

CHAPTER 2 PROFILE OF AREA

2.1 Geographical

Uttara Kannada district (formerly North Kanara) is located between 13°55' to 15°32' N lat and 74°05' to 75° 05' E long. Its geographic area is 10,291 km² (figure-1). The district has boundaries with Goa and Belgaum towards the north Dharwar, Haveri and Shimoga towards the east and Udupi towards the south. The Arabian Sea borders it on the west creating a long continuous, though narrow coastline, of 120 km.

Topographically the district may be divided into 3 distinct zones., viz., the narrow coast, the abruptly rising hills, and the flatter, elevated eastern zone that merges with the Deccan Plateau. The coastal zone is the most thickly populated with a multitude of coconut clad villages. The hill chains of the Western Ghats, which run in the north-south direction, parallel to the coast form the backbone of the district. These hills, unlike the rest of the Western Ghats, seldom exceed 600 m. These are precipitous towards their western aspect. At several points in the district, the hills run right into the sea, interrupting the continuity of the sea beaches, and providing ample rocky inter-tidal and subtidal habitats with their unique flora and fauna (Daniels, 1989).

Five major rivers viz., Kalinadi, Gangavali, Aghanashini, Sharavati and Venkatapura have their sources in the Sahyadris and flow west through the district into the Arabian Sea. Some of the magnificent waterfalls in the district such as the Jog, the Lushington (Unchalli) and Magod are associated with the rivers Sharavati, Aghanashini and Gangavali respectively. Also, where these rivers meet the sea, there are some of the finest estuaries of the west coast.

2.2 Administrative profile

The district is divided into 11 taluks. The district capital is at Karwar, the northernmost coastal taluk. The Deputy Commissioner is the administrative head of the district. The Chief Executive Officer of the Zilla Panchayat has also his office at Karwar. The Zilla Panchayat consists of the elected representatives of the people. The district has four Assistant Commissioners- at Karwar, Kumta, Bhatkal and Sirsi. The Tahasildar is the administrative head of the taluk. The villages are grouped under Village Panchayats, run by elected representatives.

The district, being the most forested one in the peninsular India, has a well-organised unit of the Forest Department. Named 'Kanara Circle' its administrative head is the Conservator of Forests. The Circle comprises of five territorial forest Divisions with the headquarters at Haliyal, Yellapur, Karwar, Honavar and Sirsi. Each Division is headed by a Deputy Conservator of Forests. The entire forest area of the district is divided into 34 forest Ranges, each under a Range Forest Officer, and 131 forest Sections each under a Forester, and 425 Beats each under a Guard.

The Fisheries Department is under the Deputy Director of Fisheries. The department, with headquarters at Karwar, administers matters pertaining to marine, estuarine and inland fish resources. In addition Karwar also has the branch office of Central Marine Fisheries Research Institute (CMFRI), Cochin. Scientists here gather regular data on marine fisheries.

The Agriculture Department is headed by the Joint Director, whose office is at Karwar. The district is well known for horticultural biodiversity. Horticulture is under the jurisdiction of the District Horticultural Officer whose office is at Sirsi.

2.3 Socio-economic profile:

Bio diversity in Uttara Kannada is closely linked to the existing culture that has evolved in different ecological zones. Nearly 75 % of the population of UK district lives in villages and remaining 25 % in small towns. It is estimated that about a fourth of the population lives below poverty line. In terms of gender related health indicators the situation in UK district is significantly better. The life expectancy at birth of females in UK district is 70. Some vital statistics of the district are given in Table 2. 1.

Thousands of people in the district have been displaced in the past due to hydel projects, Seabird Naval Base, Kaiga Atomic plant, Konkan Railway etc. The displaced people were mostly resettled in forest lands. A total of at least 5508 ha of forests have been used since 1956 for resettlement of displaced people, which include even Tibetan refugees. Forest encroachment is viewed as a serious problem. To regularise encroachments which have taken place before 27.04.1978, a total of 2824.8 ha have been released (Forest Department, 2000-01). Presently there are about 10,000 families of encroachers who are facing eviction. This is a haunting socio-economic and ecological problem.

2.4 Ecological profile

2.4.1 Climate

Uttara Kannada has a tropical climate with a well-defined rainy season between June and October, when the South-west Monsoon winds bring down an average 2500 mm rainfall annually. The remaining part of the year has hardly any rains. Whereas the coastal and crestline taluks receive high rainfall, the north-eastern taluks, Haliyal and Mundgod have very low rainfall. The details regarding the talukwise rains are given in Table 2.2

2.4.2 Geology

The soils of the district are basically derivatives of the Dharwad system- the most ancient metamorphic rocks in India- which are rich in iron and manganese (Pascal, 1988). Most of the coastal hills are covered with exposed laterite rocks. These are very unproductive rocks, most of the top-soil already washed off. Peninsular gneiss containing granite occurs towards south of the district. Yana in Kumta taluk, clad in evergreen forests, is unique in having magnificent limestone formations which rise like cathedrals. Such rocks, not found elsewhere in the Western Ghats, are commoner in the rain forests of Southeast Asia (Whitmore, 1984; Daniels, 1989).

Table 2.1 Socio-economic profile of Uttara Kannada

Geographic area	10,201 sq. km	Life expectancy at birth (both sexes together)	66.96
Total Population	6 lakhs	Life expectancy at birth of females	70 years
Proportion of female Population	47%	Total infant mortality	49/1000
GDP per capita (Rs.)	9742	Mean age at marriage of females	20.89
Population below poverty line	24.97%		
Percentage of households with out civic amenities*	33.55%		
Adult literacy rate	62.41%		

* drinking water, electricity and toilets

Based on *Human Development in Karnataka 1999*.

Table 2.2 Talukwise normal rainfall

Taluk	Rainfall (mm)	Taluk	Rainfall (mm)
Bhatkal	4016	Yellapur	2699
Honavar	3686	Sirsi	2536
Kumta	3754	Siddapur	2937
Ankola	3406	Mundgod	1156
Karwar	3120	Haliyal	1268
Joida	2381		

2.4.3 Geographical distinctness

The Uttara Kannada district is unique in the Western Ghats, with regards to the distribution of biodiversity. This unique feature is probably due to its central location where takes place biogeographical transition between the northern and southern Western Ghats. The district forms the northern limits of the geographic range for several species of plants and animals- the details regarding some of these are given in the Table 2.3. Uttara Kannada district is one of tremendous biological diversity mainly because it is a great mosaic of various major habitats and sub-habitats.

Table 2.3 Geographical distinctness of Uttara Kannada in species distribution

Name of species	Geographic distinctness	Remarks	Reference
<i>Dipterocarpus indicus</i>	Northern limit in Uttara Kannada	Tree endemic to Western Ghats	Ramesh & Pascal (1997)
<i>Polyalthia fragrans</i>	-do-	-do-	-do-
<i>Arenga wightii</i>	-do-	Endemic palm	-do-
<i>Pinanga dicksonii</i>	-do-	-do-	-do-
<i>Corypha umbraculifera</i>	Major population in the district	-do-; a gorgeous, useful palm, flowers once in life	Chandran (1996)
<i>Calophyllum polyanthum</i>	Northern limit in the Western Ghats	The mast tree of ancient fame	
<i>Myristica fatua</i> var. <i>magnifica</i>	-do-	Endemic, endangered, tree, Exclusive to <i>Myristica</i> swamps	Chandran & Mesta (2001).
<i>Gymnacranthera canarica</i>	-do-	-do-	-do-
<i>Semecarpus kathalekanensis</i>	-do-	-do- New species	Vasudeva et al (2001)
<i>Jerdonia indica</i>	-do-	Endemic herb, new report from U.K	Chandran & Mesta (2001)
<i>Neurocalyx calycinus</i>	-do-	-do-	-do-
Lion-tailed macaque	-do-	Endangered and endemic primate	Daniels (1989)
Stripe-necked mongoose	-do-	Little known mammal	Prater, (1986)
Rufous-bellied hawk-eagle	-do-	Endemic bird	Daniels (1986)
Blue-winged parakeet	-do-	-do-	-do-
Ceylon frogmouth	-do-	-do-	-do-
White-bellied treepie	-do-	-do-	-do-
Grey-headed bulbul	-do-	-do-	-do-
Wynaad laughing thrush	-do-	-do-	-do-
Black-headed babbler	-do-	-do-	-do-

2.4.4 Forests

The details regarding the administrative categories of the forests are given in Table 2.4

Table 2.4 The forest area of the Kanara Circle as per legal status

Sl.No	Department	Type of Forest	Area in Sq.km
1	Forest	1. Reserved	6840.948
		2. Protected Forest	25.090
		3. Village Forest	-
		4. Un-classed	0.020
		TOTAL	6866.058
2	Revenue	1. Reserved Forest	-
		2. Protected Forest	505.075
		3. Village Forest	26.150
		4. Unclassed	-
		TOTAL	531.225
		GRAND TOTAL	7397.283

Source: Annual Administrative Report of Forest Department, Kanara Circle 2000-01

Satellite imagery analysed by the National Remote Sensing Agency (1983, 1985) and the French Institute (Bellan, 1985) show that about 7.1 thousand km² is under forest in various stages plus tree crops such as coconut and arecanut. Deducting from this 0.13 thousand km² under orchards, we are left with a figure of 6.9 thousand km² under some kind of vegetation, at least of scrub type. The same imagery shows that 200 km² is totally barren and rocky areas (Gadgil et al, 1990). In the recent years good lot of scrub has been converted into forest plantations dominated with the Australian *acacia auriculiformis*.

Forest types: Evergreen, Semi-evergreen, Moist deciduous, Dry deciduous

Degraded forests: Tree savanna, scrub

Forest sub-habitats: Gallery/riparian forests, Myristica swamps

Man-made sub-habitats associated with/derived from forests: Plantations of teak, Eucalyptus, Acacia etc. (see Table 2.5).

Table 2.5 Area under various forest plantations in Uttara Kannada

Sl.no	Species	Plantations 1865-66 to 1999-2000 (ha)	During 2000-01 (in ha)	Total (in ha)
1	Teak & other hard wood	91330.18	1105.00	92435.18
2	Matchwood & softwood	17854.93	90.00	17944.93
3	Bamboo & canes	10675.14	72.80	10747.94
4	Cashew/fuelwood/others	66406.58	3334.25	69740.83
5	Others	67224.01	50.50	67274.51
	TOTAL	253490.84	4652.55	258143.39

Source: Annual Administrative Report of the Karnataka Forest Department, 2000-01.

2.4.5 Inland water bodies: Rivers, streams, waterfalls, tanks, reservoirs and marshes.

2.4.6 Grasslands: Grassy blanks within forests; other grassy patches close to human habitations

2.4.7 Rock outcrops

2.4.8 Marine/coastal habitats:

Open sea

Intertidal zone: Rocky, sandy

Beaches and small islands: Rocky, sandy, Casuarina plantations, coastal coconut groves; islands such as Anjidiv, Basavarajdurg and Netrani.

Estuaries and creeks: Open waters, mudflats, tree mangroves, sedges and herbaceous mangroves, gajni rice fields, salt pans

2.4.9 Agricultural systems: The people of different agro-climatic zones have domesticated/ evolved various plants/ animals for their specific regions. The agricultural system is closely interwoven organically with livestock and forests. Rice varieties exist to suit special habitats like coastal saline marshes, water-logged areas and dry rain-fed region. Farmers have also domesticated the wild varieties of fruits, or other species for cash or for household food security.

The coastal tract (Karwar, Ankola, Kumta, Honnavar and Bhatkal taluks) covering 3300 km² is more densely populated. It has 12.3% of area under cultivation, most of the lands coming under the jurisdiction of the Forest Department. Rice, coconut and groundnut are the main crops here. The coastal zone is rich in fisheries. The crestline taluks namely Joida, Yellapur, Sirsi and Siddapur cover about 5.4 thousand km². Here only 7.2% of the area is cultivated, the main crops being arecanut, pepper, cardamom, banana and rice. About 86% of the land is under the legal possession of the Forest Department.

Mundgod and Haliyal taluks (1.5 km² area), towards the north-east merge with the flatter terrain Deccan plateau. Here about 19% area is cultivated, mainly with rice, millets, pulses, sugarcane and cotton. Most farmers carry out organic farming and have very limited dependence on chemical fertilisers and pesticides.

Taking the district as a whole the net-cropped area in 1993-94 was only 11.2% of the total geographic area. There are ecological and historical reasons behind such small area put to agriculture. The details of land use in the district are given in table 2.6

Table 2.6 Land utilisation in Uttara Kannada district during 1993-94

Category	Area in ha
Forest	829613
Land put to non-agricultural use	16482
Barren and uncultivable land	20063
Cultivable land	7830
Permanent pasture and other grazing land	20359
Land under miscellaneous tree crops and groves	5319
Current fallows	5884
Other fallow land	7008
Net area sown	112121
Total cropped area	130418
Area sown more than once	18297

Source: Based on data from District Statistical Office, Karwar

2.5 History

Historical changes in land use: During the pre-colonial period, the Havik Brahmins were the only specialists in raising multi-storied spice gardens in the valleys supplied with perennial streams. Wooded hillsides sheltered these gardens from too much exposure to the scorching rays of the sun. These gardens also derived leaf manure from these adjoining forests. The traditional leaf manure forests or *betta* also were used for cattle grazing. The crops raised in the spice gardens were mainly arecanut, pepper and cardamom. Rice cultivation was carried out to a small extent in the valleys. The coastal reclaimed backwater fields or *gajnis* were used for growing salt tolerant rice. Vegetables were cultivated in all human habitations.

Community conserved areas: The village communities took care of wild pepper growing in specially maintained *kan* evergreen forests. These *kans* were also sacred groves of the villages and there was a taboo on tree cutting in these *kans*. The *kans* were centres of local and endemic biodiversity which would have been variously affected otherwise due to human impacts of diverse kinds. Other NTFP from *kans* such as toddy from the *baini* palm (*Caryota urens*), cinnamon, medicinal plants various fruits and seeds were carefully extracted by the village communities who safeguarded the *kans*. Much of coastal Uttara Kannada was already in denuded state. Three main reasons could be ascribed for coastal denudation: 1. As the district was abounding in forests and wildlife the people along the rather densely populated coast saw to that there was a savannized zone between the forest belt and coastal agriculture and habitations, to have better security from depredations of wildlife. 2. Shifting cultivation was vigorously carried out on the coastal hills causing erosion. 3. The coastal forests were set on fire periodically to promote growth of grasses for grazing.

At the same time several coastal villages had specially maintained woodlots to meet their routine biomass needs. For meeting greater needs the people depended on the forests interior.

Shifting cultivation in the forest tract: Most of the district being subjected to torrential seasonal rains exposed agricultural soils would be subjected to severe erosion and depletion of nutrients. Therefore to suit to the requirements of the terrain several communities of pre-colonial Uttara Kannada practiced slash and burn or shifting cultivation. Ragi, banana, pulses and vegetables were the main crops. Shifting cultivators also hunted for subsistence and wildlife was plentiful almost towards the close of the 19th century. As the population was thin forests would return on the abandoned fields. These secondary forests, unlike the original evergreens were rich in timber trees like teak and rosewood. The growth of bamboo, known as poor man's timber, was prolific.

Changes during the Colonial period: Uttara Kannada came under British colonial power from the dawn of the 19th century. The main interest of the British was in exploiting the abundant forest wealth. The forests were declared the property of the state and were subjected to exhaustive extraction of commercial timbers and bamboo. The traditional community based management system was abrogated. The shifting cultivators did not have any legal claims to the forest lands in which they carried out their activities in the pre-colonial days. However, with the British takeover of the forests the situation changed drastically. Various restrictions were brought in to regulate the shifting cultivation, beginning in the mid-19th century and the practice was nearly wiped out by the close of the same century. The shifting cultivators belonged to several castes the most notable being the Kumri Marattas, the Kunbis and the Karivokkaligas. With the ban on shifting cultivation most of their fields got merged with the state reserved forests. Most of the shifting cultivators presumably became almost landless labourers and marginalised peasants.

The community conserved sacred *kans* became state reserved forests. The destructive contract system to gather the NTFP replaced the earlier community based systems. Forests hereafter were managed for mainly timber and not for biodiversity which the communities cherished. The stoppage of slash and burn cultivation and the over-exploitation of timbers led to the depletion of forest wealth. For the first time the British started clearing natural forests for raising teak monoculture plantations with considerable ecological consequences and impoverishing the traditional livelihoods of the forest dependent people.

Hunting spree and depletion of wildlife: Wildlife, including of game-birds, was plentiful in the district. But with habitat changes under aggressively practiced state forestry and the promotion of sports hunting by British marksmen and local *shikaris* saw the depletion of wildlife by the end of 19th century. At the same time hunting for crop protection and wild meat by the locals was severely regulated.

Hardships to the people and concessions: The people had considerable difficulty in getting routine biomass needs for agriculture and their own subsistence. The ban on shifting cultivation reduced thousands of families pursuing an independent livelihood to migrate out of the district or to work as labourers elsewhere. Their protests

compelled the British to declare degraded forests and scrub in the vicinity of human habitations as "minor forests" and certain privileges were allowed in such forests. But as these minor forests were common property resources their depletion took place at a rapid rate. Most arecanut gardeners were however luckier since forests were allotted as "bettas" for extraction of leaf manure at the rate of nine acres for every acre of arecanut garden. In Sirsi and Siddapur taluks several kan forests almost perished due to the following reasons: 1. Some kans were allotted for arecanut gardeners as leaf manure forests. 2. Many *kans* were converted into minor forests. 3. In places where people experienced difficulties in getting firewood they were allowed to extract deadwood from the village kans which were in the traditional system of management sacred and never to be cut.

Post-colonial forest history: After independence forest management did not undergo any notable change. On the other hand forest exploitation continued more vigorously. Forest based industries appeared on the scene in a big way. Plywood, paper, packing cases, match and miscellaneous industries were granted concessions in Uttara Kannada forests for extraction of timber and bamboo at abysmally low rates leading to their fast depletion. The depletion of bamboo, known as "poor man's timber" caused considerable hardships to the rural populace. Several NTFP species such as mango, cinnamon, wild nutmegs and gulmav were depleted in the forests due to industrial extraction. These and the depletion of bamboo and canes gave great hardships to especially many rural women.

Saw mills proliferated in the district. Pre-independence period had much timber export and few large saw mills. By 1980's there were 76 saw mills operating in the district; most of them continue to this day.

The post-colonial industrial extraction affected even rare stands of forests such as Dipterocarp forests, Myristica swamps and even the *kan* forests. Some *kan* forests such as the Menasikan at Siddapur were clear-felled and converted into Acacia plantations. Selection felling in the evergreen forests caused considerable ecological damages. In the words of S.N. Rai (1981), Principal Chief Conservator of Forests, "most areas, which were worked during the past have deteriorated considerably and it is doubtful, if ever, they would regenerate to their original structure...." With the growth of many industries in Dandeli the Kali river became a dumping ground for various pollutants from the factories.

Demand for forest land: As developmental pressures increased forests were brought under increasing pressure. Over 100,000 ha of forest lands were released for non-forestry purposes since independence (the precise area according to Forest Annual Administrative Report of 1985-86 is 105231.587 ha). However the Annual Administrative Report of 2000-2001 shows the land releases after 1956 to be 61860.524 ha (see table 2.7 for details).

Monoculture plantations: Monoculture tree plantations are developed often at the expense of natural forests. Ever since the decline of natural teak due to continuous

commercial exploitation from early 19th century, and as a result of changes in ecological conditions brought about by stoppage of shifting cultivation, the natural regeneration of teak was affected. The British foresters gave top priority in forestry operations for massive changes in the natural vegetation in favour of teak. Despite concerted efforts by the British and the early days of the state forest department after independence, the area under teak plantations in 1960-61 was 24,388 ha. It rose to 53,354 ha in 1985-86, thus showing a steep rise of 119 percent in a mere span of 25 years. The area under teak rose to 92435 ha, yet another 73% by 2000-01. The total area of various forest plantations today stands at 258143 ha (see table 2-5)

2.6 Industrialisation

Apart from forest based industries already referred to other industries were established in the district, having ecological and socio-economic consequences. The Ballarpur Industries Ltd., Binaga at Karwar was established in 1975. Nearly 1200 hectares of estuarine areas of Aghanashini river in Kumta taluk were allotted to the factory for producing salt to prepare caustic soda. This caused displacement of several families of estuarine farmers. Subsequently the factory found the lands not very suitable for salt making, and returned the lands to the Government. Since the farmers evacuated from these estuarine lands were already paid compensation by the Government, the latter refused to restore the lands to the farmers. It is alleged that the industry is discharging treated effluents of sodium tri-poly-phosphate and mercury into the Arabian Sea through a pipeline, causing marine pollution (Hegde, 1999).

Table 2.7 Forest areas released for non-forestry purposes in Uttara Kannada from 1956 onwards

Sl.N	Particulars	Area in ha
1	Forest area released for cultivation by 3 men committee from 1964 to 1969	6042.500
2	Forest area released as per special G.O. No. AFD. 116/ 16/4/69	11593.342
3	-do- as per GO No. AFD-282-FGL74 of 17/19-12-1974	3399.400
4	Area released for long lease	162.100
5	Hangami Lagan in notified area	8034.450
6	Extension of Gouthana	390.400
7	Area released for township	1096.900
8	Mining area leased and area actually in operation	1591.250
9	Released to house sites to houseless	366.000
10	Rehabilitation of Tibetans, displaced ryots of Sharavati, Ghataprabha and Malaprbha, Gowli families etc.	4548.170
11	Area under submersion and other projects: 1. Kali Hydro Project 2. Bedti Project (for colony) 3. Other irrigation tanks etc.	14602.000 300.000 303.365
12	Released to KSFIC for Napier grass cultivation (Sirsi Dvn)	441.450
13	Released to KAMCO (Dairy & fruit processing unit)	153.993
14	Released to KSFIC for pineapple cultivation	163.320

15	Karnataka State Veneers Ltd	24.000
16	Power transmission lines	677.979
17	For establishment of industries	95.000
18	Area released to Horticulture Dept. (1969-70)	71.847
19	Released to Agricultural University, Dharwad	214.000
20	Sharavati Tail Race project	700.00
21	Kaiga Atomic Power Project	732.00
22	Sea Bird Naval Base Project	2259.000
23	Rehabilitation of Seabird oustees	643.720
24	Area for released for non-agriculture & other purposes	394.870
25	Konkan Railway	272.140
26	For improvement & widening of Ankola-Hubli Road	49.431
27	Rehabilitation of displaced persons of KHEP & Kaiga projects	316.410
28	Released to regularise the encroachments, which have taken place before 27-04-1978	2824.852
	TOTAL	61860.524

Source: Annual Administrative Report of the Karnataka Forest Department, 2000-01

The Uttara Kannada district is rich in minerals such as iron, lime-stone, quartz, manganese, bauxite, molluscan shells, silica etc. These minerals were exported since pre-independence days or used within the country itself. In 1955 the Dandeli Ferro Allies Pvt Ltd. was established. The factory uses manganese ore extracted from the forest belt for production of ferro alloys. By 1981, as many as 98 mining leases were given in the catchment area of Kali river itself, covering an area of 125.6 km². Total mining area within the district, mostly situated in the forests of Joida, Yellapur and Karwar taluks are reported to be 14894 ha. The mining operations cause various disturbances to the ecosystems. Erosion by runoff causes damage to forests, agriculture and rivers. The increased silt load in the river Kali was considered as detrimental to many aquatic organisms.

2.7 Power generation

The chain of hydel power projects in river Kali have total installed capacity of 1316 MW. The total area submerged under Kali stage I was 36000 acres of which 25000 acres were forests. Stage II involved construction of dams at Kodsalli, Kadra and Dandeli. The Kodsalli dam submerged 3000 acres of forests and 1200 acres of cultivated lands. More lands are getting submerged for the other dams too. The recently completed Sharavati Tail Race project submerged 575 ha of biodiversity rich forests; another 125 ha of lands were given for other associated works. About 732 ha of forest lands were released for the Kaiga Atomic Energy Plant. Environmentalists fear that the project will have severe consequences on the biodiversity of the region. For several years organized protests were made in the district against the construction of the Kaiga plant. About 677 ha forest lands were affected for making power transmission lines. The construction of more power projects are under consideration in the hitherto untapped rivers Bedthi and Aghanashini, despite organized protests from environmental activists and the farmers (Hegde, 1999).

The creation of rehabilitation centres for affected was also attended with forest clearance and ecological consequences. Ramnagar rehabilitation centre meant for settlement of Kali project evacuees was already deforested in 1975 creating severe erosion and desertification.

2.8 Project Seabird and Konkan Railway

The construction of Project Seabird Naval Base involved eviction of thousands of families of fishermen and farmers from the coastline of Karwar and Ankola taluks. Environmental modifications of great magnitude, such as building of breakwaters, dredging of the sea, filling up of coastal swamps, intensified construction activities and other landscape changes are being executed in the Project Seabird area. The rehabilitation of the evacuees brought greater pressure in other coastal villages as well as in the forest areas of hinterland.

The construction of the Konkan Railway through the west coast, while revolutionising coastal transportation had also its own inevitable environmental impact in the form of landscape changes, diversion of agricultural and forest lands etc.