

CHAPTER 8
CONCLUSION

SECTION-I

SUMMARY AND FINDINGS

The study constitutes of eight chapters in all relating to a holistic assessment of the human ecology of the study area. Care has been taken to maintain a reasonable sequence in organizing the chapters. The study begins with the introductory chapter that encompasses a brief description of the problem in the context of human intervention into the natural environment. The chapter also includes aim and objectives of the study, hypothesis, methodology, chapterisation and brief review of the related literature.

Chapter 2 deals with the geographical setting of the region. The first part covers the details of physical geography of the areas under investigation i.e. the Upper Rangit Basin, and is followed by the second part that highlights the human geographical mosaic of the entire Sikkim state. The main findings could be summarized as follows: -

1. Entire Sikkim state forms the catchment of river Tista. River Rangit is major tributary that originates from Kanchendzonga massif and flows through West and South Sikkim, uniting with Tista at Melli confluence point.
2. The confluence of Rathong chu and Rangit chu, 3 kms upstream from Legship forms the Rangit River. The catchment area North of Legship comes within the confines of the Upper Rangit Basin, and to the South, the lower basin. The Kanchendzonga Massif to the North, and the Singalila and Mainam-Tendong ranges to the West and East further define the study area. The Upper Rangit Basin covers an area of 979.02 sq kms.
3. Elevation ranges from 600 m at Legship to 7338m at the highest point within the catchment. Average rainfall is over 2620 mm annually.
4. 38.96% area within the catchment has a dense forest cover. In the lower regions agricultural lands predominate and the dense forests are found in fragmented pockets. Agriculture activity is limited to altitudes below 3000m, covering 160.88 sq km contributing to 16.44% of total catchment. The upper regions of Alpine pastures and scrub land contributes to 117.72 sq kms, beyond which is the zone of permanent snow.

5. Geologically, the basin comes under pre cambrian rocks belonging to Khanchendzonga group within Chungthang formation group. Daling phyllites are prone to landslides.

6. Sikkim has three main ethnic groups viz the Lepchas who are known to be original inhabitants, the Bhutias originating from Tibet and Bhutan, and the Nepalis. Ther Kirata groups dominate the population in the Basin living side by side with Bhutias, Lepchas and the other Nepali groups. The *lingua-franca* of the inhabitants is Nepali, though the various ethnic groups in the region have their own dialects.

7. Although a changing life style particularly in dress is observed among the people, never the less the traditional dresses predominate in the rural pockets. Different ethnic groups have different dressing patterns for men and women. Bhutia married women wear a striped apron (*pangden*) to define their marital status. Nepali men may be recognized by their typical caps (*birkhe topi*).

8. Wearing of jewellery is common and is traditional. The Bhutia women follow the Tibetan pattern, while the Nepali women follow the traditional Hindu pattern. Ear rings, bracelets, necklaces, nose rings and brooches in respective ethnic styles are worn by women.

9. Rice is the staple food, and 'chhang' and 'raksi' the traditional alcoholic beverages. Bhutias prefer the salted butter tea, and other fermented and non-fermented food items of Tibetan origin. Bhutias and Lepchas prefer beef. However, the Nepalis do not take beef on grounds of religion. '*Dal-bhat-tarkari-achar*' is the staple Nepali diet.

10. Bhutia's and Lepcha's houses follow a two-storeyed rectangular pattern, where ground floor is mainly used for domestic animals. Split bamboo, thatching and stone masonry are all used. Nepalis have separate shelters for cattle. Concrete buildings are gradually coming up and seen to be preferred by almost all ethnic groups in the region as modernity is fast penetrating into the rural country side.

11. Festivals are religion based, though all ethnic groups participate in festivities of each other. Tamangs celebrate both, Hindu and Buddhist festivals. Losar, Bumchu, Sagadawa, Tihar and Dasain are celebrated with religious fervour. Mt Khanchendzonga, the guardian deity is worshipped during Pang-Lhabsol.

12. Development activities are a part of the five year plans. Agriculture is the mainstay of economy. Rice, ginger and cardamom are the main crops grown in the region followed by maize. Horticulture is quite popular. Oranges, banana and apples are grown in large scale. Most industries are either of small scale or medium scale.

The mountainous terrain and high precipitation typify the physical features and climate. The existence of large number of water channels facilitate construction of mini to medium sized hydel projects. This has resulted in erecting of the Rangit Hydel Project. Electricity is available in almost all houses. The dense forests, rich in biodiversity lend themselves to traditional ethnobotanical practices, especially pertaining to arts and crafts, and to medicinal plants.

Soil in the region is rich in nutrients and the availability of rich bio-mass reduces dependence on chemical fertilizers which is a healthy sign. The loose soil on the slopes leads to frequent lands slides, and avalanches in the higher regions. Watershed soil treatment plans therefore need to be given a high priority.

The literacy rate, especially of the girl students needs a deliberate insight. PHCs, though they have requisite medical stores, hygiene and sanitation is below par. Availability and presence of trained medical doctors and nurses have to be ensured.

Quality of life overall is reasonably satisfactory, and will improve through education, and maintenance of traditional cultural and ecological knowledge.

Chapter 3 encompasses study of various aspects of religion which is an integral part of culture. It involves a set of beliefs and practices, which has given rise to a social system through which the people seek spiritual and physical harmony with nature, life and death. A summary of spiritual life, and its essential attributes to local culture within the realms of human ecology is elucidated below :-

1. Hinduism and Buddhism, both interlaced with animist spiritualism are the main religious traditions in Upper Rangit Basin.
2. Sikkim was under the rule of Chogyals until 1975, when Buddhism was the declared state religion. Though followers of Hindu faith are numerically larger, the state character is mainly Buddhist, which is evident from the number of monasteries, the architectural designs and the general way of life. The reservation of one seat for 'Sangha' in the state council further emphasizes the point.

3. The lama's word is taken as law by the inhabitants. The involvement of the lamas is found in all actions and activities including the rites during births, marriage, death, agricultural sowing and harvesting, and celebrations of festivals.
4. The Upper Rangit Basin is although a small geographical area of less than 1000 sq kms, it contains the oldest and most important monasteries from all sects (except Sakyapa Sect) including a Bon monastery. Hindu temples, though smaller in size, and located at less prominent places, exist in all villages and towns.
5. The sites of monasteries is selected with great care, with due considerations to auguries and omens. The ground configuration and soil study are carried out prior to erection of structures. Similar considerations are followed for erecting *chortens*.
6. All monasterie's entrances face East wards, while the altars are at the Western ends.
7. The government buildings and houses of prominent citizens have adopted many features of the monastic architectural designs, especially with respect to roofs, doors and windows, and the beams and pillars.
8. The prayer wheels and prayer flags are an integral part of monasteries, important buildings and all other habitats. Holy messages inscribed on the flags are believed to bring good luck and harmony.
9. The *chortens* contain and preserve relics and bodily remains to *tathagatas*, saints and high lamas.
10. Historically, the symbolism and concept of *chortens* can be related to the Buddhist stupas found in India and Nepal.
11. Psychic forces, spirituality and all elements of nature, i.e. land, water, air, fire, the solar system and the universe are depicted in the architectural designs of *chortens*.
12. Although, in all there are eight varieties of *chortens*, in the study area three kinds of *chortens* are generally found. All eight types of *chortens* have different structural designs. The eight types are related to enlightenment, heaped lotuses, multiple auspicious doors, great miracle, descent from heaven, reconciliation, victory and nirvana. At Tashiding the *chortens* of enlightenment, reconciliation and great miracle types are erected.

The Mahayana Buddhist and Hindu philosophies followed in the study area offer much to ponder on the spiritual and metaphysical connections between human and

nature. The Buddhist relational ethics teach that moral actions are those, which are informed, sensitive to and respectful of all beings. In both, Hinduism and Buddhism, violence to other beings within the biotic community is immoral. The 'eight fold path' of Buddhism is biocentric to the core.

All monumental structures, and the designs and symbols within them are related to biotic life and abiotic environment. Species of the avians, wild fauna and domesticated animal life are revered, and find appropriate place in murals and gompa paintings.

The *chortens* rever the lives and works of great saints and high lamas. Since the various elements of nature are depicted in the *chorten* architecture, they teach that we are born from nature, we live in nature, and after death we got rediffused with nature-only to be born again as part of the nature.

This thinking has given rise to a practice of deep ecology in the study area. Nature must be continued to be nurtured, and the concept of biocentrism through spirituality must continue to be the driving force with the inhabitants of the region.

Chapter 4 deals with the cultural ecology of the study area, which is pronounced by conservation through traditional ecological knowledge of the local inhabitants. Their life styles have also been affected by isolatory geographical setting, the composition and diffusion of ethnic groups and also the historical inputs. The main findings of the chapter could be summarized as follows :-

1. The Upper Rangit Basin, where agro-economy and spirituality are more pronounced due to its geographical isolation, was the centre of cultural and political activities till the late eighteenth century, when the capital of Sikkim was shifted from Rabdentse to Tumlong as a consequence of military invasion by Nepal.
2. Through centuries of togetherness, cultural diffusion gathered momentum in almost all disciplines of life including language, methods of praying, hoisting of prayer flags, celebrations of festivals and methodology of food preparation.
3. The present day ethnic culture is pronounced by folklores, shamans and spirit possession. The folklores relating to beliefs, superstitions and customs have been handed over from generation to generation.
4. People of higher income groups and higher levels of education continue to be conservative at heart. The middle class is comparatively less conservative and have

accepted Indian and Western cultures along with their virtues and vices. The poorer lot follow their age old traditions.

5. The traditional ecological knowledge of the local inhabitants is qualitative as opposed to quantitative; intuitive; holistic as opposed to reductionist; moral and spiritualistic as opposed to value-free and mechanistic; is based on centuries old empirical observations as opposed to experimentation; and based on collection of long time information on one locality as opposed to short time- series over large areas.

6. Most rivers, lakes and mountain tops are considered to have spiritual relationships, and therefore considered holy. People believe in divine power in lakes and mountains to release them from distress.

7. Invasive aspects of modern culture, especially use of pollution creating use of polythene, and spread of vegetable dehydrated oils have slowly infiltrated into simple minds of the local folk.

8. All ethnic groups *viz* Limbus, Sunuwars, Rais, Tamangs, Bhutias, Sherpas, Kamis and Lepchas have their respective shamanic practices. Most Hindu shamans belong to lower economical and caste status. The shamans are part time professionals as opposed to religious priests. Folk tales on shamans abound.

The practice of shamanism is understandable to the extent of faith healing. Beyond these, people need to be educated towards health, hygiene and faith in modern medical treatment practices.

Knowledge pertaining to traditional ecological know- how must be encouraged, as it helps in conservation of all the natural resources and forests.

The Upper Rangit Basin is a nature's paradise. Festivals such as Bum-chu and others are of a great importance in social life. But the fact that pilgrims attending the festivals cause acceleration of ecological degradation needs to be checked firmly through educational and physical controls.

Afforestation of degraded areas needs immediate attention. Disturbance of avian and land fauna needs to be checked through education and awareness programmes in the region.

From the point of view of human ecology a symbiotic relationship between ethnic groups and religious groups is found positive, and typical of itself in the study area. It is

interesting to note that there is an interrelationship between the local inhabitants and their Gods and Goddesses in nature. The visitors to this mountainous enclave also need to be educated on the value based systems of this local culture, so that invasive degeneration does not seep in.

Chapter 5 presents a comprehensive account of applied ethnobotany of the region. The chapter focuses on the availability and uses of plant life, and the intensity of interrelationship between botanical life and the humans. Summary of findings and the discussion on various ethnobotanical related aspects is given below. The findings could be summarized as follows :-

1. The fertile mountainous enclave, in the study area is a rich source of a variety of plant species. The home gardens, folk markets, various agro produces, dietary habits of the people and non-timber use of forest products all in unison give an expression of applied ethnobotany in the region.
2. Home gardens are common to almost entire rural habitat within the study area. Vegetables, tubers, fruits, bamboo varieties, fodder grass and fodder trees are the main constituents of the home gardens. Varieties of all kharif, rabi and off-season vegetables are grown. Variety of factors affecting diversity include financial position of owners, ground size, configuration and gradient, soil quality and the market prices of the commodities.
3. The home gardens serve both, socio-economic as well as social aspects. Socio-economic aspects include functions, role of women, cultural ethos and the calendar of activities. Ecological aspects pertain to indigenous knowledge, plant community structure, agro-ecosystems, indicator species, productivity and population interactions.
4. Local weekly folk markets display a commodities diversity of a variety of plants, animals and other products of biological origin. Plant products are either harvested from home gardens or collected from wild. Most vendors are women. Men do the species collection work from the forests.
5. Large variety of indigenous fermented foods and beverages are prepared and consumed in Sikkim. These include Kinema, gundruk, sinki, selroti, chhurpi, mesu etc. Marchaa, chhang and raksi are common fermented beverages. Original Tibetans living in higher reaches in Dzongri and Tsoka consume items like momo, thukpa, phing etc.

6. ‘Minor forest produce’ division of forest department operates five trial plots of medicinal plants in the study area. Variety of species of the medicinal plants grow in the wild, especially around Yuksom. Nepali ethnic practices on medicinal plants pertains to ‘jari-butí’ system. The Nepali system is deeply seated in antiquity, but is very thinly documented.

7. Spirituality is the mainstay of Tibetan medicine. Tibetan medicines use a mix of plant recipes for prescription, which is either taken in powder form or small rounded tablet form.

8. Non-timber forest produce finds its uses for people’s requirements of food, fuel, fibre and medicines. The major species available may be classified under the heads viz bamboos, fodder grasses, fruits, decoratives, mushrooms, yams and fibres.

The home gardens and the ethnic folk markets act as subsistence economy for the weaker sections amongst farmers. Education, awareness and better transportational facilities will help fetch the home garden produce within manageable time to the local markets.

Research work on seed-genetics, and plant stratification in home gardens will help better mapping, planning and production.

Indigenous maintenance of the wild resources of vegetation must be encouraged, as it helps in ‘conservation’. By identifying ecologically adaptive aspects of resource management, ethnobotanists contribute to the development of resource-conservative, sustained-yield agro-ecosystems.

As regards medicinal plants, the aboriginal knowledge is finding a useful mix with modern medicines. This inter-change of ‘classical old’ with ‘scientific new’ will help in rescuing the traditional knowledge, improve utility in plant therapy, find new molecular models in plants, and help in obtaining intermediate chemicals.

Chapter 6 deals with the human ecological relationship between the local inhabitants, tourists and the environment. The study area is the gateway to the summit of Mount Khanchendzonga, the base for which is located at Yuksom. The nature trail from Yuksom to Dzongri is one of the most popular hiking treks for mountain adventurists. The monasteries and holy lakes are the other pull factors attracting the tourists. The main findings of the chapter are summarised below:-

1. Tourists arriving in Sikkim are generally of three categories. Mountaineering and adventurers, who are lured by the call of the mountain peaks and glaciers. The sight seeing types who come to feel the clean pollution free atmosphere and fascinating mountain views. The third category belongs to spirituality seekers, who visit the monasteries, gompas and other historical sights.
2. Indians from the plains, and foreigners from western countries visit the study area. A large number of foreign tourists traverse the basin on motor cycles, bicycles, and some of them through self contained trekking. HMI Darjeeling conducts mountaineering training, the camp sites for which are located at Yuksom and Dzongri.
3. The Khanchendzonga National Park and the Mainam Wind Life Sanctuary form the protected areas, and hence permission for entrée is granted through the office Chief Wildlife Warden.
4. Unique fauna and flora exists in the study area. The Western watershed of Rathongchu contains vast mountain slopes and spurs covered with varieties of rhododendrons. The floristic biodiversity lends itself to detailed ethnobotanical research, thereby motivating research groups and individuals to visit and survey the area.
5. The Upper Rangit Basin being the original seat and capital centre of the earlier Chogyals, has a rich history. The historical ruins at Rabdentse, and Dubdi are added attractions.
6. Some of the oldest Buddhist monasteries are located in the Basin, which include Dubdi, Pemayangtse, Tashiding and Ralang. There is a Bon monastery and, one monastery of the Gelugpa sect located at Ravangla. Apart from being places of religious discourses, worship and meditation, they are store houses of religious books and murals. Spiritual tourists come for casual visits as well as for the purposes of research of spirituality.
7. Tourism impacts in the region pertain to both, positive and negative aspects. These impacts pertain to environment, economy, socio-cultural and human ecological fields.
8. Litter, garbage and pollution along the trails and at camping sites are major negative impacts on environment. Independent trekkers and local people are main sources of littering. The demand of fuel for firewood results in deforestation along the trails.

9. Economically, a large section of local inhabitants benefit from the tourists inflow. These include hoteliers, transporters, handicrafts centres, the local guides and the porters.

10. As regards human ecology, the interaction with tourists bring about changes in behavior, dress, life styles and social culture, some times at the cost of losing out on the values of traditional culture. The positive affects include poverty alleviation, awareness generation, infrastructure development, research and publicity.

The government, and the local officialdom need to understand the definition of 'Sustainable mountain tourism' and ensure functioning of all tourism related institutions within those norms.

Economically, it should seek to maximize human welfare within the constraints of existing capital stock and technologies.

From the points of view of environment, the carrying capacity of the eco-system needs to be taken into account. The natural resources must not be disturbed.

Human ecology is a key actor. Social organizations are crucial to ensure proper symbiotic interrelationships, without prejudice to preservation of local traditional cultures.

Chapter 7 presents the sum total of human ecological aspects of the region and also highlights the local psyche in the context of the indigenous cultural set up. The main observation are as follows :-

1. The social structure of inhabitants is based on social status ascribed mainly by tribal and non-tribal affiliations. The Nepali community therefore have a feeling that the Bhutia and Lepcha communities, though economically better off, yet enjoy more constitutional liberties.

2. Invasion of modernity and popular culture has triggered intra-contradictions within the society, inter-contradictions of the ethnic groups, and contradictions with the popular culture itself. Hence mutual incompatibility between traditional modernity may be witnessed in a few sections of the youth.

3. The isolatory setting has forced seclusion on the inhabitants. This has helped in diffusion between various communities, and preservation of traditional culture and ecological wisdom. However, this has also denied opportunities of higher education to the youth.

4. Democratization of the state and its merger with India has left certain people confused with regards to their identity. The liberties of democracy have not been fully understood, giving rise to easy life, and efforts towards making easy money.

5. The belief and faith in the Lamas, and Shamans is almost absolute. Every hazard, natural or physical is related to spirituality and the writ of the monks on their 'pronouncements' is taken to be gospel.

6. Sikkim being a less densely populated state, the level of competition is low. The inhabitants as a result have become complacent in their attitude towards hard work in the fields of education beyond senior secondary classes.

7. Personal discipline of the inhabitants is of a high order, and the law and order problems are almost non-existent.

8. Non-violence is the way of life of the inhabitants, and knowingly they do not kill or harm the plant and animal life.

The personal traits of the inhabitants clearly indicate them to be God-fearing, independent natured well disciplined, with absolute faith in spirituality and the religious heads. They continue to be highly superstitious.

Knowledge, awareness and education in their case must therefore relate to:-

- (a) Not to lose 'what they know'
- (b) Learn 'new' that is relevant and necessary.

A spirit of competitiveness in field of education is required, which can only come through political decision of earmarking a certain percentage of marks to be obtained as a prerequisite for seeking jobs.

As a people, they must be identified by the mainstream country-men as a part of the nation. Slowly, the Sikkimese will understand the meaning of state identity and national identity, thus preserving their indigenous Sikkimese culture as nationals of India.

SECTION II

SUGGESTIONS AND RECOMMENDATIONS

There is no doubt that future is, and always has been, one of the most motivating subjects for thought, planning and implementing action oriented programmes. The present day conditions have come about, as a result of human actions within their respective human and natural ecosystems in the past. Health of future ecosystems of all kinds will depend upon the actions of the present generation.

So as to ensure healthy interactions, and better prospects for future on a long term basis, the suggestions and recommendations require a holistic view and understanding. Reductionist views and action plans may result in multiplicity of efforts in a few fields, at the cost of other elements pertaining to human ecology. Keeping the summary of findings in view, a set of suggestions and recommendations is listed below.

1. Sikkim has a rich spiritual and cultural ethos. The policy paradigms of the state government must include the conservation of these human ecology attributes in all the action oriented programmes for development. These must include:-

- (a) Incorporate human ecological ethics into all academic and institutional practices.
- (b) Encourage environmental responsibility amongst all ministries, government bodies and departments.
- (c) Maintain updated audits of the environmental contents of all public and private sector industries.
- (d) Promote energy conservation and the re-use and recycling of all possible materials at individual, village, institutions, district and state levels.

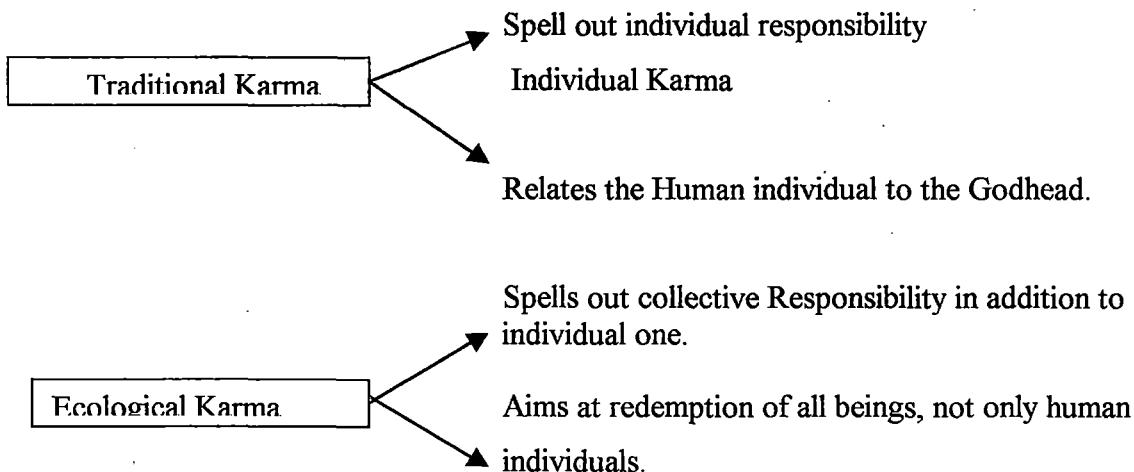
2. The planning policy must judiciously intermix the use of modern scientific techniques with the traditional ecological knowledge of the local inhabitants.

3. The existing roads and tracks in the Upper Rangit Basin need a constant maintenance, as some of them pass through geologically unstable stretches. Constructions of new roads require a systematic ground survey. The SPWD (Roads and Bridges) is recommended to be modernized in terms of equipment and training in this regard.

4. Constructions of bridges, dams dwellings and also terrace farming in some areas have resulted in fragmenting and fracturing of a few rock faces and re-entrants. It is recommended that watershed treatment plans be taken up on priority for all such locations. The rock face on road to Khecheopalri Lake and Yuksom are in need of urgent treatment.

5. There are some artisans, who are well trained in the skills of building and maintaining monasteries, gompas and *Chortens*. There are others, who carry out intricate painting and designing work. It is recommended that regular educational and training institutions be opened for such artisans and painters. Although handicraft centres do exist at some places like Kewzing, the training in these centres requires to be augmented further. Trained architects are recommended to be employed in the institutes, who should study the amalgamation of traditional designs with modern techniques.

6. Spiritual teachings amongst the Buddhist, Hindus and other minority groups should include the religious relevance to human ecology and deep ecology. The traditional *Karma* should incorporate ecological *Karma* within its folds. The recommended models of *Karma* are represented as under :-



7. The intellectuals, government officials and religious heads should seek a healthy inter-mix of 'traditional ecological knowledge' with modern scientific techniques. While the constructive aspects of 'nature conservation' must be further cemented, the invasive ideas of popular culture which attract youth towards 'drug addiction' etc need to be guarded against. The conservation of all holy places such as Khelcheopalri Lake, the

monasteries, the fauna and flora, and the general habitat is recommended to be done through traditional ecological knowledge of the inhabitants.

8. There is need recognized for training workshops to develop ethnobotany for application in the fields :-

- (a) Management and conservation of plant resources.
- (b) Capacity building in terms of knowledge and materials.
- (c) Commencement of action-oriented field projects in Upper Rangit Basin.

9. At the government and organizational levels there is a need to study and review the range of methods available for optimum output and sustainable benefits from the home gardens to include species inventory, frequency and composition. Structures of home gardens composition, and the architectural profile of the home gardens are recommended to be researched further by trained ethnobotanists for the benefits of local inhabitants

10. It is recommended that a computer programme be prepared for plant identification for 'Non-timber forest produce' uses, and also for medicinal plants. Such an inventory will be beneficial to students, field workers and also the local inhabitants.

11. Following broad areas are recommended for development of community based ecotourism strategy:-

- (a) Mechanism for local communities to directly benefit from ecotourism revenues.
- (b) The development of financial and legal mechanism.
- (c) Training of local inhabitants in garbage management, trail repairs, plantation work and management, conservation education, and the aspects of lodge operating, cooking and acting as guides.

12. The entire area of Upper Rangit Basin is recommended to be brought under the 'Man and Biosphere' (MAB) programme of UNESCO, and be declared as a 'biosphere reserve'. This will ensure protection of the ecosystems and biodiversity within the basin. This will also help in research and monitoring of the habitat through UN agencies. The UNESCO will by itself take up the responsibility of education, awareness and upliftment of the local inhabitants, while conserving their cultural heritage.