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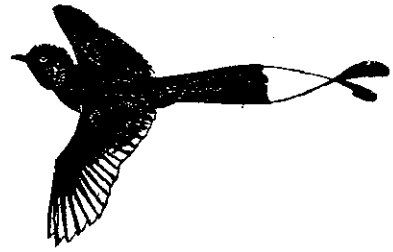

Uttara Kannada : A Case Study in Hill Area Development

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1. Introduction

On achieving independence our country launched itself on the path of modernisation and economic develcpment. Over three decades of this endeavour has yielded many impressive gains. We now have a sound industrial base and are amongst the technologically most sophisticated countries from the third world. We have enhanced our agricultural production manifolds, and have warded off the spectre of famine deaths. But, as the years have rolled by, there are more and more signs that we may have committed some grave errors in our choice of the path to development. For this path has led to large scale misuse of our natural resources, imposing on us huge costs in forms such as flood damage, shortages of fuel and fodder for the rural population and of raw materials and power for the industry. We have also failed to pull our masses out of poverty, and not only the absolute numbers, but even the proportion of our people below the poverty line appears to be on the increase. This has also led to our failure to check the growth of our already large population.

The hill areas of the country have paid particularly heavily for these mistakes in our choice of a development strategy. For the hill areas are at a serious disadvantage in deriving benefits from modern industry and intensive agriculutre, the two fronts on which development has led to substantial progress. At the same time, hill areas rich in natural resources have suffered most from their misuse and exhaustion. In fact the few industries that have come to the hill areas have proved a blight, rather than a

boon, exhausting natural resources, polluting the environment and bringing little to the local inhabitants other than large scale displacement. The fragile ecosystems of the hills have tended to collapse under the assault of exploitative developments of the last few decades, and the hill people find their livelihoods more and more threatened.

These developments have naturally aroused the concern of many thinking people. Amongst the significant responses have been the twenty point programmes. The latest of these adopted in August 1986 forcefully brings out our nation's concern for taking the benefits of development to the masses of our people, as well as protecting our endowment of natural resources. The hill area development plans have also been paying special attention to these concerns. Thus the fifth five year plan stressed the need for beneficiary orientation, while the sixth one emphasized environmental protection. The seventh plan stresses that we must not only plan for reducing the rate of environmental degradation, but also make a thrust towards environmental restoration in such a fashion as to create massive employment for the rural population in the task of conservation and augmentation of our natural resources.

This paper has been prepared as a contribution towards bringing about this orientation to bear more effectively in the development plans for the Western Ghats, the hill region stretching over 1.6 lakh km^2 of area from the river Tapi in the north to the southern tip of the peninsula near Kanyakumari. At the centre of this tract lies the district of Uttar Kannada in the state of Karnataka between the rivers Kali and Sharavathy.

This district is representative of the manifold problems for development of the Western Ghats and has been the site of several exciting new experiments involving the people, the Government machinery, and the scientific and technical institutions. We review here the experiences thus far, and sketch the future directions that we believe should be followed if the development is to be sustainable and people-oriented.

2. The Setting

2.1 The Locality

Uttara Kannada, the northernmost coastal district of the state of Karnataka lies between 13° 55' and 15° 31' north latitude and 74° 09' and 75° 10' east longitude, to the south of Goa, east of Dharwad and north of Dakshina Kannada (Karnataka State Gazetteer, 1983). It is a region of gentle undulating hills, that merge to the east with the Deccan plateau at an altitude of 500 meters with the crestline barely rising above 600 meters. The hills run all the way up to the sea so that there is only a relatively narrow coastal strip. The total geographical area of the district is 10.22 thousand km^2 with 11 talukas and 13038 villages. The district falls into 3 zones; the coastal zone of Karwar, Ankola, Kumta, Honavar and Bhatkal talukas, the crestline zone of Supa, Yellapur, Sirsi and Siddapur talukas, and the maidan zone of Haliyal and Mundgod talukas. The 1981 census records the population of this district as 10.72 lakhs, with 74.6% living in the villages.

The coastal tract covering an area of 3.3 thousand km^2 receives an annual rainfall of some 350 cm. The Forest Department

controls 76% of this tract; 12.3% of the net area is sown, 2.84% being irrigated. Rice, coconut and groundnut are the main crops and cattle, about 1.8 lakh of them, dominate the livestock. There are rich coastal fisheries. The population density of the coastal zone is the highest for the district at 171 per km^2, with Karwar a major town. There is a caustic soda factory near Karwar, and several tile and brick factories scattered along the coast. There are also some seafood canning and storage factories. There have been extensive migrations of the educated section out of the coastal tract to the urban centres, and there are regular seasonal migrations of the labour to the crestline talukas for farm employment.

The crestline talukas cover an area of 5.4 thousand km2 and receive a rainfall ranging between 200 to 500 cm. a year. The population density is relatively low at 63 per km^2. As much as 86% of the tract is legally under the control of the forest department; 7.2% of the net area is sown, with 0.93% being irrigated. Rice, arecanut and banana are the main crops, and the livestock, dominated by cattle numbers 2.34 lakhs. There are several manganese mines in this tract. Dandeli is a major industrial town with paper, plywood and ferromanganese industries. Much of the industrial labour has come from outside. Basketweavers are a significant component of the population of this tract.

The talukas of Haliyal and Mundgod, merging with the Deccan plateau receive an annual rainfall of about 120 cm. This tract covers an area of 1.5 thousand km^2 of which 70% is under the control of the Forest Department; 19% of the net area is sown and

4% is irrigated. Rice, pulses, sugarcane and jowar are the main crops; and there are some 95 thousand livestock, largely cattle. The human population density is 107 per km^2. There are no major industries or towns in these talukas.

Uttara Kannada is considered a forest district for the Forest Department once actually and still legally controls an area of 8.3 thousand out of a total of 10.3 thousand km^2. However as much as 1.05 thousand km^2 out of this has been released for a variety of purposes, including mining, hydel projects, power lines, industries and townships, resettlement of persons displaced by various projects as well as Tibetan refugees, and land legally released or encroached for cultivation. Of the 7 thousand km^2 still with the Forest Department, about 5 thousand is reserved forest, 1.5 thousand minor forest and 0.5 thousand soppinabetta forest. The department has evaluated the state of this forest in an excellent report (Reddy et al 1986). According to this report, of the reserve forest about 20% is degraded, 40%, near habitations is in moderately good condition, and the other 40% mostly on steep slopes away from habitation is in good condition. Of the minor and soppinabetta forests 70% is highly degraded and only about 30% in moderately good condition.

We have also looked at the land use pattern of the district as revealed by the satellite imagery analysed by the National Remote Sensing Agency (1983, 1985) and the French Institute (Bellan, 1985). This analysis yields a figure of 7.1 thousand km^2 under forest in various stages of degradation plus tree crops such as coconut and arecanut. Deducting from this the 0.13

thousand km^2 under orchards, we are left with a figure of 6.9 thousand km^2, close to the 7 thousand km^2 still under the Forest Department control, indicating that most of this land retains at least scrub cover. The same imagery shows that 200 km^2 is totally barren, rocky areas, while according to the revenue statistics another 1.79 thousand km^2 is fallow, culturable waste or other wasteland.

2.2 Historical Developments

Uttara Kannada, referred to as Haigdesha in the Sahyadrikhanda of the Skandapurana has historically been ruled by many dynasties, including Kadambas of Banvasi, the Vijayanagaram emperors, Sultans of Bijapur, Sondarajas and Hyder and Tippu. In midieval times the region was famous for its wild pepper which attracted the Dutch and the British to the Karwar port where they established forts. Their accounts reveal this to have been a wild and forested country, except for the coastal strip where the hill plateaus may already have been burnt down to keep out the bandits and the invading Marathas. The populations were low, the resource demands were also low. There was therefore much less danger of resource exhaustion. Nevertheless, the society of this time had many practices of nature conservation, such as sacred groves. The British traveller Francis Buchanan who travelled through the district in 1802 remarks on the stringent protection accorded to such sacred groves (Buchanan, 1870). But he immediately goes on to comment that these traditional regulations are obviously a device to keep the British from claiming their rightful property!

The British indeed had no interest other than usurping the

rich natural resources of the country as they found them to satisfy their own resource hungry economy. They naturally claimed all previously communally held property as their own, and in the period upto 1860 very rapidly exhausted the valuable timber. Thus the first British Conservator of Forests of Uttara Kannada, Cleghorn (1861) records the near total exhaustion of the natural teak of the district by 1850s and the havoc being wrought about by the construction of railway lines then in progress in many parts of south India. Cleghorn also remarks on the excellent state of preservation of the many soppinabetta forests, forests being maintained by arecanut orchard owners towards the supply of leaf manure. Around Cleghorn's time, however, the British became aware of the need to use the forests more carefully and introduced a much more systematic working of the forests. The main aim of forest working however remained the supply of timber, especially teak to meet the needs of British shipyards, cantonments and other urban centres. The demands of the rural population for their day to day needs, such as fuel and fodder or of artisans for raw material for basketry were all considered illegitimate and were grudgingly conceded not as rights but as privileges (Singh, 1986). Certain forest areas, the minor forests and soppinabettas were set aside to meet these requirements. However these lands now came under the control of the Government. The villagers thus lost all authority to regulate the use of these lands. The disorganised and increasingly impoverished ryots therefore proceeded to overuse and thoroughly degrade much of this land.

The district of Uttara Kannada was largely malarial, except

for the coastal and therefore did not participate in the rapid population growth that began especially after 1921. In fact forest continued to creep back as cultivation was abandoned with depopulation in talukas like Yellapur. Advantage was taken of the circumstances to convert the natural moist deciduous forests into teak plantations in these areas. The natural forest was however valued as source of leaf manure by the local population and there were extensive protests against introductuion of teak (Dhareshwar,1941). It is notable that the early working plans considered bamboo, a plant of tremendous value to the local population as a weed of the teak plantations and prescribed its eradication. While the period following 1860 saw an attempt at sustainable use of the forest resources, as Reddy et al (1986) record all caution was thrown to the wind during the two world wars and the forests were exploited ruthlessly. All through this period of rampant malaria the people of the district continually agitated for deforestation, for they believed that this could bring the disease under check.

The second world war not only brought in extensive exploitation of the forests, it established DDT as an effective agent for mosquito control. Uttara Kannada was one of the first districts in the entire country to be freed of malaria, and it now began to participate in the population growth going on in the rest of the country. To the natural growth were added migrations, such as those of the buffalo keeping Gavlis from Kolhapur district to the north. India had achieved independence soon after the second world war and was naturally anxious to catch up with

the industrialised West. Our developmental thrust therefore favoured industry at all costs. To attract industry to Uttara Kannada forest, land and water resources were offered to them essentially free of cost. Thus in 1950's the paper industry was offered bamboo at Re.1 per tonne,while Cleghorn records that basketweavers had begun to be charged Rs.5 per tonne of bamboo as early as 1860. The industry also polluted waters of river Kali with no checks whatsoever in the beginning. There was thus a simultaneous explosion of demand for the natural resources on part of the rapidly growing industrial sector as well as an exploding rural population.

In the beginning there was no awareness of the fact that natural resources are not unlimited and must be husbanded carefully if we are to sustain development. Each segment of the population, each wing of the Government therefore went on merrily liquidating the capital of natural resources without a thought for the whole picture and our long term needs. Thus when the giant Kali hydel project came up, the site for resettlement of refugees was in the catchment area of the same dam at a place called Ramnagaram. The Forest Department totally deforested the site while making over the land to the revenue authorities. Since the design of the dam was faulty because adequate geological investigations had not been carried out, this resettlement site remained unclaimed for several years after it was shorn of its tree cover, losing precious topsoil year by year. At the same time manganese leases in the area to be submerged were not touched while open cast mining unaccompanied by any soil conservation measures went on merrily in the catchment areas.

2.3 Biomass Budget

The consequences of this unplanned and exhaustive resource use are best brought out by looking at the production and demand for the various components of biomass; food, fuel, fodder, manure and structural material in the three zones of the district (Gadgil and Sinha, 1985). The district as a whole is not self-sufficient in food production, the deficit being highest in the more thickly populated coastal zone. It is only the Maidan zone that has per capita calorific production exceeding the daily average requirement of around 2000 cals. The deficiencies are even more serious in terms of protein availability, inspite of the coastal zone having access to fish. In the coastal and crestline regions there is a serious shortage of protein, well below the minimum daily requirement of 50 gm, pointing to our failure to step up our pulse production.

Zone	Coastal	Crestline	Maidan	Dist. as a whole
Food production Cal/head/day	1033.00	1510.00	2685.00	1428.00
Fish protein gm/head/day	11.00	0.00	0.07	6.6
Total protein gm/head/day	33.25	32.11	59.37	41.57

Next to food people need fuel for cooking, for heating bath water, for processing of agricultural produce. In Uttara Kannada the commercial sources of energy, primarily kerosene, account for

barely 7% of the domestic fuel consumption, the other 93% almost all being met through wood fuel, very little of dung being used for this purpose. Arecanut and coconut leaf petioles, husk and other woody agricultural waste can meet a good proportion of these requirements, but the rest must come from woody matter from minor forest, soppinabetta or even reserve forest areas. As the table shows this amounts to as much as 5.37 lakh tonnes a year. This is expected to be met from the 2 lakh hectares of minor and soppinabetta forests, something like 70% of which are in a highly degraded condition. Under their present condition their average annual production of fuelwood must be well below one tonne per ha. These are then currently being overexploited by a factor of more than 5, at the least.

Zone	Coastal	Crestline	Maidan	Dist. as a whole
Cooking fuel required	1.914	1.138	0.549	3.60
Other domestic fuel needs	2.08	1.24	0.6	3.92
Agricultural wastes usable as fuel	0.88	1.0	0.26	2.14

Quantities in lakh tonnes

Uttara Kannada has a large livestock population of more than 5 lakh animals, i.e. one to every two hectares of any kind of land. Taking the composition and weights of these animals into account, and assuming the daily fodder requirement at 2.5% of their body weight, we have projected their fodder requirements. In

part these are met from agricultural wastes, especially paddy straw ammounting to 1.54 lakh tonnes without even disallowing the 0.04 tonnes used for thatch. The rest must come from grazing on forest lands.This is a large burden of 7.74 lakh tonnes on 7 lakh ha of forest land, not all of which is within accessible distance for the animals. A great deal of forest land is also now covered by unpalatable weeds. Furthermore, given our restricted period of rainfall, there is hardly any grazing available beyond November. The six or more months of dry season then have to be provided for by agricultural wastes, which are sufficient just for two months. The period of January to May is then essentially one of near complete starvation for most animals.

Zone	Coastal	Crestline	Maidan	Dist as a whole
Fodder requirement	3.31	4.25	1.73	9.28
Agricultural wastes available as fodder	0.59	0.53	0.42	1.54

Annual, in lakh tonnes

Uttara Kannada farmers have a tradition of using large quantities of green leaves and dung as fertiliser. This is undoubtedly related to the poor nutrient status of these highly leached lateritic soils. We have attempted to estimate the nutrient budget of the cultivated land taking into account inputs through chemical fertilsers, vegetable matter left standing in the field, special green manure crops grown as well as leaf manure added. The balance is clearly negative, especially for

potassium.

Element	Nitrogen	Phosphorus	Potassium
Removal through harvest	4449	2602	7710
Inputs	4124	2290	3810

Annual in tonnes

Food, fuel, fodder and manure are the very evident major needs of the rural population of the district; it is evident that there are serious deficits on each score. The other day to day needs relate to construction and maintenence of shelter. New shelters have to be constructed roughly in pace with the population growth, around 2.2% per year. Older ones have to be repaired, especially in replacement of thatch. Poles are required for fencing fields and bunding streams every year. Our estimates are that 0.27 lakh tonne of fuel is consumed in baking the bricks and tiles needed for the new houses, which also need 8 thousand tonnes of timber. People as well as the brick and tile factory owners have traditionally depended, and still largely do on the forests areas for all these supplies.

Over and above this are the industrial requirements. The West Coast Paper Mill at Dandeli was expected to annually receive over 1.5 lakh tonnes of bamboo from this district, but exhaustion of the resources has meant that it can now get only about 50 thousand tonnes a year. The Harihar Polyfibres factory just on the border of the district depended on over 2 lakh tonnes of pulpwood largely from this district. It now receives around 60 thousand tonnes from the entire state.

2.4 Social Conflicts

The seroius shortages of biomass, especially in a poor country like ours where half or more of the population cannot afford to buy all the food they need, let alone fuel or fodder for their animals, inevitably means strife in the scramble to get at these resources. The conflicts that result become all the more acute when different segments of the society are trying to pull in different directions. Such a situation inevitably leads to lack of restraint in resource use, often in spite of the attempts by the state machinery to enforce discipline. Resources are inevitably abused and destroyed in this process. This only means further shortages, further strife and all the more rapid degradation of the resource base.

In spite of the great strides in industrialisation since independence, we have made little progress in generating adequate employment for our vast and growing population. Ever growing numbers therefore have to depend on land for a living. This has so far involved encroaching on land thus far uncultivated, fallow lands, revenue wastelands, and finally forest lands. Since over 80% of the district was forest land, this expansion of cultivation in Uttara Kannada has meant eating into minor, soppinabetta or reserve forest lands. So far about 50 thousand ha have been thus released for cultivation outright or as leases, another 4 thousand ha has gone to rehabilitate refugees. Over and above this are more than 4 thousand ha illegally occupied for agriculture. There have been cycles of such encroachment and its regularisation, generally coinciding with the time of elections.

But such lands tend to be poorly used for the encroachers rarely have the money to invest in soil and water conservation and other measures that are essential to put such land to productive use.

Next only to conflict over diversion of land from forestry to cultivation has been the conflict over what end use the forest produce are meant for. As documented above, the rural population relies heavily on the forest growth for their fuel, fodder, leaf manure and small timber needs. On the other hand the whole thrust of forest management introduced by the British and continued after independence till very recently has been that these rural needs are a burden to be done away with to the extent possible, so as to devote the forest resources to the maximum possible extent to meeting the urban-industrial demands. These policies have naturally been opposed by the rural population all along, leading to a series of conflicts that continue to this day. Historically they involved opposition to the constitution of reserved forests and oppposition to the conversion of natural forest, particularly valued for leaf manure to teak plantations (Dhareshwar, 1941). More recently they have involved opposition to the conversion of natural forests to Eucalyptus plantations, initially developed to meet the requirements of the pulpwood industry such as Harihar Polyfibres, and still more recently the opposition to even selection felling, for instance by the proponents of the Appiko movement.

There have been continuing conflicts over grazing by livestock. Initially the minor forest and soppinabetta lands were set aside for fuelwood collection as well as grazing by the

local population; there were restrictions on grazing in the reserved forest areas. These restrictions on grazing including a grazing fee were largely removed after independence in Karnataka.

Removal of these restrictions coupled with the eradication of malaria rendered the forests of Uttara Kannada tremendously attractive to a community of forest dwelling graziers known as Dhangar Gavlis. Bulk of their population lived on the Western Ghats of Maharashtra, although a small number had always been in the Uttara Kannada district. Early decades after independence saw a migration of several thousand Gavli families into Uttara Kannada, especially in the maidan and northern crestline talukas. This was also the time that the Paper Mill had been set up and granted large areas for bamboo extraction at Re.1/- per tonne. Including the cost of extraction and transport the mills would then have incurred at most Rs.200/- to 300/- per tonne of bamboo. The rate at markets in Bangalore in 1970's was around Rs.5000/- per tonne; in 1958 it was probably Rs.2000/- to 3000/- per tonne, at least ten times what it was costing the paper mill. The Paper Mill attempted to close its concessional areas for grazing, an attempt resisted by Gavlis as well as the local population. The result was that these forests were again thrown open to grazing with very disastrous consequences for forest regeneration. In particular the combination of gregarious flowering and opening up of the bamboo clumps for extraction by the Paper Mill with severe grazing has led to virtual elimination of bamboo from Uttara Kannada. This has meant great hardships for the rural population, especially the basketweavers who have also been agitating against the Paper Mill.

The crisis over grazing is ofcourse widespread, with minor forest areas bearing the brunt of the pressure. Attempts have now been initiated by the Forest Department to close parts of minor forests to grazing and stock them with tree growth including that of fodder species. Some of the villagers have welcomed such attempts, others have opposed them as an encroachment on their rights. Thus in Sirsi taluka, the Bhairumbe minor forest was planted with active cooperation of the local villagers. Some farmers from a neighbouring village, Golikoppa, however, opposed this programme and attempted to damage the plantation. The result was pretty serious conflict, including a court case, which has now been resolved, so much so that the villagers of Golikoppa have asked for their own minor forest to be planted up.

Leaf manure has traditionally been very important, especially for the arecanut orchard owners. They were granted access to 50 thousand ha of forest land of the district as soppinabetta land at the time of forest settlement by the British. The ownership of the land however vested with the Government, and the orchard owners were expected to use the usufruct while maintaining a tree cover of 100 trees per ha. There were no attempts to properly enforce any regulations, and in recent years with increasing pressures on biomass and rapid rise in the prices of timber, an estimated 70% of these lands have been degraded. Some orchard owners have in fact resorted to wholesale liquidation of trees to convert these into benas or grazing lands. Others have encroached on minor forest lands to meet their needs that can no longer be met by the degraded

soppinabettas.

The people of Uttara Kannada require 8 thousand tonnes of small timber just for the new houses that need to be put up, in addtion to large quantities of poles for fencing, agricultural implements, construction of bunds and so on. They are expected to meet these also from the minor forests and soppinabettas, something that is not possible in the present degraded condition of these lands. The next resort is smuggling this timber out of reserve forest, a currently common practice. This inevitably means conflict with the forest department and opportunities for professional smugglers. The smugglers have ofcourse gone beyond procuring small timber for the rural population and indulge in smuggling more valuable wood including sandalwood, once so abundant in parts of Uttara Kannada. They are also in contact with private timber merchants, the so-called malki contractors. These malki contractors are actively involved in persuading people to cut down trees on private land, and records show that they give barely 10% of the market value for trees thus cut. With such large profits at stake, they of course actively campaign for liquidation of the tree cover on private lands.

The tree clad land of Uttara Kannada is rich in fruit trees. Amongst the most significant of these are the mangoes a rich diversity of which grows wild. These include varieties like the Appimidi, much relished for pickling. Traditionally these were used by the local people. But with the commercial value of such products going up, these have been ruthlessly exploited. Thus to cite one instance,outside traders have gone to the extent of cutting down whole trees on the banks of Dharma river to save the

effort of climbing up these huge trees. Since the trees on river bank are on public property under the control of P.W.D., local people cannot check such resource misuse.

Uttara Kannada has attracted a number of projects, a whole series of dams on Kali and its tributaries, a caustic soda factory, paper and plywood mills, and now the proposed atomic energy plant and a large naval base. Each such project has meant the displacement of a large number of people, always without adequate planning and compensation. We have mentioned above the difficulties experienced by the refugees from the Supa dam, whose resettlement area at Ramanagaram had lost most of its topsoil before the people were ready to move on there. Amongst the least literate of the communities of the district are the Halakki Vakkals on the coast. A number of their families were displaced to provide salt pans for the Caustic Soda factory several years ago. They are yet to be rehabilitated.

Many industries of the district are responsible for air and water pollution often hurting livelihoods of people. Several years after its affluents had rendered the waters of Kali impotable, the West Coast Paper Mill was forced to dig wells for the affected villages. The Caustic Soda factory near Karwar has been reported to have caused serious problems of sea pollution and fish kills. This has led to much resentment on part of the fishermen.

Finally, there has been a much celebrated conflict over land for hydroelectric power generation versus forestry and horticulture in case of the Bedthi river. It so happened in this

case that the orchard owners likely to be affected were well organised and fairly rich. They were therefore successful in prompting a useful debate on a variety of environment-development issues. This has resulted in a widespread awareness of the need to critically examine the various development options before us, to look more carefully at their environmental consequences, and much more importantly, to constructively work together towards a new pattern of sustainable, envioronmentally sound and people-oriented development.

2.5 New Initiatives

A most welcome result of this awareness has been action on a variety of fronts. A Society for Environmental Awareness has been set up at Kumta which has taken up issues such as mining limestone at Yan, a site with a series of magnificent limestone outcrops, and the establishment of an atomic energy plant at Kaiga. Another movement primarily devoted to awareness has been the Appiko, an offshoot of the Himalayan Chipko. Appiko began as a demand for stopping all commercial fellings, including selection fellings in the forest. Unfortunately it has failed to go much further and constructively organise ecorestoration efforts, in spite of some highly exaggerated claims.

Such actual ecorestoration efforts were initiated, albeit on a very modest scale through 15 volunteer farmers of the Hulgol Group Villages Co-operative Service Society at Bhairumbe in Sirsi taluka. They took afforestation of degraded soppinabettas, fodder development, modernisation of animal husbandry practices and use of fuel efficient wood stoves. A major limitation of this effort

was the restriction of involvement to better off farmers of a literate higher caste, the Haviks. This is now sought to be overcome through the establishment of a broader based voluntary agency dedicated to ecodevelopment efforts, the Sahyadri Parisara Vardhini. This agency has attempted to actively involve small landholders or even landless scheduled caste families in their efforts with moderate degree of success.

An equally important consequence has been the increasing involvement of scientific and technical institutions, including the Indian Institute of Science, the University of Agricultural Sciences, the Bharatiya Agro-Industries Foundation and the Karnataka State Council for Science and Technology. The most widespread impact has of course been through a radical reorientation of the working of the Forest Department, which has increasingly turned to forestry meant to fulfill the basic requirements of the people and come gradually close to them. Other departments too especially the District Rural Development Society have taken up ecodevelopment oriented activities, especially the propagation of fuel efficient chulas. We thus have the beginnings of a genuinely new approach to development. It is however only a small beginning and a great deal more needs to be done, very much in the spirit of the new 20 point programme and the approach advocated by the Hill Area Development Advisory Committee of the Planning Commission. In what follows we hope to document the current initiatives and sketch the future directions in the hope that this will assist in bringing about such developments on the ground, which is where they count.

2.6 The Ecodevelopment Approach

In Uttara Kannada, as in the rest of the country, the employment generated through the industrial and service sectors is meagre in relation to the total population. Bulk of the people must therefore depend on the biological production of the land and waters for their well-being. Moreover, it makes no difference to them if the production is adequate over some much larger region, or if it is adequate but inaccessible to them. Their well-being is tied to the biological production in their immediate vicinity to which they themselves have an access. It is undoubtedly our responsibility to ensure that everybody in our country is assured of a minimal subsistence; which means adequate food, enough fuel to cook it with, adequate shelter, and adequate inputs of fertilizers/manure and fodder for the crops and livestock that sustain them. In practical terms this appears to translate into the responsibility to ensure that all our rural population is in a position to produce enough food and have access to adequate supplies of fuel, fodder, manure and small timber in their immediate vicinity. Food is however, relatively small in bulk, and can be transported easily. Its production may therefore be replaced by the production of another cash crop such as arecanut or prawns for Uttara Kannada. But again if only a small section of the population controls the cash crop, this will not help. After all we know that while we produce adequate food for all, half of our population has no access to it. The situation with fuel, fodder, manure and small timber is qualitatively different from that for food, since none of these can really be transported in sufficient quantities to satisfy

mass needs. They must therefore be produced locally, and in such a fashion that people have access to them.

But the question of people having access to these resources is not a simple one of removing all restrictions imposed by the state; for, regulation of access is absolutely essential, especially under the prevalent conditions of acute shortages. In fact under such pressures it is all the more important to make sure that the resources are used in a very careful, restrained fashion. Traditionally the required discipline was imposed by powerful local communities. British rule and the market economy has destroyed these local communities, and the attempts to recreate them through the community development, the panchayat raj and such other programmes have not been very successful. Nor has the beauracracy been any more successful in ensuring disciplined use of the resources. There is thus no obviously simple answer to this problem; it will have to be tackled by serious attempts to create new institutions at the local level as well as within the beauracracy. Village level co-operatives responsible for proper protection and sharing of fuel, fodder, manure and small timber resources as well as for marketing; milk and forest produce from the minor forest and soppinabetta lands, coupled to responsible Governmental machinery to ensure that there is no mismanagement, appears to us to provide the most promising solution.

A common response of the Government to people's demands has been to provide subsidies. Citizens of Delhi are subsidised incredibly heavily at the cost of the rest of the country, and

citizens of Bangalore pay almost nothing for the Kaveri water pumped up to heights of more than a hundred meters and over distances of several tens of kilometers. Industries enjoy land, water and raw materials at highly subsidised prices though the era of Re 1 per tonne of bamboo for the paper mills is over. Farmers too enjoy subsidised chemical fertilisers and irrigation water. And people of Uttara Kannada get subsidised fuelwood through the forest depts. We strongly believe that all subsidies must cease, with the one exception of basic subsistence needs of the poorest segments of the population. For them too we must not resort to doles or wages for unproductive employment such as roads that are washed off every monsoon. Rather they must be provided productive employment which will help in the restoration of our resource base, and beyond that basic necessities such as fuel, fodder and small timber at possibly subsidised rates that will guarantee a reasonable quality of life for them. In generating employment for them we must also take care to see that the attempt does not lead to further destruction of the resource base, as for instance with goat-keeping in Uttara Kannada. We beleive that this broadly defines the framework within which we must work out the developmental priorities for the Uttara kannada district for the years to come, a framework very much in the spirit of the national priorities emerging today.

We would like to emphasize that we are not advocating going back to a primitive agricultural economy. What is being stressed is efficeint, careful use of resources; and a pattern of resource use that will take us towards a more egalitarian society. This stress on more efficient resource use is very much in the spirit

of the new technological age, an age of not mere intensive use of vast quantities of materials and energy, but one of careful, highly efficient use. The emphasis on more equitable sharing of resources is also in the spirit of the modern societes, be they socialistic or capitalistic welfare states. As we move towards the twentyfirst century then we must move towards a system whcih leads to a far more careful and efficient use and equitable sharing of the resources than we have been practicing so far. This would call for innovations, technical as well as social; not a regression.

3. Energy

Next to food, we need energy, to cook the food, to heat bath water, to process agricultural produce and for industrial production. As reviewed above, there are serious shortages for all these purposes, shortages that must be removed, with cooking fuel for the rural poor receiving the highest priority.

3.1 Rural Fuel Supply

The shortages of fuel are acutest, especially for that segment of the rural population which has no orchard lands producing arecanut and coconut leaf petiole and husk fuel of their own. Since soppinabetta lands are also a privilege of the orchard owners, their mainstay is minor forests, the worst degraded of the forest lands of the district. Beginning with Kageri near Sirsi in 1981, the Forest Department has launched programmes for planting up the minor forest lands. Since people initially distrusted the departmental efforts, all the seedlings

at Kageri were pulled out by the villagers. There were also problems at Bhairumbe in 1983. But over the last two years, this resistance has been much reduced, and over 6000 ha have been planted with more than 2 crore seedlings. All the plantations are multi-species, with species producing fuelwood (Casuarina, .Acacia auriculiformis, Hopea wightiana), fodder (Leucaena, Calliandra, Sesbania, Bauhinia, and Albizia), fruit (mango, jack, jamun), minor forest produce (Garcinia, Artocarpus gomezianus (Syn). A.lakoocha),Acacia sinnata etc.). The plantations are given rigid protection with cattle-proof trenches, barbed wire fencing etc. This is essential since even if 100% of the local people are ready to co-operate, which is very difficult to achieve, they are today in no position to totally control their own cattle. These plantations also include vigorous soil and water conservation measures, such as saucers or contour trenches and gully plugging.. These are very efective, and people with wells downslope of the plantations are already reporting substantial gains in the well water yields in the dry season.

The costs of raising such plantations vary from Rs.5000 to 11000 per ha. depending on how difficult the terrain is. We believe that the results as documented in the report by Reddy et al (1986) fully justify the investment. However, the level of investment called for under any specified conditions is an issue that deserves to be much more carefully gone into, without specifying arbitrary guidelines such as Rs 1000 per ha. What needs to be introduced is not just the financial audit, but a performance audit. Thus the green matter production as a function

of investment is not a simple linear fuction, there is a threshold below which the production will be zero, and above which it may increase very little. For Uttara Kannada at least an investment of Rs. 1000 per ha is well below the threshold at which some production can materialise. Insisting on such a limit is then tantamount on insisting on totally wasteful usage of money for plantation efforts. It would in fact be very worthwhile to work out production as a function of investment including a variety of components such as investment on the seedling, investment in protection against grazing, investment in occasional irrigation in the dry season etc., for each of specific local conditions, and then to decide on the proper level of investment.

The current practice with the plantations is to provide funds for the first three years of operation and then to totally withdraw. This is a pernicious practice for it may result in a total loss of investment, especially in a situation such as that of minor forests where unregulated exploitation in the fourth year may annull all earlier efforts. It is urgently necessary right now to work out a mechanism for regulating the harvest, sharing it, and managing the plantation on a long term basis. As suggested above, a local co-operative, under strict regulation by the forest department may have to be set up to assume this responsibility. This body will have to appoint a watchman to enforce restraint. The produce should not be supplied totally free, except to the landless entirely dependent on wages. All others may be charged for the produce, perhaps in some graded

fashion. Any excess remaining over and above this may be sold through forest depots to outside consumers or the industry. The funds so generated should be used for management and further development of minor forests.

The two other approaches to the rural energy needs will include more efficient use of fuel, and tapping additional sources of renewable energy. Substantial progress has been achieved in the more efficient use of fuel for cooking and water heating in the last three years in Uttara Kannada through the propagation of Astraole, a modification of the traditional two pan domestic cooking stove to a three pan, smokeless design that can be easily constructed by locally trained artisans. This stove, designed by the Chemical Engineers of the Indian Institute of Science has an efficiency of 42%, as against 15% for the traditional stove. However, efficiencies realised under the field conditions are of the order of 32% in households that employ all the three stoves, and 24% in households that need only two; even this can make for tremendous saving. Further fuel saving in cooking stoves should be possible with more technical effort, as well as with serious efforts at dissemination. Fuel efficient designs of bath water heating stove as well as jaggery making stove are also available and being propagated.

There are many interesting lessons from the last three years of experience of the propagation of these fuel efficient chulas. Firstly, there is no machinery readily available for such a purpose in contrast to extension of improved agricultural practices. Indeed, technology diffusion does need such machinery, and it is just being set up in the form of technology

demonstration centres by the Karnataka Department of Science and Technology in collboration with the ASTRA group of the Indian Institute of Science. In the present case, the District Rural Development Society and the Forest Department played an important role by providing subsidies, the Department of Ecology and Environment, Government of Karnataka and Karnataka State Council for Science and Technology by funding technical work and training programmes. What is most reassuring is that the technology has been absorbed enough that a local school teacher has devised improved, faster ways of constructing the chulas and his services are in great demand by the better off. More effort is however clearly necessary, especially for developing a better design for the poorer households who use only two chulas, and to ensure better quality of construction of chulas. In this context an experiment at introducing scientific principles behind the design of fuel efficient chulas as a part of the high school science teaching by the Indian Institute of Science may prove very worthwhile. It is also essential to rationalise the subsidies for such stoves, basing them on economic rather than caste criteria. In fact, the better off may be forced to construct such stoves with their own resources by linking it to the supply of fuel through the forest depots.

Biogas and solar energy are the two renewable sources of energy of great promise for the rural Uttara Kannada. Biogas is already fairly popular amongst the richer farmers, but community biogas plants are unlikely to be very generally successful. Community biogas plants may however succeed with Gavlis, a group

of forest dwelling buffalo and cattle keepers with large animal holdings and relatively homogeneous societies. Tapping of solar energy through flat plate collectors or through solar ponds for community bath water facilities also holds much promise for heating of bath water consumes as much fuel as cooking in the district of Uttara Kannada.

The production and management of fuel resources, as well as construction of fuel efficient chulas are activities likely to generate much needed employment in the district.

3.2 Urban Needs

The fuel supply to the towns of Uttara Kannada was earlier through the urban poor bringing in dead and fallen wood on head-, bicycle- and cart-loads. With the shortages mounting, this had to be restricted to only head loads especially as much of the fuel brought into the towns was flowing out to cities like Bangalore. Today bulk of the town fuel supply is through depots, 75 of them in the district. These depots supply fuel at the subsidised rate of Rs 80 /- as opposed to the current market rate of Rs 450 /- per tonne. To sustain the fuelwood supply for towns it is essential to identify a fuel catchment and raise plantations of fast growing species. Forest department has identified such catchments for Sirsi (2000 ha), Siddapur (1000 ha), Gokarn (1500 ha) and Ankola (3000 ha). It is of course necessary to make sure that the development of these catchment does not cut into the supplies for the local villagers. It would also be desirable to bring to the town (as well as industrial) market wood production from the private bena as well as soppinabetta lands. To

stimulate wood production on the soppinabettas it is necessary to grant the orchard owners tree pattas for trees over and above the mandatory 100 per ha. There is currently pending before the Government a proposal to permit the soppinabetta holders to retain 70% of the price of the wood so marketed. All this wood should of course be marketed through the forest depots completely eliminating the malki contractors who pay very low rates and exert undue pressure for cutting trees on private land. The forest depots should buy and sell wood at prevailing market prices eliminating all subsidies except for those explicitly identified as being below the poverty line. The supply of fuel through the depots should also be linked to the compulsory construction of fuel efficient devices by all consumers. These would include the Astracle and bath water stoves for households, as well as designs specially developed for other establishments such as hotels , hostels and maths.

The forest department estimates yields of the order of 135 tonnes per ha at the end of 5 years from fast growing species plantations in this district. The investment required is estimated at Rs 8000 per ha, while the returns would come to Rs 60.75 thousand at the end of the fifth year. This is clearly a financially sound proposition provided that it is executed properly and with full cooperation of the local population. Such an exercise should generate substantial employment for the local population; in addition arrangements should be worked out to plough back part of the revenue generated to the Panchayat in whose jurisdiction the area of the fuel forest falls. Perhaps this ploughing back should take the form of subsidies in fuel and

small timber supply for the poor residents of that Panchayat area. Such a scheme should obviously take very high priority in the development plans of the district.

We estimated above that the annual requirements of fuel supply from the forest are about 5.34 lakh tonnes. At a yield of 135 tonnes per ha on a rotation of 5 years this means a harvest of some 4 thousand ha. every year. The total extent of fuel plantations needed is 20 thousand ha, well within the 1.5 lakh ha of minor forest available. Obviously, the whole situation can be dramatically turned around if we are willing to make the effort and invest 3.2 crores of rupees per year for the first five years. When hundreds of crores are readily given for hydel projects with far longer gestation periods, this seems a most reasonable proposition if we are going to take our new priorities seriously.

The sewage produced in the towns of Uttara Kannada represents a potentially valuable source of energy in the form of biogas, and every attempt should be made to tap this. This would also prevent rivers like Aghanashini suffering the fate of Bedthi polluted by the sewage of the Hubli town.

3.3 Industrial Needs

The abundance of fuel in earlier times, coupled with suitability of the soils has resulted in a flourishing tile industry on the west coast. There is no readily available information on the fuel requirements of the tile industry which are substantial. The industry also uses outdated, highly fuel-inefficient technology. It should be compelled to switch over to

modern fuel efficient kilns. The industry should also be forced to buy fuel at the prevailing market rates from the forest depots with arrangements through village co-operatives or individuals for sale of their produce through this channel. The Government should not alienate minor forest or soppinabetta lands directly for industrial production or through joint sector companies; the industrial production by Government or joint sector should be entirely restricted to degraded reserve forest land. This would ensure that the benefits of industrialisation would begin to flow to the rural population; it is high time that this happened.

Timber for construction, plywood and panel industries is largely obtained from forests clearfelled by the Forest Department for establishing plantations as well as by selection fellings in moist deciduous and wet evergreen forests. In the areas worked under selection system no planting was done but only natural revegetation was relied on to restock the areas. This was not found adequate and consequently the yield was diminishing rapidly during successive felling cycles.

In recent years the Forest Department has taken up gap planting in selection felled areas in moist deciduous forests with very promising results. It would be necessary to initiate similar revegetation efforts in the wet evergreen forests also, with suitable species indigenous to the evergreen zone in order to improve the stocking and maintain the productivity of forests.

4.Animal Husbandry

4.1 Dung Machines

With its highly leached, fragile soils agriculture in Uttara Kannada is dependednt upon high levels of inputs of organic manure. The traditional system therefore has been of maintaining a large number of free grazing cattle who are provided bedding of leaf litter. The cattle are stunted, the famous Malnad giddas that can jump over trenches and between barbed wires and withstand long periods of near starvation. Their main product is dung, not milk. Their numbers have increased with those of people, and as considered above, the grazing pressure now makes it very difficult to achieve any regeneration, natural or artificial of the forest growth. This grazing pressure is also responsible for favouring growth of unpalatable weeds such as Chromotaena (Syn. Eupatorium) which has greatly increased the intensity and destructive power of the fires that are set every summer. It is absolutely necessary now to completely revolutionise this whole system of animal management and to go in for maintenance of a much smaller number of genetically improved animals that are stall fed and restricted to a paddock. Such animals cannot be economically maintained if large quantities of feed have to be purchased. This system then necessarily calls for large scale production of hand harvested fodder.

4.2 Fodder Production

This system then requires: (a) production of grass,legume and tree fodder, (b) genetic upgrading of livestock, (c)

stall/paddock feeding, (d) health care, (e) marketing of milk, and (f) efficient conversion of dung into manure. Such a switch-over has been successfully accomplished by the 15 volunteer farmers of the Hulgol Society project mentioned above. They are producing fodder in the dry season in their paddy fields by growing sunhemp or fodder cow-pea, on farm bunds by growing trees like Subabul and Calliandra, and to a limited extent on the soppinabetta lands as well. They have well designed stalls and paddocks and animals cross-bred with the help of BAIF or UAS. They have biogas plants, and scientifically designed manure pits receiving the slurry. A small number of other better off farmers of the district have also adopted this system.

However the real challenge is to see this technology percolate to the small land-holders, and even more importantly to the landless who are being provided loans for the purchase of animals. Sahyadri Parisara Vardhini has made a beginning with 6 small holders in 4 villages, who have set up paddocks as well as small plots for fodder cultivation. A very promising component of this is the production of grass on the saline estuarine, or the so-called gazni lands on the coast. But on the wider scale, the Government machinery, especially the Animal Husbandry department will have to step in to see that these people are provided not just one time animal purchase loan, but financial as well as technical inputs over an extended period of time to develop the whole system of management of animals including fodder supply and health care, marketing of milk as also the disposal of aged animals.

While there are excellent possibilities of production of some fodder on paddy fields in the rabi season and on farm bunds, the bulk of the fodder has to be produced on soppinabetta, minor forest as also reserve forest lands under new plantations. The forest department has made an excellent beginning towards this by establishing sylvipastoral farms in 100 ha. These include besides fodder trees of genera Leucaena, Calliandra, Sesbania, and Albizia, legumes like Desmanthus and grasses like , CO-1, D-2 and Napier.In additon, naturally growing grass is being hand-harvested in large quantities from the other plantations protected against grazing. It would however be most desirable to have a sylvi-pastoral centre each serving an area of 30 sq km. This means 325 centres for the district, which in the estimate of the Forest Department would require Rs. 61 crores of capital investment, including the development of a proper water facility etc and an annual recurring expenditure of Rs 2.8 crores. It would of course be desirable to sell this high quality green fodder at market rates, except to the landless and recover most of the investment. In addition to these special centres, the minor forest plantaions can produce large quantities of fodder if properly protected and managed. We have already sketched above our ideas on how this may be organised through a village level co-operative under strict supervision of the Government department.

Bulk of the fodder will necessarily be produced in the five months of the monsoon. It is essential to properly preserve this for use later. This requires the development of silaging techniques under conditions of high rain fall . Some experiments

along these lines have already been initiated by the Sahyadri Parisara Vardhini with the guidance of U.A.S., Dharwad.

4.3 Gavlis

The forests of Uttara Kannada harbour over a thousand families of a group of forest dwelling pastorals called Gavlis, most of whom have migrated from Maharashtra in the 1950's. A Gavli family may on the average have 10 or more animals, and free range grazing by these large concentrations of animals under the present conditions is certainly destructive of the forest resource base. At the same time, the Gavlis have been major milk producers for the Dharwad dairy as well towns like Dandeli. It is notable that while considerable investment has gone into ensuring that their milk reaches urban consumers by setting up facilities like chilling plants, nothing whatever has been done to produce better fodder and otherwise modernise the animal husbandry practices of these people. At the same time, Forest Department has been trying to move them outside the forest area. In fact, in the 1960's several hundred hectares were deforested near Mundgod for resettling them. However, the resettlement was never completed because the Gavlis demanded 4 acres per family as against the 2 acres being offered. In the meanwhile much of this land has been occupied by non-Gavlis, while the Gavlis continue in the forest. Some years ago an excellent fresh scheme to rehabilitate them and to modernise their animal husbandry practices has been prepared by BAIF. This should be quickly implemented.

4.4 Rabbits, Bees, Fish and Prawns

The forests of Uttara Kannada have a tremendous potential for developing bee-keeping, which needs to be systematically developed further, especially along with the development of minor forests. Fortunately many fodder plants being planted in these areas such as Callianra are also excellent nectar yielders. Another useful new introuction to the district has been the rabbit, of much promise especially for generating employment of the landless provided it does not escape into the wild.

The fresh waters of the district have been hardly developed for their potential for fish production; this needs careful attention, as does the development of prawn culture, coupled to coconut cultivation in the estuarine tracts. We will not enter at all into the question of marine fisheries, including the conflict between mechanised and traditional crafts and the reported fish kills by the Caustic Soda factory. There is obviously much food for serious thought and planning here.

5. Manure

The farmers of Uttara Kannada, as indeed of the rest of the Western Ghats tracts, have depended on heavy inputs of green leafy matter along with dung and dry leafy matter as mulch to maintain the fertility of their fields. The arecanut orchard owners have been particularly dependent on it, and hence won the privilege of soppinabettas at the time of land settlement in the last century. The minor forests too are extensively lopped for leafy matter, especially by those without soppinabettas. The lopping has been thoroughly unrestrained and has led to killing

of trees as well as a severe setback for any regeneration and growth. It is clear that lopping has to be regulated and substantially reduced. To this end, official rules on the lopping of soppinabettas do exist, though they have never been implemented. There are no existing regulations on the lopping in the minor forest areas.

The 15 volunteer farmers of Hulgol Society project initiated in 1982 experiments on moderation of lopping, or resorting to the use of dry leaves by abandoning lopping altogether. The results have been most encouraging. There are however several difficulties in implementing these improved practices on a wider scale. Firstly, most of the leaf manure is collected by wage labourers who are paid so much per basket. They are naturally interested in collecting as many basketloads with as little effort as possible. Secondly, much of the leaf manure comes from minor forest lands where there is currently no regulation. Enforcement of better lopping practices would therefore depend on a tremendous educational effort, a change in the system of organising leaf manure collection, and setting up of a structure for the mannagement of the minor forest lands as suggested above.

The Hulgol Society volunteers have also experimented with a variety of ways of generating green manure resources on their own land. The most effective amongst these is growing Glyricidia on borders and bunds. Sunhemp grown during the rabi season in paddy fields has also yielded excellent results in providing fodder as well as green manure. Cover crops such as Pueraria and Mimosa invisa in the arecanut orchards also reduce the requirement for

the mulching material. Manure can also be prepared much more efficiently from dung and vegetable matter by following scientific practices. There is an excellent scope for use of bio-fertilisers such as blue-green algae in the paddy fields. All these measures can substantially reduce the lopping pressure on the forests and need to be propagated vigorously.

6. Structural Materials

The demands on plant material to serve structural purposes are manifold; poles for fences, poles, beams and rafters for houses, wood for agricultural implements and fishing boats, thatch for huts and cattle sheds, softwood for paper, polyfibre and plywood industries and hardwood for the timber mills. The current picture is one of inadequate attention to the needs of the rural people and artisans encouraging smuggling and providing business for the malki contractors, while the industry is provided raw material at subsidised rates encouraging overexploitation. What then is needed is encouragement of production of structural material on private lands, soppinabettas, minor as well as reserve forests, its supply through forest depots at reasonable rates with subsidies restricted to the rural poor, and establishment of co-operatives of artisans to organise supplies and marketing.

Farmers could take care of their own needs for fencing by growing Glyricidia or subabul on farm bunds and margins. They could also grow other tree crops such as Casuarina very effectively on the bena and soppinabetta lands provided that proper tree pattas are assigned to them and arrangements made for

marketing. Special plantations of bamboo, and perhaps in future of cane etc. could be developed on minor forest or other suitable lands to meet the needs of basketweavers. Till recently, the Forest Department had geared all its plantation programmes to industrial raw materials. This, for example, had led to extensive clearfelling of natural forests to raise Eucalyptus plantations in the Uttara Kannada district. As this programme was launched without due experimentation there were major failures, such as the pink disease extensively affecting the Eucalyptus in this high rainfall tract. The Forest Department has now taken the excellent decision to stop all clearfelling of forest in the district, although it appears as if clearfelling continues through the initiative of plantation and cashew corporations of the Forest Department. The Forest Department has also taken up new approaches to the management of the reserved forest including gap planting with a variety of species. One particularly notable technical development relates to the propagation of bamboos. Excellent nursery stocks as well as plantations of bamboos have been developed in the Haliyal Division. We have thus come a full circle from elimination of bamboo as a weed to its efficient propagation. These techniques could be widely adopted by the farmers as well.

Other important initiatives include the establishment of basketweavers' co-operatives with regulated supply through the Forest Department and efficient marketing. Unfortunately, the Sirsi co-operative has suffered from political rivalries, but some cane basket weavers we talked to from villages deep in the

forest were happy at the facility of proper raw material supply and marketing through their society. Such societies obviously should be strengthened and come to play a useful role in managing the raw material and generating much needed employment.

We reiterate that forest depots should become the sole agency handling forest produce doing away with the malki contractors, as well as the private agencies extracting raw material for the industries. Extraction in the reserve forest too should be through the agency of forest labourers' co-operatives rather than private contractors. The minor forest co-operatives as also private individuals should deal through the depots for marketing produce including to the industry. The industry and all others who can afford should be supplied the produce at market value, the subsidies being entirely restricted to the poor. The forest depots should also ensure adequate supplies to the co-operatives of artisans.

7. Soil and Water Conservation

Soil and water lie at the base of all biological production and their good management is vital. The current systems of land use are often inimical to this. For instance, the farmers sweep clean all organic matter from the soppinabetta lands, and then set fire to it at the end of the summer. The minor forest lands are thoroughly overgrazed, with trampling by animals destroying soil. Clearfelling of forests on steep slopes that was practiced till recently certainly resulted in severe soil erosion. Many arecanut orchards are ill-drained and water-logged. It is therefore, necessary to cover all aspects of soil and water

conservation in each natural microcatchment in a co-ordinated fashion, covering the Government as well as private lands as part of a co-operative effort. Till now, such co-ordination had been lacking; but a new co-ordinated programme involving the agriculture, horticulture and Forest Departments has just been taken up in the Sonda watershed. Unfortunately, here too sustained effort seems to be impossible as the programme stands transferred to Kali areas after some initial work at Sonda.

As the entire district really needs to be covered with long term involvement of the local people, we suggest that the Mandal Panchayats that will soon come into being should assume the responsibility of careful planning of soil and water conservation measures at the microcatchment level, as well as its execution involving all the various Government departments, the local people and the technical experts. The measures would include physical treatments such as bunds, development of the vegetation cover, proper drainage and irrigation practices, water harvesting and good cultivaiton practices such as contour ploughing and mulching. It is vital to encourage efficient use of water through sprinkler and drip irrigation wherever possible. In this context the recent initiatives of the Forest Department in incorporating extensive soil and water conservation measures in their plantation programmes are a very welcome development.

The task of planning efficient resource use in full detail on the ground is a major technical task and would require a large number of people to organise it. It would be most appropriate to enlist the co-operation of the local schools and colleges in this task, as it would also provide them with a worthwhile educational

experience. Efforts along these lines have been initiated through a project of the Karnataka State Council for Science and Technology. This project is supervised by a group of technical experts from Government departments as well as technical institutions, but is actually implemented with the help of Sahyadri Parisara Vardhini, a local voluntary agency and colleges and high schools.

We shall not go here into the problems caused by mining and industrial pollution, although these have a very significant impact.

8. Biological Diversity

Uttara Kannada is a locale rich in plant and animal life. In fact, the number of species of birds it supports exceeds that in the whole state of Kerala. It was a district once famous for shikar, and the site of a major wild life sanctuary at Dandeli, now thoroughly disturbed by giant Kali hydel project. It is rich in wild economic plants such as cinnamom and wild relatives of pepper and mango. It also had important old traditions of nature conservation such as sacred groves. However this heritage, both biological and cultural is threatened today and needs careful nurturing. A number of steps need to be taken in this context, including measures to reduce man-wild life conflict, identification and protection of a network of nature reserves, revival of old traditions of conservation, and establishment of germ plasm banks.

Uttara Kannada has innumerable enclaves of cultivation surrounded by forest with the result that crop damage by wild

pigs and barking deer is extensive. It would be desirable to organise the protection of these farms by electric fencing with short pulses of high voltage currents that repel but do not kill the animal. There should also be an effective system of compensation for cattlle kills by panthers and tigers.

The reserve forests are today being worked everywhere, even if it be at a low intensity so that very soon there will be no virgin areas left at all. It is necessary to carefully examine the situation in the field, and identify the areas particularly rich in plant and animal diversity and permanently set them apart as a network of nature reserves. A project for the identification of such localities is currently under way by the Indian Institute of Science.

Even today Uttara Kannada and neighbouring areas have some excellent forest preserved on religious ground, the devara kadu or kaan forests. Unfortunately this protection is on the wane in recent years and these forests are getting degraded. Last two years have seen a most interesting revival of this tradition through the establishment of new sacred groves or Pavitravanas near Gokarn, Murdeshwar, Idgunji, Ulvi, Kagal, Banavasi, Sirsi and Salkani by the Forest Department in co-operation with the local people. These vanas are being started with a variety of indigenous species used for religious purposes.

The district's wealth in wild plants of medicinal and other economic value, wild relatives of cultivated plants, as well as local cultivars needs careful protection. This has to an extent been achieved by individual efforts, such as those of Shri Gopal

Hegde, Kanchikai who has a tremendous collection of fruit tree varieties. Systematic attempts have now started with the establishment of a herbal garden near Bakkal in Sirsi taluka and individual farmers being prompted to develop collections of local cultivars, e.g. mango varieties by Shri M.V.Hegde, Kovesar at the instance of the forest department.

9.Generating Employment

Generating productive employment for our vast population is clearly the most urgent of our country's requirements. We have so far followed three routes to this end; intensive agriculture under irrigation, industrialisation and a variety of rural employment programmes. There is only limited scope for irrigation in this hilly district. The other two routes have yielded scant results because we have paid insufficient attention to economic realities and the health of the resource base involved. The industrial route requires an investment of more than a lakh of rupees per job created, and we do not have that kind of money. Moreover the industrial ventures of Uttara Kannada have probably destroyed more jobs through resource destruction than the fresh jobs they have created. Thus the Caustic Soda factory has displaced large numbers of farmers and adversely affected fishermen through water pollution. The rural employment programmes are often similarly ineffective; thus, providing a loan to a landless to purchase a cow when he has no fodder to feed it nor any way to market the milk which has has no value locally.

A new approach is clearly needed and it will have t

involve (a) state generated employment to maintain the health of our resource base of soil, water and vegetation cover, and (b) stimulation of employment in the agriculture, handicraft and small scale industry sector by augmenting biological production.

We suggest below a series of such possibilities:

a) Intercropping in cultivation

b) Introduction of appropriate rabi crop,e.g sunhemp

c) More efficient irrigation and drainage

d) Coconut cultivation on the brackish gazni lands

e) Cashew production on coast

f) Pineapple production

g) Flower and vegetable crops on the coast

h) Sericulture

i) Dairying based on fodder production on minor forest lands

j) Rabbit farming

k) Fish farming in irrigation tanks

l) Prawn cultivation

m) Bee keeping

n) Kissan nurseries; in the last three years as many as 20 lakh seedlings have been raised through 500 nurseries at the instance of the forest department in this district.

o) Tree prodution on Khushki/bena lands

p) Tree production on individual tree patta on soppinabetta/minor forest land

q) Tree production by co-operatives on minor forest land

r) Tree production on school,college land

s) Social security plantations on degraded reserve forest land

t) Development of processing industries based on: cashew, Agave fibre, coir; furniture from wood, cane, bamboo; chipboard from wood; chemicals from Agave, Garcinia, Myristica, Strychnos.

u) Production of compacted soil-cement blocks

v) Fire- and rot-proof thatching

w) Construction of fuel efficient chulas

x) Soil and water conservation programmes

y) Afforestation programmes

10. Involving the People

The key to people-oriented development has to be a real involvement of people at all phases; in creation of awareness, in planning of the development programmes, through partnership in the productive process, and in the execution and monitoring of the programmes. A variety of individuals and institutions, not just the elected representatives should take part in the process; these would include the village as well as higher level co-operatives, panchayats and zilla parishats, schools and colleges. We expect the village level co-operative managing the minor forest production, as well as marketing of milk and forest produce as a vital link that has to be carefully nurtured. The mandal panchayats should lead in planning and co-ordinating good resource use on a micro-catchment basis as well as interact with the local schools, colleges and village level co-operatives. The local educational institutions could help create awareness about environment and health issues, carry out surveys, assist in microcatchment planning, run technology demonstration centres, conduct action-oriented field research such as on the suiability

of new fodder species,and run nurseries and school forests.

This whole effort will of course have to depend critically on the co-operation and participation of the Government departments, as well as real involvement of technical institutions such as Universities of Agricultural Sciences. It is therefore a sign of tremendous hope that much progress along these lines has already been achieved and one may look forward to an era of regreening of the land and a return to prosperity of the most ordinary citizen of the district.

11. Summary

— Uttara Kannada, with a population of 10 lakhs and a land surface of 10,000 sq km has:

2000 sq km of well maintained reserve forest

2000 sq km of somewhat degraded reserve forest

1000 sq km of considerably degraded reserve forest

500 sq km of somewhat degraded minor forest

1000 sq km of highly degraded minor forest

150 sq km of somewhat degraded soppinabettas

350 sq km of highly degraded soppinabettas

1790 sq km under somewhat degraded private and revenue wastelands

200 sq km of totally barren private and revenue wastelands

130 sq km under orchards

1000 sq km under other cultivation

— There are 1000 people per sq km of cultivated land

— Vegetation cover is undergoing further rapid degradation because the annual demands for fuel, fodder, leaf manure and structural material exceed the increment by factors of 5 or more

— There is little potential for new irrigation projects in this hilly district

— Industrialization has generated little employment potential; it has perhaps destroyed more through degradation of natural resources

— There is tremendous potential for augmenting the biological production of cultivated as well as uncultivated lands through efficient use of land, water and vegetational resources

— This will help fulfill the basic needs of the people as well as generate considerable employment

— This should therefore be the cornerstone of the development strategy for the district

— Last four years have seen several promising experiments along these lines by forest, rural development and ecology and environment departments, local co-operatives, schools and colleges, as well as scientific institutions

— This report documents these experiments and sketches the directions that the future programmes should take so that development will be sustainable and allow the benefits to percolate to the poorest stratum in the society.

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