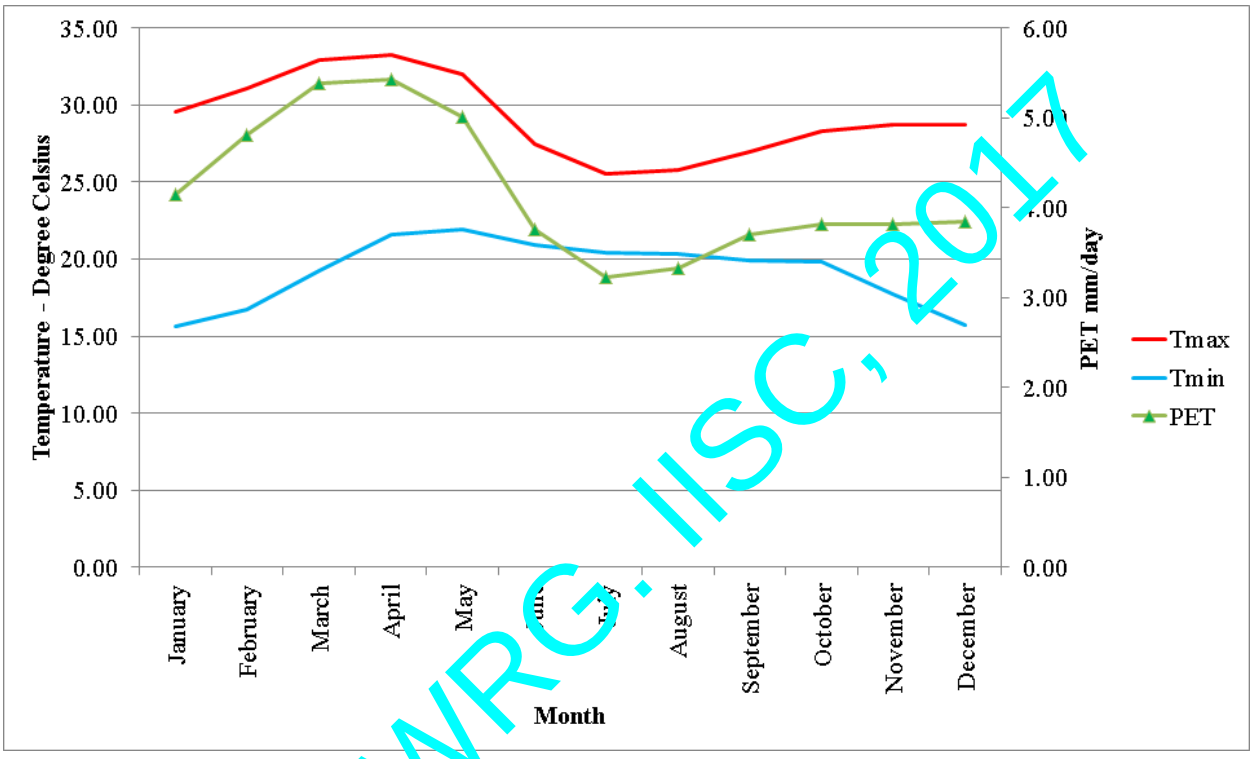


Figure 5: Temperature and PET dynamics in Sagara

Demographically, Sagara has a population of 206112 persons (2011 census) which has grown at a decadal rate of 2.55% since 2001.

Land use Analysis: Land use Land cover (LULC) dynamics is a major concern, as the abrupt changes has a negative impact on ecology, climate, hydrological regime, ecological flow, and also people's livelihood in the region. LULC dynamics are specific to a region and vary from region to region. Land Cover refers to the observed physical cover on the earth's surface. Land cover essentially distinguishes the region under vegetation with that of non-vegetation. Land use refers to use of the land surface through modifications by humans and natural phenomena. Land use can be classified into various classes such as water bodies, built up, forests, agriculture, open

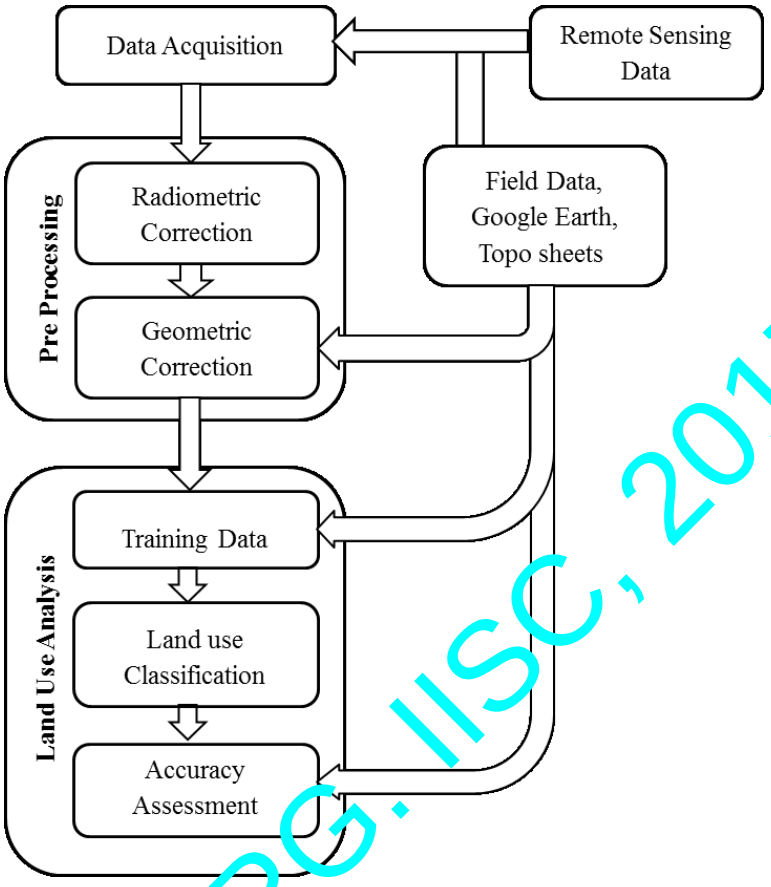
lands, sand, soil, *etc*. Land use modifications alter the structure of the landscape and hence the functional ability of the landscape. The modification includes conversion of forest lands, scrublands to agricultural fields, and cultivation lands to built-up, construction of storage structures for water bodies leading to submergence of land features that may vary from small scale to large scale.

Landscape is heterogeneous land area of interacting systems which forms an interconnected system called ecosystem. The functional aspects (interaction of spatial elements, cycling of water and nutrients, bio-geo-chemical cycles) of an ecosystem depends on its structure (size, shape, and configuration) and constituent's spatial patterns (linear, regular, aggregated). The status of a Land use land cover can be visualized using the LULC information. Land use land cover information of a region provides a base for accounting the natural resources availability and its utilization. The information pertaining to LULC provides a framework for decision making towards sustainable natural resources management sectors.

Satellite remote sensing technology provide consistent measurements of landscape condition, allowing detection of both abrupt changes and slow trends over time for managing natural resources. Remote Sensing (RS) data with Geographic Information System (GIS) and Global Positioning System (GPS) helps in effective measure of landscape dynamics in cost effective manner.

Method involved in classification of a remotely sensed data using GIS is as depicted in Figure 6. ***Data Acquisition*** involves collection of the remotely sensed satellite data, ancillary data include cadastral revenue maps (1:6000), the Survey of India (SOI) topographic maps (1:50000 and 1:250000 scales), vegetation map of South India developed by French Institute (1986) of scale 1:250000. Topographic maps provided ground control points (GCP's) to rectify remote sensing data and scanned paper maps. French institute maps were delineated to identify the forest cover and used to classify the RS data. Other ancillary data includes land cover maps, administration boundary data, transportation data (road network), etc. Pre-calibrated **GPS** (Global Positioning System - **Garmin GPS units)** were used for field data collection, which were used for RS data preprocessing, classification as well as for validation. Satellite data of 1973 to 2012 were used to understand the landscape dynamics in Sagara taluk.

Figure 6: Method - land use analysis



Pre-processing of data: The remote sensing data is checked for radiometric errors and geometric errors. The radiometric errors are rectified through radiometric correction, and the image is geometrically rectified by geo-referencing the image. Geo-registration of remote sensing data has been done using ground control points collected from the field using pre calibrated GPS and also from known points (such as road intersections, etc.) collected from geo-referenced topographic maps published by the Survey of India. The geo-referenced image is cropped to the study area. Vector data of the district, taluk, river basins and village boundaries, drainage network, water bodies (lakes, ponds) were digitized from the Survey of India topographic maps, cadastral maps and digital elevation models. Population census and taluk wise village boundaries were collected from the Directorate of Census Operations (http://censuskarnataka.gov.in).

Land use classification and accuracy assessment: The method involves i) generation of False Colour Composite (FCC) of remote sensing data (bands – green, red and NIR). This helped in

locating heterogeneous patches in the landscape ii) selection of training polygons covering 15% of the study area and uniformly distributed over the entire study area, iii) loading these training polygons co-ordinates into pre-calibrated GPS, vi) collection of the corresponding attribute data (land use types) for these polygons from the field, iv) Supplementing this information with Google Earth/Bhuvan. Land use classification was done using supervised pattern classifier - Gaussian maximum likelihood algorithm based on various classification decisions using probability and cost functions Land uses during the different period were computed using the temporal remote sensing data through open source GIS: ***GRASS- Geographic Resource Analysis Support System*** (http://ces.iisc.ernet.in/grass). The land use was classified into five major categories such as *Built up, Water, Agriculture, Plantation, Forest*. 60% of the derived signatures (training polygons) were used for classification and the rest for validation. Statistical assessment of classifier performance based on the performance of spectral classification considering reference pixels is done which include computation of kappa (κ) statistics.

Land use dynamics of Sagara taluk is presented in table 1 and figure 7. Land use analysis shows that the forests have reduced from **57.3%**in 1973 to **42.57%** in 2013 due to intense agriculture and horticulture activities.

Table 1: Land use dynamics of Sagara (all units in %)

Year	Urban	Vegetation	Water	Others	Plantations
1973	0.08	57.29	4.90	26.98	10.76
1990	0.11	44.17	7.71	12.13	35.87
2001	0.13	46.03	6.35	10.73	36.77
2012	0.13	42.57	6.81	13.29	37.20

Status of Forest in Sagara indicating various land use categories as per the French institute maps (Pascal 1982) is depicted in Figure 8. In addition to the land use analysis using temporal medium resolution satellite imageries, Google earth was use to map *kan* boundaries according to the cadastral maps. These cadastral maps were rectified for geometric errors considering various prominent points on the ground as well as on the maps. The rectified maps were converted to Keyhole Markup Language files (KML files) and encroachments were delineated for Sagara *kans* (selected *kans* from Forest Working plan of Sagara division 2001-11). The results of encroachment areas are depicted in Table 2.

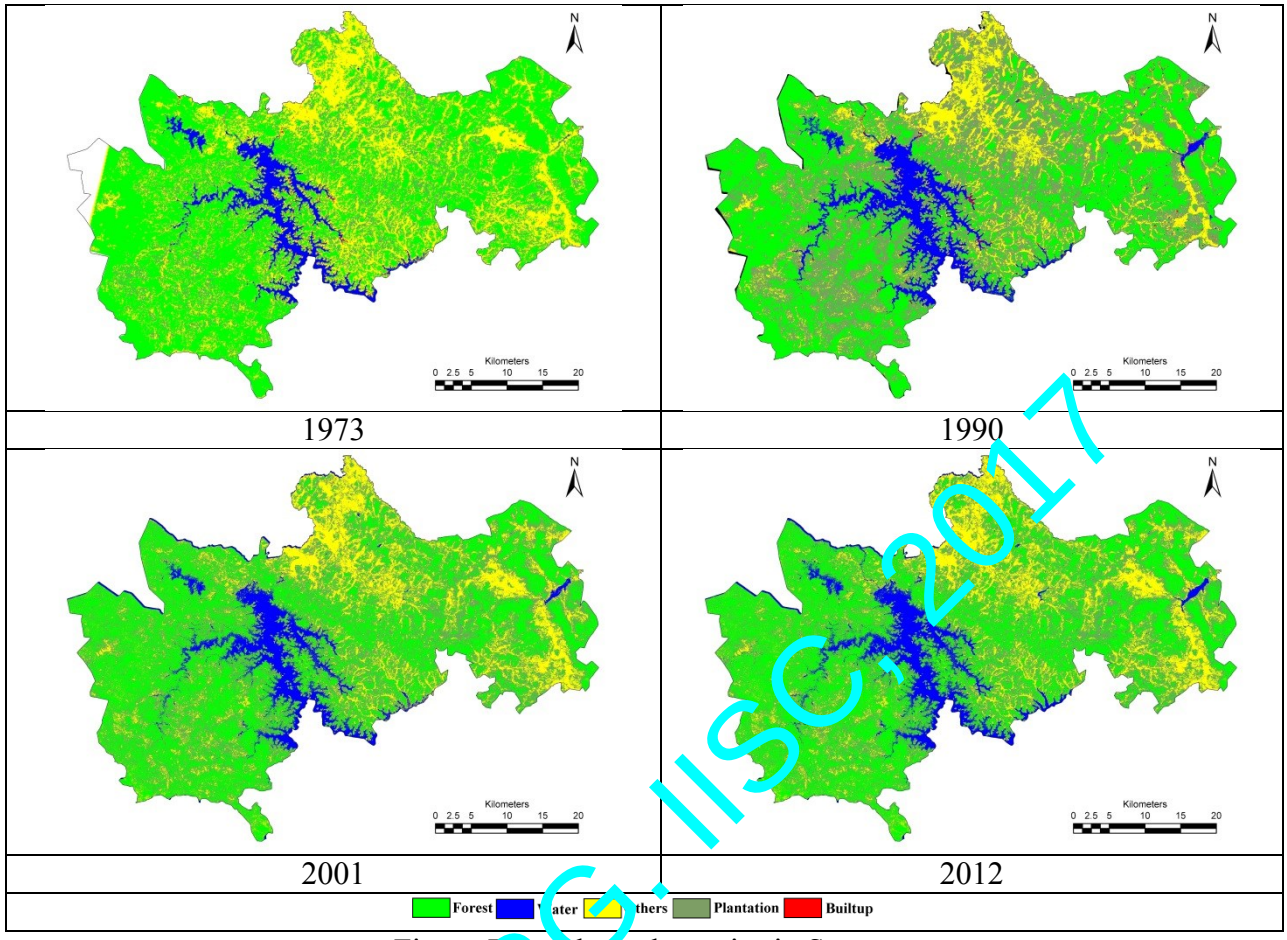


Figure 7: Land use dynamics in Sagara

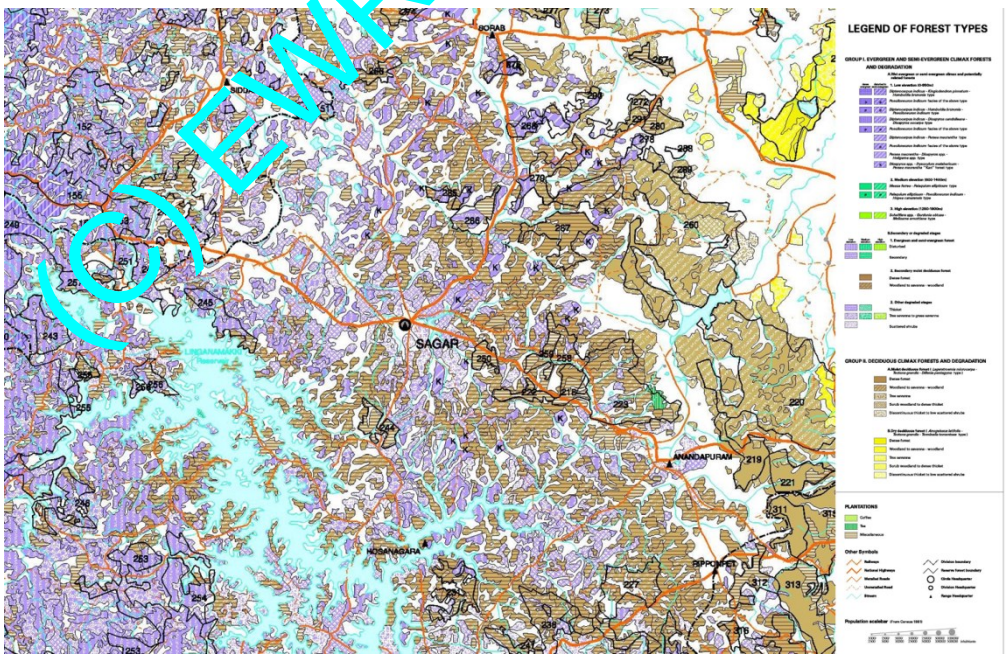


Figure 8: French Institute map of Sagara Taluk

Table 2: Status of Kan forest in Sagara division

Village Name	Cadastral Survey number	Cadastral Map Area in Ha	Encroachment Area in Hectare		
			2004	2014	Change between 2004 - 2014
Adhranthe	62	4.74	0.67	0.71	0.04
Arehuda	80	19.57	0.00	0.00	0.00
Avinalli	101	48.45	1.36	2.91	1.55
Avinalli	35	10.69	0.09	0.26	0.17
Bardavalli	285, 286	56.82	5.60	6.72	1.12
Barur	136	199.11	63.78	71.09	7.32
Bellanne	44	12.23	0.00	0.00	0.00
Bellenne	50	8.28	0.42	0.61	0.19
Belur	122	42.87	0.00	0.00	0.00
Belur	43	5.27	1.65	1.85	0.20
Belur	93	79.52	24.44	26.34	1.90
Bhimneri	17, 18	24.68	7.88	10.11	2.23
Chikkanallur	159, 160	32.89	0.00	0.00	0.00
Chikkanallur	168	61.87	9.86	10.70	0.84
Chikkanallur	28, 37	174.83	54.47	73.54	19.06
Chikkanallur	49, 50	49.32	18.28	24.47	6.18
Genasinkuni	121	29.05	3.59	4.75	1.16
Gulehalli	15	1.33	0.00	0.00	0.00
Gulehalli	37	17.87	0.72	0.97	0.25
Haitur	11	35.76	3.01	3.33	0.32
Heggattu	24	12.85	0.73	2.22	1.49
Hirenallur	231	22.93	0.00	0.00	0.00
Hirenallur	242	13.64	0.00	0.00	0.00
Hirenallur	249	8.24	0.00	0.00	0.00
Hirenallur	284	46.50	0.00	0.00	0.00
Hosanalli	35	12.77	5.06	5.06	0.00
Hosakoppa	53	21.73	13.44	13.44	0.00
Hosakoppa	68	11.79	0.00	0.00	0.00
Hunsur	1	34.51	2.06	2.90	0.84
Lavigere	104	7.96	0.47	0.82	0.35
Marsa	17, 18	146.33	86.35	90.99	4.63
Marsa	27	16.02	16.02	16.02	0.00
Marsa	44, 46	19.66	19.66	19.66	0.00
Marthur	120	29.46	3.03	3.03	0.00

Marthur	90	7.28	7.28	7.28	0.00
Marur	40	211.59	86.42	133.24	46.81
Marur	73	18.16	6.91	9.87	2.96
Masur	1	101.31	44.38	48.57	4.19
Masur	102, 103, 145	67.36	14.78	15.66	0.88
Masur	144, 129	58.96	11.77	12.25	0.48
Masur	47	63.00	5.63	10.17	4.53
Mulkere	17	15.60	0.89	2.04	1.14
Nadakalsi	1	160.60	92.51	97.41	4.90
Nadakalsi	111	9.97	0.00	0.00	0.00
Nadamanchale	45	76.57	8.71	14.51	5.80
Sathlalu	41, 42	119.20	9.38	12.40	3.02
Shiraguppe	56	58.71	19.87	21.50	1.63
Shiravala	95	3.14	0.00	0.00	0.00
Shiravala	99	52.40	13.85	13.85	0.00
Suntikoppa	133	41.50	41.50	41.50	0.00
Suntikoppa	22	4.55	4.55	4.55	0.00
Suntikoppa	234	83.19	12.16	19.57	7.41
Sydur	221	28.53	6.74	15.60	8.86
Sydur	272	13.27	3.23	6.46	3.23
Sydur	352	86.43	11.93	12.29	0.36
Sydur	358	21.70	0.96	1.99	1.03
Sydur	388	23.62	3.60	7.96	4.36
Tadagalale	155	16.42	16.42	16.42	0.00
Tadagalale	300	146.70	29.98	29.98	0.00
Ullur	29	23.26	9.11	9.59	0.49
Yalavarsi	18	8.81	1.92	2.43	0.51

OBSERVATIONS

Presence of Lakes in the upstream of the well keeps the ground water table intact during all seasons with deviation of less than 0.6m (2ft) with respect to mean.

Presence of forests kept the lakes perennial. Kans with less variability and nonforests had higher variability in lake dynamics across months.

Forest plays major role in the maintaining hydrological status during post monsoons that can be observed by the Ground water (< 1.2 metre variation on an average), well maintained quantity of water in the lake and almost constant flow post monsoon.

Degradation of forest have led to deterioration of water sources, this could be observe in Lavigere lake when compared to Baruru lake (deviation is higher in Lavigere Lake compared to Baruru Lake).

Similarly comparing Kanle, Bilisiri, Varadamoola, Yennehole and Hulkodu shows presence of higher pristine forests in the area, higher quantity of water available in the post monsoons i.e., over 5 times.

During field visits (April 2014 to April 2016), large scale degradation of forest in Lavigere, Baruru, Huttadimba, Hosgunda, Masuru, and other due to anthropogenic activities (agriculture, timber, etc).

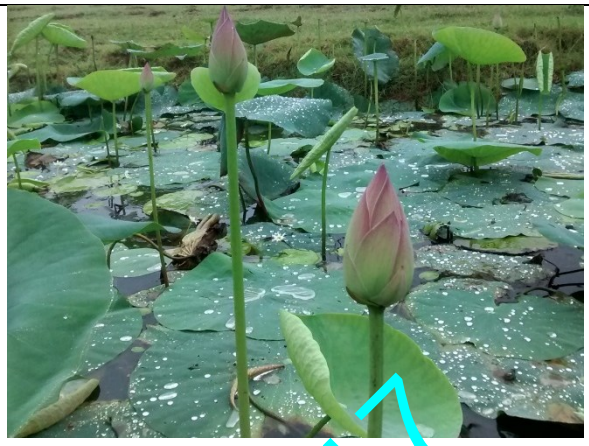
Of all the observed Lakes in Sagara, **encroachments** were found to be common followed by **bad quality of water** (where in DO is less than 2) due to complete macrophytes and other floral cover (*see Common flora found in lakes of sagara*), and siltation.

Some of the lakes in Sagara are well maintained by the village lake committees.

COMMON FLORA FOUND IN LAKES OF SAGARA

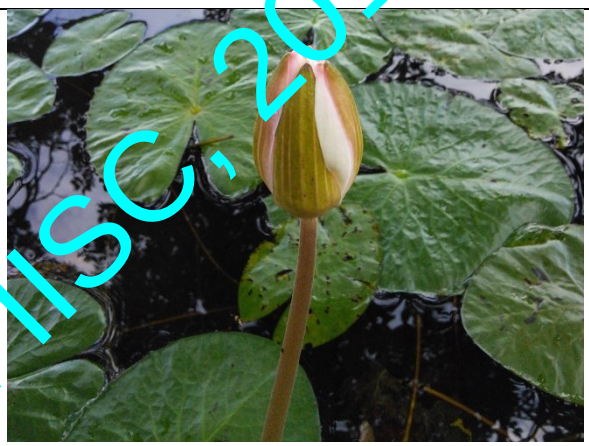
	
Trapa	Polygonum
	
Salvinia	Nymphaea
	
Ludvigia	Nymphaea/Lily

Nymphaea



Nelumbos

Nelumbos



Nelumbos

Birds in Sagara

Slno	Family	*Species*	Common Name	ಕನ್ನಡ
1	Nectariniidae	*Nectarinin zeylonica*	Purple Sunbird	ಕದಿರುಗಣಿ
2	Picidae	*Dryocorpus javensis*	Great Black Woodpecker	ಕಪ್ಪು ಮರಕುಟಿಗ
3	Ardelidae	*Ardea cinerea*	Grey Heron	ಕಬ್ಬಾರೆ ಹಕ್ಕಿ
4	Oriolidae	*Oriolus xanthonuis*	Black Header Oriole	ತಲೆತಲೆ ಹರಿಶಿನ ಬುರುಡೆ
5	Meropidae	*Merops orientalis*	Small Green Bee eater	ಕಳ್ಳಿ ಪೀರ
6	Dicruridae	*Dicrurus macrocercus*	Black Drongo	ಕಾಜಾಣ
7	Phasiandae	*Gallilnula sonneratti*	Grey Junglefowl	ಕಾಡು ಕೋಳಿ
8	Charadridae	*Vanellus indicus*	Red wattled Lapwing	ಕೆಂಪು ಟಿಟ್ಟಿಭ
9	Coculidae	*Centropus bengalensis*	Lesser Coucal	ಕೆಂಬೂತ
10	Pycnonotidae	*Pycnonotus cafer*	Red Vented Bull Bulbul	ಕೆಮ್ಮೀಸೆ ಪಿಕಳಾರ
11	Ardelidae	*Ardeola grayii*	Pond Heron	ಕೋಳದ ಬಕ
12	Accipitridae	*Haliastur indicus*	Brahmini Kite	ಗರುಡ
13	Pisttacidae	*Psittacula krameri*	Rose Ringed Prakeet	ಗಿಳಿ
14	Sturnidae	*Acridotheres tristis*	Indian Myna	ಗೊರವಂಕ
15	Ardelidae	*Bubulcus ibis*	Cattle Egret	ಗೋವಕ್ಕಿ
16	Campephagidae	*Pericrocotus flammenus*	Scarlet Minivet	ಚಿತ್ರಪಟ್ಟಿ
17	Columbidae	*Streptopelia chinensis*	Spotted Dove	ಚೋರೆ ಹಕ್ಕಿ
18	Rallidae	*Gallilnula chloropus*	Indian Moorhen/ Common Moorhen	ಜಂಬುಕೋಳಿ

19	Ardelidae	*Casmerodius albus*	Large egret	ಡೊಡ್ಡ ಬೆಳ್ಳಕ್ಕಿ
20	Jacanidae	*Metopidius indicus*	Bronze-winged Jacana	ದೇವಕ್ಕಿ
21	Pittidae	*Pitta brachyara*	Indian Pitta	ನವರಂಗ
22	Phasiandae	*Pavo cristatus*	Common Peafowl/Indian Peafowl	ನವಿಲು
23	Rallidae	*Fulica atra*	Common Coot	ನಾಮದಕೋಳಿ
24	Phalacrocoracidae	*Phalacrocorax niger*	Little Cormorent	ನೀರು ಕಾಗೆ
25	Coraciidae	*Coracias bengalensis*	Indain Roller (Blue Jay)	ನೀಲಕಂಠ
26	Rallidae	*Porphyrio porphyrio*	Purple Moorhen	ನೀಲಿ ನಾಮದಕೋಳಿ
27	Ciconiidae	*Anastomus oscitans*	Openbill Stork	ಬಾಯ್ಕಳಕ
28	Monarchinae	*Terpsiphone paradisi*	Asian Paradise-Flycatcher	ಬಾಳದಂಡೆ ಹಕ್ಕಿ
29	Threskiornithidae	*Threskiornis melanocephalus*	White Ibis	ಬಿಳಿ ಕೆಂಬರಲು
30	Corvidae	*Corvus splendens*	House Crow	ಬೂದು ಕಾಗೆ
31	Bucerotidae	*Ocyceros griseus*	Malabar Grey Hornbill	ಬೂದು ಮಂಗಟ್ಟೆ ಪಕ್ಷಿ
32	Ardelidae	*Egretta garzetta*	Little Egret	ಬೆಳ್ಳಕ್ಕಿ
33	Dicruridae	*Dicrurus pradiseus*	Racket Tailed Drongo	ಭೀಮರಾಜ
34	Corvidae	*Dendrocitta vagabunda*	Indian Tree Pie	ಮಟಪಕ್ಷಿ
35	Musicapidae	*Copsychus saularis*	Magpie Robin	ಮಡಿವಾಳ
36	Laridae	*Sterna aurantia*	River Tern	ರೀವ ಹಕ್ಕಿ
37	Accipitridae	*Milvus migrans*	Black Kite	ಹದ್ದು

38	Musicapidae	*Turdoides striatus*	Jungle Babbler	ಹರಟೆಮಲ್ಲ
39	Charadridae	*Vanellus malabaricus*	Yellow Wattled lapwing	ಹಳದಿ ಟಿಟ್ಟಿಭ
40	Rallidae	*Amaurornis phoenicurus*	White Breasted Water Hen	ಹುಂಡುಕೋಳಿ
41	Ciconiidae	*Leptoptilos javanicus*	Lesser Adjutant	
42	Anatidae	*Dendrocygna javanica*	Lesser Whistling Teal (Tree Duck)	
43	Rallidae	*Gallicrex cinerea*	Water Cock	
44	Columbidae	*Chalcophaps indica*	Emerald Dove	
45	Cuculidae	*Cuculus micropterus*	Indian Cuckoo	
46	Megalaimidae	*Megalaima malabarica*	Crimson Throated Barbet	
47	Picidae	*Dryocopus martius*	Great Black Woodpecker	
48	Pycnonotidae	*Pycnonotus leucoti*	White eared Bulbul	
49	Motacillidae	*Dendronanthus indicus*	Forest Wagtail	
50	Estrildidae	*Lonchura atricapilla*	Black Headed Munia	
51	Columbidae	*Treron phoenicoptera*	Common Green Pegion	

Flora of Sagara Kans and forests

Slno	Family	Species
1	**Alangiaceae**	*Alangium salviifolium*
2	**Anacardiaceae**	*Holigarna arnottiana*
3	**Anacardiaceae**	*Holigarna ferruginea*
4	**Anacardiaceae**	*Holigarna grahamii*
5	**Anacardiaceae**	*Holigarna nigra*
6	**Anacardiaceae**	*Mangifera indica*
7	**Anacardiaceae**	*Nothopegia castaneaefolia*
8	**Ancistrocladaceae**	*Ancistrocladus heyneanus*
9	**Annonaceae**	*Artabotrys zeylanicus*
10	**Annonaceae**	*Demos lawii*
11	**Annonaceae**	*Goniothalamus cardiopetalus*
12	**Annonaceae**	*Orophea zeylanica*
13	**Annonaceae**	*Polyalthia fragrans*
14	**Annonaceae**	*Uvaria narum*
15	**Apocynaceae**	*Alstonia scholaris*
16	**Apocynaceae**	*Ervatamia heyneana*
17	**Apocynaceae**	*Hemidesmus indicus*
18	**Apocynaceae**	*Tabernaemontana alternifolia*
19	**Arecaceae**	*Calamus thwaitesii*
20	**Arecaceae**	*Caryota urens*
21	**Asteraceae**	*Eupatorium odoratum*
22	**Bignoniaceae**	*Pajanelia longifolia*
23	**Bignoniaceae**	*Stereospermum colais*
24	**Burseraceae**	*Canarium strictum*
25	**Celastraceae**	*Lophopetalum wightianum*
26	**Clusiaceae**	*Garcinia gummi-gutta*
27	**Clusiaceae**	*Garcinia indica*
28	**Clusiaceae**	*Garcinia morella*
29	**Clusiaceae**	*Mammea longifolia*
30	**Clusiaceae**	*Mesua ferrea*
31	**Combretaceae**	*Terminalia bellirica*
32	**Combretaceae**	*Terminalia paniculata*
33	**Combretaceae**	*Terminalia elliptica*
34	**Cornaceae**	*Mastixia arborea*
35	**Datiscaceae**	*Tetrameles nudiflora*
36	**Dichapetalaceae**	*Dichapetalum gelonioides*
37	**Dilleniaceae**	*Dillenia pentagyna*

38	**Dipterocarpaceae**	*Hopea ponga*
39	**Ebenaceae**	*Diospyros buxifolia*
40	**Ebenaceae**	*Diospyros candolleana*
41	**Ebenaceae**	*Diospyros montana*
42	**Ebenaceae**	*Diospyros nigra*
43	**Ebenaceae**	*Diospyros oocarpa*
44	**Ebenaceae**	*Diospyros paniculata*
45	**Ebenaceae**	*Diospyros sp.*
46	**Ebenaceae**	*Diospyros sylvatica*
47	**Elaeagnaceae**	*Elaeagnus conferta*
48	**Elaeocarpaceae**	*Elaeocarpus serratus*
49	**Euphorbiaceae**	*Agostistachys indica*
50	**Euphorbiaceae**	*Antidesma menasu*
51	**Euphorbiaceae**	*Aporosa cardiosperma*
52	**Euphorbiaceae**	*Bischofia javanica*
53	**Euphorbiaceae**	*Blachia denudata*
54	**Euphorbiaceae**	*Bridelia retusa*
55	**Euphorbiaceae**	*Fahrenheitia zeylanica*
56	**Euphorbiaceae**	*Macaranga peltata*
57	**Euphorbiaceae**	*Mallotus philippensis*
58	**Euphorbiaceae**	*Margaritaria indica*
59	**Euphorbiaceae**	*Phyllanthus emblica*
60	**Flacourtiaceae**	*Casearia championii*
61	**Flacourtiaceae**	*Flacourtia montana*
62	**Flacourtiaceae**	*Homalium zeylanicum*
63	**Flacourtiaceae**	*Hydnocarpus pentandra*
64	**Gnetaceae**	*Gnetum edule*
65	**Icacinaceae**	*Nothapodytes nimmoniana*
66	**Lauraceae**	*Actinodaphne angustifolia*
67	**Lauraceae**	*Alseodaphne semecarpifolia*
68	**Lauraceae**	*Beilschmiedia roxburghiana*
69	**Lauraceae**	*Cinnamomum malabatrum*
70	**Lauraceae**	*Litsea floribunda*
71	**Lauraceae**	*Litsea laevigata*
72	**Lauraceae**	*Litsea sp.*
73	**Lauraceae**	*Persea macrantha*
74	**Lecythidaceae**	*Careya arborea*
75	**Leeaceae**	*Leea indica*
76	**Leguminosae**	*Acacia auriculiformis*
77	**Leguminosae**	*Albizia lebbeck*

78	**Leguminosae**	*Archidendron monadelphum*
79	**Leguminosae**	*Butea monosperma*
80	**Leguminosae**	*Dalbergia horrida*
81	**Leguminosae**	*Derris sp.*
82	**Leguminosae**	*Entada rheedi*
83	**Leguminosae**	*Erythrina variegata*
84	**Leguminosae**	*Pithecellobium monadelphum*
85	**Leguminosae**	*Pterocarpus marsupium*
86	**Leguminosae**	*Saraca asoca*
87	**Lythraceae**	*Lagerstroemia microcarpa*
88	**Lythraceae**	*Lagerstroemia microcarpa*
89	**Melastomataceae**	*Memecylon talbotianum*
90	**Melastomataceae**	*Memecylon mabaricum*
91	**Melastomataceae**	*Memecylon terminale*
92	**Meliaceae**	*Aglaia elaeagnoidea*
93	**Meliaceae**	*Chukrasia tabularis*
94	**Meliaceae**	*Dysoxylum malabaricum*
95	**Meliaceae**	*Dysoxylum binectariferum*
96	**Meliaceae**	*Reinwardtiodendron anamalaiense*
97	**Meliaceae**	*Toona hexendra*
98	**Meliaceae**	*Trichilia connaroides*
99	**Moraceae**	*Antiaris toxicaria*
100	**Moraceae**	*Artocarpus gomezianus*
101	**Moraceae**	*Artocarpus heterophyllus*
102	**Moraceae**	*Artocarpus hirsuta*
103	**Moraceae**	*Artocarpus hirsutus*
104	**Moraceae**	*Ficus callosa*
105	**Moraceae**	*Ficus nervosa*
106	**Moraceae**	*Ficus sp.*
107	**Moraceae**	*Streblus asper*
108	**Myristicaceae**	*Knema attenuata*
109	**Myristicaceae**	*Myristica malabarica*
110	**Myrtaceae**	*Syzygium caryophyllatum*
111	**Myrtaceae**	*Syzygium cumini*
112	**Myrtaceae**	*Syzygium travancoricum*
113	**Myrtaceae**	*Syzygium gardnerii*
114	**Myrtaceae**	*Syzygium laetum*
115	**Myrtaceae**	*Syzygium sp.*
116	**Olacaceae**	*Strombosia ceylanica*
117	**Oleaceae**	*Chionathus mala-elengi*

118	**Oleaceae**	*Jasminum malabaricum*
119	**Oleaceae**	*Jasminum sp.*
120	**Oleaceae**	*Linociera malabarica*
121	**Oleaceae**	*Olea dioica*
122	**Pandanaceae**	*Pandanus fascicularis*
123	**Rhamnaceae**	*Ziziphus rugosa*
124	**Rhizophoraceae**	*Carallia brachiata*
125	**Rubiaceae**	*Canthium dicoccum*
126	**Rubiaceae**	*Canthium rheedii*
127	**Rubiaceae**	*Catunaregam spinosa*
128	**Rubiaceae**	*Ixora brachiata*
129	**Rubiaceae**	*Ixora coccinea*
130	**Rubiaceae**	*Psychotria dalzelli*
131	**Rubiaceae**	*Psychotria flaviana*
132	**Rutaceae**	*Atlantia racemosa*
133	**Rutaceae**	*Toddalia asiatica*
134	**Rutaceae**	*Vepris bilocularis*
135	**Rutaceae**	*Zanthoxylum rhetsa*
136	**Santalaceae**	*Santalum album*
137	**Sapindaceae**	*Allophylus cobbe*
138	**Sapindaceae**	*Dimocarpus longan*
139	**Sapindaceae**	*Harpullia arborea*
140	**Sapindaceae**	*Sapindus laurifolius*
141	**Sapindaceae**	*Schleichera oleosa*
142	**Sapotaceae**	*Chrysophyllum roxburghii*
143	**Sapotaceae**	*Mimusops elengi*
144	**Sapotaceae**	*Xantolis tomentosa*
145	**Smilacaceae**	*Smailx zeylanica*
146	**Sterculiaceae**	*Helicteres isora*
147	**Sterculiaceae**	*Pterospermum diversifolium*
148	**Sterculiaceae**	*Sterculia guttata*
149	**Symplocaceae**	*Symplocos racemosa*
150	**Tiliaceae**	*Grewia tiliifolia*
151	**Ulmaceae**	*Aphananthe cuspidata*
152	**Ulmaceae**	*Celtis cinnamomea*
153	**Ulmaceae**	*Celtis timorensis*
154	**Ulmaceae**	*Trema orientalis*
155	**Verbenaceae**	*Callicarpa tomentosa*
156	**Verbenaceae**	*Vitex altissima*

Irrational allocation of common lands - Khata *Kan* Sacred Groves in Sagra taluk, Shimogga

Khata kans, are the common lands(forests) of the village who were supposed to use the same for fire wood, extraction of medicinal products, and many other NTFP's. These patch of forests provided perennial resource to the villagers. Since ages, the head of the village was responsible for maintaining these Khata kans. But, in the current years, influential community claims the ownership of these lands, altering the landscape from forested to Agriculture/Horticulture.

Case Study: the current study focuses on the assessment of Khata Kan of Nargodu-Koppa Village Survey number 43, Sagara Taluk, Shimoga District, Karnataka. Nargodu village is located in Sagara taluk about 12 kilometers from Sagara City. Nargodu Revenue map with suevery numbers is as depicted in Figure 1. Survey number 43 of Nargodu-Koppa village has an area of 24 Acres 18 Guntas. Spatial landscape dynamics since 1972 is as depicted in Figure 2. Temporal Satellite imageries doesn't indicate any changes in survey number 43 until 2016 i.e., Forest had remained intact, whereas in 2017 forest has started to degrade through large scale tree cutting activities.

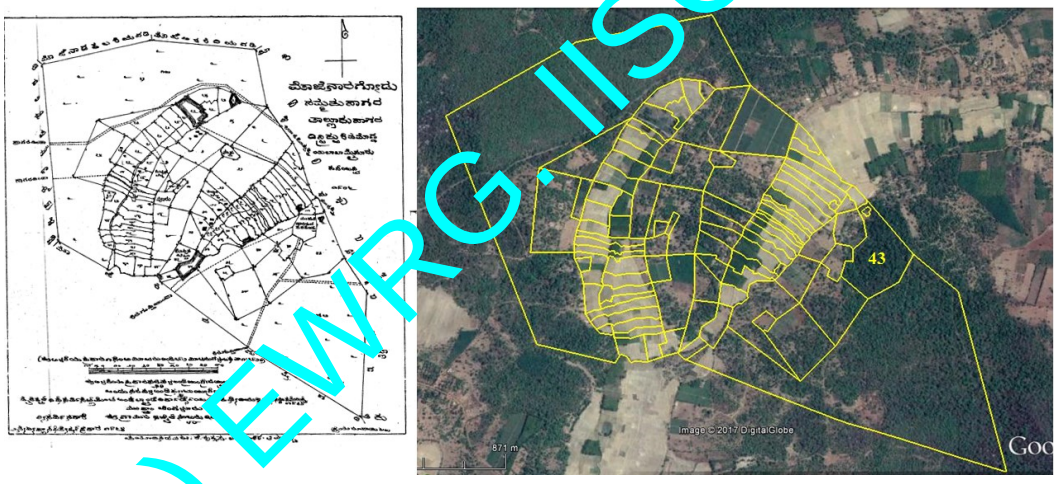


Fig. 1: Nargodu Village

Land records accessed from Bhoomi web page indicates that Survey number 43 was Khata Kan unitll 2009, which was further in name of Bangaramma and Devaraju since 2012 till date (Figure 3, Table 1) due to irrational allotments by the senseless district administration and local politicians.

Table 1: Nargodu Land records

Slno	Year	Owner - Bhoomi Land Records	Area (Ac.Gu)
1	untill 2009	Khata Kan	24.18
2	2011/12 – 2017	Bangaramma, Devaraju	24.08

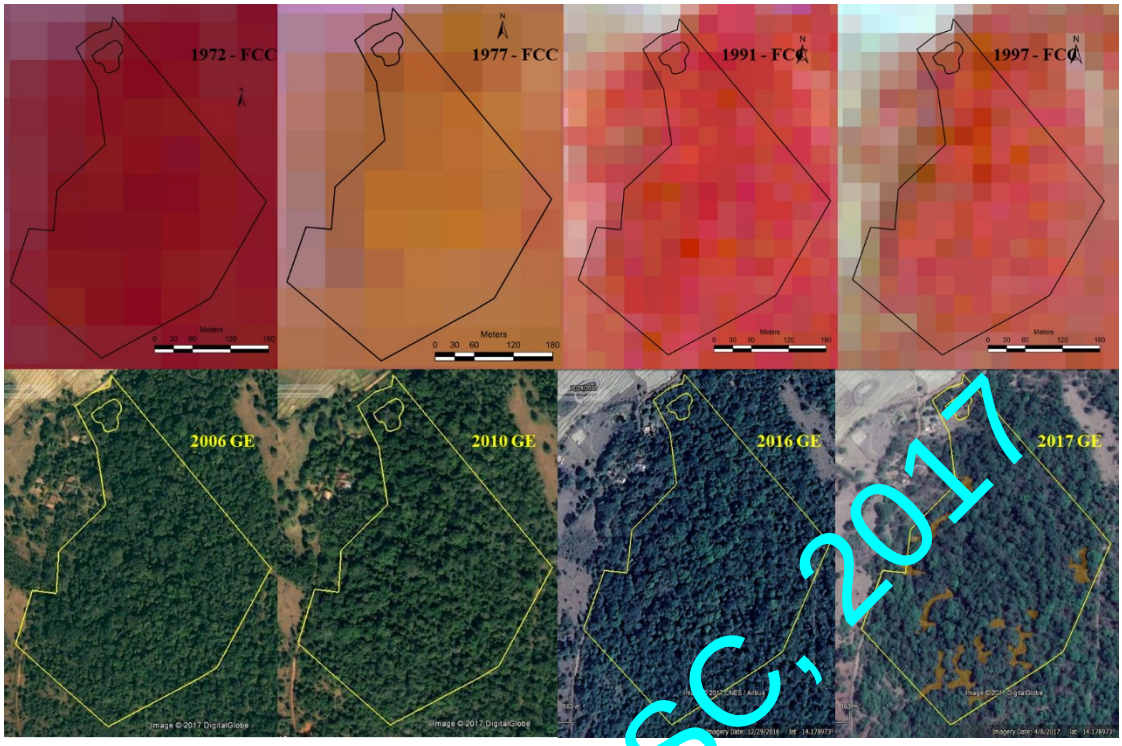
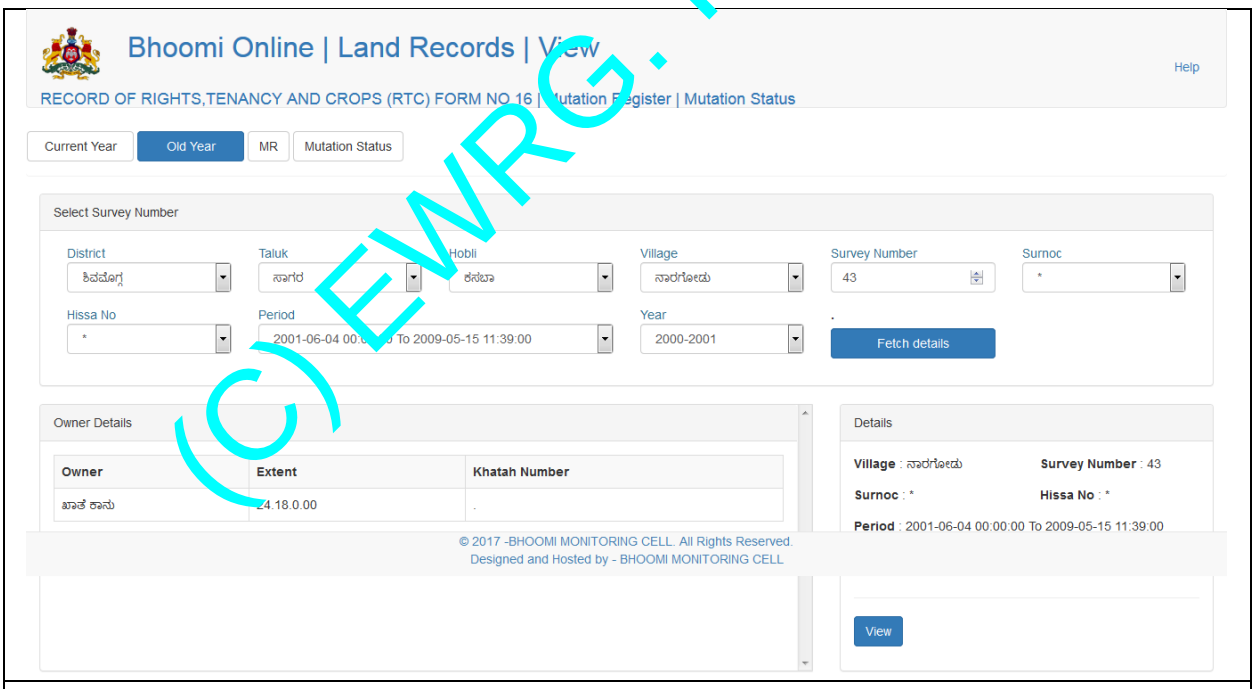
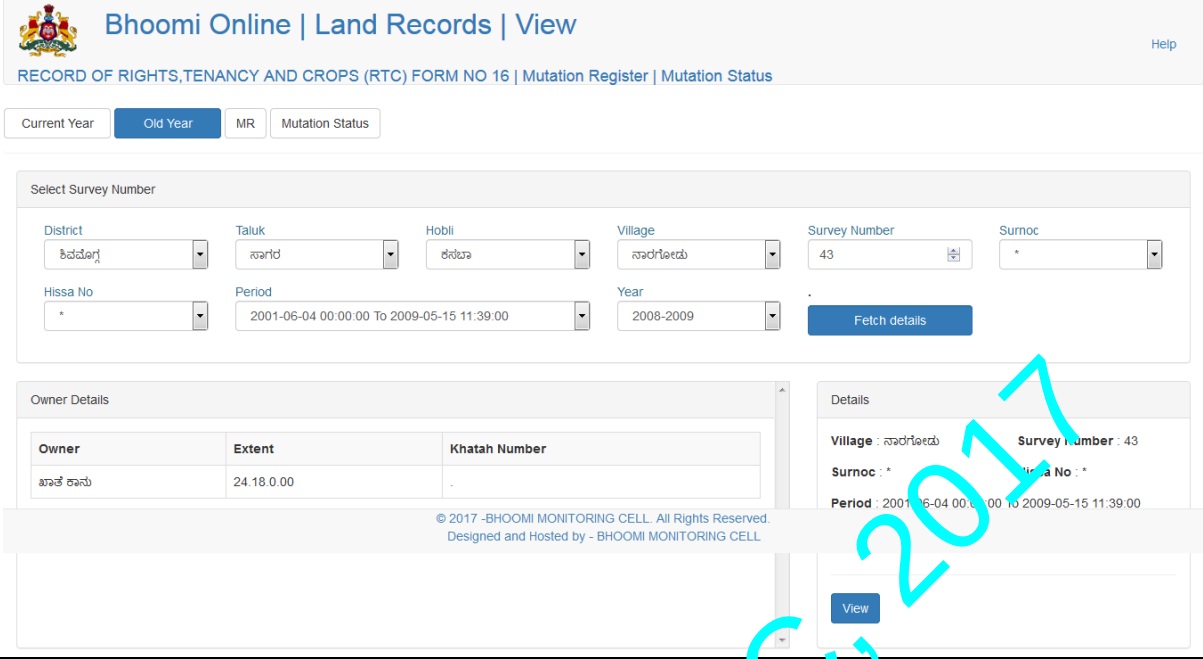


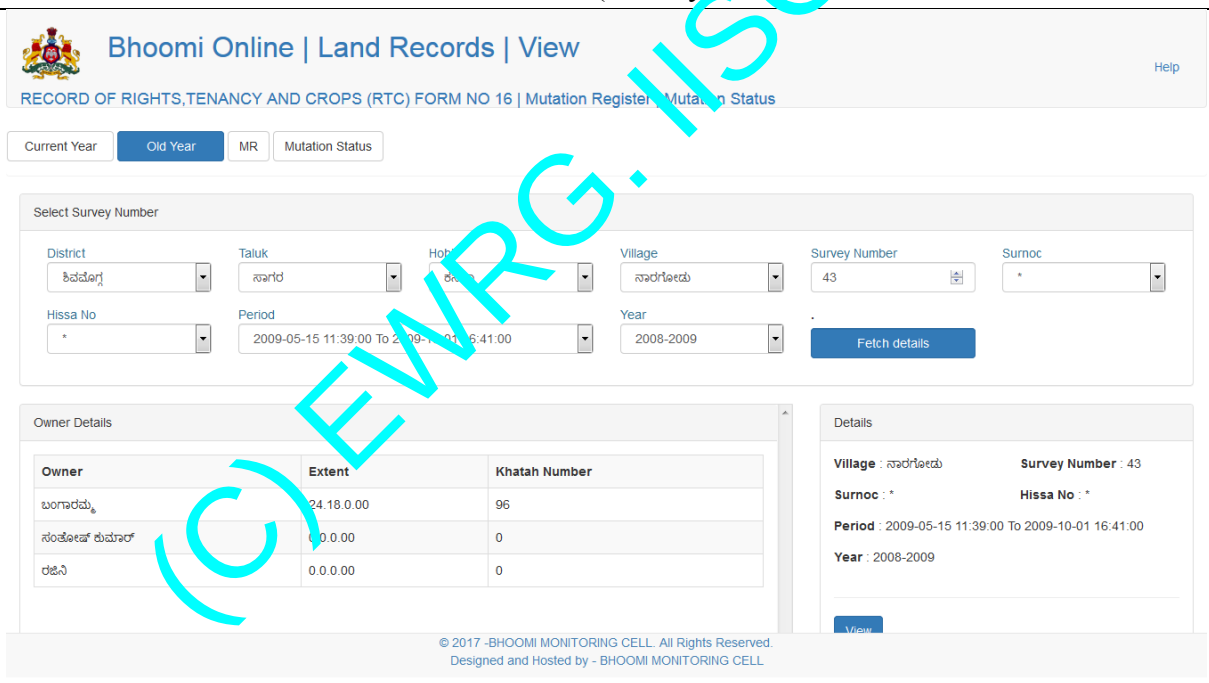
Fig. 2: Land use dynamics (24.08 acre forest lands)



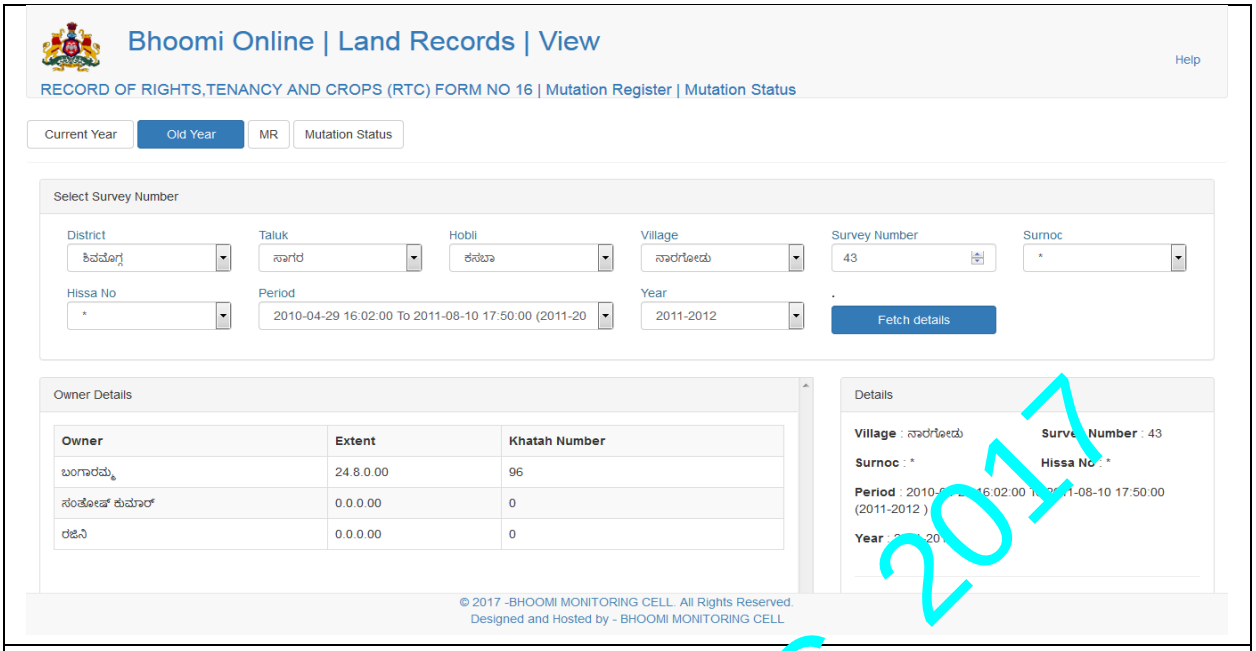
2000 - 2001



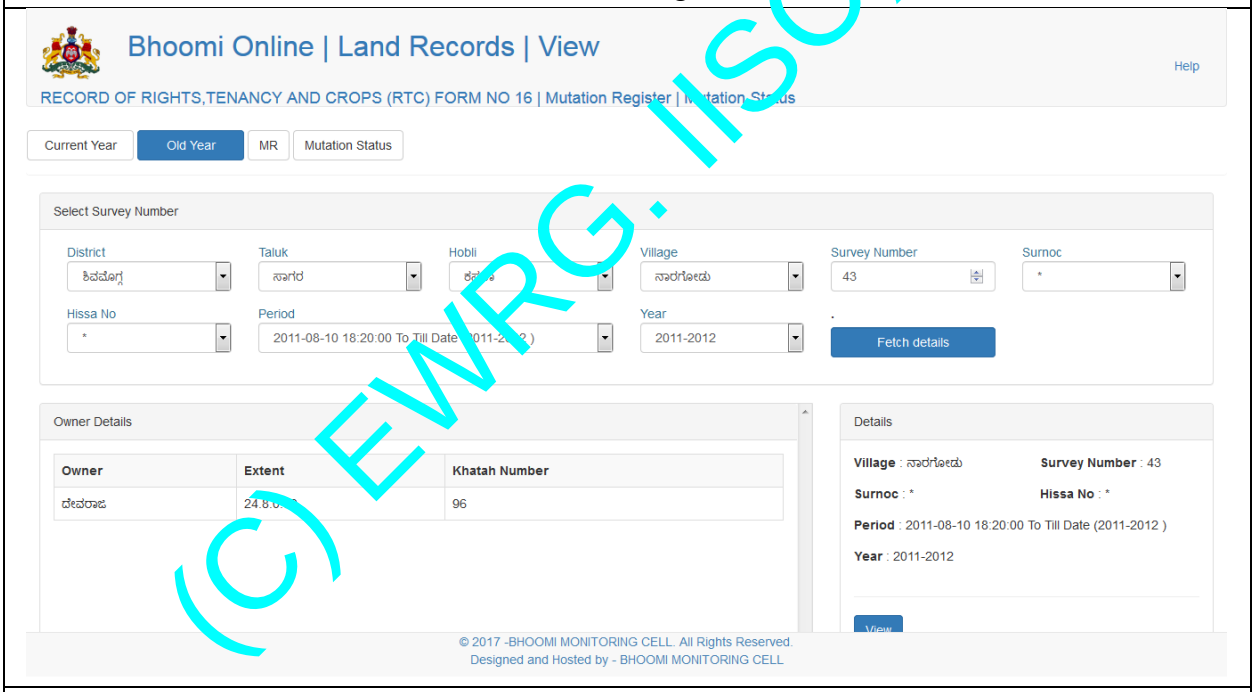
2001 – 2009 (15 May 2009)



2009 (15 May to 1 October)



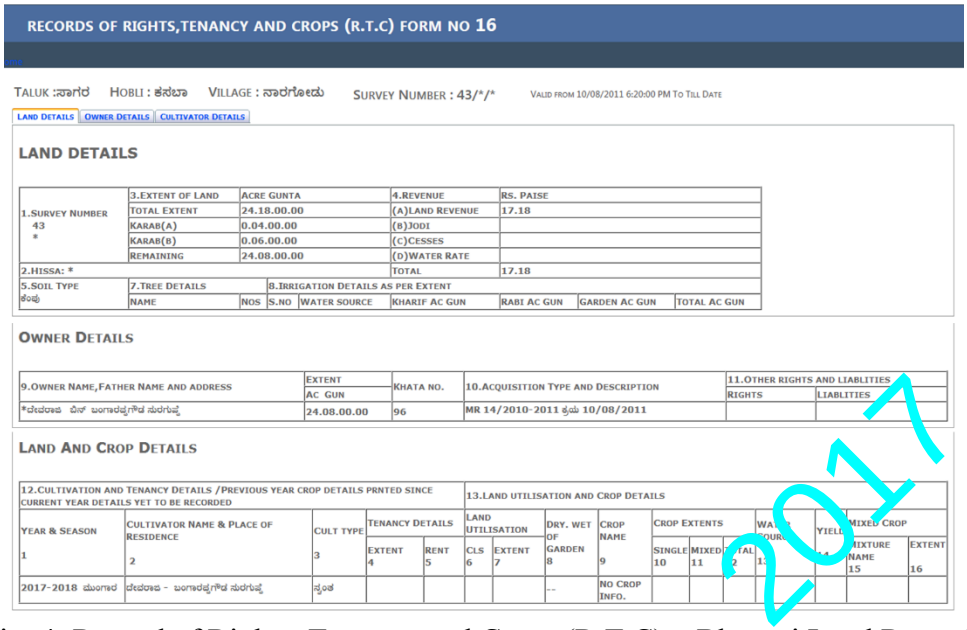
2009 until 10 August 2011



10 August 2011 till date (2017)

Fig. 3: Mutation Status – Bhoomi Land Records
(Source: https://landrecords.karnataka.gov.in , Accessed on 13 December 2017)

The current owner of the land claims that the land is being used for growing crops such as ginger, jowar *etc.* Record of Rights, Tenancy and Crops (R.T.C) doesn't indicate any crop being grown in the region (Figure 4) and temporal remote sensing data (and field investigations) highlights the presence of good patch of native forests.



RECORDS OF RIGHTS,TENANCY AND CROPS (R.T.C) FORM NO 16

TALUK :ಸಾಗರ HOBLI : ಕಸಬಾ VILLAGE : ಸಾರಗೋಡು SURVEY NUMBER : 43/*/* VALID FROM 10/08/2011 6:20:00 PM TO TILL DATE

LAND DETAILS OWNER DETAILS CULTIVATOR DETAILS

LAND DETAILS

1.SURVEY NUMBER 43 *	3.EXTENT OF LAND	ACRE GUNTA	4.REVENUE	RS. PAISE
	TOTAL EXTENT	24.18.00.00	(A)LAND REVENUE	17.18
	KARAB(A)	0.04.00.00	(B)JODI	
	KARAB(B)	0.06.00.00	(C)CESSES	
	REMAINING	24.08.00.00	(D)WATER RATE	
2.HISSA: *			TOTAL	17.18

5.SOIL TYPE ಕೆಂಪು	7.TREE DETAILS		8.IRRIGATION DETAILS AS PER EXTENT				
	NAME	NOS	S.NO	WATER SOURCE	KHARIF AC GUN	RABI AC GUN	GARDEN AC GUN	TOTAL AC GUN

OWNER DETAILS

9.OWNER NAME,FATHER NAME AND ADDRESS	EXTENT AC GUN	KHATA NO.	10.ACQUISITION TYPE AND DESCRIPTION	11.OTHER RIGHTS AND LIABLITIES	
				RIGHTS	LIABLITIES
*ದೇವರಾಜ ಬಿನ್ ಬಂಗಾರಪ್ಪಗೌಡ ಸುರಗುಪ್ಪೆ	24.08.00.00	96	MR 14/2010-2011 ಕ್ರಮ 10/08/2011		

LAND AND CROP DETAILS

12.CULTIVATION AND TENANCY DETAILS /PREVIOUS YEAR CROP DETAILS PRNTED SINCE CURRENT YEAR DETAILS YET TO BE RECORDED								13.LAND UTILISATION AND CROP DETAILS										
YEAR & SEASON	CULTIVATOR NAME & PLACE OF RESIDENCE	CULT TYPE	TENANCY DETAILS		LAND UTILISATION		DRY. WET OF GARDEN	CROP NAME	CROP EXTENTS			WA... SOURC...	YIELD	MIXED CROP		
			EXTENT	RENT	CLS	EXTENT			SINGLE	MIXED	TAL			MIXTURE NAME	EXTENT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2017-2018 ಮುಂಗಾರ	ದೇವರಾಜ - ಬಂಗಾರಪ್ಪಗೌಡ ಸುರಗುಪ್ಪೆ	ಸ್ವಂತ					--	NO CROP INFO.										

Fig. 4: Record of Rights, Tenancy and Crops (R.T.C) – Bhoomi Land Records (Source: https://landrecords.karnataka.gov.in , Accessed on 13 December 2017)

Field work carried out at Sagara on 28 November 2017 and GPS track is indicated in Figure 5. Field work photo graphs of field investigations are depicted in Figure 8. Field work shows that survey number 43 is a pristine forest having about 84 species of trees, 36 species of shrubs, 21 species of climbers (Table 2), conforming the presence of pristine forests, which is clandestinely alloted to an individual for private activities while depriving the community their right to use the forest for livelihood.

Fig. 5: Survey on 28 November 2017


FENCE





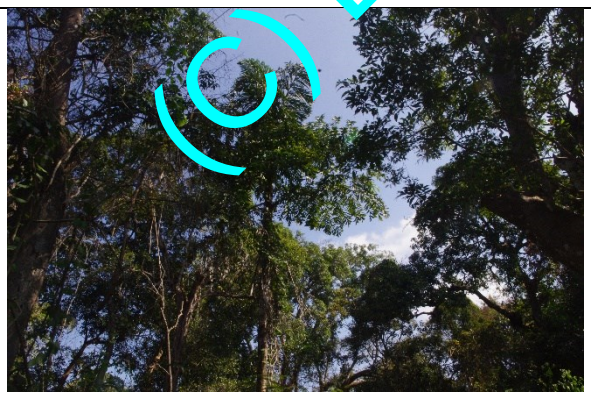






TREE FELLING


REGENERATION




Glimpse of mature natural vegetation

Fig. 6: Field work Photographs

Table 2: List of Floral Species

Sl.no.	Tree species	Habit	Family
1	*Actinodaphne angustifolia* (Blume) Nees	TR	Lauraceae
2	*Actinodaphne hookeri* Meissn . *In DC. Prodr.*	TR	Lauraceae
3	*Albizzia lebbeck* (L.) Benth.	TR	Fabaceae. (Leguminosae)
4	*Alseodaphne semicarpifolia* Nees	TR	Lauraceae
5	*Alstonia scholaris* (L.) R. Br.	TR	Apocynaceae
6	*Aporosa cardiosperma* (Gaertn.) Merr.	TR	Euphorbiaceae
7	*Artocarpus gomezianus* Wall. ex Trec.	TR	Moraceae
8	*Artocarpus heterophyllus* Lam.	TR	Moraceae
9	*Artocarpus hirsuta* Lam.	TR	Moraceae
10	*Atalantia* wightii Yu. Tanaka	TR	Rutaceae
11	*Beilschmiedia roxburghiana* Nees	TR	Lauraceae
12	*Carallia brachiata* (Lour.) Merr.	TR	Rhizophoraceae
13	*Careya arborea* Roxb.	TR	Myrtaceae
14	*Caryota urens* L.	TR	Arecaceae. (Palmae)

15	*Cassia fistula* L.	TR	Fabaceae. (Leguminosae)
16	*Cassine glauca (Rottb.) Kuntze, Rev. Gen.*	TR	Celastraceae
17	*Catunaregam spinosa* (Thunb.) Tirveng.	TR	Rubiaceae
18	*Chionanthus mala-elengi (Dennst.) p.s. Green*	TR	Oleaceae
19	*Chukrasia tabularis* A. Juss.	TR	Meliaceae
20	*Cinnamomum malabatrum* (Burm.f.) J. Presl	TR	Lauraceae
21	*Dalbergia latifolia* Roxb.	TR	Fabaceae. (Leguminosae)
22	*Dillenia pentagyna* Roxb.	TR	Dilleniaceae
23	*Diospyros ebenum.J. Koenig ex Retz.*	TR	Ebenaceae
25	*Diospyros melanoxylon* Roxb.	TR	Ebenaceae
25	*Diospyros montana* Roxb.	TR	Ebenaceae
26	*Diospyros sylvatica* Roxb.	TR	Ebenaceae
27	*Ficus amplissima* Sm.	TR	Moraceae
28	*Ficus hispida. L.f.*	TR	Moraceae
29	*Ficus callosa* Willd.	TR	Moraceae
30	*Ficus microcarpa* L.f.	TR	Moraceae
31	*Ficus tsjahela* Burm.f.	TR	Moraceae
32	*Flacourtia montana* J. Graham	TR	Salicaceae
33	*Garuga pinnata Roxb.*	TR	Burseraceae
34	*Grewia tiliifolia* Vahl	TR	Malvaceae
35	*Haldina cordifolia* (Roxb.) Ridsd.	TR	Rubiaceae
36	*Holigarna arnottiana* Hook.f.	TR	Anacardiaceae
37	*Holigarna ferruginea* Marchand	TR	Anacardiaceae
38	*Homalium ceylanicum (Gardner) Benth.*	TR	Salicaceae
39	*Hydnocarpus pentandra* (Buch.-Ham.) Oken	TR	Achariaceae
40	*Ixora brachiata* Roxb.	TR	Rubiaceae
41	*Knema attenuata (Hook.f.& Thomson) Warb*	TR	Myristicaceae
42	*Lagerstroemia microcarpa* Wight	TR	Lythraceae
43	*Lannea coromandelica* (Houtt.) Merr.	TR	Anacardiaceae
44	*Litsea floribunda* (Blume) Gamble	TR	Lauraceae
45	*Litsea laevigata (Nees) Gamble*	TR	Lauraceae
46	*Macaranga peltata* (Roxb.) Muell.Arg.	TR	Euphorbiaceae
47	*Magnolia champaca (L.) Baill. Ex pierre*	TR	Magnoliaceae
48	*Mallotus philippensis* (Lam.) Muell.Arg.	TR	Euphorbiaceae
53	*Mangifera indica* L.	TR	Anacardiaceae
54	*Memecylon talbotianum* Brandis	TR	Melastomataceae
55	*Mimusops elengi* L.	TR	Sapotaceae

56	*Mitragyna parvifolia . (Roxb). Karth.*	TR	Rubiaceae
57	*Murraya koenigii* (L.) Spreng.	TR	Rutaceae
58	*Nothapodytes nimmoniana (J. Graham) Mabb.*	TR	Icacinaceae
59	*Olea dioica* Roxb.	TR	Oleaceae
60	*Phyllanthus emblica* L.	TR	Euphorbiaceae
61	*Pongamia pinnata* (L.) Pierre	TR	Fabaceae. (Leguminosae)
62	*Pterocarpus marsupium* Roxb.	TR	Fabaceae. (Leguminosae)
63	*Santalum album* L.	TR	Santalaceae
64	*Spondias pinnata* (L. f.) Kurz	TR	Anacardiaceae
65	*Sterculia guttata* Roxb.	TR	Malvaceae
66	*Stereospermum tetrogonum. DC.*	TR	Bignoniaceae
67	*Strychnos nux-vomica* L.	TR	Loganiaceae
68	*Syzygium gardnerii* Thwaites	TR	Myrtaceae
70	*Syzygium caryophyllatum* (L.) Alston	TR	Myrtaceae
71	*Syzygium cumini* (L.) Skeels	TR	Myrtaceae
72	*Syzygium zeylanicum* (L.) DC.	TR	Myrtaceae
73	*Tabernemontana al*ternifolia (L).	TR	Apocynaceae
74	*Tamilnadia uliginosa* (Retz.) Poir.	TR	Rubiaceae
75	*Terminalia bellirica* (Gaertn.) Roxb.	TR	Combretaceae
76	*Terminalia paniculata* Roth	TR	Combretaceae
77	*Terminalia tomentosa Bedd.*	TR	Combretaceae
78	*Trema orientalis* (L.) Blume	TR	Ulmaceae
79	*Vangueria spinosa* Hook.f.	TR	Rubiaceae
80	*Vepris bilocularis* (Wight & Arn.) Engl.	TR	Rutaceae
81	*Vitex altissima* L.f.	TR	Lamiaceae
82	*Xantolis tomentosa* (Roxb.) Raf.	TR	Sapotaceae
83	*Zanthoxylum rhetsa* (Roxb.) DC.	TR	Rutaceae
84	*Ziziphus caracutta* Lam.	TR	Rhamnaceae
Species found in the shrub layer (shrubs and tree saplings)			
1	*Alangium salviifolium (L. f.)*	Sapling	Cornaceae
2	*Alseodaphne semecarpifolia Nees*	Sapling	Lauraceae
3	*Alstonia scholaris (L.) R. Br.*	Sapling	Apocynaceae
4	*Aporosa cardiosperma (Gaertn.) Merr.*	Sapling	Euphorbiaceae
5	*Artocarpus hirsuta Lam.*	Sapling	Moraceae
6	*Artocarpus heterophyllus Lam.*	Sapling	Moraceae
7	*Beilschmiedia roxburghiana Nees*	Sapling	Lauraceae

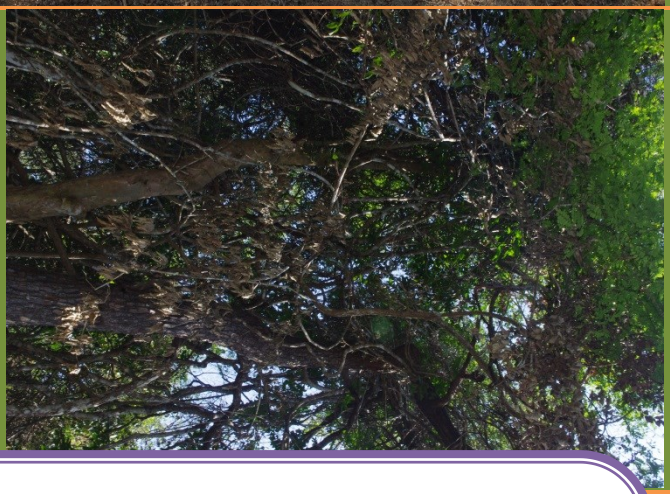
8	*Canthium coromandelicum (Burm,f.) Alston*	Shrub	Rubiaceae
9	*Careya arborea Roxb.*	Sapling	Myrtaceae
10	*Cassia fistula L.*	Sapling	Fabaceae. (Leguminosae)
11	*Dalbergia latifolia Roxb.*	Sapling	Fabaceae. (Leguminosae)
12	*Diospyros ebenum J. Koenig ex Retz.*	Sapling	Ebenaceae
13	*Diospyros melonoxylon (Roxb)*	Sapling	Ebenaceae
14	*Eupotorium odoratum L.*	Shrub	Asteraceae
15	*Flemingia strobilifera (L.) w.T. Aiton*	Shrub	Leguminosae
16	*Holarrhena pubescens Buch. Hami. Wall.ex. Don.*	Shrub	Apocynaceae
17	*Holigarna arnottiana. Hook. F.*	Sapling	Anacardiaceae
18	*Hydnocarpus pentandra (Buch.-Ham.) Oken*	Sapling	Achariaceae
19	*Ixora brachiata (Roxb).*	Sapling	Rubiaceae
20	*Knema attenuata (Hook.f.& Thomson) Warb*	Sapling	Myristicaceae
21	*Lagerstroemia microcarpa Wight*	Sapling	Lythraceae
22	*Lantana camara L.*	Shrub	Lamiaceae
23	*Mallotus philippensis (Lam.) Muell.Arg.*	Sapling	Euphorbiaceae
24	*Mimusops elengi L.*	Sapling	Sapotaceae
25	*Mussaenda laxa (Hook.f.) Hutch.ex Gamble*	Shrub	Rubiaceae
26	*Murraya koenigii (L.) Spreng.*	Shrub	Rutaceae
27	*Nothapodytes nimmoniana (J.Graham) Mabb.*	Sapling	Icacinaceae
28	*Olea dioica Roxb.*	Sapling	Oleaceae
29	*Pongamia pinnata (L.) Pierre*	Sapling	Fabaceae. (Leguminosae)
30	*Santalum album L.*	Sapling	Santalaceae
31	*Sterculia guttata Roxb.*	Sapling	Malvaceae
32	*Stereospermum tetrogonum. DC.*	Sapling	Bignoniaceae
33	*Syzygium cumini (L.) Skeels.*	Sapling	Myrtaceae
34	*Syzygium gardnerii Thwaites.*	Sapling	Myrtaceae
35	*Syzygium zeylanicum (L.) DC.*	Sapling	Myrtaceae
36	*Tabernemontana alternifolia (L).*	Shrub	Apocynaceae
37	*Terminalia bellirica Roth.*	Sapling	Combretaceae
38	*Terminalia paniculata (Roth.)*	Sapling	Combretaceae
39	*Terminalia tomentosa Bedd.*	Sapling	Combretaceae
40	*Vepris bilocularis Wight & Arn. Engl.*	Sapling	Rutaceae
41	*Zanthoxylum rhetsa (Roxb.) DC.*	Sapling	Rutaceae
Climbers			

1	*Argyreia populifolia Choisy.*	Climber	Convolvulaceae
2	*Allophyllus rheedei (wight.) Rodlk.*	Climber	Sapindaceae
3	*Caesalpinia mimosoides Lam.*	Climber	Fabaceae. (Leguminosae)
4	*Carissa congesta Wt.*	Climber	Apocynaceae
5	*Cissus javana DC.*	Climber	Vitaceae
6	*Cayratia pedata (Lam.) Gagnep.*	Climber	Vitaceae
7	*Combretum latifolium Blume .*	Climber	Combretaceae
8	*Cyclea peltata (Lam.) Hook.f.& Thomson.*	Climber	Menispermaceae
9	*Dioscorea bulbifera L.*	Climber	Dioscoreaceae
10	*Diploclisia glaucescens (Blume) Diels .*	Climber	Menispermaceae
11	*Emblia tsjeriam -cottam (Roem . & Schulta.)A. Dc.*	Climber	Primulaceae
12	*Getonia floribunda (Roxb.)*	Climber	Combretaceae
13	*Hemidesmus indicus (L.) R. Br.ex Schult.*	Climber	Apocynaceae
14	*Jasminum malabaricum (Wight.)*	Climber	Oleaceae
15	*Jasminum multiflorum (Burm. F.) Andrews*	Climber	Oleaceae
16	*Moullava spicata (Dalzell) Nicolson*	Climber	Fabaceae. (Leguminosae)
17	*Pothos scandens L.*	Climber	Araceae
18	*Toddalia asiatica (L.) Lam.*	Climber	Rutaceae
19	*Smilax zeylanica L.*	Climber	Smilacaceae
20	*Uvaria narum (Dunal) Blume*	Climber	Annonaceae
21	*Wagatea spicata Dalz.*	Climber	Fabaceae. (Leguminosae)

Now, there is an urgent need to protect native forests (meant for community) from these colonial mindset bureaucrats (whose objective is to exploit and loot for their individual gain).





ENERGY AND WETLANDS RESEARCH GROUP

SAHYADRI: ENVIRONMENTAL INFORMATION SYSTEM (ENVIS)

CENTRE FOR ECOLOGICAL SCIENCES

NEW BIOSCIENCE BUILDING, III FLOOR, E-WING, LAB: TE15

Indian Institute of Science, Telephone : 91-80-22933099/22933503(Ext:107)/23600985

Fax : 91-80-23601428/23600085/23600683[CES-TVR]

Email : tvr@iisc.ac.in, energy.ces@iisc.ac.in

Web: http://ces.iisc.ernet.in/energy, http://ces.iisc.ernet.in/biodiversity

Open Source GIS: http://ces.iisc.ernet.in/grass