

CHAPTER 8

ACTION PLAN FOR CONSERVATION AND SUSTAINABLE USE OF UTTARA KANNADA'S BIODIVERSITY

8.1 DOMESTICATED BIODIVERSITY

Uttara Kannada has great diversity in its landscape, soil and rainfall. There are accordingly tremendous local diversity of cultivated plants. Notable is the diversity of rice, mangoes, jackfruit, pepper, brinjal, banana, lady's finger, coconut, arecanut etc. Such diversity has been developed through the efforts of generations of farmers.

More the local varieties of a crop, greater is the stability of agricultural sector. For example there are over 40 local varieties of rice alone in Kumta taluk. Developed by farmers these varieties have tremendous genetic variability and adaptability. The *Kagga* variety is salt tolerant; the *Sannakki* of Medine is scented like Basmati. The *Halaga* is popular variety grown by several farmers, having good resistance to pests and diseases. For each special use there is a suitable variety.

Uttara Kannada was once famous for its production of pepper. Pepper was grown not only in the gardens but the villagers had even taken care of wild pepper in the forests such as Pepper forests (*Menasukans*).

Today, unfortunately, due to the large-scale introduction of hybrid, high yielding and grafted varieties of crops, and with the threat from genetically modified (GM) varieties round the corner, we are losing precious heritage of scores of locally adapted varieties of all cultivated plants. This is not only a loss to the efforts of the local farmers, but also makes the future of agriculture itself dark. The new varieties are of crop plants most often do not have adaptability to local conditions. Pests and diseases are more for them. Farmers are forced to more of pesticides, which are dangerous to ecosystems, water bodies and affects badly the health of humans and animals.

The large-scale conversion of *gajni* rice fields into prawn culturing ponds has nearly wiped out the *Kagga* rice. The local varieties of mangoes, such as *Appemidi* famed for pickle making, have disappeared largely; their trees were cut for making matchsticks and other industrial purposes.

8.1.1 Action plan: Creation of a database on diversity of all the crop plants.

Responsibility: Departments of Agriculture and Horticulture, to work in coordination with NGOs and academic institutions, and knowledgeable individuals from villages.

Methodology: The departments should maintain, as a matter of routine, village-wise database on cultivated biodiversity. The database has to be periodically updated. Geographic Information System (GIS) to be used for the database with the assistance of the District NRDMS Centre, if required. It is very important to prepare Panchayat-wise

“**People’s Biodiversity Registers**” (PBR), in which all such information has to be recorded.

Project: Farmer’s Newsletter on traditional agriculture

- Farmer’s Newsletter to cover various traditional crop varieties, including tree crops and wild relatives of cultivated plants
- Write up on rare local varieties and the farmers/individuals who safeguard them to be given prominence
- The newsletter to cover innovations in organic farming techniques, soil and water conservation, details on biopesticides etc.

8.1.2 Action plan: Make farmers, including marginal farmers partners in conservation of traditional varieties in their natural areas (*in situ* conservation)

(“*In situ* conservation” of cultivated species means conservation in the surroundings where they have developed their distinctive properties- Ref: Biodiversity Bill, 2002).

The Government of India, as well as the State agricultural universities are spending huge amounts on conservation of genetic diversity of crop plants, fruit trees etc, at enormous cost to the public finances, in central places, away from natural areas of these crops (*ex situ* conservation). At the same time the farmers who have evolved scores of traditional varieties through ages of efforts are not made partners in conservation.

The services of farmers, including marginal farmers are to be used with proper recognition/ incentives to them as an encouragement for continued conservation of rare or threatened local varieties of all domesticated crops. Such a plan of conservation, under proper monitoring, will greatly ensure the continuity of all rare and threatened varieties while recording, acknowledging and providing incentives for the role of the farmers.

For example “Kagga” rice which has salt tolerance, and grown in the coastal gajni lands is endangered due to conversion of rice fields into prawn culturing areas. The scented “Sannakki” of Medine village is grown in very small area by Karivokkaliga farmers, without encouragement from source whatsoever.

Note: The **Biodiversity Bill 2002** says every local body shall constitute a “**Biodiversity Management Committee**” for conservation, sustainable use and documentation of biological diversity including preservation ofland races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling of knowledge relating to biodiversity.”

(“Cultivar”: A variety of plant that has originated and persisted under cultivation or was specifically bred for the purpose of cultivation.

“Folk variety” means a cultivated variety of plant that was developed, grown and exchanged informally among farmers.

“Landrace” means primitive cultivar that was grown by ancient farmers and their successors).

The Biodiversity Bill requires that while taking any decision relating to the use of local biological resources and the knowledge relating to them the respective Biodiversity Management Committees (BMC) are to be consulted. The BMC may even charge for any agency for using biological resources within its jurisdiction.

The State Government is required to constitute a **Local Biodiversity Fund**. “The fund shall be used for conservation and promotion of biodiversity in the areas falling within the jurisdiction of the concerned local body and for the benefit of the community...”

Project: Restoration of Kagga rice cultivation in gajni fields: Government to assist the farmers whose gajni rice fields in the backwater areas have been severely damaged because of conversion into shrimp ponds.

8.1.3 Action Plan: Promotion of organic farming:

The Uttara Kannada farmers have a great heritage of organic farming, perhaps more than any other district in Karnataka State. Because of hilly landscape and heavy seasonal rains organic matter is highly essential for protection of agricultural soils. Most arecanut gardeners have been granted bettalands for extraction of leaf manure. These bettalands are forests in support of agriculture. The other farmers usually resort to “Minor Forests” or even Reserve Forests for their leaf manure needs.

Most Minor Forests have been in poor condition. This has prompted the Forest Department to plant fast growing tree species such as *Acacia* in such degraded forests. The actions required to promote organic farming are:

- Promotion of tree growth in bettalands, most of which are in poor condition. The Forest Department to evolve joint schemes with farmers to make the bettalands more tree-covered.
- Enrichment of Minor Forests with more local species for promotion of organic agriculture.
- Promotion of bio-pesticide plants and use of bio-pesticides. Education of farmers regarding use of biopesticides. Agriculture and Horticulture departments to promote only organic farming.
- Promotion of vermiculture
- Civic bodies such as municipalities and panchayats to work in close coordination with agriculture departments so that organic waste available in market places are regularly composted and made available to farmers as manure.
- Pharmaceuticals to sponsor growing of medicinal plants by farmers by using organic methods.
- The creation of village fodder farms will promote stall feeding of cattle and make available more quantity of cattle manure.

- Organic consumer movement to be promoted by NGOs so that the farmers get better returns for their farm produce.

5.1.4 Action Plan: greater facilitation of women in conservation of traditional crop biodiversity

Small scale conservation of indigenous crops, including tree crops such as mango, jackfruit, kokum, gooseberry, drumstick etc. to be promoted for household food security. Even non-agricultural families to be involved in such efforts. Women to play greater role in promotion of home gardens. Prizes to be instituted at village and taluk levels for promotion of home gardens.

Project: Promotion of efforts like “Malenadu Home Garden and Seed Exchange Network” of Uttara Kannada Women (based at Sirsi), for conservation of traditional crop biodiversity.

Begun in 2001, this is a modest effort at documenting and increasing the diversity of home gardens in Uttara Kannada. The home garden could be a tiny patch of land outside one’s house, or a small field or a mixed garden.

Home gardens provide food security, nutrition and provide an additional source of income, especially for women. Even the very poor are part of this production system. Home gardens are important genetic resources of cultivated plants, and other folk knowledge related to the plants.

Growing of vegetables, flowers and even trees are part of these home gardens. Currently, about 100 women from 5 villages of Yellapur are part of this network. They meet regularly to discuss about the gardens, exchange seeds. The crops grown are non-hybrids and only by organic methods.

The home garden network is part of a project of Kalpavriksh, Pune. A network of seed banks to be run by women to be encouraged/sponsored.

Such projects need sponsorship from institutes such as NBPGR, which anyway spend huge amounts of money for “*ex situ*” conservation of seeds/genetic resources.

Project: Promotion of local medicinal plants in home gardens

Women may be trained in raising local medicinal plants in small scale in their home gardens. They may also be trained in storage methods for such medicinal plants/their products, and in marketing. These gardens could also strengthen traditional health care systems.

Responsibility: NGOs, Departments of Agriculture/Horticulture/Small Scale Industries.

Project: Documenting, conservation, and sustainable use of semi-wild plants of rural landscapes

The village communities have great dependence on local biodiversity of semi-wild and wild plants for food, medicines, dyes, cosmetics and various other needs. Such plants often are under threat due to increasing human impacts. The PBR should account for such utility plants of the village landscapes and plan for their conservation through habitat protection and cultivation as well as record their uses by local people.

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8.2 FOREST BIODIVERSITY

8.2.1 Action plan: Adoption of watershed based approach in forest management

The Indian peninsula is passing through one of the most critical periods as far as water availability is concerned. Forest fragmentation, diversion of the streams, creation of more monoculture plantations, instead of species rich forests, mining etc. have resulted in decline of the water-holding capacity of the forests.

In a watershed based approach, every forest patch may be graded based on its spectral characters in the satellite imageries. The multi-canopied natural evergreen forests have highest water conservation value. Such forests may be earmarked for future protection. All the swamp forests of the Western Ghats have highest water-conservation values and therefore should be accorded top priority. Such swamps like the *Myristica* swamps of Uttara Kannada may be protected with the help of the local village communities.

Multi-strata evergreen forests have to be restored in all potential areas if we desire that the streams and rivers should flow perennially. Also such forests are rich in species, especially endemic species of the Western Ghats.

Project: Conservation of the swamp forests and their surroundings.

A recent study of the *Myristica* swamps of Uttara Kannada reveals that these swamps are highly threatened. These swamps have rare and even hitherto unrecorded species- the endangered tree *Semecarpus kattalekanensis* for instance. The main problem for conservation of these rare forest stands are 1. Ignorance of the biological and ecological value of such forests; 2. The understaffed nature of the Forest Department. As many of the swamps and rare forest stands are in remote areas they are easily encroached upon by the people for conversion into arecanut gardens. These encroachments are detected only after the damages are already done. Local forest committees of villagers have to be formed for protection of such swamps. Local youth may be appointed as watchmen. Rights for harvesting of NTFP from the surrounding forests may be given to the local villagers as an incentive for protecting such rare ecosystems.

The most important swamp forests to be protected alongwith their surrounding forests are

1. Forests of Malemane village (Siddapur Range)

2. Myristica swamps of Hemgar, Kudgund and Hukli villages (Siddapur and Kyadigi ranges)
3. Myristica swamp of Halsolli hamlet in Mahime village (Gersoppa range)
4. Myristica swamps of Harigar and Unchalli villages of Amenalli range.

Responsibility: Forest Department in collaboration with JFM committees, Self Help Groups, or by appointing local youth for monitoring and safe-guarding these swamp forests and other rare forest stands rich in endemics.

Project: Evaluating watershed value of forests using satellite imageries to be supported by ground surveys.

Responsibility: Forest Department in collaboration with scientists/local academic institutions/Centre for Environmental Sciences, IISc.

8.2.2 Action plan: Protection of relics of primary forests

Relics of primary forests are still present in Uttara Kannada, especially towards its south. These can be recognized by the presence of high levels of endemism among the flora and fauna. These forests give rise to more perennial streams than the secondary forests. Examples of such forests are Karikallani Gudda (Siddapur range),

- Relics of primary forests and forests in advanced stages of succession to be identified at the ground level and by using satellite imageries.
- Steps to be taken for maintaining proper connectivity between such forests
- Greater attention to be paid for their protection and prevention from any kind of fragmentation.

8.2.3 Action plan: Forestry to be more people and biodiversity centred, than timber-centred.

Species rich forests of the Western Ghats have great potential to support livelihoods of lakhs of people. Day by day newer materials from forests are finding demand, especially in this age of great advances in medicine and biotechnology. Plants are becoming popular as sources of more and more medicines, natural dyes, biopesticides, cosmetic products, essential oils, biochemicals etc. These are in addition to conventional NTFP such as fruits and seeds, shikakai, dalchini, canes, uppage (*Garcinia gummi-gutta*), honey etc.

Biodiversity conservation cannot succeed by alienating thousands of humans who live dispersed throughout the forest belt of Uttara Kannada. Uttara Kannada forests being rich in diversity, these can be developed into great sources of NTFP.

There is general discontent among the rural people and forest dwellers about the contract system for gathering NTFP. The contractors have no permanent interest in the forest and their method of extraction is destructive. Therefore NTFP management has to be passed into the hands of committees of villagers, where JFM is not existing. Forest Department

and NGOs should be entrusted with the formation of such committees or Self-Help groups.

The Revised Forest Strategy of the World Bank Group, while highlighting the importance of forests in protecting vital local and global environmental services and values provided by forests, emphasizes harnessing the potential of forests to reduce poverty; and integrating forests in sustainable development.

- Forest policies need to be reoriented towards creation and strengthening of rural livelihoods, through NTFP enrichment.
- NTFP management committees to be formed at village/hamlet levels where JFM is not existing.
- Contract system for NTFP gathering is more destructive than earning revenue to the State.
- Forest Range-wise planning to be made and reviewed towards achieving the objectives of NTFP enrichment, enhancement of watershed value and safeguarding the ecology.
- Villagers to be trained in NTFP management and value addition
- Developing direct linkages of the NTFP collector at the grassroots with the end-market necessary so that the profits are not siphoned off by the middlemen.
- As honey from wild plants is in good demand as a nourishing food, and for preparation of medicines, the degraded forests should be planted with nectar producing plants.
- The forest plantations to be critically re-evaluated from their productivity point and ecological values. All poor-grade plantations to be planted up with NTFP plant species of the Western Ghats.
- People's Biodiversity Registers to record the local people's knowledge about forest biodiversity and traditional uses of forests

8.2.4 Action plan : Dispensing with the contract system for NTFP collection

This would involve formation of local level biodiversity management committees as enunciated in the Biodiversity Bill. If JFM committees are already functioning well in such villages, the NTFP gathering may be entrusted to these.

Project: Training of rural people, especially women in value addition to NTFP or utilisation of NTFP for producing goods through cottage/small-scale industries.

Responsibility: Department of Small-Scale Industries, Forest Department.

Training rural women in scientific extraction, processing/manufacturing and marketing of forest-based goods can considerable employment

- Production of cane furniture, bamboo articles
- Honey preservation, bottling and marketing

- Primary processing of medicinal plants, extraction of crude drugs, preparation of finished drugs if simple procedures are involved.
- Production of biopesticides
- Production of natural dyes from plants, which have ever-expanding global market.
- Production of pickles, juices, jams and preserves from the fruits of wild plants
- Extraction, cleaning, packing and marketing of gums, resins, spices etc from the wild

These activities will generate more employment in the rural areas.

Project: Development of direct linkages of NTFP collector with the end-market

The middlemen siphons off bulk of the profits by monopolising the marketing links for NTFP thereby depriving the forest dwellers of fare share, which, otherwise would have been theirs' if direct linkages are developed between the collectors or heir co-operatives and the market.

8.2.5 Action plan: Enrichment of forests in biodiversity to support more number of livelihoods and not through expansion of agriculture.

This will involve:

- Planting up poor grade forest plantations with NTFP species. Such plants while improving the quality of forests will also generate employment through forest based handicrafts, cottage industries etc.
- Creation of a system of small scale nurseries to be run by marginal farmers and tribals
- Plants to be raised in such nurseries should be for (a) NTFP, (b) ecosystem services (water and soil conservation, carbon stocking, protection of local microclimate, rendering fire resistance); (c) food plants for wildlife and (d) endemic species of Western Ghats
- The creation and maintenance of wild-life corridors (migratory paths of wild animals)
- Local people to benefit from religious, cultural, academic and adventure tourism
- The Government to create trade centres for marketing of local arts and crafts, ethnic foods, forest based herbal medicines etc.
- Local youth to be trained as certified guides and resource persons for eco/ academic and cultural tourism
- Manpower need to be created for waste management in tourist areas within forests
- Creation of specially maintained "honey forests" in the vicinity of every village, where plant species known to promote honey production to be raised.
- Bamboo craftsmen of Uttara Kannada to be encouraged and be provided with bamboo at nominal rates.
- Movement of bamboo out of the district may be restricted but all kinds of bamboo items produced by cottage industries may allowed to be transported to markets outside
- Creation of taluk-wise butterfly parks will promote both biodiversity and education

8.2.6 Action plan: Declaration of forest patches of biodiversity significance as “Heritage Sites.”

The Biodiversity Act, 2002 empowers the State Government, from time to time in consultation with local bodies, notify in the Official Gazette, areas of biodiversity importance as biodiversity heritage sites.

The State Government may frame rules for management of such heritage sites in consultation with the Central Government.

Some of the forest sites of biodiversity importance worthy of bringing under the heritage site category are:

1. Karikanamman forest in Honavar taluk- (for Dipterocarpus; also a sacred forest)
2. Katlekan forest in Siddapur taluk (For Dipterocarpus, Myristica swamps, Lion-tailed macaque etc.)
3. Myristica swamp and its surroundings in Mahime village in Honavar taluk
4. Yana forest, for its biodiversity and watershed value, cultural importance.
5. All forests of watershed value to be designated as heritage sites in consultation with local bodies.

8.2.7 Action plan: Protection of riparian forests

These forests are extremely important in biodiversity, nutrient supply to the river, protection of rivers from siltation and proper flow of streams into the river. The forests on the banks of all the rivers to be protected from any further development pressures.

8.2.8 Action plan: Strategy for fire management in forests

Effective fire management cannot take place without people’s co-operation. Forests in dry belt cannot be protected from fires for years together, as the fire danger increases from accumulation of dry biomass. The fire itself has a place in forest management. Therefore the fire management strategy may be flexible:

- Fire management strategy to be implemented village-wise only in consultation with the JFM, village panchayat etc.
- Fire management has to be in mosaic of patches so as to avoid the risk of forests bursting into flames at one time.
- Semi-evergreen ground vegetation to be promoted wherever possible
- Greater watershed protection in fire prone forests
- Selective removal of dry biomass by villagers to be permitted from locally designated areas where fire risk exists.

8.2.9 Action plan: Measures for wildlife protection

- Habitat and microhabitat types of all forms of wildlife to be identified and protected.

- Eco-clubs/village wildlife protection committees to be formed in forest villages to monitor ecosystems, to create awareness
- Local Biodiversity Management Committees and Local Biodiversity Funds (under the provisions of the Biological Diversity Act, 2002, to promote eco-clubs, wildlife protection committees
- Ponds in forest areas to be de-silted and fish farming promoted under the various schemes so that more protein food is available to the people
- Markets for sea-fish selling suggested as an ameliorative measure
- Raising and protection of food plants for wildlife in forest blanks as well as in areas dominated by monocultures to be given due importance.
- Maintenance and creation of wildlife corridors, including micro-corridors to be considered.
- Encroachers who belong to otherwise landless categories and who have blocked important wildlife corridors may be rehabilitated elsewhere.

Project: Creation of butterfly parks within every vegetational zone

This could be an important activity to be sponsored within every vegetational zone of the district. Such activity will be of high educative value, will enhance tourism potential, will generate knowledge on kind of plants to be grown for promoting various kinds of butterflies. The butterfly parks to generate adequate revenue for their maintenance as well as generate rural employment.

8.2.10 Action plan: Conservation of wild relatives of cultivated plants

Such plants are part of the ‘gene bank’ of crop plants. Uttara Kannada forests are rich in the wild relatives several cultivated plants such as mango, jackfruit, Garcinia, Nellikai (goose-berry), nutmeg, pulses, ginger, cinnamon, turmeric, pepper, bitter-gourd (hagalakai), snake-gourd (patalekai), brinjals, grapes etc. Forests having good population of such wild relatives to be given special place in conservation.

8.2.11 Action plan: Protection of forests from increased tourism

The increased tourism within forest areas have adverse effect on fragile ecosystems, eg Yana and Uluvi forests.

- Carrying plastic bags, littering forests with plastics, paper or other refuse to be banned. Successful protection of mountain ecosystems from trash, found in Eravikulam National Park to be emulated.
- Forest trails to be periodically cleaned off trash by volunteers. Such a policy has been developed in Matheran (Maharashtra) by the Municipal Corporation
- Nature clubs to be formed in tourism villages
- Tourist education bureaus to be set up in tourist areas.

8.2.12 Action plan: Anshi to be part of the proposed Sahyadri Ecologically Sensitive Area (SESA)

Anshi Ghat is in the process of getting converted into a National Park. This could uproot hundreds of forest dwelling families, who have been living there through generations. Instead it has been suggested that the Anshi be part of the proposed Sahyadri Ecologically Sensitive Area (SESA). The services of the people can be enlisted in conservation and sustainable use programmes.

8.3 COASTAL AND MARINE ECOSYSTEMS

The State ministry for fisheries has to be more broad-based as Ministry for Fisheries and Coastal and Marine Resources Management. Socio-economic studies necessary to document the problems faced by traditional fishing communities. Various interventions into the life and activities of traditional fishing communities have affected their livelihoods. The State has to evolve policies to help the fishing communities to restore their livelihoods.

8.3.1 Action plan: Mangrove planting and protection

Mangroves swamps are among the several specialised tropical marine ecosystems, where biological productivity is exceptionally high. The mangroves stabilise the shoreline and prevent shore erosion. The detritus from mangroves feeds as well as provides nursery grounds for the young of shrimps and fishes. These shrimps and fishes migrate into the mangrove marshes for food and shelter. Therefore mangroves sustain coastal fisheries. In most countries of south and south-east Asia, mangrove swamps are routinely used for aquaculture. Mangroves are also valued for their timber, tannin, firewood, paper-pulp (Untawale and Wafar, 1986).

Widespread planting of mangroves can protect the river banks from erosion, the rivers from flooding as well as compensate for the loss of nutrient input into the estuaries from the Western Ghat forests due to construction of dams. Through contributing detritus the mangroves can enrich the production of shell fish and thereby increase women's employment and take care of nutritional needs of especially poor families. Mangroves also attract resident and migratory birds which enrich biodiversity and offer ecotourism potential.

- Coastal panchayats to be allowed funds for mangrove planting. Incentives to be given to panchayats and other local bodies, village self-help groups and cooperatives of estuarine farmers for raising and maintaining mangrove forests.
- The services of estuarine farmers like the Patgars to be taken for raising mangroves in the backwaters.
- Involve traditional fishermen of backwater villages, whose livelihoods have been affected by commercial shrimp farming, in mangrove regeneration and protection.
- Top priority to be given for raising mangroves by the Forest Department
- Scheme to be prepared for rehabilitation of abandoned prawn farms with mangroves so that their ecology is restored and they are made suitable for natural method of fish farming and raising of Kagga rice.

- The gajni areas in Kumta to the tune of 1800 acres used by the Ballarpur Industries, Binaga for salt production, and abandoned subsequently, may be reconverted into mangroves. This will enrich the coastal ecosystems substantially.
- The owners of fallow estuarine lands to be extended assistance for mangrove planting. Scheme to be evolved for planting potential mangrove areas and degraded mangrove areas within CRZ to be planted with mangroves. The scheme to cover both private and state owned lands.

8.3.2 Action plan: Regulation of marine fishing to sustainable limits

- The domination of fishing sector by outside commercial sectors to be brought under check.
- Finances for fishing related enterprises to be given to traditional fishing communities only.
- Mesh regulations for all kinds of fishing nets to be strictly enforced.
- The imposition of closed fishing period during the monsoon, when most of the fish breed, to be uniformly followed by all the coastal states. This needs a Central Government agency to monitor. It has been suggested that a Central Ministry on Marine and Coastal Resources is desirable.
- No collaborative ventures for bottom trawling in Indian territorial waters to be allowed on the grounds that such trawling is very destructive of the marine ecosystems.
- The use of any kind of large-scale trawl nets needs to be re-examined to minimise the incidental catches and other damages to the ecosystems.
- Licensing of more number of trawlers, and purse-seines and other mechanized boats to be stopped in the entire coastal Karnataka, for the next 10 years, until the fish stocks recover.

8.3.3 Action plan: Safeguarding the livelihood security of the artisan fisheries

- The near-shore waters, to a specified distance, to be reserved for fishing by artisan fishermen only, who use Rampani nets, caste nets, hooks, canoes and other non-mechanized crafts.
- The artisan fishermen may be exempted from the fishing ban imposed during the monsoon season.
- The Coast Guard may be deployed to carry out such regulations.

8.3.4 Action plan: Aghanashini river estuary to be considered as Ecologically Sensitive Area

- Today, despite rising human disturbances in its estuaries, Aghanashini is by far the richest of the west coast rivers in terms of its biodiversity and productivity.
- The river supports livelihoods of thousands of families of fishermen, shell-fish and shell gatherers, salt makers, farmers, water transporters, and so on.
- The river is very rich in shell-fish the collection and sale of which employs thousands of women.

- Primary productivity in the river is stated to be high
- An estimated 135 species of birds are associated with the river estuary.
- An independent estimate says it produces annually about Rs.40 crores worth of fish and shell fish alone (in addition to income from agriculture it supports, salt making, Aquafarms etc.).
- It is to be ensured, however, that the declaration of the river/estuary as ESA does not affect the traditional livelihood activities of the coastal farmers and fishing communities.

8.3.5 Action plan: Restrictions on prawn catching during breeding period

Paeneus indicus –white shrimp- breeds during December to May, *P. monodon* –tiger prawn- breeds during May to October, in bar mouths, estuaries and backwaters. A ban on catching of the above species during the breeding periods has been recommended.

8.3.6 Action plan: Pollution control in the prawn farms

The Supreme Court norms for shrimp farmers are to be strictly implemented. The stocking levels in the shrimp farms are to be monitored and certified periodically. The shrimps are to be grown only by using biodegradable feeds, manure and disinfectants.

8.3.7 Action plan: Periodical ban on the catch and sale of over-exploited fish species.

The fishermen to be periodically informed about the details regarding fishing restrictions. The Fisheries Department to take the responsibility and impose the regulations from time to time.

8.3.8 Action plan: Education programme on sustainable use of fish resources

Fisheries Department, CMFRI, NGOs to undertake the task.

8.3.9 Action plan: Welfare measures for fishing community women

- Creation of increased livelihood opportunities for women very important. By restoration of natural coastal ecosystems women's employment and family financial security can be strengthened. Lots of women have been displaced from their traditional fishery related occupations due to over-fishing, the entry of commercial sector in fishing, fish processing and transport, and aquaculture in the backwaters by prawn contractors, destruction of mangroves, and probably due to the adverse impacts of shell and sand mining in the coastal rivers. Salting, drying and selling of dry fish used to be a major occupation of fisher-women of the coast. They are helpless today in not getting enough quantity of fish for drying because fresh fish is purchased in bulk by ice factories. Since female unemployment is highest in the estuarine areas, as a result of contract system and aquaculture, these women need greater attention so that they can take better care of their families.

- Certain share of the fish catch should be allotted to fisher-women's cooperatives for drying purpose. All the important fish-landing centres should be equipped with centralised fish drying facility.
- Farming of ornamental fishes and aquarium making and servicing.
- Promotion of cottage industries using sea-weeds (in production of agar, algin, pickles, jellies, base for medicines etc)
- Promotion of fisher-women's co-operatives is very essential
- Panchayat-wise yards for preparing dry fish

8.3.10 Action plan: Identify breeding grounds and other sensitive localities of fish and other marine species, and declare such areas as protected from exploitation.

- CRZ regulations state areas of fish breeding and mangroves are to be treated as CRZ I. However no such areas are so far identified.

8.3.11 Action plan: Protection of ecology of sea beaches

- Construction of seawalls to protect sea erosion should be done with the permission of CRZ authority, and only after Environmental Impact Assessment.
- Sea beaches to be re-vegetated on a war footing:
 - a. To protect them from erosion
 - b. To enhance natural beauty and tourism value
 - c. To enhance ecosystem value- shelter for coastal birds, enrichment of inter-tidal fauna, nutrient supply to the coastal waters.
 - d. To yield economically important products to the village communities:
 - Honge (*Pongamia pinnata*): Oil as bio-fuel
 - Honne (*Calophyllum inophyllum*): Oil for medicine, soaps, lighting
 - Ketike (*Pandanus* spp): Leaves for baskets, mats, fancy articles; flowers for sale, perfumes
 - Hoovarasu (*Thespesia populnea*): Medicinal
 - Salvadora oleoides*: Medicinal
- Preservation of the naturalness of pristine beaches

Coastal Uttara Kannada, despite developmental pressures, and rising human population has some of the pristine beaches of the west-coast. The pristineness of such beaches need to be safeguarded. The notable beaches are Mundalli (2 km south of Bhatkal), rocky beach of south Dhareshwar (Kumta taluk) and Managuni and Honebail (Ankola taluk).

The following measures are suggested for their conservation:

1. CRZ regulations to be followed strictly
2. No tourism project to come up in the vicinity of these beaches
3. Vegetation need to be preserved without disturbance

4. Night camping by tourists not to be permitted.
5. Nature clubs may be promoted in the respective beaches for vigilance
6. Activities such as educational tourism and trekking may be promoted

8.3.12 Action plan: Promotion of eco-tourism in beaches

The development of eco-tourism and protection of ecology have to go hand in hand. Ecotourism development to benefit local villagers and to improve the ecology of beaches. The beaches having the potential for eco-tourism development are: Shirali and Bailur (Bhatkal taluk), the beaches of Dhareshwar north, Kumta, Gudeangidi and Gangavali (Kumta taluk). The activities necessary for promotion of ecotourism are:

- Beautification of beaches by raising natural vegetation of native trees, bushes, creepers and herbs.
- Promotion of sand-dune formation
- Periodic cleaning up of plastic and trash
- Providing water and toilet facilities in the houses of poorer people
- Assistance to the local bodies for appointment of beach maintenance staff (to be chosen from among the local villagers).
- Tourism Department may provide assistance for eco-tourism development which should avoid any construction activities on beaches.

8.3.13 Action plan: The question of shell mining and sand mining in the coastal rivers and estuaries to be re-examined and subjected to fresh EIA studies.

Both the activities are presently not covered by CRZ regulations

8.3.14 Action plan: Involvement of Indian Navy and Coast Guard in environmental protection

- The Navy to raise natural vegetation in the Project Seabird area and in the islands such as Anjidiv.
- Caution to be exercised to protect sensitive island ecosystems such as at Netrani island in Bhatkal reported to be affected by naval exercises, firing etc.

8.3.15 Action plan: Regular monitoring, reporting and controlling of pollution levels

- Dumping of city wastes in the coastal estuaries are great threats to their ecology and human health
- Pollution from various chemicals, oil spills, heavy metals, radio-active materials, domestic and municipal waste, bacterial contamination etc. to be routinely monitored and the results to be brought out for public benefit in monthly bulletins.
- The local bodies to strictly enforce pollution control measures for the sea and coastal waters. They should have stream-lined waste disposal measures.

8.3.16 Action plan: Inventorying Coastal and Marine Biodiversity

This task is to be carried out primarily by academic/research agencies such as the Post-graduate Centre for Marine Biology at Karwar, in collaboration with Botanical and Zoological Surveys, Fisheries College, Mangalore, Fisheries Department, CMFRI Cochin, Forest Department (to look into aspects of mangroves and sea-shore vegetation). Local educational institutions could collaborate. Folk knowledge on coastal biodiversity and its conservation aspects uses has to be a part of the database. The database has to be part of the District Biodiversity Centre.

Project 1: Compilation of Community Based Inventories

The traditional fishing communities are a repository of great amount of traditional knowledge, which needs to be promoted.

- Involving schools and colleges, local knowledgeable individuals, community leaders, Linked to an on-going monitoring programme coordinated by the District Biodiversity Centre
- Folk knowledge on marine currents, climatological phenomenon, fish movements, fishing boats and gear to be compiled
- Documentation of folk knowledge on medicinal and nutritional values of fishes
- Educated youth of fishing community to be associated with the work

Coordination: District Biodiversity Centre

Expected outputs: Preservation of folk knowledge on biodiversity, its uses, traditional management, knowledge on various phenomena associated with ocean and the sea coast

Project 2: Museum on Community Fisheries

Great amount of ignorance on coastal fisheries exists presently. Traditional knowledge on fisheries also is fading away with use of modern gadgets. A museum on fisheries may be established in Uttara Kannada to display all aspects of traditional fisheries. This museum should be mostly manned by fisherfolks, including fisher-women. All fishes and shell-fishes and other organisms known to the community, traditional fishing gadgets, lifestyles and culture, and other aspects related to lives of various fishing communities may be displayed in the museum.

Agencies to involve/execute: Fisheries Department, Educational institutions, Departments of Kannada and Culture, Tourism, District Biodiversity Centre

Funding: Independent corpus funds; self-generated revenue

Expected outputs/benefits: Preservation of folk heritage, employment for fisher-folks, a place to display their traditional knowledge, skills, arts and crafts.

8.3.17 Action plan: Protect ecology of all the coastal rivers and their estuaries

These rivers and their estuaries are lifelines of densely populated coastal villages. They safeguard the livelihoods of thousands of families without any capital investment from humans. Therefore tampering excessively with the fragility of these systems can upset the welfare of the bulk of the humans on the coast in addition to adversities on biodiversity. Even tampering with the forests of the Western Ghats and damming of the rivers can have far reaching adverse consequences on the river ecology. Projects on diversion of river waters or the linking of Western Ghat rivers should not be undertaken hastily without estimating their impact on coastal ecology and livelihoods.

8.4 GENERAL ISSUES

8.4.1 Action plan: Formation of a Biodiversity Centre/Board for Uttara Kannada

- To inventorise biodiversity based on all the studies so far made
- To find out the gaps and coordinate research necessary to fill the gaps
- To furnish biodiversity related information to the various departments and to provide a common forum for discussion on biodiversity related matters
- To examine all issues/programmes having implications on biodiversity and to render necessary advise to the district administration
- To coordinate the preparation of People's Biodiversity Registers
- To arrange for training programmes to the local Biodiversity Management Committees.
- To be a repository of Community based Biodiversity Inventories. Since in these inventories are to be recorded the village level biodiversity and folk knowledge relating to them, they will prevent unscrupulous exploitation of folk knowledge for commercial gains by outsiders and will in due course ensure equitable sharing of resources. These inventories could as well strengthen the people's cases for safeguarding their traditional knowledge, resource areas such as estuaries, NTFP rich forests, local cultivars of diverse crop plants etc.
- The centre to identify individuals and communities as well as institutions engaged in in situ/ex-situ conservation works, and work out a system of incentives to reward such efforts on a need-based approach. The centre to also bring to the notice of the district administration the misuse of biodiversity or matters which bring about degradation of ecosystems and species.
- Need to ensure that biodiversity conservation and sustainable use enhance the quality of women and weaker segments of the population
- Capacity building among school and college teachers to monitor biodiversity. Local knowledgeable individuals to play key role.
- To prepare management plans for village landscapes. Villages to be seen as landscapes of diverse elements such as forests, scrub, grassland, streams/river, ponds etc. The dynamics of the village as an ecosystem to be assessed, corridors to be devised between major natural landscape elements, so as to facilitate movement of species.

Constitution: A scientist to coordinate; Deputy Commissioner as chairman; a body of scientists as regular members and officers from biodiversity managing departments as ex-officio members. Representation from NGO as well as women,

8.4.2 Action plan: Making people partners in conservation

In Uttara Kannada people and forests have been in constant interaction through ages. Traditional village societies did maintain biodiversity rich surroundings. The forests abounded in timbers and bamboo and wildlife was plentiful almost to the close of the 19th century. Whether it be conservation of forests and wildlife, domesticated biodiversity or conservation of sacred groves, people's participation is necessary, as is also envisaged in the Biodiversity Bill, 2002.

8.4.3 Action plan: Ensuring livelihood security through biodiversity enrichment and sustainable use

- Youth to be trained as tourist guides, caterers, as field experts for taking guided tours
- Youth to be trained in dealing with cultural heritage of the district so as to offer guidance to pilgrims, scholars and enthusiasts of arts and crafts who come from different parts of the world, but do not get the necessary guidance.
- Local youth may be trained to run museums, arboretum, botanical gardens
- Growing of medicinal plants, value addition and marketing
- Promotion of ethnic foods
- Promotion of health tourism- through recognition of local health traditions, setting up of health resorts- to be run by trained local people.
- People to be trained in waste management

8.4.4 Action plan: Creation of village fodder farms to be run by local people, on self-sustaining basis, in selected villages of every Panchayat

- To safeguard forest ecosystems from cattle damages as well as to enhance cattle productivity
- To protect cattle from eating plastic, trash and toxic substances
- To promote organic farming
- To increase livelihood security in villages
- To protect soil and water resources by providing adequate ground cover

8.4.5 Action plan: Pollution monitoring and control centre for Uttara Kannada

The district is full of fragile ecosystems, yet there is no strategy for promotion of organic agriculture. Waste disposal and sanitation methods in the towns and villages are very poor, posing health hazards to the people and adversely affecting biodiversity.

- Regular pollution monitoring of water bodies, agricultural, fisheries and dairy products essential. The results of the analysis to be published for public guidance. (The recent publicity given to the poor quality of bottled drinking water from well

known companies, due to pesticide and bacterial contamination, has benefited the public immensely).

- Pollution data to help the district administration in taking appropriate decisions for mitigation
- Local bodies to have streamlined waste disposal methods- recycling, incineration, conversion into manures etc.
- Pollution monitoring cells to be established in local educational institutions.
- Civic bodies to have committees to deal with pollution. The committees to take up pollution matters with their respective civic bodies/Pollution Control Board/District CRZ authority etc.

Responsibility: Pollution Control Board

8.4.6 Action plan: Popularisation of ex-situ conservation measures

- Schemes for development of botanical gardens/ arboreta/ fruit tree orchards in the campuses of academic institutions
- Strengthening organically grown traditional crops, so that along with conservation traditional crops will be conserved
- Designing vegetation of parks, roadsides, and public places in such a way that suitable endemic species, NTFP plants, and plants which render ecosystem services to be promoted.
- Promotion of gardens of indigenous medicinal plants involving villagers, forest dwellers and women
- Restoring the ecology of the degraded bettalands

8.4.7 Action plan: Human resources development for biodiversity management

- Training of schools and college teachers
- Capacity building for village communities and stakeholders
- Formation of eco-clubs/nature clubs in schools and colleges (KSCST already taking lead in this regard. The efforts need to be promoted).

8.4.8 Action plan: Conservation of the endemic fishes of Uttara Kannada rivers.

At least 44 species of fresh water fishes of Uttara Kannada rivers are endemic to Western Ghats/South India. The damming of rivers, diversion of streams for agriculture, uses of explosives for catching fishes have adverse effects on fresh water fishes.

- Periodical status reports on fresh water fishes to be published
- Use of explosives for fishing to be banned

8.4.9 Action plan: Employment generation through eco-tourism

Tourism can generate employment all over the district, because Uttara Kannada is immensely blessed with natural beauty. Eco-tourism can bring greater livelihood security

to large number of people; but care should be taken to see that tourism is through conservation of natural landscapes, without endangering biodiversity. Eco-tourism policy should be of such nature so as to involve local people in larger number- and not to be monopolised by few.

A master-plan to be prepared for promotion of ecotourism. It involves:

- Identifying the tourist spots of scientific, educational cultural and religious importance.
- Generate employment for local people, especially village communities, whose very survival depend on the health of the ecosystems in their vicinity.
- Generate employment for women, their arts and crafts
- Promotion of ethnic foods
- Enrichment of watershed through natural methods
- Carrying capacity estimates of tourist spots
- Development of eco-friendly infra-structure
- Generate income for maintenance of natural areas through tourism promotion
- Training of local youth as tourist guides
- Steps to be evolved for making tourism spots garbage free
- Sensitive ecosystems to be kept closed to tourism.
- Drive to collect plastics and other garbage to be intensified. The local bodies, such as village panchayats, or self help groups to be rewarded by the tourism department for keeping the hygiene.

Tourism Department to arrange for

Note: Appropriate action plans and projects to be prepared in consultation with the government departments, academic institutions and people.