

Chapter 11



GOVERNMENT INITIATIVES ON ENVIRONMENT

STATE GREEN MISSION

A Unique Innovative Environment Programme Launched in Sikkim

The Government of Sikkim launched a unique and innovative programme called “State Green Mission” with the view to raise avenue plantation along the roads and beautification of all vacant and waste lands to further reinforce wide spread recognition of

Sikkim being a Green State. The Hon'ble Chief Minister Dr. Pawan Chamling formally launched this Mission on 27th February 2006 in the presence of all Ministers, officers and the public of Sikkim.



Launching of Sikkim Green Mission on 27th February 2006

Aims and Objectives

The major objectives of the programme are to create green belt and avenues for meeting aesthetic recreational needs of the people and beautify the areas for tourist attraction. This programme is expected to provide fringe benefits like reduction in the surface run-off discharge and checking erosion in the downhill side and will also create a store house of genetic diversity by planting all the indigenous trees, shrubs, herbs, climbers, creepers, conifers and green foliages including fruits and medicinal plants.

The greenery generated out of this programme will also reduce noise pollution to the neighboring household population; attract the avifauna, butterflies, squirrels etc and their shelter. Sikkim becoming a Garden State, the mission will also work with objective to promote tourism as a sustainable and eco friendly activity in the state of Sikkim. The programme is also expected to generate awareness on environment & forests and bringing in sense of participation and ownership among people in the whole process.

Implementing Mechanism

A State level committee under the chairmanship of Hon'ble Chief Minister is formed to oversee and to provide policy and administrative support to this mission. The Forest, Environment and Wildlife Management Department is the Nodal Department. At constituency level, there is Green Task force headed by the Area MLA to implement the programme in the Field. One District level officer is appointed as Nodal

officer for each constituency. The Forest Department will provide all technical guidance, saplings and manure for the programme. All the Government departments will provide managerial and labour force from the existing establishment. At ward level, one village protection committee is constituted headed by the concerned ward Panchayat member.

Some Technical Aspects

Planting pattern	The pits are normally to be dug at 6-7 feet away from the edge of the road. If Space available, two rows plantation on either side of the road. Spacing at six meter interval for tree species and 2 meter for ornamental bushes may be given. Maintain 3meter distance in between two rows. Pit digging will be in staggered manner (Center between the two pits of the other row). If the space is less, single row plantation to be taken on either side at the spacing of 3 meter for tree species and 1 meter for ornamental Bushes. Bulbous and Herbaceous plants to be planted only on up hill side ordinarily. If there are visible clear continuous patch available on the down hill side, bulbous and herbaceous plants can be planted.
Pit size	2'x2'x2' = for up to 2.5' height saplings; 3'x3'x3' for plants with 3' and other tall plants; 1'x1'x 1' for ornamental bushes/shrubs; total soil working for bulbous plants. Place the dug out soil on the uphill side.
Plantation	Cuttings like Erythrina, Populous, Gurgis and Weeping Willow are to be planted between January and first week of April. Cuttings are other species to be planted after June. All the saplings are planted generally from May to June/July depending on showers. Conifers, Rhododendron may be planted between 2 nd wk of March to May and Cherry (paiyu) to be planted between First week of March to 3 rd Week October. Where as Cherry (Geyzing Type) may be planted during December – March. Walnut bareroot has to be planted between December and March. The Ornamental bushes and bulbous plants are to be planted before May.

SPECIES RECOMMENDED FOR STATE GREEN MISSION

Altitude : 2000' – 5500'

Trees: *Aesculus indica* (Horse Chestnut), *Cassia fistula* (Amaltas), *Cassia nudosa*, *Erythrina soberrosa* (phaledo), *Lagerstromia flosreginae* (Jarul), *Emblica officinalis* (Amala), *Bauhinia sp.* (Tanki), *Alstonia scholaris* (Chatiwan), *Paulonia fortunei* (Chinese teak), *Paulonia elongate* (Chinese teak), *Paulonia fortunei* (Chinese teak), *Tamarix indica* (imli, thithri), *Tree ferns* (*Cycus*), *Callistemon* (Bottle Brush), *Jaccaranda mimosifolia* (Jaccaranda), *Syzygium cuminii* (Jamun).

Shrubs: *Magnolia lilliflora* (Magnolia), *Cycos*, *Gaikhuray Fern*, *Datura sp.*, *Tecoma stans*, *Hydrangea*, *Hibiscus* (china rose), *Euphorbia pulcherrima*, *Bougainvillea*, *Allemanda*, *Cestrum*, *Ixora stricta*, *Plumeria* (Temple tree), *Yesterday, today & tomorrow*, *Saraca indica* (Ashoka).

Bulbous & herbal plants: *Eucharis* (Pyaji Phool), *Nerium*, *Zephranthus robusta*, *Costus speciosus*, *Hemerocalis*, *Ophiopogon*.

Orchids: *Dendrobium sp.* (Auley sunakhari), *Cymbidium longifolium* (Lekh sunakhari).

Altitude : 5500' – 7000'

Trees: *Prunus cerasodes* (Paiyu) October flowering, *Prunus Gayzing Type* March flowering, *Cedrella toona* (tooni), *Michelia excelsa* (rani champ), *Rhododendro arboretum* (lali guras), *Symingtonia populnea* (Pipli), *Aesculus indica*, *Paulonia fortunei* (Chinese teak), *Salix babylonica* (weeping willow, bayas), *Tree ferns*.

Shrubs: *Mahonia napaulensis* (chutro), *Hypericum sp.*, *Hydrangia*, *Magnolia grandiflora* (Gogey champ), *Luculia gratissima*, *Viburnum sp.* (Asarey), *Tibouchiana*, *Spiraea*, *Ardisia*, *Euphorbia pulcherrima* (lallu pathi), *Jasminum* (jasmine).

Bulbs & herbal plants: *Agapanthus*, *Bergenia sp.* for walls, *Zephranthus robusta*, *Hedychium species*.

Orchids: *Coelogyne cristata*, *Cuelogyne nitida*, *Coelogyne ochracea* for walls and rocky area.

Altitude : 7000' - 10,000'

Trees: *Magnolia cambelli* (Gghey champ), *Acer species* (kapasi), *Juniperous recurva* (Juniper), *Juniperous Pseudosabina* (Juniper), *Larix griffithii* (larch Gobrey), *Tsuga brunoniana* (salla), *Populus ciliate* (poplar), *Salix babylonica* (Bayas), *Prunus sp.*

Shrubs: *Hypericum sp.*, *Rhododendron sp.* (gurans), *Luculia gratissimum*, *Viburnum sp.* (asarey), *Enkianthus campanulata*, *Rosa candida*, *Hydrangia*, *Magnolia lilliflora*, *Pieris spp.*, *Spiraea* (April fool).

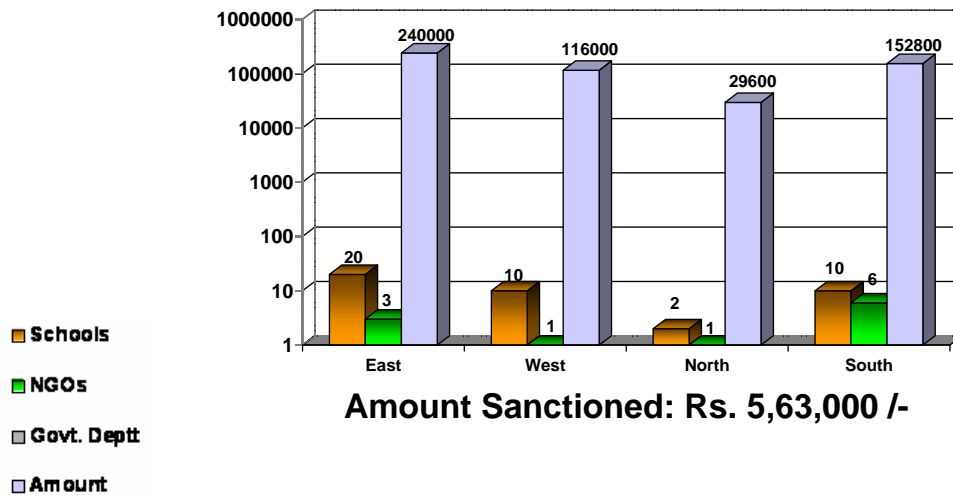
Bulbous & herbal plants: *Lupins*, *Bergena*, *Arisaema sp.*, *Hemerocalis*, *Cardiocrinum giganteum*

NATIONAL ENVIRONMENT AWARENESS CAMPAIGN on SOLID WASTE MANAGEMENT IN SIKKIM

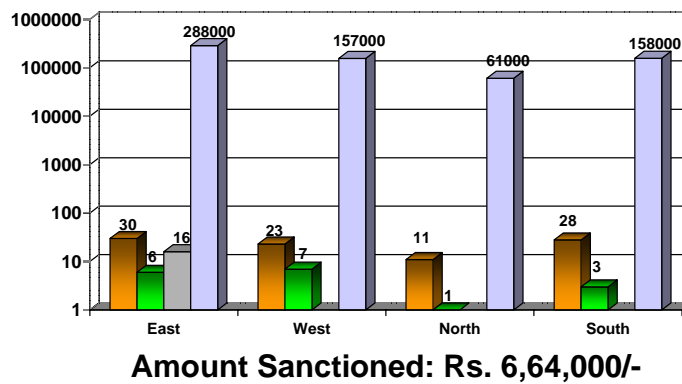
Sponsored by the Ministry of Environment & Forest, Government of India, National Environment Awareness Campaign aims to stimulate mass awareness on environment and initiate action oriented strategies at the grass root level. The Forest, Environment and Wildlife Management Department, Government of Sikkim is the Regional Resource Agency for implementation of NEAC programme. The State Environment Agency is coordinating the programme at state level under the chairmanship of PCCF-cum-Forest Secretary and CF (LU & E) as the State Nodal Officer.

The District Environment Committees are implementing and monitoring the programme in the concerned districts. NEAC programme on "Solid Waste Management" was implemented in the state in the financial years 2005-06 and 2006-07. All the participating organizations and schools were given financial assistance for awareness and action oriented activities according to the proposals sanctioned by the Ministry. The following figures illustrate the number of participating organizations and amount sanctioned for the year 2005-06 and 2006-07 NEAC programmes.

NEAC 2005-06



NEAC 2006-07



NATIONAL GREEN CORPS PROGRAMME IN SIKKIM

ECO-CLUBS HAVE BEEN ESTABLISHED IN THE SCHOOLS OF SIKKIM UNDER NATIONAL GREEN CORPS PROGRAMME

The following schools were released with annual grant of Rs. 2500/= each for the year 2006-07 for functioning of eco-clubs in the school.

SENIOR SECONDARY SCHOOLS

NORTH SIKKIM (30)	SOUTH SIKKIM (97)	EAST SIKKIM (84)	WEST SIKKIM (69)
1. Hee-Gyathang	1. Bermiok Tokal	1. Assam Lingzey	1. Buriakhop
2. Mangan	2. Jorethang	2. Central Pendam	2. Chakung
3. Phodong	3. Namchi	3. Chujachen	3. Dentam
	4. Namchi Girls	4. Deorali	4. Gyalshing Girls
	5. Namthang	5. Dikling	5. Hee-Yangthang
	6. Ravongla	6. Enchey	6. Mangalbaria
	7. Sadam	7. Khamdong	7. Pelling
	8. Temi	8. Lingdok	8. Sombaria
	9. Yangang	9. Mamring	9. Soreng
		10. Ranipool	10. Tashiding
		11. Ranka	
		12. Rhenock	
		13. Rumtek	
		14. Samdong	
		15. Singtam	
		16. Song	
		17. Tadong	
		18. Tashi Namgyal	
		19. West Point	
		20. Holly Cross	

SECONDARY SCHOOLS

NORTH SIKKIM	SOUTH SIKKIM	EAST SIKKIM	WEST SIKKIM
1. Chungthang	1. Ben	1. Aho Shanti	1. Bermiok Martam
2. Gor	2. Bikmat	2. Aritar	2. Chumbong
3. Kabi (Kalzang Gyatso)	3. Borrong	3. Dikchu	3. Daramdin
4. Lachen	4. Damthang	4. Duga	4. Darap
5. Lachung	5. Jarrong	5. Lingtam	5. Dodak
6. Lingdong	6. Kewzing	6. Linkey	6. Gelling
7. Mangshila	7. Kitam	7. Lower Samdong	7. Gerethang
8. Passingdong	8. Lingee	8. Lower Sumin	8. Kaluk
9. Phensong	9. Lingmoo	9. Lower Syari	9. Kamling
10. Singhik	10. Maniram	10. Luing	10. Kechupheri
11. Tingvong	11. Melli Bazar	11. Machong	11. Khandu
	12. Melli Gumpa	12. Makha	12. Khaniserbong
	13. N.T.L Vok	13. Martam	13. Lingchom
	14. Namchi New	14. Middle Camp	14. Okhrey
	15. Namphok	15. Modern	15. Ribdi
	16. Nandugaon	16. Namcheybong	16. Sakyong
	17. Neh- Broom	17. Nandok	17. Sribadam
	18. Pabong	18. Pabyuick	18. Tharpu
	19. Perbing	19. Pacheykhani	19. Timberbong
	20. Ralong	20. Padamchey	20. Uttarey
	21. Rateypani	21. Penlong	21. Yangsum
	22. Rong	22. Phadamchey	22. Yoksam
	23. Sumbuk	23. Rangpo	23. Zoom
	24. Sangnath	24. Sapley Sardarey	
	25. Tarku	25. Sichey	

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|-------------|---------------------|
| 26. Turuk | 26. Sirwani |
| 27. Tingmoo | 27. Sudunglakha |
| 28. Turung | 28. Tarpin |
| | 29. Tumin |
| | 30. Upper Dalapchen |

JUNIOR HIGH SCHOOLS

NORTH SIKKIM	SOUTH SIKKIM	EAST SIKKIM	WEST SIKKIM
1. Gnon Sangdong	1. Alleydara	1. Adampool	1. Begha
2. Lingthem	2. Assangthang	2. Ahopul Kisan	2. Bongten
3. Lingzya	3. Chalamthang	3. Arithang	3. Budang
4. Manul	4. Chemchey	4. Amba	4. Central Martam
5. Namok	5. Chuba	5. Barapathing	5. Chota Samdong
6. Namphrick	6. Chunlok	6. Bering	6. Deythang
7. Pakshek	7. Dalep Kewzing	7. Bhasmey	7. Gangyap
8. Phamtam	8. Denchung	8. Bhusuk	8. Hathidunga
9. Rang Rang	9. Deythang	9. Bojoghari	9. Hee - Patel
10. Ringhem	10. Goam	10. Bordang	10. Karjee
11. Salimpakyal	11. Kabrey	11. Burtuk	11. Labdang
12. Sarchuk	12. Kamrang	12. Chewribotey	12. Langang
13. Swayam	13. Karjee	13. Dugalakha	13. Legship
14. Thebuk	14. Kartikay	14. Ganchung	14. Lower Bermiok
15. Tingchim	15. Karungthang	15. Gaucharan	15. Lungchok
16. Tumlong	16. Kateng	16. Majitar	16. Mabong
	17. Legship Hingdam	17. Martam Yangtang	17. Malbasey
	18. Lingee Paiyong	18. Mulukey	18. Malbasey Budang
	19. Lungchok	19. North Regu	19. Mangsari
	20. Mamlay	20. Pachak	20. Melli
	21. Mangley Sinchuthang	21. Pachey	21. Mukrung
	22. Manzing	22. Pakyong	22. Naya Bazar
	23. Melli Paiyong	23. Pangthang	23. Nazar Barfok
	24. Mickhola	24. Parakha	24. Pakkigaon
	25. Namlung	25. Patuk Chandey	25. Pelling Chumpong
	26. Namphing	26. Phalichadara	26. Piplay
	27. Omchu	27. Rakdong Tintek	27. Reshi
	28. Pabong Daring	28. Ralap	28. Rimbik
	29. Pahlidara	29. Raley Kheseey	29. Rinchenpong
	30. Paksom	30. Rangpo Bazar	30. Rumbuk
	31. Passi	31. Rhenock Bazar	31. Samdong
	32. Pathing	32. Rhenock Khamdong	32. Sardong
	33. Phamtam	33. Rey Mindu	33. Singling
	34. Phong	34. Rolep	34. Sopakha
	35. Raiyong	35. Rongli	35. Tikpur
	36. Salghari	36. Rongneck	36. Zeel
	37. Salleybong	37. Rorathang	
	38. Sangmoo	38. Sama Lingdum	
	39. Sokpay	39. Samlick Marchak	
	40. Sripatam	40. Sang Challamthang	
	41. Suntaley	41. Simick Lingzey	
	42. Thangsing	42. South Regu	
	43. Temi Tea Garden	43. Sumin Lingchey	
	44. Tingley	44. Tareythang	
	45. Tingrithang	45. Taza	
	46. Tinzir	46. Tumlabong	
	47. Upper Jaubari	47. Upper Syar	

Landmark Milestones for Environment Conservation in Sikkim

1. State Government passed and announced a Comprehensive State Policy on Forest, Environment and Land Use 2000 based on the basic principle of conservation and sustainability.
2. Introduced the Compulsory Environmental Education for schools in 2000.
3. Mandatory Environmental Impact Assessment (EIA)/ Environment Management Plan (EMP) and Catchment Area Treatment (CAT) Plan for all Hydro-Electric Projects (HEP) & Other Projects as well.
4. Ban of smoking & Pan Parag in 2001.
5. The State Government demanded the Status of "Environmentally & Ecologically Fragile Protected State" from the Central Government.
6. Abandoned and closed the Rathang Chhu Hydro Electric Project in West and Firing Range "G" in North Sikkim.
7. To preserve the Heritage and fragile ecology, notified in 2001 sacred peaks, caves, rocks, lakes, chhorten & hot springs and banned scaling of important peaks including Mt. Khangchendzonga (8598m) for mountaineering expeditions, etc., Conservation of unique terrestrial & aquatic ecosystem of wetlands/lakes by prohibiting the commercial activities.
8. By legislation, banned the use of non-biodegradable materials like plastics, poly-bags, Bio-medical / chemical waste in 1997.
9. Eco-governance has been strengthened by launching "CM online Website".
10. In 2000 directed all the Government Department & Institutions to keep all compounds green & pollution free. No land shall be left fallow or barren.
11. In 1995 banned the Green felling in forests & no clear felling, only dead, dying and diseased trees allowed to be removed for the bona fide use.
12. In 1998 imposed ban on Grazing in reserved forest areas, plantation areas and water sources areas; fodder collection allowed on sustainable basis.
13. Year 1995-96 declared as "Harit Kranti" year and period 2000-2010 as 'Harit Kranti Dashak' for Green Sikkim through people's participation.
14. Till March 2007, minimum diversion of forest land for non-forestry purposes (approx. 934 ha in last 27 years) and compensatory Afforestation (approx. 2200 ha.) completed.
15. For Community participation in Forest, Environment & Wildlife and Natural resources Protection & Management has been institutionalized through the creation of network of JFMCs (in 1998) / EDCs (in 2001) & WDCs along with the involvement of / NGOs / Panchayats with emphasis on women's participation.
16. Integrated Watershed Development Program (IWDP) for Non-forest areas through the Jilla Parishad with more emphasis on fuel wood and fodder plantation to reduce pressure on natural forests and to enhance the productivity of land.
17. On 5th June 1999 launched "Smriti Van" program "A People's Programme" to bring people close to the nature and this Programme has been taken up in the 166 Panchayats. In the Year 2007 "Sanjeevani Smriti Van" at Hanuman Tok Forest area is being started. The concept of "RUKH BHAI TIKHA" also initiated.
18. In the year 1998 the State award "Rajya Van Samrakshan Evam Paryavaran Puraskar" was constituted.
19. For Perspective planning State Forestry Action Plan & State Forestry Research Plan were formulated in co-ordination with Government of India.
20. A network Protected Area Network (PAN) of National Parks, Sanctuaries, Himalayan Zoological Park and Biosphere Reserve created for conservation of bio-diversity [PAN-30.69% (42.46% including Biosphere Reserve) of the Geographical Area]. By notification 2001 imposed ban on tourists carrying plastic bags & containers in PAN area.
21. Sikkim State Biodiversity Strategy and Action Plan (SBSAP) formulated under the National Biodiversity Strategy and Action Plan (NBSAP).
22. A State Biodiversity Park at Tendong first of its kind was created in 2001.
23. To protect Patenting and Intellectual Property Rights (IPRs) a State Level Apex Committee has been constituted in 2001.
24. In 2000 imposed ban on lopping of Dhupi tree (*Cryptomeria japonica*) and collection of Nagbeli & Mosses.
25. In 2000 all agencies in the State were directed to use the alternatives of wood in construction to conserve the forests & ecology.
26. A State Medicinal Plants Board (SMPB) was established in June 2002 for conservation and development of medicinal plants sector. Many Herbal Gardens created in various representative areas along with creation of mass awareness for cultivation. A JARI BUTI KOSH has also been created. A Sanjeevani Herbal Garden (about 50 ha area) has been planned at Hanuman Tok near Gangtok. There is restriction for commercial exploitation of medicinal plants from the wild areas.
27. Modern tools for forest protection like Wireless communication network, Arms and Ammunition, Global Positioning System (GPS), Fire Fighting Equipments have been introduced since 2001.
28. State Forest Act has been Amended in 2000 & related rules made with Strong legal provision for forest resources offences. Number of illegal encroachers from forests and protected areas evicted.
29. To avoid the Land slides/slips/erosion of areas, treatments and reclamation has been made an integrated part of project planning.

30. For Tourism Development "Tourism Master Plan" has been developed on the committed principle of Eco-tourism and Nature tourism with strict measures.
31. In Urban and Semi-Urban areas the concept of Urban Forestry, Eco-cities & Eco-village has been developed and is under implementation.
32. As per State Industrial Policy 1996, only eco-friendly, pollution free and Green industries would be encouraged.
33. The Sikkim Human Development Report 2001 and Sikkim People's Vision 2001 documents prepared for perspective and sustainable development of State.
34. Organic State – no use of chemicals, pesticides & insecticides etc. and only the use of bio-manure shall be encouraged.
35. 70 % of the State budget outlay has been earmarked and shall be used for the Integrated development of rural areas.
36. The concept of "Model Village" implemented in each constituency.
37. In the ruling Sikkim Democratic Front (SDF) Party's decadal conference held in March 2002, a numbers of resolutions were passed for protection and conservation of natural resources, Environment, biodiversity, glaciers, lakes/ wetlands, Wildlife, Medicinal plants and culture/heritage/traditions as well.
38. Election Manifesto: In the manifesto of General Election for Parliament & Assembly and for Panchayats election, major emphasis has been given by including the area of concerns for Preserving Environment, Pollution free, Biodiversity, Medicinal plants, Water Resources, traditional knowledge, wildlife, heritage sites, Participatory Afforestation, Plantation, Smriti Van Programme, Herbal gardens and Protection of Forests & Forest lands.
39. To reduce the dependence of villages on firewood and forests, Free LPG connection for people below poverty line and economically weaker section of society are being provided since 15th August 2002.
40. Constitution of High Level Task Force (Environment Commission) for Environment and Natural Resources.
41. Sikkim Green Mission 2006 – To Integrate the People with Nature & Invoke Mass Support for the cause. All road projects to have green/plantation components. 2% budget of SPWD(R&B) and RMDD and 1 % of all other Departments have been earmarked for the Green Mission.
42. Sikkim State Biodiversity Board constituted in 2006 and Sikkim State Biological Diversity Rules 2006 formulated.
43. Green Roads: All the Road construction agencies have been directed that the construction of road and their stabilization works along with plantation must go together.
44. Continue Increase in Forests Cover: In 1987 it was 38.8 4% and in 2003 it has gone to 46.28 % which is the best example of sustainable development in the world.
45. Highest Green Protection Index: Sikkim ranks highest on India's Green Protection Index (0.903) by the protection of its natural resources as per Green Indicators 2004, a report by NOIDA; India based NGO Group "INSCRIPTION" in Down TO Earth May 2004.
46. Capacity Building Programme: The State Government has given special emphasis on capacity building of all levels of employees and public as well. 2 % budget of each department is earmarked for the purpose.
47. Eco-Clubs, Green Funds created in a number of schools & colleges.
48. Gangtok- MG Marg declared as "Spit Free Zone" to minimize the pollution.
49. Sikkim Wildlife (Regulation of Trekking) Rules 2005, Guidelines for Appointment of Himal Rakshak 2006, Pokhari Samrakshan Samiti 2006, State Environment Agency 2006, Guidelines for Lake Conservation in partnership with Gram Panchayats and Pokhari Samrakshan Samiti's in Sikkim 2006, formulated.
50. Construction Projects: No final bills of executing agency or contractor shall be released until the Environment & Forestry measures are taken along with the clearances.
51. The State Government has decided that every family shall have FOUR DUSTBINS for disposal of different kinds of waste materials.
52. Glaciers Study & Action Plan to take the timely action on the affect of Global Warming on our water resources, the State Government has decided to constitute a Expert Group for the purpose.
53. Ban on killing of Wildlife and aquatic animals has been imposed by the Government.
54. In the MOU/ Agreement signed with Power Project Proponents, sufficient provisions has been made for Rehabilitation & Resettlement Plan, Environment Cess @ One paise per unit of electricity sold, Catchment Area Treatment (CAT) Plan, EIA/EMP studies with State Government & Maintaining Ecological balance etc.
55. Sikkim Ecology Fund and Environment Cess Act 2005 and the Sikkim Ecology Fund & Environment Cess Rules 2007 enforced from 1st April 2007.
56. National Bamboo Mission Programme launched in the State for Development Bamboo Sector from 2007.
57. Wetland Conservation Programme for protection, conservation & management lakes and wetlands is being implemented from 2007.
58. The Regeneration and Plantation of rear, threatened and endangered species shall be taken up on priority.
59. Sir Chogyal Palden Thendup Namgyal Memorial Park near White Hall, Gangtok established in 2008.
60. Saramsa Garden upgraded to International standard in 2008.
61. Hydrangea Park and Bhanu Path upgraded with modern water fountain in 2008.
62. The Eco-tourism Directorate created and notified in 2008.
63. Hamro Van Media launched in 2008.

ENVIRONMENTAL EDUCATION IN SCHOOL SYSTEM (EESS)

Environmental Studies in primary stage were introduced in the year, 2002-03 as EVS-I and EVS-II. EVS-I covers the social environment (History/Civics) where as EVS-II covers the physical environment (General Science).

The Department of Education had taken up a project on Environmental Education in School System (EESS) along with other 10 States in the year 2003. The project is funded by World Bank. The implementing agency is the Ministry of Environment and Forests (MoEF). The project has the following major components:

1. Development of Text Books in Science, Social Science and English for classes VI-VII.
2. Printing and Development of Teacher support materials.
3. GLOBE Teachers Training Programme(100 Project Schools)
4. Stakeholders and Educational Administrators Orientation Programme on EESS (4 Districts).
5. Masters Trainers Training Programme on EESS
6. Teacher Training (4 districts).

Under the development of Textbooks, a workshop on Greening of Textbooks was held from 27-29th Nov. 2003, where the review of textbooks and local specific components to be infused in the textbooks of classes VI -VIII in subjects Science, Social Science and English were identified under the guidance of Centre for Environment Education (CEE). These greened text books were printed by Frank and Bro. and Co., New-Delhi, and these books were implemented from the academic session 2004 onwards. Under Global Learning and Observation to Benefit Environment (GLOBE), 98 schools were covered and one teacher from each school was trained for the measurement of certain parameters of the environment

Stakeholders Orientation Programmes had been conducted in all the four districts. The basic aim of this programme was to make teachers, parents, NGOs and District Educational Administrators aware about the various components of the project and their implementation strategies. The programmes were held in April 2004. This programme was conducted from 19-22nd May 2004. Also a workshop was conducted on 23-24th May to develop framework for teacher handbook and other supplementary materials. Based on this frame work, a hand book

was prepared and printed. The basic aim of this hand book is to supplement classroom teaching. In the last phase of the project, about 400 teachers were trained regarding various method of teaching Environmental issues.

All Government Schools under Department of HRD, are taking keen interest and taking up various environment awareness related activities

- Plantation in school compound each year on the eve of 'Van Mahotsava' in co-ordination with HRDD/ Forest Department Officials.
- Opening of a joint bank saving account in the name of school head and school prefect called 'Green Fund' for conducting environment awareness related activities in each school.
- Formation of eco-club at Secondary and Sr. Secondary level to conduct quiz, debate and rallies among students to spread the message of environment related activities.
- Announcement of cash awards by HRD Department on the eve of Teacher's Day every year for the greenest school.
- Fencing of school compound under SSA scheme for protection of environment.

RURAL DEVELOPMENT AND ENVIRONMENTAL

In order to achieve the broad objectives of the Total Sanitation Campaign Programme, It is also felt utmost necessary to have the following Components incorporated as part of the Programme along with the other components of TSC to be implemented in the State.

1. Attached bathing cubicles for the BPL rural families with household latrine being provided under the Programme.
2. Community bathing cubicle for the rural people.
3. Conversion of human and cattle wastes into environmentally friendly bio-products by introducing simple but effective technologies for harnessing bio-energy and organic fertilizers.
4. Introduction of Solid & Liquid Waste Management methods including hardware components.
5. Dedicated water supply facilities to all sanitation hardware Components i.e toilets blocks in schools, Anganwadi Centers, Institutional and Community complexes.

**STATUS AND PROGRESS OF RURAL SANITATION PROGRAMME
UPTO 30th Nov 2006**

Table 11.1 Physical Status And Progress Of Rural Sanitation Programme

Year	Target	Achieved	Target	Achieved	Target	Achieved
2001-06	Individual house hold latrine for BPL families		Institutional Sanitary Latrine		Bathing Cubical	
	36808	34477	2348	2186	29	29

Source : RDD, Govt. of Sikkim

Rs. in lakhs

Table 11.2 Financial Status And Progress Of Rural Sanitation Programme

Year	Target			Achieved		
	Central	State	Total	Central	State	Total
2001-06	777.76	566.15	1343.91	594.78	487.20	1081.98

Source : RDD, Govt. of Sikkim

The Ministry of Rural Development, Department of Drinking Water Supply Government of India, has given emphasis on IEC & HRD activities also. Therefore, along with the hardware construction, sensitization and capacity building programmes at the GPU level and mass Sensitization programme at the constituency level are also being carried out.

Rural Sanitation Programme

With the launch of the Total Sanitation Campaign Programme, the Government of India and the State Governments have made significant gains in the area of public sanitation so as to achieve the goal of improving quality of living and public health standards.

The State government has taken a policy decision to make Sikkim a Nirmal State. Taking this view in mind, the Panchayati Raj Act has also been amended making it mandatory for the PRI members to construct toilet of their own in their households.

The basic objectives of the Total Sanitation Campaign programme are as follows:-

1. Bring about an improvement in the general quality of life in the rural areas through proper sanitation habits.

2. Accelerate Sanitation coverage in rural areas to be provided on demand based criteria rather than need basis.
3. Awareness creation and health education through IEC campaign and HRD workshops.
4. Cover Schools/Aganwadis in rural areas with sanitation facilities and propagate hygiene education and sanitary habits among students.
5. Encourage cost effective and appropriate tried & tested technologies in hardware and waste disposal methods.
6. Totally eliminate open defecation to minimize contamination of environment and spread of diseases.
7. Convert dry latrines to flush latrines and eliminate manual disposal practices wherever in existence in rural areas.

The components in the programme being undertaken are:

Hardware Activities.

1. Individual Household Latrine for the Below Poverty Line.,
2. School Toilet for both boys and girls,
3. Anganwadi Toilet,
4. Institutional Toilet,
5. Community Sanitary Complex

Software activities.

1. Start-up,
2. IEC/HRD

✦ TOURISM AND ENVIRONMENTAL

There are two major registered tour operators in the state of Sikkim who act as umbrella organization of the Tourism Department, namely, Travel Agent Association of Sikkim having more than 175 Tour Operators affiliated to this body and another Sikkim Association of Adventure and Tour Operators with more than 20 Tour Operators affiliated with it. Besides this there are more than six Tourism Development Societies, namely, South Sikkim Tourism Society, Aritar Lamphokari Development Cooperative Society, East Sikkim, Hee-Bermoik Tourism Development & Heritage Conservation Society, West Sikkim, Rabongla Tourism Development Corporation Society, South, Pelling Tourism Development Corporation, West Sikkim, Mangan Tourism Development Society, North Sikkim.

The Department of Tourism on its part has been regularly organizing awareness camps to the tour operators/taxi drivers and regular checking are being made in those areas for which the permit is being issued by Tourism Department. One of the major areas for concern is Tsomgo Lake. In order to de-pollute and de-congest the lake area, Tourism Department under the Centrally Sponsored Scheme has constructed shopping complex with parking facilities. Further, we have been regularly requesting the UD&HD not to issue any hawkers' license in and around the tourist destinations, as stated above, as the implementation of registration of Tourism Trade Rules is taking sometime, permit to the tourist taxies plying upto Tsomgo and Baba Mandir which are being issued by Check-post (Police), will also be brought under the jurisdiction of Tourism Department. Thereafter only, the quality of service/standard of vehicles etc. can be checked and action taken. Under the provisions of this Rules, Tourism Department will also notify in official Gazette, all the tourist destinations including trekking routes etc. and the entry of tourists into these notified areas will be regularized and channelized, and, strict measures resulting cancellation of registration of license would be taken if any of the registered travel agents/tour operators/service providers/hotel/restaurant/bar owners violate the laws in force. As far as the assets like cafeterias/bungalows are concerned, these have been leased out to the educated unemployed youths on minimum rental charges.

Salient points in Tourism master plan in the state related to protection of environment.

- i) Maintenance of tourism trade and environment.
- ii) Emphasis on sustainable development approach to plan in tourism. Environmental and socio-economic impacts to be considered so that negative impacts are prevented.
- iii) Basic principle in environmental management is maintaining the carrying capacity of the tourism area.
- iv) Provision of adequate infrastructure to serve tourism.
- v) Maximizing local inputs of the goods and services that are used tourism so that this sector is well integrated into the local economy.
- vi) Expansion of local shopping opportunities and increasing local tourist attractions are ways of increasing tourist expenditure.

Future strategies and interim proposed to protect environment in the tourism related activities.

- The Department of Tourism, as submitted above, proposes to bring all the agencies involved in tourism trade including tour operators, travel agents, hotels, restaurant owners, tourist taxi, all registered tourism development cooperative societies under the jurisdiction of Sikkim Registration of Tourism Trade Rules, 2006, once implemented. Thereafter, we will form strategies and measures would be taken up for regulation of the activities including protection of environment.
- Except for Tsomgo Lake for which efforts have already been made to protect the lake, permits in the high altitudes like Nathula are being issued only to the registered travel agents conducting packaged tour, who are very experienced and maintain their own code of conduct for protection of environment. As regards Alpine tours, this will be opened only after the Rule, in question is implemented.

High Altitude Solid Waste Management: The tourism amenities constructed at high altitude especially, the toilet facilities has its own septic tanks for digestion of such wastes. Solid wastes generated at the tourist spots are proposed to be managed by the UD&HD. The source level segregation of bio and non-bio degradable waste has also been proposed.

SCIENCE & TECHNOLOGY AND ENVIRONMENT

✚ STATE TISSUE CULTURE CENTRE

- **Orchid micro-propagation:**

The centre has undertaken micro-propagation of orchids specially Cymbidiums and *Phalaenopsis*. The cymbidiums which are under cloning are commercially important hybrids both as cutflower and pot plants. The protocol of each variety has been worked out and they are under mass multiplication. The laboratory has also collected *Phalaenopsis* orchids in different color shades for cloning. The centre has successfully isolated and cultured *Phalaenopsis* from the flower shoot which offers true to type seedlings. The centre has also pollinated *Phalaenopsis* hybrid and produced seed pod which was subsequently cultured in the laboratory.

- **Micro-propagation of Chinese teak (*Poulowniafortunii*):**

The centre has successfully isolated and cultured the Chinese teak (*Poulownia fortunii*) in the laboratory. Poulownia popularly known as Chinese teak is the fastest growing tree which can be harvested as timber in ten years period.

- **Tissue culture of medicinal and aromatics plants:**

Medicinal plant *Dactylorhiza hatagiarea* locally called Paanch aunley is a high altitude plant found in alpine region. The plant belongs to orchid family and has various medicinal properties. The centre has collected seed pod from the field without disturbing its natural habitat and cultured in the laboratory. The results are yet to come. The centre has also worked on two oil yielding plant namely, Geranium and Patchouli and successfully isolated and multiplied in the laboratory.

- **Multiplication of Geranium and Patchouli through cuttings:**

The centre has multiplied about 1500 numbers geranium and patchouli through cutting in the shed. The further multiplication is stopped due to the space problem in the shed. In addition to the above two aromatics plants the centre is also working on the agro techniques of important seasonal plants such as Chrysanthemum, calceolaria, cyclamen, orchids etc. The technical know-how so developed or perfected shall be useful to impart trainings to the growers.

- **Training on mushroom cultivation:**

Training on mushroom cultivation was conducted at Changey Lakha, Rongli, E. Sikkim under the Boarder Area Development Programme during May 2005. In the said training programme more than 30 rural women were trained in mushroom cultivation.

✚ PATENT INFORMATION CENTRE (PIC)

Patent Information Centre for Sikkim is the eighth PIC in India that has been established very recently under the Sikkim State Council with the collaboration with the PFC, TIFAC, DST and Government of India.

Objectives:

1. Creating awareness about Intellectual Poverty Rights, especially the patents, in neighboring regions of this centre and enabling R & D institutions, University, Industry and Government Departments through workshops, seminars, conferences etc.
2. To analyze the patent information on regular basis.
3. To provide technical assistance to the inventor in patenting their inventions keeping in touch with TIFAC and supply related documents.

STATE REMOTE SENSING & GIS APPLICATION CENTER

With the advancement of technology in the field of Remote Sensing and its Applications, it has gained considerable importance for acquiring the information about the earth surface with remote access. It has been found to be of great help in mapping of natural resources especially in the remote and inaccessible areas. The capability of high resolution, synoptic perspective and repetitive coverage has been an added advantage for monitoring and mapping of natural resources. During the financial year 2005-06 the State Remote Sensing Application Centre has undertaken the following programs:

1. *Technology Mission for Horticulture in North East including Sikkim, Phase II:*

The North Eastern Region offers tremendous scope for cultivation of a variety of horticultural crops because of its diversities in topography, altitude, and agro-climate. "Technology Mission for Integrated Development of Horticulture" launched by Department of Agriculture and Cooperation, Govt. of India aims to realize this potential in the region. Realizing the potential of the multi-spectral imaging, temporal monitoring, large area coverage capability of Remote Sensing in generating time-critical and accurate information, this project has been approved under the Technology Mission. Space Application Centre has been entrusted with the responsibility of implementing the project in collaboration with the State Departments and other agencies. One of the objectives of the project is to identify suitable sites for expansion of horticultural crops. A comprehensive agreement has been signed with the Constructional and Power Generation Cooperative Society, Thangu, Lachen. The project is being executed by the Society on turnkey basis. After its successful testing and commissioning, Society would maintain the plant with revenue which would be collected in due course of time.

2. *National (Natural) Resources Information System (NRIS)*

The project aims in preparation of the digital database on the natural resources and the infrastructure of Sikkim. Once such database on the resources is completed, there is a program within the project to discuss the matters with the officials of Planning and the District administration to identify the gaps for management and development of the resources. The database is created jointly with the Regional Remote Sensing Service Centre, Department of Space, GoI, Kharagpur. Under this project, database on

drainage, lakes, road, land use, soil, geology, revenue block, settlement, and forest management boundaries and other infrastructures etc. has been created.

3. *Installation of STFS (Satellite Time and Frequency Signal) and Teleclocks:*

With the support of the Department of Science & Technology and the National Physical Laboratory (Council of Scientific & Industrial Research), New Delhi, Sikkim State Council of Science and Technology installed one STFS (Standard Timing Frequency Satellite) and six teleclocks in the state on trial basis.

Six numbers of teleclocks were installed in the following places at Gangtok

1. Secretariat
2. STNM Hospital
3. District Administrative Center
4. Samman Bhawan
5. Raj Bhawan
6. Excise (ABKARI) Building

STFS as been installed in the laboratory of Sikkim Remote Sensing Application Center, Sikkim State Council of Science & Technology, Gangtok.

4. *Microzonation of Sikkim Region (SEISMICITY PROJECT):*

The Earth Science System Division of DST, GOI has sponsored the project to the Geology and Geophysics Department, IIT, Kharagpur. The Sikkim State Council of Science & Technology has coordinated the project in the State. The Main objectives of the project are:

1. Detail study of Seismo-tectonics of the Sikkim Himalayas, and understanding of the Earthquake Generating process.
2. Seismic risk Evaluation and determination of the Q factor for engineering construction.

5. *Technical support provided to the users in the State:*

The centre also provides technical assistance and services to different users in the State (both govt. and non governmental agencies) as and when they come with their requirement, especially related to the identification of catchments area, classification of Satellite data etc. The services are provided on payments

- Preparation of different type's thematic map of various watershed catchments Area.
- Scanning and plotting facility availed to user department.

The following are some of the services provided to the other departments like Forests Department, Agricultural & Horticulture Department, etc.

- Identification of catchment of Rangit Chu upto Reshi and Legship.
- Identification of catchment of Bhushuk khola upto Sethipool.
- Classification of Satellite data to identify high and low discharge zone pertaining to the above mentioned catchments areas,
- Base map and General Classifications map of the Talam, Tshangu Lake, Menmoisto lake, Bithang chu lake North Sikkim.
- Preparation of numbers of other thematic map like Slope, Aspect of the above lake.
- Printing of Auto CAD drawing to the Private Vendor.
- Training given to the officials from Agriculture Department for demarcations of watershed boundary and map preparation.
- Scanning facility availed to user departments.

ANIMAL HUSBANDRY AND ENVIRONMENT

- Introduction of high yielding variety of perennial fodder like Hybrid Napier, Guinea Grass, Para, etc.
- Encouraging farmers to plant fodder in areas not fit for crop farming.
- Encouraging chaffing of fodder to minimize loss and make efficient use of the fodder.
- Propagation of silage & hay making during surplus flush season.
- Cultivation of Oats/ maize in dry field after the harvest of paddy as winter fodder.
- Encouraging mixed cropping system so that fodder & crop is harvested side by side.

Status of Waste Management in the slaughter houses:-

As of now no treatment is in place for treatment of waste from slaughter house as the quantum of waste is very less, further all the waste consists of organic matter and is therefore drained into the river. However the department has planned modernization of slaughter houses with the provision of hot water and steam for cleaning and other proper measures for disposal of wastes.

Mechanism for Meat Inspection

Qualified veterinary officer and an inspector are posted at the slaughter house for ante and post mortem examination. They also inspect the meat at the meat stalls for hygienic measures adopted by the sellers. Proper sanitation facilities exist at the slaughter house. Besides the above a committee headed by Principal Director with members from UD HD, Health & family welfare and AHLF & Vs have been formed to monitor poultry stalls in the state. The committee meets to improve the hygienic set up of the meat stalls. A poultry Processing plant with proper disposal of waste is planned so that only dressed poultry meat is allowed for sale in the market. This would cease the roadside make shift poultry slaughter of birds.

Wastes from veterinary hospital

The quantity of bio hazardous waste generated from the veterinary hospitals is very less and these are disposed by proper burial in trenches. In situations where such waste increases, it is planned to incinerate such wastes at the request of Sikkim Manupal at Tadong.

WATER SUPPLY AND ENVIRONMENT

The Water Security & P H E Department has been entrusted with the works of supplying safe drinking water to Gangtok and most of the urban towns within Sikkim. Presently, we have full fledged treatment plant at Gangtok, Namchi and Jorethang. Other towns have also been partially covered with the water treatment facilities. The Department is ensuring safety of drinking water by conducting frequent quality test of water wherever the department is entrusted with the works of supplying water. Proper dosing of water is done with chemicals before it is supplied to the consumers.

In the coming years the Department has plans to set up full fledged water treatment plants in other towns and district capitals for ensuring safety

and sound health of citizens. Duly keeping in mind the health of the consumers, the department has organized many technical trainings to the departmental staff regarding testing of water quality so that there would be no complaints regarding the quality of water supplied to the consumers. The department is always coordinating with the institutions which are responsible for quality control to ensure safe and potable water supply to the consumers.

The largest quantity of drinking water is supplied to Gangtok city. The quantum of water treated at water treatment plant at Selep is to the extent of 8 MGD. The source of Gangtok water supply is Haas Pokhri which flows down from Tamjay and develops into a river called the Rately-chu. At Tamjay

the river is contaminated due to army settlement by the side of this river, where numerous urinals are constructed and frequently the sewage from septic tanks is emptied into the stream. The river flows downstream for a considerable length after which it is tapped and conveyed through closed conduits for a length of 17kms to the treatment plant at Selep. The water is then pass through sedimentation tanks and treated through rapid sand filtration after which it is disinfected with chemicals and supplied to the consumers.

The problem of contamination arises when consumers lay their pipes through Jhoras, drains and other unhygienic places where with passage of time the joints become loose and contaminants enter the water supply lines thereby affecting the health and hygiene of consumers.

■ WATER SUPPLY SYSTEM IN THE STATE:

- State of Sikkim solely depends upon “Surface Water Sources”. The basic Water Supply System consists of tapping of water (sources) located at higher reaches and transporting the same through gravity mains to the lower reaches at consumer points, towns, bazaars and villages.
- Spring flows from the water reserved in the underground aquifers of rocks. These aquifers in the rock stratas have to be charged with rain water, this recuperation takes place only if there is enough rainfall and vegetation to hold the moisture, absence of vegetation does not help in containment of moisture but rather helps accelerate flow of runoff downhill to the rivulets thus rendering the voids devoid of water content.
- The surface water sources are very sensitive to rivulet pollution and degradation of environment. Due to global warming and ecological imbalance the discharge is depleting which is a cause of great concern. South and West district of the State are comparatively dry. It has been observed that snow line at Bermeli Source for Namchi is gradually receding causing reduced discharge. Therefore, the aspect of conservation of water sources needs to be addressed with great concern and weightage attaching importance to the conservation and ecological balance of the environment.

PHED has been successfully supplying water to all its consumers. However, there still exists scope for improvement in the present systems. There is also an urgent need of forward planning and implementation of the needed water supply schemes so that sudden catastrophe of water shortage does not befall on the public.

■ Constraints :-

Due to lack of clear-cut water policy identification and quantification of water resources, development of these water sources, their allocations for different uses and most of all protection and conservation needs to be addressed sincerely. It is felt that steps should be initiated to arrest loss of moisture content in the catchment areas and thereby prevent depletion of available discharge by resorting to adequate plantation and preservation of the existing forest canopy. This could be achieved if the catchment areas could be declared as Biosphere. Water supply which is an essential commodity for the sustenance of life needs to be addressed with grave concern. Conveying water supply to the doorsteps of consumers calls for implementation of water supply schemes. In the process ducts and pipes needs to be laid along the land for transporting drinking water. It is here that we have difficulty in obtaining clearance from concerned authorities on time for availing the required land for laying pipes, constructing treatment plant and reservoirs for enabling safe supply of drinking water to the citizens. In the process projects are delayed and sometimes the schemes have to be abandoned due to time constraint.

■ Conclusion:-

Clearly, the problems associated with water pollution have the capabilities to disrupt life on our planet to a great extent. We must become familiar with the local water resources and learn about ways for disposing harmful household wastes so that they don't end up with sewage treatment that can't handle them or landfills not designed to receive hazardous materials. We have to preserve existing trees and plant new trees and shrubs to help prevent soil erosion and promote infiltration of water into the soil. As we head into the twenty first century, awareness and education will most assuredly continue to be the two most important ways to prevent water pollution. If these measures are not taken and water pollution continues, life on earth will suffer severely. Global environmental collapse is not inevitable. We all must think of sustainable development rather than economic expansion. Conservation strategies have to become more widely accepted, and people must learn that energy use can be dramatically diminished without sacrificing comfort. In short, with the technology that currently exists, the years of global environmental mistreatment can begin to be reversed.

SEWERAGE DISPOSAL AND TREATMENT

Gangtok can boast of having the only sewerage treatment plant in the entire North Eastern Region. The plant was built in the early eighties with a capacity to treat 1.26 MGD of raw sewage. The sludge is digested by anaerobic method using the high trickling filtration technique. In this process effluent is re-circulated to improve the quality of effluent by diluting the raw sewage and seeding it with active organisms and enzymes to prevent odor by freshening the applied sewage. Recirculation ratio of re-circulated flow to the raw sewage is kept at a maximum of 8 and normally not more than 2-3 single stage, two stage and multistage filtration with different patterns of recirculation is in practice to achieve high degree of purification.

Raw sewage includes waste from sinks, toilets and industrial processes. Treatment of the sewage is required before it can be safely buried,

or used, or released back into local water systems. In a treatment plant, the waste is passed through a series of screens, chambers and chemical processes to reduce its bulk and toxicity. The three general phases of treatment are primary, secondary, and tertiary. During primary treatment a large percentage of the suspended solids and inorganic material is removed from the sewage. The focus of secondary treatment is reducing organic material by accelerating natural biological processes.

Tertiary treatment is necessary only when water is to be reused. The treatment of raw sewage consist of the following stages first the matter passes through the Grit chamber where segregation of organic particles like grits, silts etc before entering into the treatment is processed. Openings are so made that in organic materials of higher sizes interfering the biological process are arrested in these screens. This is one of the major requirements to allow more organic matters to pass for subsequent biological treatment as food for micro-organisms.

Primary and Secondary sedimentation tanks

Settling tank function on sedimentation theory in which suspended particles are separated from sewage water by gravitational settling. The plant is provided with clarifiers having central inlet for the sewage and effluent channel with peripheral weir. The purpose of sedimentation tank is to remove suspended solid by gravity. As primary tank reduced organic loads (BOD) to the tune of 30 to 32% this

deduction on BOD allows tricking filter (bio-filtration) plant to operate effectively and efficiently. It also eliminates inorganic suspended solid, organic and residual inorganic solids, free oil and grease and other floating material. Then the sewage is passed on to the trickling filters where biomass grows attached to inert medium such as rocks, slag, ceramic, plastic or synthetic materials. The depth of the filter medium varies from 0.9 m to 3.0 m.

The trickling filter is classified as low rate, high rate and super rate depending on hydraulic and organic loading applied on them. Recirculation is provided in high rate and super rate filter but not adopted in low rate filter. The purpose of trickling filter is for secondary treatment process where biological treatment takes place. The residual BOD coming from primary clarifier is mostly removed in this biological reactor. About 85 to 90% of residual BOD may be removed in trickling filter.

Secondary settling tank

Basically there is not much difference in the function of secondary clarifier except for the characteristics of settleable solids. In primary clarifier the settleable solids (sludge) are mostly silts, grits with certain percentage of biomass. The nature of sludge in secondary is primarily bio-filter humus, which mostly constitute cells of microorganisms.

Sludge thickening or dewatering is adopted for reducing the volume of sludge or increasing the solids concentration. The purpose of sludge thickener is to permit increased loadings to sludge digester, minimize the land requirement as well as handling cost when digested sludge is transported to disposal sites and it saves unit cost. The purpose of digester is to digest the sludge by anaerobic method where the sludge is pumped from sludge thickener to the digester with the help of sludge recirculation pumps. The constraints being faced is due to systems which do not work to the desired satisfaction due to the inclement weather conditions and wear and tear of the existing plant which has been operational for more than two decades. The period from November to the beginning of March experiences cold weather conditions which is not favorable for bacteria to breed thus digestion of sludge is severely affected. Again the span extending from end of April till the end of September experiences continuous torrential rainfall thus the digested sludge cannot be dried in the drying bed which is open to air. Considering the constraints proposal has been submitted and approved by the

ministry of Forest and Environment to install plants duly incorporating the latest technology which will take care of all the shortcomings in the present Sewage treatment system. Other towns do not have Sewage treatment plants and the raw sewage is being collected in septic tanks where it is digested by anaerobic method.

Proposals have been drawn up to lay sewerage treatment Plants at places where the population is quite significant like Ranipul Bazaar, Singtam, Rangpo, Melli, Jorethang and Namchi. The existing plant at Gangtok is proposed to be augmented to accommodate another 1.77 MGD of raw sewage because of the fact that the load has increased tremendously due to the extension and expansion of sewerage networks in and around Gangtok. This would cater to about 1,10,000 people considering per capita water supply @ 135 lpcd.

Rehabilitation of existing sewerage network

The existing sewerage trunk lines were laid more than two decades ago, as a result the RCC hume pipes and Manhole chambers have been damaged considerably which needs to be rehabilitated in most of the stretches. Recently CCTV was used to detect the damages and other related problems within the sewer lines along certain parts of trunk lines. Comprehensive report for this has been drawn up by AUS AID. The

same will be submitted to the government for consideration and sanction so that the works could be implemented promptly.

Future strategies

The State proposes to ensure clean and safe environment for which earnest steps are being taken by the department to negate the effects of environmental pollution. The department in close coordination with the Ministry of Forest and Environment has drawn up ambitious plans and strategies to fight the effects of pollution. The Ministry of Forest and Environment has sanctioned schemes relating to pollution abatement of river Rongnachu amounting to Rs. 1581.00 lakhs. With this amount works have been taken up to extend the Sewerage network in and around Gangtok including construction of a treatment plant to accommodate additional load of 1.77 MGD in addition to the existing treatment plant which has a capacity to treat only 1.26 MGD. Proposals have been drawn up to bring the entire Gangtok within the ambit of sewerage network comprising of Chandmari, Thathangchen and Syari for which a treatment plant is proposed at Kopibari. All the rivers including Rangit and Teesta are also under active consideration, therefore, schemes have been drawn up to bring most of the major towns within the Sewerage network. Presently schemes for Ranipool, Singtam, Rongpo, Melli, Jorethang and Namchi have been forwarded to Ministry of Forest and Environment to obtain requisite funding under NRCP. With the launch of JNNURM plans afoot to provide sewerage network to almost all the towns of Sikkim.

Guidelines for the Appointment of *Himal Rakshak*

The Need

(1) About 59% of Sikkim (4,187 sq. km) lies above 3000 meters and most of this is classified as Reserve Forests. This sub-alpine and alpine landscape of the Sikkim Himalayas locally referred to as *Himal*, has a unique ecosystem and cultural and wildlife values associated with it. It is a repository of unique, globally significant wildlife like the Snow Leopard, Musk Deer and Black Necked Crane and also provides an ideal habitat for their survival. The *Himal* also forms the headwaters of important perennial rivers and conserving this water bank is essential for the survival of thousands of villagers who live at the lower elevations. Improved ecological health of this ecosystem translates to sufficient water in the streams even in the lean season, which sustains agricultural and horticulture crops, directly

translating to food and health security of the villagers living down stream. The *Himal* is also a repository of valuable medicinal plants, which form the basis for the indigenous systems of medicine. Most of the peaks, lakes, rivers and caves here are considered sacred and are visited by pilgrims to pay homage.

Present Status, Gaps and Challenges

(2) Though most of lower and middle hill forests have been brought under the Joint Forest Management (JFMC/EDC) network, the upper hill forests of the Himalayas, inspite of determined efforts, still continue to be under inadequate management, beset with threats and need urgent interventions. The main threats being unregulated grazing, unplanned trekking tourism, hunting and trapping of wild animals, smuggling of medicinal and aromatic plants and lack

of awareness amongst the security forces. Effective conservation of the *Himal* by forest staff alone is very difficult due to its high altitude, remoteness, tough terrain, harsh climate and limited resources available. Further lack of adequate infrastructure and facilities make every patrolling visit more like an expedition, with a large contingent of support staff and resultant high attendant costs.

✚ The Strategy

(3) Hence it is proposed to enlist the support of the villagers, practicing traditional subsistence livelihoods in the high altitudes of the Himalayas, in conservation management. Such villagers, who are willing, shall be recognized as *Himal Rakshaks* (Honorary Mountain Guardians) and their capacity building done. This will result in a more effective, participatory “on ground” conservation of the *Himal* jointly with the Forest Department. Since it is their traditional livelihoods which compel the *Himal Rakshaks* to access the *Himal*, these livelihoods will be permitted in a regulated manner, provided they perform their duties and responsibilities.

✚ Legal Status

(4) Section 4(1) of the Wildlife (Protection) Act 1972 empowers the state government to appoint

- a) A Chief Wildlife Warden
- b) Wildlife Wardens
[(bb) Honorary Wild Life Wardens]
- c) Such other officers or employees as may be necessary for the purposes of the Act. *Himal Rakshaks* can be appointed on a honorary basis, under sub-section (c) of section 4 of the Act read in conjunction with clause (b) of section 33, read with sub-section (8) of section 35 and subsection (2) of section 36A of the Wildlife (Protection) Act, 1972 (53 of 1972). Under section 59 of the aforesaid act, such *Himal Rakshaks* shall be deemed to be public servants within the meaning of section 21 of the Indian Penal Code.

The legal status, land tenure and ownership of the *Himal* shall remain unchanged.

✚ Criteria for Selection

(6) The following criteria should be kept in mind while assessing the suitability of a person as a *Himal Rakshak*. (a) Bonafide resident of the state of Sikkim. (a) Genuine concern for wildlife conservation. (b) Personal record free of any current involvement in any activity detrimental to the interests of nature and wildlife conservation. Any person involved in commercial exploitation of wildlife should not be considered. (c) Personally visit the *Himal* regularly in the normal course of his lifestyle (d)

Willingness to render support to the official machinery. The nature of the livelihood is traditional and has been carried out since generations. (e) The livelihood is of subsistence level and for bonafide personal use and not for any commercial purpose. (f) This livelihood is the sole basis for the sustenance of the household. (g) The sensitive habitats / strict conservation zones are not disturbed. (h) Any other regulation that may be assigned by the concerned divisional forest officer or any other high authority.

Yak (and Hybrid Yak) herders from the districts of West, South and East Sikkim are not eligible for selection under this criterion, since there is no cold desert in these districts, which is the only natural home for the yak in the state.

An important point to bear in mind is the identification of *Himal* areas prone to threats or close to sanctuaries, national parks and conservation reserves. Selection of persons as *Himal Rakshaks* must be related to such high altitude problem areas because it is these areas which need priority attention and where public participation is needed most.

✚ Procedure for Appointment, Performance Appraisal and Termination

- (7) These guidelines for the appointment of *Himal Rakshaks* should be approved by the State Government.
- (8) When recommending any person for such appointment, the criteria laid down in paragraph 6 above must be kept in mind.
- (9) It is very important that the right persons are selected for appointment as *Himal Rakshaks*. The selection process would involve an initial selection by the concerned JFMC/EDC jointly with the concerned Ward Panchayat and forwarded to the concerned Divisional Forest Officer who shall verify whether the criteria for selection has been adhered to or not. He shall then forward the names of suitable persons to the Chief Wildlife Warden of the state for onward appointment.
- (10) The appointment of any *Himal Rakshak* should in the first instance be generally for a period of one year. Thereafter on the recommendation of the concerned Divisional Forest Officer, it may be renewed for a period not exceeding 2-3 three years at a time. Each *Himal Rakshak* should be issued an identity card having his signature and photograph duly attested by the concerned divisional forest officer.
- (11) The performance of the *Himal Rakshaks* shall be reviewed annually by the concerned divisional

forest officer jointly with the concerned JFMC/EDC and the Gram Panchayat. In the absence of such appraisal, the appointment of the *Himal Rakshak* shall be automatically renewed for the next year.

- (12) The divisional forest officer may at his/her discretion, terminate the appointment of any *Himal Rakshak* at any time, if he/she does not perform his duties and responsibilities or carries out any activity detrimental to the interests of nature and wildlife conservation.

✚ Duties and Responsibilities

(13) The main duty and responsibility of a *Himal Rakshak* is to assist whole heartedly in wildlife conservation work with regard to the following matters:

- a. Control of poaching and clandestine trade in wild animals and products / articles thereof
- b. Detection of offences under the Wildlife (Protection) Act and the rules made thereunder.
- c. Preventing damage to the habitat of wildlife
- d. Preventing smuggling of medicinal and aromatic plants for trade
- e. Preventing instances of bio-piracy by tourists and others
- f. Reducing the negative impacts from unplanned trekking tourism
- g. Carrying the message of conservation to the people and enlisting their public support for nature and wildlife conservation
- h. Carrying out biological surveys and monitoring
- i. Render assistance to the forest personnel during their visits to the *Himal*
- j. Any other matter related with the conservation of wildlife, which may be entrusted by the concerned Divisional Forest Officer.

✚ Powers

- (14) The *Himal Rakshak* shall report to the concerned JFMC/EDC and the concerned divisional forest officer and under section 59 of aforesaid Act he/she shall be deemed to be a public servant within the meaning of section 21 of the Indian Penal Code. Protection for action taken in good faith is provided under section 60 of the Act.

- (15) With a view of making the *Himal Rakshaks* useful and effective it is necessary that the following specific powers under the Wildlife (Protection) Act 1972 should be delegated to them: (a) Powers of entry, search, seizure and detention under section 50 for prevention and detection of offences under the Act.

- (16) Apart from the above, the State Government may delegate any other power under the aforesaid Act, as it may consider necessary.

✚ Benefits and Capacity Building

- (17) The *Himal Rakshaks* shall be permitted to continue their existing livelihood in the *Himal* in a regulated manner provided they perform their duties and responsibilities. The State Government is however not liable to pay any monetary remuneration to the *Himal Rakshaks*, in lieu of their service.

- (18) The State Government should recognize outstanding work or service rendered by a *Himal Rakshak*. Such recognition can be by way of a letter of commendation, or a certificate signed by the Forest Minister or Forest Secretary. Cash awards could also be considered for suitable cases.

- (19) The Forest Department shall in partnership with reputed NGOs and others seek to build the capacity of the *Himal Rakshaks* in conservation management. This would include trainings and support for collection of data in prescribed formats on status, distribution and threats to wildlife and their habitat.

✚ Cooperation

- (20) If the circumstance warrant, the departmental staff should provide all possible help and assistance. However no staff or vehicle support can be provided to *Himal Rakshaks* as a matter of course.

- (21) Just as it is expected that the *Himal Rakshaks* should assist the forest personnel, it is equally essential that the Forest Department should take all possible steps to associate the *Himal Rakshaks* in their work. This can be achieved best by fostering a spirit of mutual trust and confidence.

Environment Impact Assessment (EIA)

- Sikkim, being a hilly state it is blessed with a large potential for hydro-power development in the field of micro, Mini and Mega hydel schemes. However only a small portion has been explored so far. The potential of river Teesta was investigated by the Central Water Commission (CWC) cascade development and has been identified to be in six stages. Out of these six stages, Teesta stage- V (510MW) is under the verge of completion by the National Hydel Power Corporation (NHPC). The other stages have been allotted to the private developers and NHPC, all are reviewing the capacity and required studies are under going.

The installed capacities of different stages of Teesta project are given below:-

Stages	Installed capacity
Teesta I	320
Teesta II	850
Teesta III	1200
Teesta IV	495
Teesta V	510
Teesta VI	500

The state Government has allotted Teesta stage VI hydro electric project to the Lanco Energy Private Limited. Its original detailed project report was prepared by the CWC which identified an installation capacity of 360 MW with the proposed under ground power house location at Subinkhor and with Dam at Khanitar. Accordingly DPR was prepared by the CWC with a dam height of 76 mt. This dam would have totally submerged the existing Sikkim Manipal institute of Technology (SMIT), Indian Oil Corporation Depot, a part of National Highway, huge no of house holds and few agriculture lands. At the time of issuing letter of intent the state Government has requested to protect these structures, accordingly the Lanco Energy Private limited has utilized the services of the experts to review the project for protecting the structures and to review the project capacity. After completion of necessary survey and investigations it was established that the submergence of the above properties and displacement of house holds could be effectively avoided by shifting the location of the Dam from Khanitar- Mamring to Sirwani and the capacity of the project could also be enhanced from 360 MW to

500 MW. The dam was also replaced by a Barrage. The final DPR for 500 MW has been prepared after detailed technical studies.

This project power house is situated in South Sikkim, about 52 kilometers (km) from Gangtok city and is located next to a sparsely populated rural area about seven km from Rangpo and around 400mt from National highway 31A. Site location studies were conducted in 2005 by a team of experts from the State Power Department, CWC and subsequently by LANCO Energy Private Ltd, and the site was selected subject to the Environmental clearance and FCA-1980 for the involved Forest land from the MoEF, Govt. of India. In 2005, a Master Plan study including some preliminary design studies were also conducted by some other agencies.

Construction and operation facilities can cause habitat fragmentation, generate noise and vibration, and impact wetlands and other natural ecosystems—as well as affect historic resources, community cohesion, and other social and community characteristics. Because of the wide range potential, impacts to the natural and human environment, and legal requirements under the EIA notification issued by the Ministry of Environment and Forests, Government of India, the user agency i.e. LANCO Energy Private Limited has entrusted the responsibility of preparing a Environment Impact Assessment (EIA) report, Catchment area Treatment Plan and Environment Management Plan (EMP) for the Hydel project to the Department of Forests, Environment and Wildlife Management, Government of Sikkim. This report was prepared with the help of house experts and technical experts from outside the Department.

Because of its land locked scenario and wide altitudinal variations the state can only be approached by road through West Bengal. The nearest rail head is at New Jalpaiguri - 115 Km from the state capital and the nearest airport is at Bagdogra is 125 Km away; both in West Bengal. The state has been recognized as a peaceful state and has ample scope for tourist development along with the Hydel project potential but due to non availability of direct air route or any second alternative route tourist in-flow is not up to the mark. Hence the state can enhance itself for upliftment next to tourism by hydel projects.

■ M/s. Jal Power Corporation Limited (JPCL) proposes to develop a hydroelectric project for harnessing the power potential of river Rangit, in West Sikkim district within the state of Sikkim. The scheme envisages construction of a 29 m high concrete dam across river Rangit to the north of village Rishi. The proposed Rangit-IV HEP is located downstream of Rangit Hydroelectric project (Stage-III) under operation by National Hydro Power Corporation (NHPC). The project proposes to utilize the tail water of Rangit (Stage-III) hydroelectric project as well as discharge of Kalej-Khola a major tributary of Rangit river. This project is being conceived, as a run of the river scheme. The water from the reservoir will be diverted for power generation through 6 km long Head Race Tunnel (HRT) to a surface power house located at the confluence of Rothak Khola with Rangit river. The coordinates of the dam site 27°13'10"N and 88 ° 18'10"E. A head of about 103.6 meter will be utilized to generate power of 120 MW for generating energy 585 MU for 90% dependable year. The total land required for the

project is 116.25 ha of which forest/government land is 84.53 ha. The balance 31.72 ha of land is owned by private land owners..

■ M/S Gati Infrastructure Limited (GIL) proposes to develop Bhasmey Hydroelectric power project (51 MW) located between Latitude 27°11'12" N to 27°11'45" N and Longitude 88°33'16"E to 88°36'45"E for harnessing the power potential of river Rangpo, in East district of Sikkim. The Bhasmay project envisages a peaking power plant comprising one intake with a storage reservoir, a headrace tunnel, surge shaft, surface penstock, an open air powerhouse and an outdoor switchyard. The maximum gross head of the scheme is 113.0 m and the nominal discharge 55 m³/s. Based on these parameters the plant will have an installed capacity of 51 MW and a total average annual energy production of 244.1 GWh (=MUs, Million Units). The annual peaking energy production is expected to be 161.1 GWh with an annual base energy production of 83 GWh.

CLAUSES FOR ENVIRONMENTAL PROTECTION IN MoU/ AGREEMENTS OF HYDRO ELECTRIC PROJECTS

OBLIGATIONS OF THE GOVERNMENT:

3.1: Granting consents/permissions and Assistance in obtaining Clearances: The Government /SPDC shall assist the company for expediting the various statutory / non statutory clearances required for the implementation of the projects, from various competent authorities of the State Government / Central Government or the Board- subject to Company makes diligent and complete applications.

3.2: Use of materials – In accordance with the Law and on payment of royalty.

3.6: Rehabilitation and Resettlement Plan (R & R): The company shall, wherever required and subject to approval of any competent authority prepare a R & R plan in coordination with the Government for local residents –affected or displaced – the cost of the preparation and implementation to be borne by the company and implemented under the supervision of the Government.

3.15: Monitoring Committee – The Government shall constitute a multi-disciplinary committee –

comprising of company, different departments – Meeting quarterly.

3.18: Project Level Welfare Committee – The Government shall constitute Project Level Welfare Committee – comprising of Local politicians, Gram Pradhans, important villagers, Local Administration and Company.

3.19: Mortgaging of land: Non Forest land acquired only - no forest land diverted can be mortgaged.

3.22: Imposition of Tax/Duty: The Government shall impose an Environment Cess- @ 1 paise per unit electricity sold & shall be collected at source.

OBLIGATIONS OF THE COMPANY:

4.4: Rehabilitation and Resettlement Plan (R & R): The Company shall prepare a R & R plan in coordination with the Government–Implementation under the supervision of the Government- the cost of the preparation and implementation shall be borne by the company- and shall be the part of the project cost.

4.5: The Company shall ensure proper quality control and safety measures during implementation including geological studies and testing at the sites etc. The Government shall

have the right to institute and appropriate mechanism to ensure the compliance by the Company in this regard.

4.6: Catchment Area Treatment Plan (CAT): The company shall make suitable financial provision in the Project cost for CAT plan as determined by the FEWMD, State Govt. and approved by the Ministry, GOI- the Cost involved on this account shall be paid by the Company to the concerned authorities of the State Government.

4.8: Environment Impact Assessment (EIA) Studies: The Company shall be liable to carry out EIA/EMP in association with the FEWMD, State Government as required under EPA-1986 and obtain the consent of –SPCB.

4.10: Maintaining Ecological Balance: The company shall be responsible for maintaining the ecological balance by preventing deforestation- water pollution and defacement of natural landscape and also responsible to take all measures to prevent any unnecessary destruction, scarring or defacement of all natural surroundings.

4.11: Ensuring Flow of Water: The Company shall ensure such Minimum flow of water immediately down blow of the weir/barrage/dam for downstream requirement as specified in environment clearance.

4.12: Fishing, Recreational and Navigational rights: Fishing, Recreational and Navigational rights in the river, water, channels, reservoirs, lakes shall remain vested with the Government subject to restrictions for operational requirements, safety and security of project.

4.14: Dumping of Excavated Materials: The company shall ensure that the materials excavated from the site shall be dumped in the Areas duly approved by the SPCB.

4.15.1: Recruitment of Staff/ Labour: The Company as well as its contractors shall ensure that all the unskilled/ skilled manpower other than executives- shall be recruited through the Employment Cell at Gangtok, Sikkim. Whenever Employment cell- whom the vacancy has been notified- fails to responds in time- the company may resort to other modes of recruitment on temporary basis till such time the local manpower is available.

The import of labour from outside the state shall be made in limited manner. Those brought – shall

be examined medically- registered with local authority- for period not beyond six months after the commissioning date of Project. Furnish the list, names- required registered permit- nature of works – leaving of the project. The company- shall liaise with the State Government – shall allow the District Authorities or Officers of the concerned departments to make inspections of the project sites, relevant registers, books etc. for the purpose.

4.15.2: For employment of the executives, the company shall give preference to the bonafide residents of Sikkim.

4.16: Displaced Families: The Company shall provide employment to one member of each family displaced families or adversely affected – covered in R & R Plan referred to in Clause 3.6 and 4.4 of MOU.

4.17: Use of Facilities: Subject to availability, security, safety, Law and Order and operational factors being met – the Company shall permit free use by the Government and the general Public of all service roads constructed and maintained and also other facilities like Hospitals, Post Office, Schools etc. shall be extended to local public as per the guidelines of the Company.

4.19: Usage of Land: The Company shall ensure that the land is used only for the project and the activities ancillary to it.

4.20: Use of Materials : As per Law and in case of any object of Archaeological importance is found – hand over the same to the Government free of cost – if any precious or semi-precious material found – informed the State Government and shall abide by the instruction of the Government.

4.21: Adherence to Laws: The Company shall follow all the relevant laws.

4.28: Protection of Fish Culture: The Company shall take appropriate steps for the protection of fish culture as per the environmental requirement.

4.28: Adoption of Village: The Company shall adopt the village near the vicinity of project area- provide mutually agreed facilities like road, school, health, water, sanitation, power, religious/ social/ community development and maintenance.

4.32: The Company shall not name/ rename any thing and the buildings –reflecting Sikkimese traditional style.

FOREST (CONSERVATION) ACT 1980 CELL

Forest (Conservation) Act, 1980 is a unique piece of legislation, and a regulatory mechanism that reflects the collective will of the nation to protect its rich biodiversity and natural heritage and that permits only unavoidable use of forest land for various developmental purposes. It embodies the firm commitment of the Government of India and the State Government to balance the conservation of forests with the sustainable development need of the country contributing to better environment, health and economy. The remarkable feature of this Act is that it is regulatory and not prohibitory.

Since 1980, Rules and Guidelines have been framed for diversion of forest land for non-forestry purposes. Since its inception, the Act has facilitated developmental activities like construction of power projects, irrigation projects, roads, railways, schools, hospitals, rural electrification, telecommunication, drinking water facilities, mining etc. on forest lands and checked the

indiscriminate diversion of pristine forest areas. Between 1950 and 1980, forest lands have been diverted at the rate of 1.50 lakh hectare per annum by the various State Government / UT Administrations. This diversion has however, come down to as low as 0.38 lakh hectare per annum after 1980. In the State of Sikkim, since the inception of the Act till March, 2005 about 165 numbers of proposals have been accorded forest clearance for diversion of about 934.00 ha of forest land for various development projects. The Compensatory Afforestation stipulated was 2337.01 ha, out of which about 2141.99 ha. i. e 91.65% of Compensatory Afforestation target has been achieved and the balance target could not be achieved due to either non-receipt of fund or late receipt of fund from the User Agency. The details are given below in **table – Basic information for proposals under Forest (Conservation) Act, 1980 (Districts & State Profile)**

Application of Forest (Conservation) Act,1980

STATE PROFILE AS ON 31st MARCH 2007
State: Sikkim, Period [25-10-1980 to 31-03-2007]

Sl. No.	1	2	3	4	5	6	7
Districts			East	West	North	South	Total State
Forest Cover (Ha) FSI 2001			67900	72800	132600	52900	326200
Clearance under Act so far	Forest Land diverted (ha)	-	240.06	51.78	370.85	271.74	934.44
	No. of Proposals	-	53	22	42	56	173
Purpose of Diversion	Hydel	Area Nos.	107.9 7	14.746 3	66.147 7	35.20 4	223.99 20
		Irrigation	Area Nos.	3.21 1	0.35 1	0 0	0.88 3

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Application of Forest (Conservation) Act,1980

STATE PROFILE AS ON 31st MARCH 2007
State: Sikkim, Period [25-10-1980 to 31-03-2007]

Sl. No.	1	2	3	4	5	6	7
Districts			East	West	North	South	Total State
Mining	Area Nos.	Area	0.62	1.80	0	0	2.42
		Nos.	1	1	0	0	2
Road	Road/ Railway	Area	62.15	2.8667	301.107	34.4348	400.56
		Nos.	15	8	26	19	68
Transmission Line	Thermal/ Tr. Line	Area	24.346	29.86	0.48	91.29	145.98
		Nos.	6	4	1	9	20
Others	Area Nos.	Area	41.837	2.16	3.1164	109.94	157.05
		Nos.	24	5	8	21	58
Compensatory Afforestation	Stipulated	Non Forest land	0	15.78	7.276	2.70	25.75
		Degd. Forest land	487.72	235.26	1151.49	436.79	2311.26
Achieved	Non Forest land Degd. Forest land	Non Forest land	0	13.014	2.262	2.50	17.77
		Degd. Forest land	583.07	271.55	800.405	469.19	2124.22

Abstract: 1. Stipulated Compensatory Afforestation = 2337.01 Ha.

2. Achieved Compensatory Afforestation = 2141.99 Ha.

Hence, the Compensatory Afforestation % of stipulated = 91.65 %

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SMRITI VAN PROGRAMME-SIKKIM

A PEOPLES PROGRAMME

The concept of **Smriti Van** is a novel idea of involving society at large in nature conservation. This is a concept in which trees can be planted, including on marriage, birthdays, anniversaries, demise, and friendship or in the remembrance of near and dear ones. The concept can be implemented by setting up “Smriti Vans” in all villages / Panchayats, urban areas, tourist places, religious places and crematorium etc. The initiatives for this purpose no doubt have to be taken by the state government or the local body by making the land available, technical advice and seedlings etc. The planning and implementation would necessarily require active participation of the local community and ultimately the management should be entrusted to the local community, organizations, NGO’s or welfare associations etc.

All over the world, people believe in perpetuating the memory by erecting memorials. Trees can be planted as “Live Memorial”. Planting of a tree(s), on any occasion would not only satisfy the desire to keep the memory fresh, but also help in the national cause of “Greening and Maintaining the ecological balance as well as atmospheric equilibrium”. The planting of non timber species, which have value in terms of the regular usufruct they give like fruits, flowers, nuts, leaves, medicines, fodder and even shade, without having to be felled when mature, will enhance the concept of perpetuation of the memory of an ancestor, who is seen to continue to be a benefactor.



To make it a mass voluntary movement, active involvement of people and all the sections of society

for a **GREEN SIKKIM**, the State Government decided to create and establish the **MEMORIAL FORESTS / SMRITI VANS** at various desired places in the State. **Hon’ble Chief Minister Dr. PAWAN CHAMLING** inaugurated and launched the programme on 5th June 1999 (**WORLD ENVIRONMENT DAY**) at Bulbuley in East district, which is followed in other districts as well. The programme has been taken to the doorsteps of the people by creation of Smriti Vans in every Village & Panchayats.



In this programme till date in the State of Sikkim, in addition to Smriti Van in every Panchayat (Total 166 Nos.), more than 62 (Sixty Two) numbers of SMRITI VANS at various places have been created such as : BULBULEY (56 nos) [East District]; Rinchenpong- Tagore Smriti Van & Sakyong [West District]; Guru Padma Sambhava Smriti Van at Samduptse (Tendong) & Rabong [South District] ; and the Yumethang Valley Smriti Van (High Altitude) in North District . A total of more than 1, 35,000 nos. (One Lakh thirty five Thousand) numbers of seedlings in addition to Panchayat Smriti Vans have been planted in the year 1999-2000,2000-01,2001-02 , 2002-03, 2003-04, 2004-05, 2005-06 & 2006-07 and are being maintained, nursed & protected by various Non-Government Organizations(NGOs), Community Based Organizations(CBOs), Associations, Religious & Social Institutions, Schools, Government & semi – government agencies, and by individuals as well. The response and participation is tremendous and very encouraging.

BIRD PARK AT RABDENTSE, WEST SIKKIM

INTRODUCTION

Prof Ulhas Rane of 'The Designers' had been in communication with Ms. Usha Lachungpa, the Project Officer of the FEWMD for the concept development of Butterfly Park in Sikkim since 1998. Subsequently 'The Designers' sent a Broad Outline for the Project proposed at Sikip in South Sikkim in 2002. Further to that 'The Designers' responded to the invitation (8 July 2005) from FEWMD to visit Sikkim in order to discuss the feasibility of various Ecology Parks Projects and then survey various sites identified by the Department and advise on appropriate sites for the Projects. Prof. Ulhas Rane visited various sites on 29, 30 August 2005 and offered his suggestions and recommendations. Ultimately in February 2006 the FEWMD informed 'The Designers' about the final selection of the site at Rabdentse in West Sikkim for the Bird Park Project which was approved by the Govt. of Sikkim.

'The Designers' were invited to visit Sikkim to survey the site for its feasibility and to provide Consultancy of the Design and Development of the Bird Park. Prof. Ulhas Rane visited Sikkim from 28 February to 4 March 2006 and carried out detailed site surveys and discussions about the project and consultancy. He also gave a presentation of the general Concept and various similar projects designed by 'The Designers' to the Honourable Chief Minister & the Forest Minister on 3 March 2006. The Honourable Chief Minister commended the concept and advised to expedite the work.

The consultancy proposal of 'The Designers' was approved by the Govt. of Sikkim and the FEWMD invited 'The Designers' to Sikkim to formalise the Consultancy and commence the project work. The design team visited Sikkim from 22 to 29 May 2006. The detailed discussions were conducted on 23 May 2006 with the FEWMD officials when the draft agreement was finalised. The design team commenced the systematic work of preliminary surveys and research. The team members visited the site on 27 & 28 May 2006 and carried out extensive technical and ecological fieldwork on the site and surrounding influence region. The team also had interactions with FEWMD officials on the site when brief concept was explained and instructions to commence some basic work were given to the officials. Subsequently the literature survey and communications with national/international institutes and experts was also initiated. Further to this the Ecology Team also visited the site on 3 & 4



November 2006 and carried out detailed ecological observations and analysis of the site and the surrounding region. This was followed by the presentation to the FEWMD officials and discussion about the modalities to take the project ahead. The Agreements of consultancy were also signed during this meeting.

The CFR (Draft) was submitted in December 2006 for the perusal and comments of FEWMD officials and the Govt. of Sikkim. The comments were received in January 2007 which has been incorporated now in this CFR (Final). This CFR is based on the analytical work carried out in eight months.

GENERAL CONCEPT

The wonders of nature have always inspired humans in spite of all their technological advances. They create awe, affinity, respect, fear and various complex moods in the human mind. Birds are such wonderful creations of nature, which have fascinated humans from all walks of life. They have found their way into our poems, songs, stories, paintings and almost all forms of art. They have also attracted great attention of scientists and ecologists, who have been studying the role of birds in the intricate web of life. Ecologists all over the world are curious about the breeding biology, life cycle, calls / songs, migration and behavioural patterns and their study has become a very important research area. Birds live in diverse habitats and have evolved adapting to the habitat and food pattern. They have a complex lifestyle and live in varied ecosystems. Human's unending greed for 'development' has resulted in the blatant destruction of the environment. The process of urbanisation has also brought tremendous pressure on natural resources, particularly in tropical regions where ecosystems rich in biodiversity are adversely affected.

Environmental destruction and urbanisation has created large distances between nature and humans.

Humans started their two-way efforts to overcome these adverse factors. **Environmental conservation** became a major issue all over the world during the last three decades. Simultaneously the study of various facts of nature also received great importance. The idea of zoological parks emerged in China. However the emphasis remained mainly on bigger mammals. **'Education through recreation'** became a key feature. Birds are considered important indicators for the health of various forest habitats as they depend on diversity of habitats for nesting and food. **Therefore diversity of birds indicates biodiversity of habitats.** Birds have attracted human's curiosity, mainly because of their flights, vibrant colours, calls / songs, migration and diversity. Therefore, it is not surprising that birds in the tropical region, which are diverse, large and colourful, have attracted the attention of humans from all over the world. Birds from the tropics became researchers' topics. It is very popular to keep birds in captivity even in the households for their colours and songs. The destruction gave emergence to various Wildlife Protection Acts and subsequently to an idea of Aviaries and captive breeding of birds. There are many Aviaries all over the world and a few Bird Parks also. There are many Birdwatcher Groups / Clubs / Societies. The major concentrations are in Europe, America and Asia. Some aviaries are for research-cum-recreation purposes, whereas many breeding centres have commercial motives. However, the concept of a Bird Park is still in its nascent stage and scientists, ecologists and naturalists are carrying out various experiments. The task is complex and difficult due to the delicate and complex nature of this wonderful creature and its diverse ecosystems. In India, there are no Bird Parks. There are a few, small aviary experiments in various zoos in major cities e.g. Delhi, Kolkata, Mumbai and Chennai. Ms. Usha Lachungpa of FEWMD has been carrying out bird observations and studies in Sikkim since 1998.

The concept of a Bird Park and the task of its creation are challenging and the idea itself is a unique contribution to environmental conservation.

✚ SITE ANALYSIS

The landlocked Himalayan State of Sikkim is wedged in between China in the north, Nepal in the west, Bhutan in the east and the Indian State of West Bengal in the south. The Singalila Ridge containing Mt. Khangchendzonga (8,581 M) on the west and the Chola Range on the east is capped in the north by the main Himalayan range, trapping Sikkim in a gigantic mountainous horseshoe. This large strip of rugged

mountain country feeds the mighty Teesta and Rangit rivers which run north to south across Sikkim.

Sikkim broadly has three altitudinal zones: The **Tropical Zone** upto 1200 M which extends down to the foothills of the outer Himalayas, the **Moist Temperate Zone** extending to 2500/2800 M and the **Temperate Zone** which goes all the way upto 4,000m. The telescoping of terrain has created a divergent range of climates and vegetation making Sikkim a unique home for over 527 bird species and is, perhaps, the richest birding area in the Himalayas.

150 Kms from Siliguri, the western towns of Pelling and Pemayangtse present breathtaking views of the beautiful Singalila range. Pelling is on the state highway connecting Gangtok and Yoksum and rests at the foot of snow capped Mt. Khangchendzonga. The important Pemayangtse monastery is a few kilometers from Pelling and is situated on a hilltop (2,100 M) which is covered by moist temperate Oak forests decorated with moss and lichens.

The proposed **Bird Park site** is located at Rabdentse in West Sikkim on the State Highway between Geyzing and Pelling about 110 kms from Gangtok. This is around 180 kms from the nearest airport at Bagdogra in West Bengal. The nearest railway station is at Jalpaiguri about 160 kms. The famous Buddhist Monastery Pemayangtse is situated about 2 kms north of the Bird Park site whereas the nearest large town Geyzing is situated on SH – about 10 kms south of the Bird Park site. The famous archaeological ruins of the ancient second capital of Sikkim are located adjacent to the site with present access through the site. The longitude and latitude of the Bird Park site are 88° 15' 16" E and 27° 18' 5" N respectively. The site is undulated and the average elevation of the site is about 1950 m above the MSL.

The site identified by FEWMD for the Bird Park is known as **Rabdentse Nature Reserve** admeasuring approx. 18.86 hectares which was earlier used as plantation cum garden as a forefront to the archaeological ruins of the ancient capital. The core area of the Bird Park needs a serene, clean and undisturbed environment. This area needs to be separated from concentrated human activities, vehicles, noise, illuminations, etc. Visual isolation is also a necessity for the core area. A sizeable buffer zone around the core area is required to achieve this. Considering the major adjacent features i.e. Archaeological Ruins of the ancient Capital and Pemayangtse Monastery, contoured and forested hills, requirements of segregation and buffer, the stretch of the Bird Park looks sufficient to begin with. This will

informally extend into the surrounding forested hills owned by the FEWMD.

The site is located on the undulated slope facing South and Southwest direction. The slope is covered with dense forest (mainly plantation) and good undergrowth. The access road i.e. the State Highway touches the site on its Northwest and Southwest boundary. The property of Pemayangtse monastery is adjacent to the part of Northern boundary; whereas the property of the Archaeological ancient site is adjacent to the Eastern boundary. Some Reserve Forests are adjacent to the site on its Northeast and Southeast boundary. A portion on the Southwest boundary touches the property of the government offices of the Forest Department and Divisional Commissioner. The region on the north and south is of similar character interspersed with private properties having terraced fields.

The site has varied undulations, partly flat and gentle slope and partly steep. The existing pathway leading the Archaeological Site runs almost through the centre of the site dividing it in northern and southern portion. The northern portion is mostly covered by a low valley whereas southern portion is undulated plateau leading to steep slope towards southwest. The northern portion has a flattish valley which acts as water course during the monsoon. A small dam exists on this water course which retains some amount of water forming into a shallow pond and flat glade.

The general landform comprises of slopes with varied gradient intersperse with shallow stream beds caused by rainwater run off. The soil is a mix of muram and sand with micaceous rocks. The slopes are covered with wild vegetation of herbs, shrubs,

creepers and many trees. Since the site had been developed as a Nature Reserve as a foreground to the Archaeological site and also leading to the old forest nursery, the area has good plantation of forest trees and good natural ground cover. The open patches in the main shallow valley with a watercourse have grasses, sages, ferns and semi-aquatic vegetation surrounded by wild shrubs and a few trees. This area and the steep slope on the southwest are also invaded with a few weeds like *Tridax sp.*, *Eupatorium sp.* etc. There are many old, large trees which shelter variety of epiphytic plants. The surrounding hill slopes have typical temperate vegetation including some big forest patches. At present there are two entries to the site from the state highway; main entry being on the Northwest with an existing entrance gate providing approach to the Archaeological site whereas subsidiary entry is on the Southwest near the recently developed View Point Pavilion. The Forest Department has very recently constructed an Interpretation Centre in front of the main gate and has also developed a small pond with a little picnic area around it. However, it is not operational yet.

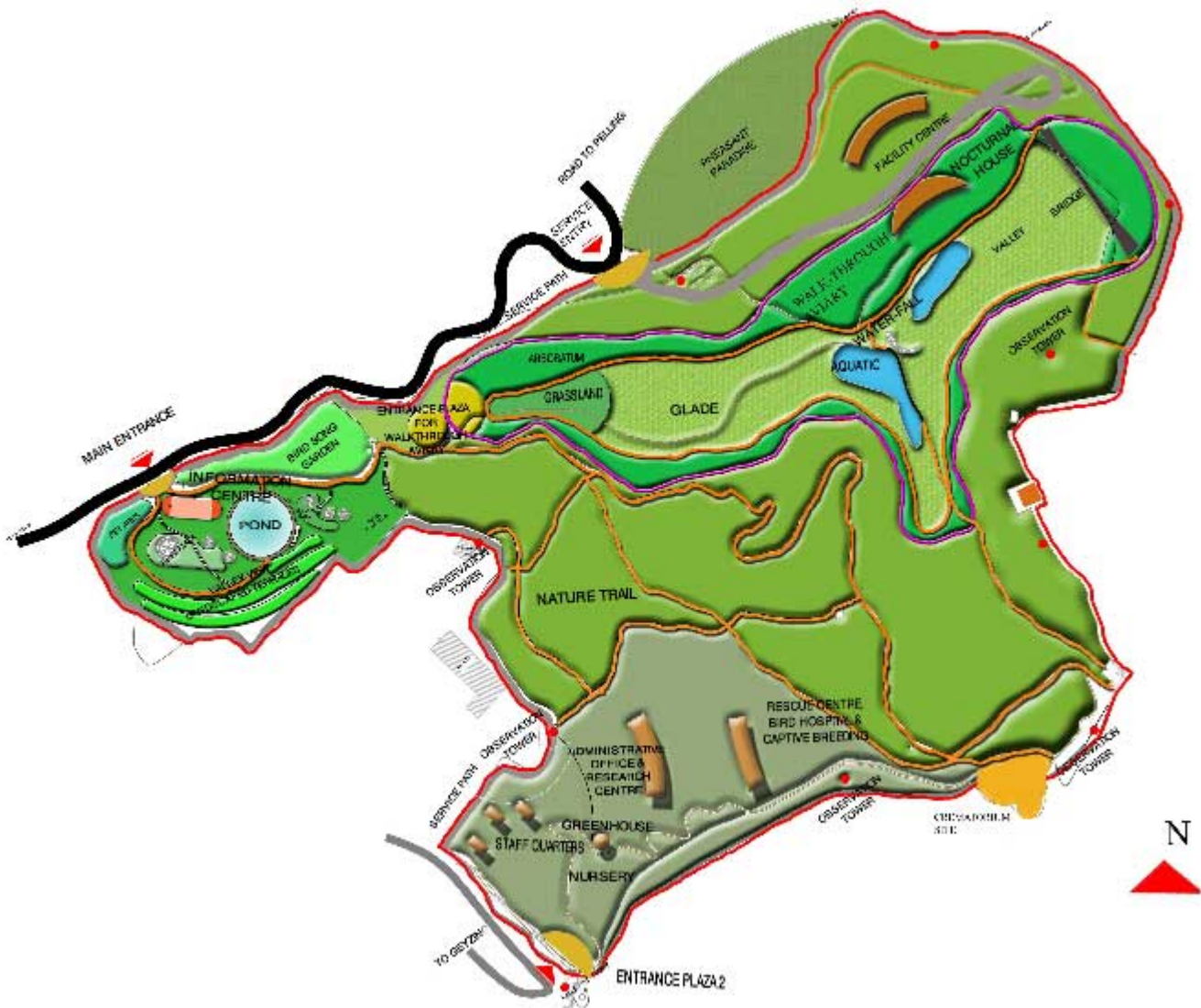
The **northeast region** of India is one of the world's **Biodiversity Hot Spot** areas. **Sikkim** is one of the 'Eight Sisters' that comprise the north-eastern states of India. Sprawling across the steep hills on both sides of the Teesta and Rangeet rivers, Sikkim is a paradise with dense forests of rich biodiversity, terraced paddy fields, Cardamom and tea gardens.

The influence area, i.e. 20 kms radius from the Bird Park site, consists mainly of the deep valleys and the hilly high altitude terrain of West Sikkim district. The important natural forests in this influence area consist mainly under Reserve Forests.



90AERIAL IMAGE OF THE REGION

MASTER PLAN OF THE BIRD PARK



Considering all the physical aspects at various levels from the country's zone, state, district and the Bird Park site itself, it seems to be an ideal location.



Dam and Water Body



Water Course with Glade and Grassland



New Interpretation Centre



New Pond and Picnic area



Khangchendzonga range from Pelling



Archaeological site – Ancient Capital (Rabdentse, West Sikkim)

(All photos by Ulhas Rane)

ECOLOGICAL OBSERVATIONS

The ecological analysis is based on the preliminary research carried out in six months through literature survey, rapid site surveys and remarks/ comments of various experts and naturalists in this field followed by an intensive site survey by Ecology Research team in November 2006 within the Bird Park site, adjoining forested hills, 20 kms radius influence area and natural forested regions of reserve forests. Some information was compiled from the knowledge of the forest officials working in the region. The emphasis in these studies was mainly on Birds and Vegetation.

CLIMATE & GEOLOGY

The Bird Park site and the influence area has typical climate of temperate zone. The closeness to the Khangchendzonga range results in a highly humid atmosphere almost all round the year. Temperature ranges from 10° C to sub zero in winter (Nov to Mar) and from 25° C to 15° C in summer (Apr to Oct) with occasional low temperatures during the monsoon (Jul to Oct). The region is occasionally affected by snow fall/hail storm during peak winter. The relative humidity ranges from 40% to 90% and the average rainfall of 350 cm per year is mainly spread over five months (May to Sep) of the year extending sometimes upto October.

The geology of the region is very interesting. An important feature of great geological importance in West District is the presence of many 'Windows'. One of the 'Windows' shows the older rocks of the Daling group overriding the younger rocks of the Gondwana group along a major thrust plane called the 'Tadong Thrust'. While schist and phyllites constitute the lower valleys, the dolomite, sandstones and quartzite's form the upper slopes of hills. The tallest peaks in the northern parts of the district exhibit granite rocks. All these rock formations bear evidence of repeated folding and thrusting movements. The Bird Park site is located on the Daling Group of rocks of the Gorubathan formation. This formation consists of a succession of green slate, phyllites, phyllonite with cherty fine-grained chloritic quartzite, metavolcanics, green beds and green fieldspathic poorly sorted arenaceous rocks. The site also consists of micaceous rocks and soil which is sandy and red muram. The Southwest portion is heavily strewn with big boulders. The soils are acidic with low nutrient contents of sandy silt texture.

FLORA

The region of Sikkim is very rich in floristic diversity. The study region has undulated slopes with stretches of wild undergrowth and dense tree cover, Cardamom plantations, terrace paddy cultivation. The river basins and stream shores have tall grasses and small grasslands. The region falls within the transitional zone of Sub Tropical Mixed Broad Leaved

Hill Forests (900m to 1800m) and Himalayan Wet Temperate Forests (1800 m to 2700 m). Trees like *Alnus nepalensis*, *Castanopsis sp.*, *Engelhardtia spicata*, *Michelia sp.*; shrubs like *Rubus sp.*, *Daphane*, *Berberis* and ferns, epiphytic plants provide a distinctive character to the forest. It also has climbers like *Pathos*, *Vitis*, *Rhaphidophora*, *Smilax* etc.

The Bird Park site is mainly (70%) covered with trees, wild herbs and shrubs. The forests include various tree species like *Castanopsis*, *Engelhardtia*, *Michelia*, *Quercus*, *Acer* etc. The secondary growth consists of *Girardinia*, *Boehmeria*, *Maesa*, *Ardisia*, *Melastoma*, *Edgeworthia* etc. Existing vegetation includes a top canopy of Chestnut trees interspersed with *Michelia* and *Quercus*, Open forest patches have been invaded by *Eupatorium sp.*, *Tridax sp.* etc.

BIRDS

Among over 8000 species of birds found worldwide, over 1200 species are found in the Indian Subcontinent. The Eastern Himalayas shelter very rich biodiversity and Sikkim is known to have over 550 species of colourful and rare birds of wide variety ranging from Tickle's flowerpecker to Bearded Vulture using different habitats like temperate forests to alpine meadows.

Pelling and Pemayangtse are well wooded and the moist forests hold Maroon-backed and Rufous-breasted Accentors, Green-tailed Sunbirds, Rufous-gorgeted Flycatchers, Blue-fronted Redstarts, Brownish-flanked Bush Warblers, Scarlet and Long-tailed Minivets, Coal, Green-backed and Black-throated Tits, various Yuhinas, Fulvettas, Shrike Babbler, Scimitar Babbler, Laughingthrushes and Babbler. Migrating Steppe Eagles, Greater Spotted Eagles and Oriental Honey Buzzards add raptor diversity in cold November.

The Bird Park region has been occupied by typical avifauna of Middle Hills Forests of Eastern Himalayas. The families of Timalinae and Turdie seem to be abundant in the region. They include Owls, Eagles, Pheasant, Barbets, Treepies, Minivets, Bulbuls, Flycatchers, Babbler, Thrushes and Warblers etc. These birds are resident as well as migratory. Over 120 species have been recorded in this area in different seasons. Many smaller and less attractive species like Warblers though present, are likely to be under-recorded.

The overall analysis projects a very healthy and interesting trend of the occurrence of many species of birds in considerable abundance. The natural ecosystem seems to be very conducive to birds. Therefore, the cultivation of indigenous food and shelter plants and creating micro-habitats of birds in the Park even under controlled conditions seems to be an achievable objective.

BUTTERFLY VALLEY AT RANGRANG, NORTH SIKKIM

INTRODUCTION

Prof Ulhas Rane of **'The Designers'** had been in communication with Ms. Usha Lachungpa, the Project Officer of the FEWMD for the concept development of Butterfly Park in Sikkim since 1998. Subsequently 'The Designers' sent a Broad Outline for the Project proposed at Sikip in South Sikkim in 2002. Further to that **'The Designers'** responded to the invitation (8 July 2005) from FEWMD to visit Sikkim in order to discuss the feasibility of the Butterfly Project and then survey various sites identified by the Department and advise on an appropriate site for the Project. Prof. Ulhas Rane visited various sites on 29, 30 August 2005 and offered his suggestions to carry out preliminary investigations of the site at Sirwani. Ultimately in February 2006 the FEWMD informed **'The Designers'** about the final selection of the site at Rangrang in North Sikkim which was approved by the Govt. of Sikkim.

'The Designers' were invited to visit Sikkim to survey the site for its feasibility and to provide Consultancy of the Design and Development of the Butterfly Park. Prof. Ulhas Rane visited Sikkim from 28 February to 4 March 2006 and carried out detailed site surveys and discussions about the project and consultancy. He also gave a presentation of the general Concept and various similar projects designed by **'The Designers'** to the Honourable Chief Minister & the Forest Minister on 3 March 2006. The Honourable Chief Minister commended the concept and advised to expedite the work.

The consultancy proposal of **'The Designers'** was approved by the Govt. of Sikkim and the FEWMD invited **'The Designers'** to Sikkim to formalise the Consultancy and commence the project work. The design team visited Sikkim from 22 to 29 May 2006. The detailed discussions were conducted on 23 May 2006 with the FEWMD officials when the draft agreement was finalised. The design team commenced the systematic work of preliminary surveys and research. The team members visited the site on 24 & 25 May 2006 and carried out extensive technical and ecological fieldwork on the site and surrounding influence region. The team also had interactions with FEWMD officials on the site when brief concept was explained and instructions to commence some basic work were given to the officials. Subsequently the literature survey and communications with national/international institutes and experts was also initiated. Further to this the Ecology Team also visited the site on 6 & 7



November 2006 and carried out detailed ecological observations and analysis of the site and the surrounding region. This was followed by the presentation to the FEWMD officials and discussion about the modalities to take the project ahead. The Agreements of consultancy were also signed during this meeting.

The CFR (Draft) was submitted in December 2006 for the perusal and comments of FEWMD officials and the Govt. of Sikkim. The comments were received in January 2007 which have been incorporated now in this CFR (Final). This CFR is based on the analytical work carried out in eight months.

GENERAL CONCEPT

The wonders of nature have always inspired humans in spite of all their technological advances. They create awe, affinity, respect, fear and various complex moods in the human mind. Butterflies are such wonderful creations of nature, which have fascinated humans from all walks of life. They have found their way into our poems, songs, stories, paintings and almost all forms of art. They have also attracted great attention of scientists and ecologists, who have been studying the role of butterflies in the intricate web of life.

Ecologists all over the world are curious about the breeding biology, life cycle and behavioural patterns of butterflies and their study has become a very important research area. Butterflies have a complex lifestyle and live in a very delicate and fragile ecosystem. Human's unending greed for 'development' has resulted in the blatant destruction of the environment. The process of urbanisation has also brought tremendous pressure on natural resources, particularly in tropical regions where ecosystems rich in biodiversity are adversely affected.

Environmental destruction and urbanisation has created large distances between nature and humans.

Humans started their two-way efforts to overcome these adverse factors. **Environmental conservation** became a major issue all over the world during the last three decades. Simultaneously the study of various facts of nature also received great importance. The idea of zoological parks emerged in China. However the emphasis remained mainly on bigger mammals. **'Education through recreation'** became a key feature. Butterflies are considered important indicator species for the health of various forest habitats as they depend on diversity of plants in both their larval and adult stages. **Therefore diversity of butterflies indicates diversity of plants.**

Butterflies have attracted human's curiosity, mainly because of their vibrant colours. Therefore, it is not surprising that butterflies in the tropical region, which are large and colourful, have attracted the attention of humans from all over the world. Butterflies from the tropics became collector's items. The destruction gave emergence to various Wildlife Protection Acts and subsequently to an idea of breeding of butterflies in captivity.

However, the concept of a Butterfly Park is still in its nascent stage and scientists,

ecologists and naturalists are carrying out various experiments. The task is complex and difficult due to the delicate and fragile nature of this wonderful creature and its ecosystem. In India, there are a few scientifically developed Butterfly Parks e.g. Assam & Bangalore. There are a few, small experiments in Kolkata, Mumbai and Chennai. Ms. Usha Lachungpa of FEWMD has been carrying out several experiments in butterfly breeding in Sikkim since 1998.

The concept of a Butterfly Park and the task of its creation are challenging and the idea itself is a unique contribution to environmental conservation.

SITE ANALYSIS

The proposed **Butterfly Park site** is located at Rangrang in North Sikkim on NH--- about 60 kms from Gangtok, the capital of Sikkim. This is around 200 kms from the nearest airport at Bagdogra in West Bengal. The nearest railway station is at Siligudi about 180 kms from the site. The nearest village Rangrang is situated on NH--- about 5 kms north of the Butterfly Park site whereas the nearest town Mangan is situated on NH – about 15 kms north of the Butterfly Park site. The longitude and latitude of the Butterfly Park site are 88° 31' 33" East and 27° 28' 58" North respectively.



AERIAL IMAGE OF THE REGION

The river Teesta flows on the western side of the Site. The river Teesta flows here at an altitude of about 700 m whereas the National Highway near the site is at an altitude of about 900 m. Thus the average elevation of the site is about 820 m above the MSL.

The site originally identified by FEWMD for the Butterfly Park is the western slope admeasuring approx. 6.5 hectares which was earlier used for plantation cum nursery. The core area of the Butterfly Park needs a serene, clean and undisturbed environment. This area needs to be separated from concentrated human activities, vehicles, noise, illuminations, etc. Visual isolation is also a necessity for the core area.

A sizeable buffer zone around the core area is required to achieve this. Considering the major site feature i.e. Teesta River, contoured hills, requirements of segregation and buffer, the stretch of the Butterfly Park is increased upto the Teesta River having a control area of approx. 20 hectares. This will informally extend into the surrounding forested hills owned by the FEWMD.

The site is located on the west facing undulated slope which is covered with huge boulders, sparse forest and good undergrowth. The access road i.e. the National Highway is the eastern boundary of the site whereas the River Teesta forms the western boundary of the site. The region on the north and south is of similar characters interspersed with private properties having terraced fields. The region beyond west of the River Teesta starts rising again and has similar character.

The site has varied undulations, partly gentle slope and partly steep. An ancient royal path runs

almost through the centre of the site dividing it in eastern (highway side) and western (river side) portion. This region has low gradient. The western portion has a few private properties encircled by the forest land.

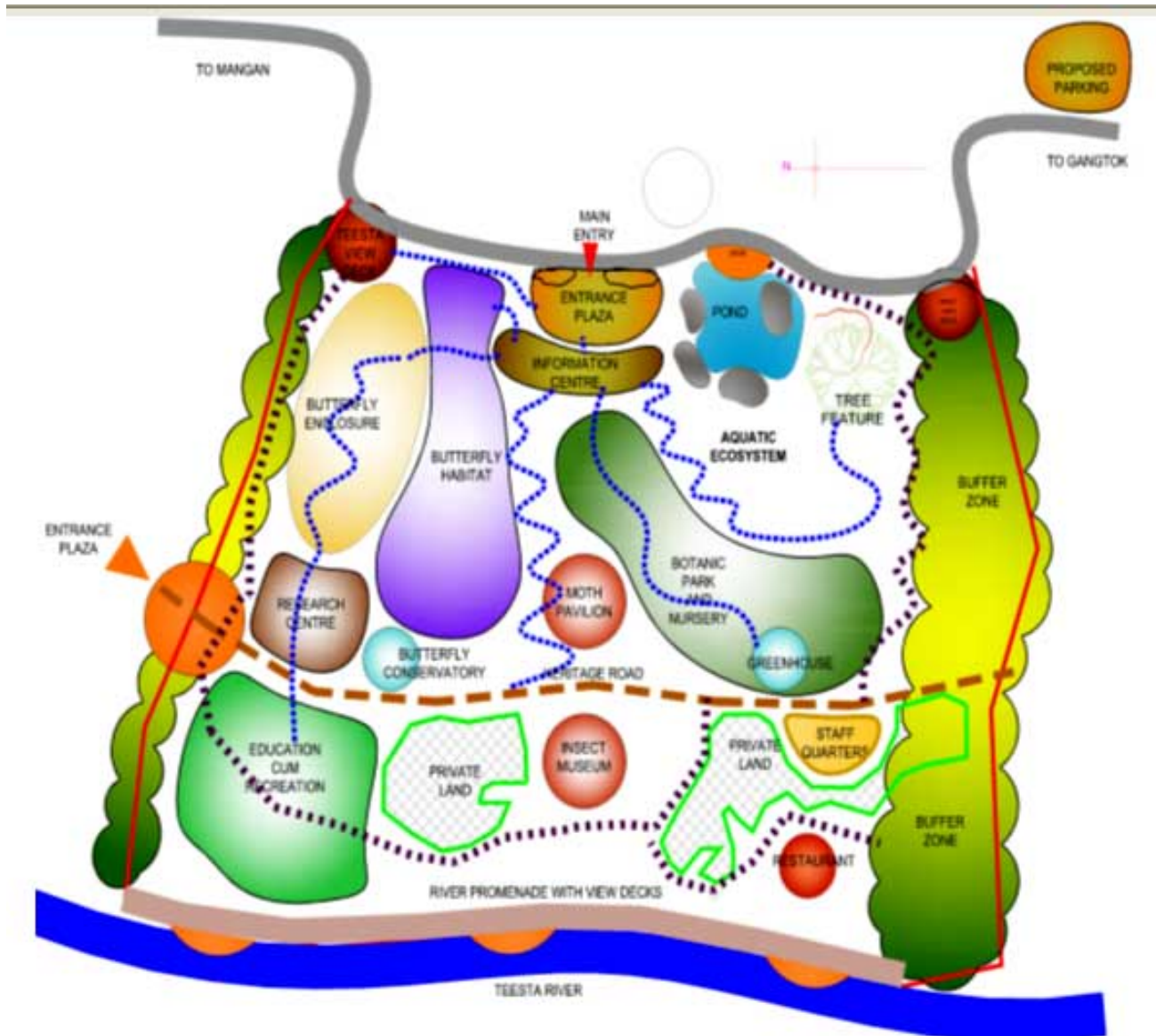
The general landform comprises of slope with varied gradient intersperse with huge boulders and shallow, stream beds caused by rainwater run off. The soil is a mix of clay and sand with micaceous rocks embedded with semi precious agates. The slopes are covered with wild vegetation of herbs, shrubs, creepers and a few trees. Since the site was earlier used as a forest nursery, small area still has plantation of horticultural / medicinal plants.

The open patches have been invaded by weeds like *Eupatorium sp.* The stream beds have peculiar vegetation with dominant plant being *Pandanus sp.* The undercover is full of ferns of different varieties. There are old, large *Ficus elastica* trees which act like feature trees of the site. The surrounding hill slopes have a moist-deciduous type of vegetation including some big trees. The present access to the site is from the national highway leading to North Sikkim from Gangtok.

The **north-east region** of India is one of the world's **Biodiversity Hot Spot** areas. **Sikkim** is one of the 'Eight Sisters' that comprise the north-eastern states of India. Sprawling across the steep hills on both sides of the Teesta and Rangeet rivers, Sikkim is a paradise with dense forests of rich biodiversity, terraced paddy fields, Cardomom and tea gardens.

The influence area, i.e. 20 kms radius from the Butterfly Park site, consists mainly of the deep Teesta valley and the hilly terrain in East and North Sikkim districts. The important natural forests in this influence area consist mainly under Reserve Forests.

MASTER PLAN OF THE BUTTERFLY PARK



Considering all the physical aspects at various levels from the country's zone, state, district and the Butterfly Park site itself, it seems to be an ideal site.

BUTTERFLY PARK SITE



ECOLOGICAL OBSERVATIONS

The ecological analysis is based on the preliminary research carried out in six months through literature survey, rapid site surveys and remarks/comments of various experts and naturalists in this field followed by an intensive site survey by Ecology Research Team in November 2006.

The intensive rapid studies were carried out within the Butterfly Park site, adjoining forested hills, 20 kms radius influence area and natural forested regions of reserve forests. Some information was compiled from the knowledge of the forest officials working in the region. The emphasis in these studies was mainly on butterflies and their food-plants.

CLIMATE & GEOLOGY

The Butterfly Park site and the influence area have a variable climate since the region is located in a transitory belt of middle and high altitude and in a temperate zone. The closeness to the River Teesta results in a highly humid atmosphere almost all round the year. Temperature ranges from 13° C to 5° C in winter (November to March) and from 25° C to 13° C in summer (April to October) with occasional low temperatures during the monsoon (July to October). The region is occasionally affected by snow fall / hail storm during peak winter. The relative humidity ranges from 40% to 90% and the average rainfall of 390 cm per year is spread over four months (July to October) of the year. The geology of the region is very interesting and the site consists of rocks of Gneissic Group which are micaceous and at many places are embedded with agates. The region is heavily strewn with big boulders. The river shore also has huge boulders and small sandy patches. The soils are acidic with low nutrient contents of silty sand or sandy silt texture.

FLORA

The region of Sikkim is very rich in floristic diversity. The study region has undulated slopes with stretches of wild undergrowth and sparse tree cover, Cardomom plantations, terrace paddy cultivation. The river basins and stream shores have tall grasses and small grasslands. The vegetation varies from evergreen to moist-deciduous or Broad-leaved forest. Ficus trees, Pandanus, ferns and epiphytic plants provide a distinctive character to the forest. The secondary growth consists of Boehmeria, Maesa,

Ardisia, Melastoma, Edgeworthia, Tridax, Polygonum etc. It also has climbers like Pathos, Vitis, Rhaphidophora, Smilax etc.

The Butterfly Park site is mainly (70%) covered with wild herbs and shrubs. The dominant trees on the site are Ficus elastica and Pandanus sp. The other low lying area has aquatic vegetation, grasses and herbs, whereas the hill slope is covered with evergreen shrubs greatly infested by weeds of *Eupatorium*. The site being an old forest nursery consists of a few horticultural / medicinal / economic plants. Adjoining forested hills have moist-deciduous vegetation with a few large trees.

BUTTERFLIES

The butterfly fauna of Sikkim is very rich. It was noted that out of 15 species of endangered / rare butterflies affected by wildlife trade, 12 species are found in Sikkim.

The ecological study explorations were carried out to ascertain the natural status of butterflies and their food plants in the Butterfly Park site and the influence area. The rapid survey was concentrated on the census of butterflies (diversity and frequency), observations on insectivorous birds and reptiles, notes on larval and nectar food-plants and occurrence of known food-plants.

More than 38 species of butterflies belonging to five families were recorded. The emphasis was to record large, attractive and showy butterflies suitable for the Butterfly Park. Hence many smaller and less attractive species like Whites, Browns and Rings though present, were under-recorded.

Additionally, hypothetical assessment of butterfly species and food plants is being made by confirming the occurrence of at least one of them in the region.

The overall analysis projects a very healthy and interesting trend of the occurrence of many species of butterflies in considerable abundance. The natural ecosystem seems to be very conducive to butterflies. Therefore, the cultivation of indigenous food plants and breeding of butterflies in the Park even under controlled conditions seems to be an achievable objective.

State Biodiversity Park, Tendong, South District

(Biodiversity Conservation)



Tendong State Biodiversity Park is located in South District, and lies about 70 km to the west of Gangtok and 14 km north of the district headquarter, Namchi. This is in the southern part of the Maenam - Tendong ridge, which virtually bisects Sikkim longitudinally. The Tendong State Biodiversity Park occupies the northern aspect of this ridge between Gyanchung and Damthang, below the state highway, and is very accessible. It is adjoining to the Temi Tea Garden. The total area of the park is 255 ha and the altitude varies from 1400 msl to 2050 msl, aspect being north.

Topography is hilly, with flat land only in patches. A number of streams pass through the area. This Biodiversity Park comprises of Middle and Upper Hill Forests. There are existing groves of Walnut,

Chestnut, Oak and Alder. Since it has been carved out of a Reserve Forest, Eifel Tar R.F., the existing area is very rich in natural resources. Barking Deer, Flying Squirrels, and a variety of lesser mammals inhabit this rich area. The avifauna diversity is also very rich.

A programme for strengthening of State Biodiversity Park has been formulated and being implemented since a few years back for protection, propagation and conservation of rare and endangered species including medicinal plants of the locality. This will not only serve as a representative unit of sub-tropical to temperate flora and fauna of State but also serves as a centre for nature education, awareness and recreation. The details of fund allocated and utilized till the end of financial year 2006-2007 are given below:

Rupees in Lakhs

Sanctioned Provision	Fund allocated & utilized		Total	Remarks
	2005-2006	2006-2007		
76.69	20.00	30.00	50.00	2007-2008 Under progress

Red Panda Conservation Programme at Himalayan Zoological Park – Bulbulay, Gangtok

Dr. Madan K. S. Shanker (Dy. Director/ Zoo & WL)

History of zoo

Himalayan Zoological Park is located 6 Km from Gangtok town. It spreads over an area of 205 ha. and is at an altitude of 6100 ft to 7200 ft from sea level. Initial construction of the zoo started in the year 1990-91 which was then opened to the visitors only in the year 2001. The selected land was an ideal pasture for grazing of livestock and collection centre for fodder & wood for the locals. The fencing of the complex gave an opportunity for the regeneration of the thick forest which exists now. To add to the beauty, Rhododendron plants (*Guras*) of different varieties including hardened species-tissue culture & *Michelea champaka* (*Champ*) were planted along with other varieties of ornamental plants.

Rescued wild animals such as orphaned or injured, found a home. Initially Barking deers and Himalayan Black Bears from Rustomji Deer Park near Tashiling Secretariat were transferred to Himalayan Zoological Park with subsequent introduction of other rescued wildlife.



Enclosure design:

The wild animals in an ex-situ conservation programme are provided vast areas simulating semi-natural habitat. Big areas are provided for regular exercise and natural activity. Provision of den in the Bear enclosure with thick vegetation mostly dominated by bamboos has enhanced bears to undergo hibernation during winters. The bamboo shoots are liked both by bears and Red Panda. Another species of plants is a shrub – polygonum species of plants. It acts like an appetizer. Similarly, enclosures for large cats like Snow Leopard, Tibetan Wolf & leopard Cats are designed in such a manner that the top covers is left open. Birds do very often enter the enclosures and make themselves vulnerable to the predators. This activity renders the cats to retain their natural instinct to hunt for food. Re-location programme will definitely be successful in future if the captive wild animals out number the carrying capacity of the zoo and become subjected to be re-located in the natural wildlife habitat. Enclosures for herbivores like Goral, Barking deers, Blue Sheep, Takin and Yak are not less than 10,000 square meters with thick vegetation. Initially, enclosure for Red Panda was full of bamboos but as the bamboo shoots are more palatable to these pandas it didn't give opportunity for these bamboos to regenerate. Now, bamboos are to be supplemented in the Red Panda enclosure.

Existing wild animals in Himalayan Zoological Park:

Mammals:

1. Red Panda. Schedule I, WPA.
2. Snow leopard. Schedule I, WPA.
3. Tibetan Wolf. Schedule I, WPA.
4. Leopard. Schedule I, WPA.
5. Leopard Cat. Schedule I, WPA.
6. Himalayan Palm Civet. Schedule II, WPA.
7. Large Indian Civet. Schedule II, WPA.
8. Barking Deer. Schedule III, WPA.
9. Goral. Schedule III, WPA.
10. Yak. Schedule I, WPA.
11. Himalayan Black Bear. Schedule II, WPA.

Birds

1. Silver Pheasant-Exotic bird
2. Lady Amherst-Exotic bird
3. Golden Pheasant-Exotic bird
4. Kaleej Pheasant - Schedule I of WPA.

*WPA – Wildlife Protection Act



Red Panda Conservation Programme:

Location of Himalayan Zoological Park, Gangtok is an ideal natural habitat for the Red Pandas with plenty of natural food for thriving of these pandas. Lush green vegetation with different species of bamboos like *parang*, *nigalo* & *singanay* are mostly palatable to this particular animal. During winters when mercury falls down and snow is abundance, Red Pandas of the wild seems to encroach the zoo complex signifying its dominance over the location.

In the year 1995, Workshop on “Red Panda Conservation” at Padmaja Naidu Himalayan Zoological Park (PNHNP), Darjeeling was organized by the Red Panda Stud Book Keeper, Dr Angela Glatston of Netherland Zoo. Participants from the states of India having Red Panda in wild were invited. Dr Madan K.S.Shanker (Dy. Director cum Zoo Veterinarian) and Mr. C. Lachungpa, IFS (The then DFO/Wildlife) represented Sikkim State. Consequent upon presentations and discussions, Red Panda Stud Book Keeper, Dr Angela Glatston of Netherland Zoo agreed to manage a pair of Red Panda for Himalayan Zoological Park, Gangtok. Female from Rotterdam zoo along with a male, captive bred at PNHNP, Darjeeling Zoo was sent as an initial breeding pair for Gangtok zoo in the year 1997.



New born baby Red Panda



Acclimatization and attaining maturity age took two years after which first successful breeding was observed in the year 1999. The pair delivered successively every year till 2002 until female died in the year 2003. During all the four successive breeding, litter size remained to two in numbers only two females were born while rests were males. Unfortunately, both the female cubs didn't survive. During the term, zoo did witness the escape of a male Red Panda (captive bred) during snowfall when few bamboos were bent inside the enclosure and created a ladder for escape. The loss of fertile female gave a halt to the ongoing breeding programme. Efforts to acquire a fertile female from other zoos were all in vain.

Subsequently, an opportunity to rescue three wild cubs of Red Panda (2 males + 1 female) in the year 2005 gave another hope for a new start of breeding programme. It was a bad luck for the cubs to be separated from the parents during chase from the stray / wild dogs, just adjacent to the zoo which was left with no other chances except being brought to the zoo hospital for hand rearing. The energy to hand rearing was fruitful as all the cubs survived.

In the first week of January 2007, the female Red Panda of wild origin was paired with a healthy captive bred male before the onset of the mating season for acclimatization. The normal mating period lies during February-March and the gestation period is in between 125- 130 days. Usually, the cubs are delivered in the month of June with a litter size of one to three in numbers. And it was on 28th May 2007, a single cub was delivered by the female of wild origin which was named “Rigsel” meaning “Precious” by Shri T. T. Dorji, Additional Chief Secretary, Govt. of Sikkim. It was the first occasion when a female of wild origin had delivered at Himalayan Zoological Park, Gangtok. This year, too, on dated 13th June 2008 the same pair delivered to a single cub. Both the cubs are given intense care for future conservation programme. This would enhance breeding policy “Breed without inbreeding” and conservation of pure gene of wild.





Goral being transported safely

Future Plans of Himalayan Zoological Park:

The Himalayan Zoological Park aims to keep only the wild animals of the Eastern Himalayas with priority to undergo conservation breeding programme of wild animals under Schedule I & II of Wildlife Protection Act. Projects for conservation & breeding are prepared for Red Panda, Snow Leopard, Blue Sheep, Takin, Blood Pheasant, Kaleej, Tragophan and many more endangered wildlife fauna of Eastern Himalayas.

The ongoing population estimation project of Red Pandas in the wild which is jointly conducted by WWF-India, Sikkim Programme Office, Gangtok and Sikkim Forest, Environment & Wildlife Management is an effort for the status survey of Red Pandas in the wild. Global concern for the conservation of Red Pandas has already been kicked off with the workshop on "PRE-Population Habitat & Viability Assessment" from 17-19th February 2007 at Gangtok with the participations of experts from around the world. The workshop was organized by WWF-India and supported by Rotterdam Zoo. Study of degraded habitat or sustainable habitat but with no Red Pandas, population estimation in wild and efforts to re-stock from the ex-situ conservation programme would be included in the programme. The programme would also be inclusive of the study of biology, reproduction, genetics, distribution, threats and fragmentation of pandas in in-situ condition. The provision of semi-natural habitat for the wild animals of eastern Himalayas for an ex-situ conservation programme at Himalayan Zoological Park, Bulbulay would in future definitely prove successful for the conservation programme for the endangered and extinct wildlife fauna.



Leopard



Silver Pheasant- Female



Himalayan Palm Civet

Areylungchok Musk Deer Conservation Zone

Notified vide No. 889/FEWMD Dated 10/02/2006

Aims and Objectives

Conservation of the Musk Deer (*Moschus chrysogaster*) population – the flagship species of the high altitude alpine ecosystem, and its habitat alongwith other high altitude flora, fauna, and alpine ecosystems at Areylungchok in West Sikkim by declaration of 27 square kilometer of the Khangchendzonga National Park (1.51% of the total area of KNP) as the Areylungchok Musk Deer Conservation Zone (AMDCZ).

Conservation Importance and Values

The steep rocky ridge of Areylungchok located between the Rathong chu and Relli rivers has been traditionally free from grazing by both sheep and yaks and also collection of medicinal plants. Steep rocky cliff, shortage of water, heavy wind and snow and severe cold all play a vital role in this area being free from livestock grazing pressure. The lower reaches of this ridge along the Onglaktang valley has extensive Rhododendron thickets which give way to Alpine scrub (Rhododendron and Juniper) in the middle reaches. The upper reaches have a limited extent of alpine sedge meadows.

This area has a population of musk deer and blue sheep and is also important from the point of view of studying the impacts of pastoralism, since it has a very limited grazing history by domestic livestock. Valuable medicinal plants like *Sharmaguru*, *Mykopila*, *Bikhma*, *Jatamanshi*, *Bhutkesh*, *Pakhanbhed*, *Dandu* and *Khokim* were also abundantly available. Tussock forming grasses like *Bhalu buki* and *sun buki* formed large meadows.

This unique vegetation is not available in other parts of KBR. Availability of other fodder plants like *Ganar*, *Cheeru*, *Suire*, *Teeure*, *Khokim* and *Dandu* further enrich the value of these meadows. The presence of a number of *urars* (caverns) provides cover from inclement weather for wild ungulates. During winter when there is a shortage of winter pastures, these meadows play an important role in providing the much needed fodder during the lean season.

Baseline Habitat Survey during summer of 2005

Vegetation sampling was conducted during late July and August based on 30 (1 X 1 meter quadrat) sample plots with the sampling stations at Ghumney, Surgey Danra and Dhurd. This alpine landscape can be categorized as follows:

S. No.	Landscape	Property Value
1	Habitat Type	Tussock forming Sedge Meadow
2	Aspect	South west
2	Biotic Pressure	Very limited history of grazing or collection of medicinal plants traditionally. Status is pristine.
3	% vegetation	cover 75 %
4	% cover of palatable plants	58% (dominated by <i>Bhalu buki</i> (<i>Kobresia duthiei</i>))
5	Species richness (no of species 5.5 per sample plot of 1m ²)	
6	Valuable fodder plants	<i>Bhalu buki</i> (<i>Kobresia duthiei</i>), <i>Kesari buki</i> (<i>Kobresia nepalensis</i>), <i>Sun buki</i> (<i>Kobresia capillifolia</i>), <i>Rani buki</i> (<i>Festuca vallesiaca</i>), <i>Suire buki</i> (<i>Juncus sp.</i>), <i>Ganer</i> (<i>Heracleum sp.</i>), <i>Kenjo</i> (<i>Rheum nobile</i>), <i>Harkat</i> (<i>Carex nivalis</i>) and <i>Shyamphul</i> (<i>Pleurospermum sp.</i>)

7	Evidence of key wildlife (direct and indirect evidence)	Musk Deer, Blue Sheep, Himalayan Tahr, Snow Partridge and Himalayan Monal
8	Valuable medicinal plants	<i>Bikh (Aconitum ferox), Khokim (Rheum acuminatum), Dandu (Allium wallichii), Bhutkesh (Anemone polyanthes) and Jatamanshi (Nardostachys randiflora)</i>

Rocky ledges were also present which act as shelter for blue sheep during heavy snowfall. It is also an important Himalayan Tahr habitat. These meadows serve as a critical winter pasture for them. Should be given highest conservation importance and kept free from competition from domestic livestock. Also these meadows are limited in extent.

Feeding signs of musk deer on the nutrient rich inflorescence (flowers) of *Ganar* and *Khokim* at Ghumne and Danra Jhareni was found. Pellets and hoof marks of musk deer were found at Upper Chonrigang and Khola Urar. Above Chonripaley we came across hoof mark of musk deer and pellets of blue sheep. Pellets of snow partridge (*Larewa*) and Himalayan Monal (*Danphe*) were abundantly available.

The team also came across five traps in the ridge above Rungdung village which were subsequently demolished by the park authorities. Also there are unconfirmed reports of a sheep herder from Dhoopi to have indulged in poaching of musk deer at Areylungchok in the same year.

Existing legal status and threats

The Areylungchok Musk Deer Conservation Zone (AMDCZ) falls within the Khangchendzonga National Park which is notified under the Wildlife Protection Act -1972 and the flagship species here is the globally endangered Musk Deer (*Moschus chrysogaster*) which is protected under schedule I of Wildlife Protection Act-1972. Adult males have a pod under their abdominal skin which is valued for its scent. The musk deer is persecuted for its valuable pod using trained dogs as well as setting traps. The main threat to the musk deer is from hunting by laying traps and also using hunting dogs by sheep herders from Dhoopi village and professional hunters from Karjee village. There are increasing linkages between local persecution of wildlife and the larger illegal wildlife trade. Unplanned tourism also threatens this sensitive and shy animal.

Boundaries

Declaring this area within the KNP, with the following borders as a Areylungchok Musk Deer Conservation Zone.

North Khola Urar stream (is contiguous with the southern boundary of the Lampokhri Medicinal Plants Conservation Zone)

East Follows the source of the Khola Urar Stream, crosses the ridge and again follows the stream till it meets with the 3000m contour

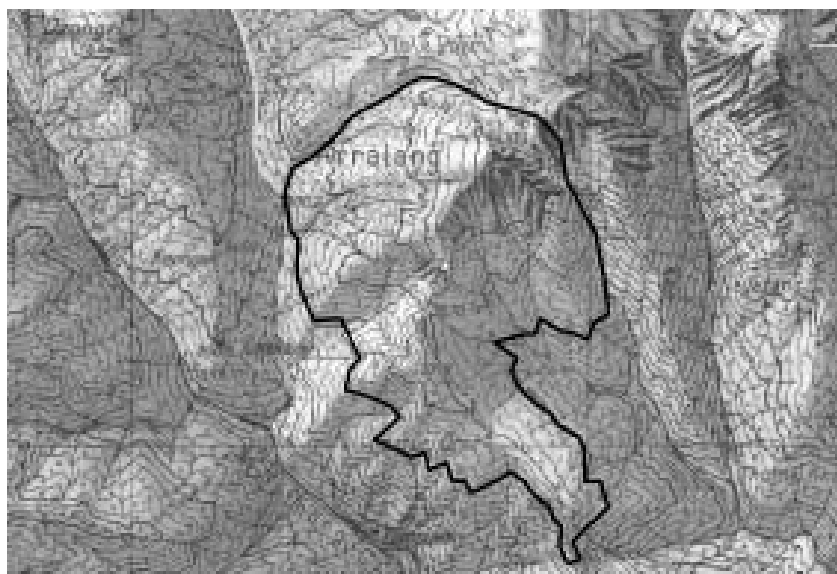
South Follows the 3000 meter contour

West Follows the 3000 meter contour till it meets the Khola Urar stream

Total Area 27 square kilometers (1.51% of the total area of KNP)

This conservation area includes the areas around Khola Urar, Surgey Danra, Ghumne, Shyarbey, Chongripaley, Sukey Pokhri, Dhurd, Mool Dhunga, Patey Bhanjyang, and Kasturi Urar.

Map of the conservation Area



Key Issues in the Conservation Management Plan

(A) Conservation Initiatives

- 1) Publicity of these regulations by installing adequate signages at Yuksam, Labdang and near the trekker's huts, camping sites and the conservation zone.
- 2) Informing the travel agents, tour operators, herders, panchayats, pack animal operators, trekking service providers, Himal Rakshaks, JFMC/EDC and NGOs about these regulations.
- 3) Capacity building of field staff of forest department, travel agents, herders, pack animal operators, Himal Rakshaks, Panchayats, JFMC/EDC and local NGOs.
- 4) Annual census / survey of the population, distribution and status of musk deer and blue sheep and other indicator flora and fauna in this conservation zone shall be conducted.
- 5) Encourage focused conservation and recovery programs for the musk deer.
- 6) Regular patrolling jointly with the local community, JFMC/EDC and Himal Rakshaks especially during monsoons and winters should be conducted to ascertain instances of poaching and status of other threats and controlling them.
- 7) Setting up of a wildlife intelligence network
- 8) Involvement of reputed NGOs in wildlife research, conservation and monitoring
- 9) These conservation initiatives should be incorporated into the existing schemes and programmes of the Khangchendzonga National Park and Khangchendzonga Biosphere Reserve in order to provide adequate funds for implementation of this zonation and conservation management plan.

(B) Conservation Regulations

- 1) Movement of pack animal (horses, dzos and yaks) beyond Thangsing into Chonrigang, Lampokhri, Chamrey, Khola Urar and Areylungchok is prohibited throughout the year.
- 2) Movement of pack animal (horses, dzos and yaks) beyond Labdang into Kasturi Urar, Patey Bhanjyang, Sukey Pokhri, Areylungchok and Khola Urar is prohibited throughout the year.
- 3) For tourists entering from Thangsing, only day trek is permitted from Thangsing to Lampokhri. Movement of tourists and support staff is permitted only up to Lampokhri. No camping by tourists within this conservation zone is permitted.
- 4) For tourists entering from Labdang on the Areylungchok-Dzongri trek, camping is permitted only at Kasturi Urar and Khola Urar. Pack animals (horses, dzos and yaks) are not permitted on this trek. Lighting fire or cooking food is permitted only at the designated campsites.

(C) Legal provisions and penalty

- 1) Pack animal (horse, dzo and yak) operators or yak herders who enter into this conservation zone shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned pack animal operator or yak herder shall be banned from entering in the forest areas of the state for a period of five years.
- 2) If tourists or support staff violate the conservation regulations then the concerned travel company organizing the trek or in its absence the group leader of the trekking party (hereinafter referred to as "trek manager") shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned "trek manager" shall be banned from trekking or organizing trekking in the forest areas of the state for a period of five years.
- 3) The compounding officer shall include all forest officers not below the rank of a block officer. The compounding officer may order reward to be paid to a person who renders assistance in the detection of the offence or apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money. The compounding officer may meet up the expenditure incurred for detecting the offence and apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money.
- 4) These rules shall apply in addition to the laws relating to forests, environment, wildlife and biodiversity.

Lampokhri Medicinal Plants Conservation Zone

Notified vide No: 890/FEWMD Dated: 10/02/06.

Aims and Objectives

Conserving the wild germplasm and the habitat of valuable and endangered medicinal plants along with other high altitude flora, fauna and wetlands at Lampokhri (near Thangsing) in West Sikkim by the declaration of 15 square kilometer of the Khangchendzonga National Park (0.84% of the total area of KNP) as the Lampokhri Medicinal Plants Conservation Area (LMPCZ). It envisages the creation of *insitu* field gene banks of inter and intra specific diversity of medicinal plants across the alpine zone of the Greater Himalayas in the Eastern Himalayas.

Conservation Importance and Values

The Lampokhri area is in the south eastern corner of the Onglaktang valley having a western aspect. This area around Lampokhri (near Thangsing), Chonrigang, Sano Taar, Dalle Pokhri, Chamrey, Khola Urar, Khola Jhareni, Thulo Jhareni, Danra Jhareni and Pairey Jhareni is extremely rich in insitu germplasm of valuable medicinal plants like *Kurki*, *Jatamanshi*, *Panchamla*, *Bikh*, *Bikhma*, *Bhutkesh*, *Pakhanbhed*, *Rambu*, *Dandu* and others. A few plants of *Bikhma* were found only here. Pellets of musk deer were found near the *urars* (caverns) at Upper Chonrigang and Sano Taar.

Baseline Habitat Survey during summer of 2005

Jhareni is a ridge between Aralungchok and Lampokhri, with abundant water availability since it is crisscrossed by three streams namely Khola Jhareni, Thulo Jhareni and Pairo Jhareni. It is covered with rich Silver Fir forests and Rhododendron thickets. This ridge is specially a treasure-house of valuable medicinal plants. The most profuse regeneration of *Kurki* was inside the yak sheds and in the *urars* nearby. Local resource persons inform that the *gothala* collect *Kurki* and store it in the yak shed and the nearby *urars* are used to dry it in makeshift *Bhattis*. The seeds that got scattered in the process, are now germinating. There is also abundant growth of valuable medicinal plants like *Bikh*, *Panchamla*, *Pakhanbhed*, *Dandu*, *Jatamanshi* and *Bhutkesh* also many other endangered plants were also found here.

Existing legal status and threats

The Lampokhri Medicinal Plants Conservation Area (LMPCZ) falls within the Khangchendzonga National Park which is notified under the Wildlife Protection Act -1972. The biggest threat to the medicinal plant population is from illegal collection and smuggling by the yak herders. Also grazing on the vegetative and sexual parts of these herbs by yaks during summer adversely impacts the reproduction cycle of these plants. As they are not able to complete their life cycle and consequently natural regeneration is hampered. During the habitat survey conducted in the summer of 2005, the yak herder with yak sheds at Chonripaley and Jhareni had just been evicted. However there is grazing pressure from dzos and horses especially at Chongripaley, Lampokhri and Chamrey.

Boundaries

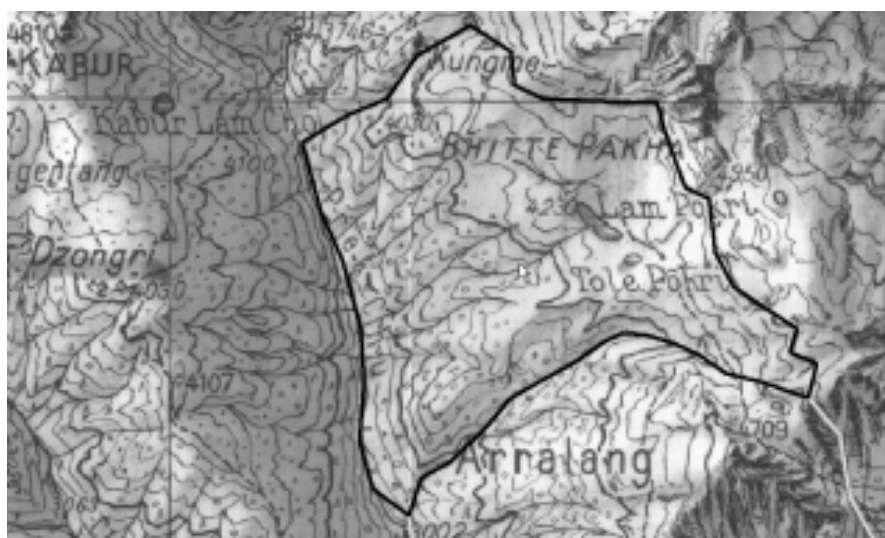
Declaring this area within the KNP, with the following borders as Lampokhri Medicinal Plants Conservation Zone (LMPCZ)

North	Neer pokhri stream
East	6000 meter contour
South	Khola Urar stream (is contiguous with the northern boundary of the Aralungchok Musk Deer Conservation Zone)
West	Prek Chu river

Total Area 15 square kilometers (0.84% of the total area of KNP)

This conservation area includes the areas around Lampokhri (near Thangsing), Chonrigang, Sano Taar, Dalle Pokhri, Chamrey, Khola Urar, Khola Jhareni, Thulo Jhareni, Danra Jhareni and Pairey Jhareni.

Map of the conservation Area



Conservation Management Plan

(A) Conservation Initiatives

- 1) Ethnobotanical studies in partnership with Bare Foot botanists (BFBs) from local communities. Documentation of all plant taxa occurring in this medicinal plants zone with herbarium records, systematic estimation of plant populations and regeneration, distribution patterns, association, micro habitat and use patterns needs to be carried out.
- 2) Encourage focused conservation and recovery programs for endangered medicinal plants like *Aconitum spicatum* (*Bikhma*) and others.
- 3) Regular patrolling jointly with the local community, trekking service providers, JFMC/EDC and Himal Rakshaks especially during monsoons and winters should be conducted to ascertain instances of illegal collection and smuggling of medicinal plants and the status of other threats.
- 4) Setup a wildlife intelligence network.
- 5) Involvement of reputed NGOs in medicinal plants research, conservation and monitoring.

(B) Conservation Regulations

- 1) Movement of pack animal (horses, dzos and yaks) beyond Thangsing into Chonrigang, Lampokhri, Chamrey, Khola Urar and Aralungchok is prohibited throughout the year.
- 2) Movement of pack animal (horses, dzos and yaks) beyond Labdang into Kasturi Urar, Patey Bhanjyang, Sukey Pokhri, Aralungchok and Khola Urar is prohibited throughout the year.
- 3) For tourists entering from Thangsing, only day trek is permitted from Thangsing to Lampokhri. Movement of tourists and support staff is permitted only up to Lampokhri. No camping by tourists within this conservation zone is permitted.
- 4) For tourists entering from Labdang on the Aralungchok-Dzongri trek, camping is permitted only at Kasturi Urar and Khola Urar. Pack animals (horses, dzos and yaks) are not permitted on this trek. Lighting fire or cooking food is permitted only at the designated campsites.

(C) Legal provisions and penalty

- 1) Pack animal (horse, dzo and yak) operators or yak herders who enter into this conservation zone shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned pack animal operator or yak herder shall be banned from entering in the forest areas of the state for a period of five years.
- 2) If tourists or support staff violate the conservation regulations then the concerned travel company organizing the trek or in its absence the group leader of the trekking party (hereinafter referred to as "trek manager") shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned "trek manager" shall be banned from trekking or organizing trekking in the forest areas of the state for a period of five years.
- 3) The compounding officer shall include all forest officers not below the rank of a block officer. The compounding officer may order reward to be paid to a person who renders assistance in the detection of the offence or apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money. The compounding officer may meet up the expenditure incurred for detecting the offence and apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money.
- 4) These rules shall apply in addition to the laws relating to forests, environment, wildlife and biodiversity.

Yongzokdrak Blue Sheep Conservation Zone

Notified vide No: 891/FEWMD

Dated: 10/02/06.

Aims and Objectives

Conservation of the globally endangered Blue Sheep (*Pseudois nayur*) population – the flag ship species of the high altitude alpine ecosystem, and its habitat along with other high altitude flora, fauna, glaciers and alpine ecosystems at Yongzokdrak in West and North Sikkim by declaring 56 square kilometers of the Khangchendzonga National Park (3.14% of the total area of KNP) as the Yongzokdrak Blue Sheep Conservation Zone (YBSCZ).

Conservation Importance and Values

Located at the northern tip of the Onglaktang valley, due north of Sungmoteng Tsho (Samiti Lake), beyond Jemathang, one has to cross the 4800m high Gochela pass to descend into the Yongzokdrak meadows. These meadows are hidden between glaciers and form amongst the last refuge for the globally endangered Blue Sheep in West Sikkim. Yongzokdrak is the sacred rock (*Naydo*) of Sikkim (notified by the Sikkim Government) and Guru Padmasambhava meditated here on the way to Tibet. These are amongst the best summer pastures in KBR with a high abundance of nutritious fodder like *Sun buki* (*Kobresia capillifolia*) and *Harkat* (*Carex sp.*). There is abundant supply of water too, in the form of a number of small lakes. This meadow is bounded by Talung glacier towards the North, Pandim mountain towards the east, Kabur Mountain towards the west and the Forked Peak towards the South.

The presence of abundant and nutritious fodder plants coupled with abundant water availability make them the most valuable summer pastures of KNP. No wonder these meadows are packed with horses, dzos and sheep during summer. These meadows are an ideal habitat of the globally threatened Blue Sheep and other high altitude flora and fauna.

This habitat is also critical for the apex predator of the Himalayas - the snow leopard (*Uncia uncia*), wolf (*Canis lupus*), Himalayan yellow throated marten (*Martes flavigula*), Lammergeier (*Gypaetus barbatus*), Snow partridge (*Lerwa lerwa*), Snow pigeon (*Columba leuconata*), Tibetan snowcock (*Tetraoanus tibetanus*) and others.

Baseline Habitat Survey during summer of 2005

Vegetation sampling was conducted during late July and August based on 10 (1 X 1 meter quadrat) sample plots with the sampling stations at Panchpokhri. This alpine landscape can be categorized as follows:

S. No.	Landscape	Property Value
1	Habitat Type	Sedge Meadow
2	Aspect	North east
2	Biotic Pressure	Traditionally grazed by sheep and over the last en years by pack animals (horses and dzos)
3	% vegetation cover	95 %
4	% cover of palatable plants	75% dominated by <i>Sun buki</i> (<i>Kobresia capillifolia</i>)
5	Species richness (no of species per sample plot of 1m ²)	7
6	Valuable fodder plants	<i>Sun buki</i> (<i>Kobresia capillifolia</i>) and <i>Harkat</i> (<i>Carex nivalis</i>)
7	Evidence of key wildlife (direct and indirect evidence)	Blue Sheep, direct sighting
8	Valuable medicinal plants	<i>Bhutkesh</i> (<i>Anemone sp.</i>) and <i>Sharmaguru</i> (<i>Lomatogonium sp.</i>)

At Samiti Lake, (Sungmteng Tsho) there is a trekkers hut of the Tourism Department. Samiti Lake and its environs are prime habitat for the blue sheep. We found about ½ kg of pellets of blue sheep right inside this trekkers hut. During inclement weather the blue sheep have been using this hut specially during the trekking off season.

In 2005 there were about 80 pack animals (Dzos and horses) and 200 sheep grazing in these rich meadows during summer. Also the survey team came across two herds of blue sheep at Chetruke and Panch Pokhri having a total population of 52, including 8 lambs in this conservation zone.

During the winter habitat survey in January 2006 the survey team came across two herds of blue sheep at Lamune and Zemathang having a total population of 50 in this conservation zone.

Existing legal status, threats and gaps

The Yongzokdrak Blue Sheep Conservation Zone (YBSCZ) falls within the Khangchendzonga National Park which is notified under the Wildlife Protection Act -1972 and the globally endangered Blue Sheep (*Pseudois nayur*) is the flagship species, which is protected under schedule I of Wildlife Protection Act-1972. But just assigning high legal protection status is not sufficient unless the existing threats are reduced and gaps plugged.

Many mountain ungulate populations, important prey of carnivores, are being depleted and lost due to competition with livestock, as well as hunting for meat. Overgrazing by dzo, horses and domestic sheep and presence of sheep herders during summer are the current threats from pastoralism. Overstocking rangelands with livestock is causing vegetation degradation, which threatens the sustainability of pastoral production as well as the survival of wildlife populations. There are increasing linkages between local persecution of wildlife and the larger illegal wildlife trade. Seasonally migrating livestock herds, as well as livestock imported into the region for the tourism enterprise pose a serious risk of spreading exotic diseases to wildlife. Also unplanned tourism threatens sensitive and biologically important high altitude wetlands.

During the Winter Habitat Survey conducted in January 2006, the survey team came across a trap laid for snaring blue sheep using salt as bait at Yangzee. The impacts of these threats can be seen by observing the behaviour of Blue Sheep which have become very shy and the whole herd bolts at the slightest hint of human presence. There are a number of glaciers originating from the Gochela, Kabur, Pandim, Narsing and Tingchen Khang. The affects of global climate change can be detected in the retreat of these glaciers, and now there are huge boulders, stones and chunks of ice along the glaciated valleys. The glaciers have receded not only up the valley but also almost half way up the mountain face.

Boundaries

Declaring this area within the KNP, with the following borders as a Yongzokdrak Blue Sheep Conservation Zone

North Starts from the ridge on the northern flank of Talung glacier and continues due east along the north eastern flank of Talung glacier **East** Starts from the north eastern flank of Talung glacier and continues along the ridge westwards till it reaches the Gochela pass from where it proceeds due south along the ridge trekking trail above Gochela pokhri, Jemathang, Teen kune Pokhri till it reaches Sungmoteng Tsho (Samiti Lake)

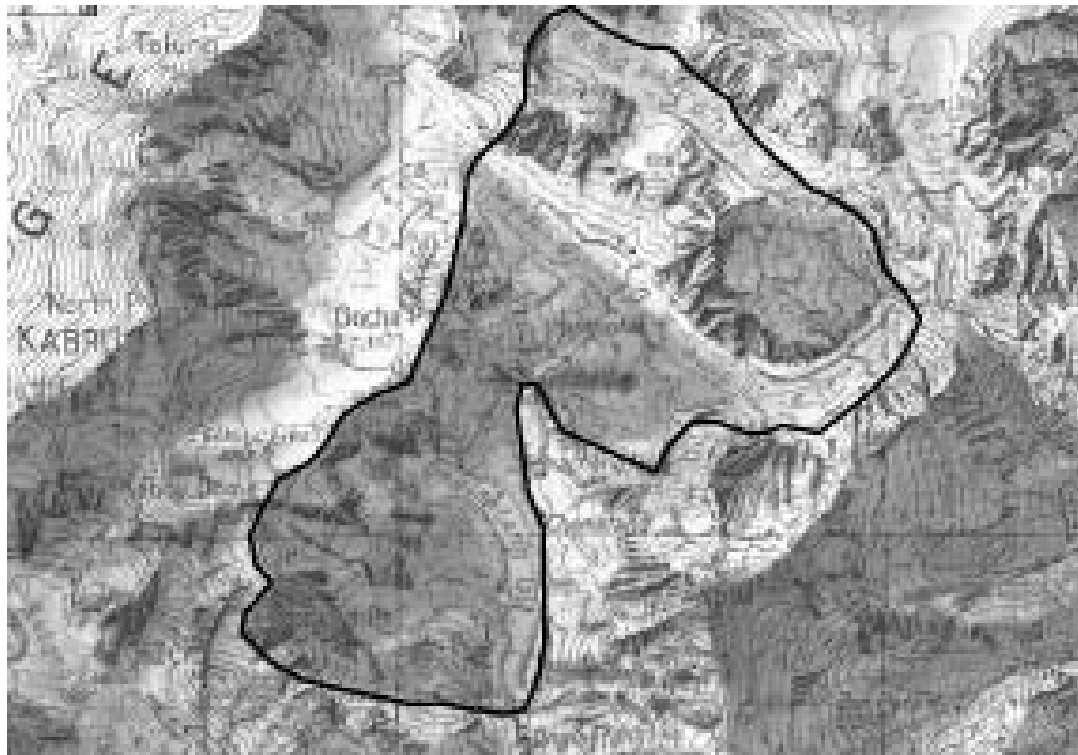
South From Sungmoteng Tsho it follows the outlet of the lake till it meets the Prek chu river and then moves due west along the ridge till it scales the Forked Peak.

West From Forked Peak it follows the ridge due north till it reaches Kabur Dome peak, from where it moves due west and descends behind Kabur dome into the Talung glacial valley and follows it till it reaches the base of Gochela peak. From here it follows the 5200 m contour and joins the northern flank of the Talung glacier.

Total Area 56 square kilometers (3.14% of the total area of KNP)

This conservation zone includes the areas around Samiti lake, Jemathang, Onglaktang glacier, Teen Kune Pokhri, Gochela Mountain, Pandim Mountain, Kabur Dome Mountain, Forked Peak Mountain, Chetruke, Panch Pokhri, Yongzokdrak and Talung glacier.

Map of the conservation Zone



Key Issues in the Conservation Management Plan

(A) Conservation Initiatives

- 1) Publicity of these regulations by installing adequate signages at Yuksam, and near the trekker's huts, camping sites and the conservation zone.
- 2) Informing the travel agents, tour operators, trekking service providers, herders, panchayats, JFMC/ EDC, Himal Rakshaks and NGOs about these regulations.
- 3) Capacity building of field staff of forest department, travel agents, herders, pack animal operators, Himal Rakshaks, Panchayats, JFMC/EDC and local NGOs.
- 4) Annual census / survey of the population, distribution and status of blue sheep and other indicator flora and fauna in this conservation zone shall be conducted.
- 5) Encourage focused conservation and recovery programs for endangered species
- 6) Regular patrolling jointly with the local community, JFMC/EDC and Himal Rakshaks especially during monsoons and winters should be conducted to ascertain instances of poaching, status of other threats and controlling them.
- 7) Setting up of a wildlife intelligence network
- 8) Involvement of reputed NGOs in wildlife research, conservation and monitoring
- 9) These conservation initiatives should be incorporated into the existing schemes and programmes of the Khangchendzonga National Park and Khangchendzonga Biosphere Reserve in order to provide adequate funds for implementation of this zonation and conservation management plan.

(B) Conservation Regulations

- 1) The conservation regulations shall be enforced by the forest officers in coordination with the Ecodevelopment Committees (EDC), Joint Forest Management Committees (JFMC) and Himal Rakshaks.
- 2) Other than forest officers, the Ecodevelopment Committees (EDC), Joint Forest Management Committees (JFMC), registered Non Governmental Organizations (NGO), Himal Rakshaks and the trekking service providers shall be authorized to detect offences under these rules and arrest the offender if there is reason to believe that he will abscond. Any person so arrested shall be handed over forthwith to the nearest forest/wildlife office.
- 3) Movement of pack animal (horses, dzos and yaks) beyond Lamune [towards Samiti Lake (Sungmoteng Tsho)] is prohibited.
- 4) The trek from Samiti – Jemathang – Teen Kune Pokhri – Gochela Pass is permitted only upto Teen Kune Pokhri. Movement of tourists and support staff is permitted only up to Teen Kune Pokhri.
- 5) No camping by tourists is permitted within this conservation zone.

(C) Legal provisions and penalty

- 1) Owners of pack animals (horses, dzos and yaks) who enter into this conservation zone shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned pack animal operator shall be banned from entering in the forest areas of the state for a period of five years.
- 2) If tourists or their support staff trek beyond Teen Kune Pokhri or camp within the conservation zone then the concerned travel company organizing the trek or in its absence the group leader of the trekking party (hereinafter referred to as “trek manager”) shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned “trek manager” shall be banned from trekking or organizing trekking in the forest areas of the state for a period of five years.
- 3) The compounding officer shall include all forest officers not below the rank of a block officer. The compounding officer may order reward to be paid to a person who renders assistance in the detection of the offence or apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money. The compounding officer may meet up the expenditure incurred for detecting the offence and apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money.
- 4) These provisions shall apply in addition to the laws relating to forests, environment, wildlife and biodiversity.

Singalila Ecotourism Promotion Zone

Notified vide No:892/FEWMD

Dated: 10/2/06.

Aims and Objectives

With an objective to promote sustainable community based ecotourism with minimum negative impacts and provide incentives to the local community from conservation, the Singalila ecotourism promotion zone is being defined and set aside in West Sikkim district. The Singalila ecotourism zone comprises of 4 approved treks and 27 designated camping sites.

Criteria for designating nature trails and camping sites

Existing nature trails and camping sites have been preferred. Three new round trekking trails Everest Singalila, Yambong Singalila and Areylungchok Dzongri are being promoted in order to reduce the impacts along the already overcrowded Khangchendzonga Base Camp trek. Camping right on the bank of high altitude lakes and in areas of critical conservation importance is to be discontinued.

Existing status, threats and gaps

Community based Ecotourism is an important source of seasonal income for the villagers residing in remote areas. The impacts of unmanaged tourism are accelerating the rate of destruction in areas, which were once regarded as inaccessible. The negative impacts of unplanned tourism like deforestation due to the use of firewood, unhygienic sanitation, garbage accumulation, smuggling of plants and animals have to be regulated and at the same time the benefits arising from this enterprise equitably shared. Unplanned tourism also threatens sensitive and biologically important high altitude wetlands.

Unplanned tourism related pressure on the forest in terms of the firewood used for heating and cooking purposes has been more distinctly visible at some camping places. Water runoffs along the trail due to continuous trampling by the pack animals are bringing about soil loss along the trail and in the pasturelands. Lack of proper garbage management system by the tourists, Himalayan Mountaineering Institute (HMI) trainees and their support staff in this high altitude tourist destination has led to continuous accumulation of garbage on the route up to Goecha La, HMI base camp and the surrounding sacred lake area. Another concern is the stray dogs, which accompany these trekking groups and prey on the ground nesting birds and lesser mammals. The pack animals e.g. horses, dzos and yaks used in the tourism enterprise compete with the wild herbivores for accessing the limited fodder resources in the summer pastures.

Due to the limited accommodation in the trekkers huts most of the tourists do camping in tents and toilet tents are widely used. Since campsites are not designated this has resulted in camping and setting up of toilet tents as per convenience. The porters and other support staff often defecate in the adjoining forests resulting in a spread of pollution. There is a shortage of permanent, functional, alpine toilets with running water facility in the camping sites. Also the pack animals do not have shelters at the designated camping sites.

Baseline Habitat Survey during the summer of 2004 and 2005

Habitat surveys were conducted during the summer of 2004 and 2005 covering the Everest Singalila Trek, Yambong Singalila Trek, Khangchendzonga Base Camp Trek and the Areylungchok Dzongri Trek. During this survey critical wildlife habitats were identified at Yongzokdrak, Lampokhri, Areylungchok, and Narsing for Blue Sheep, Medicinal Plants, Musk Deer and Himalayan Tahr respectively. Subsequently consultations with the villagers was organized at Yuksam, Nambu and Labdang based on which these trekking routes have been finalized, ensuring minimum impact to wildlife sensitive habitats and at the same time providing alternative livelihoods to the local community.

Boundaries

The Singalila Ecotourism Promotion Zone in West Sikkim district shall comprise of four approved treks namely Khangchendzonga Base Camp, Yambong Singalila, Areylungchok Dzongri and the Everest Singalila and comprise of the designated nature trails and designated camping sites.

Designated Nature Trails and Designated Campsites for ecotourism

The following treks are operational within Khangchendzonga National Park, Barsey Rhododendron Sanctuary and adjoining Reserve Forests in West Sikkim. The Khangchendzonga Base Camp is a trek operational since a long time, while the Yambong-Singalila, Everest-Singalila and Areylungchok-Dzongri are relatively new. The designated nature trail and camping sites need to be notified to ensure that the trekkers stick to the designated trails. They can switch from one trail to another only at the intersection points of the two trails. The following treks, nature trails and campsites are being notified in the Singalila Ecotourism Promotion Zone in West Sikkim.

Trek No.	Trek Name	Designated Nature trails in forest area	Designated Campsites in forest area
1	Khangchendzonga Base Camp Trek Entry Point: Yuksam Exit Point: Yuksam	Existing nature trail starting from Yuksam and passing sequentially through Sachen, Bakhim, Tshoka, Phedang, Dzongri, Doring Taar, Chonrigang, Koktshurung, Thangsing and Lamune and back	Sachen, Bakhim, Tshoka, Phedang, Dzongri, Doring Taar, Chonrigang, Koktshurung,
		Only day treks are permitted to Dzongri Top, Lampokhri (Lam Tsho), Sungmoteng Tsho (Samiti Lake) upto Teen Kune Pokhri, Tshoka to Gunsa / Jamlingang, and from Koktshurung to Phedang (lower route)	Thangsing and Lamune
2	Yambong-Singalila Trek Entry Point: Nambu Exit Point: Yuksam And vice versa	The nature trail from Rimbi to Dechenphuk (Neytham) and from Chongri passing sequentially through Nayapatal, Lower Yambong, Upper Yambong, Daphey bheer, Gomathang, Pangding, Chonrigang and then to Dzongri where it joins the Khangchendzonga Base Camp trek Only day treks are permitted to Lachmi Pokhri	Dechenphuk (Neytham), Nayapatal, Lower Yambong, Upper Yambong Gomathang, Pangding
3	Everest – Singalila Trek Entry Point: Hee Bermiok, Hilley, Soreng Exit Point: Uttarey, Nambu or Yuksam and vice versa	The nature trail from Hee Bermiok and passing sequentially through Samma Taar, Barsey, Jorbotey, Kalijhaar, Phalut, Chewabhanjyang, Chitrey, and then to Dechenphuk (Neytham) where it joins the Yambong – Singalila trek or drop down to Uttarey village The nature trail from Hilley to Barsey and from Buriakhop (Soreng) to Barsey and then joining the above trail	Hilley, Samma Taar, Barsey, Jorbotey, Kalijhaar, Phalut, Chewabhanjyang, Chitrey
4	Areylungchok – Dzongri Trek Entry Point: Labdang Exit Point: Yuksam	The nature trail from Labdang and passing sequentially through Kasturi Urar, Kholo Urar / Chamrey and then to Thangsing where it joins the Khangchendzonga Base Camp trek.	Kasturi Urar (above Labdang) Kholo Urar /Chamrey
	Only one way trek is permitted, starting from Labdang	This trek passes through the wildlife sensitive habitats namely the Areylungchok musk deer conservation zone and the Lampokhri medicinal plants conservation zone. Pack animals (horses, dzos and yaks) are not permitted on this trek. Lighting fire or cooking food is permitted only at the designated campsites	

Ecotourism Promotion Plan

(A) Ecotourism Promotion Initiatives

- (1) Publicity of these regulations by installing adequate signages at Yuksam, Labdang, Nambu, Uttarey, Hee Bermiok, Hilley, Barsey and near the trekkers huts, camping sites and conservation area.
- (2) Informing the travel agents, herders, pack animal operators, panchayats, JFMC/EDC and local NGOs about these regulations.
- (3) Publicity of these regulations by taking out press release and launching a website of the forest department.

- (4) Provide feedback forms and also web enabled feedback to the trekkers so that they can provide feedback on their trekking experience.
- (5) Training and capacity building of travel agents, herders, panchayats, JFMC/EDC and local NGOs about these regulations.
- (6) Designating the boundaries of the camping sites on the ground and providing basic amenities in the camping sites like running water, alpine toilets, kitchen cum porters barrack and pack animal shelters.
- (7) These ecotourism promotion initiatives should be incorporated into the existing schemes and programmes of the Khangchendzonga National Park and Khanghendzonga Biosphere Reserve in order to provide adequate funds for implementation of this zonation and conservation management plan.
- (8) The Tourism Department may also support in the promotion and development of the Singalila Ecotourism Zone in West Sikkim.

(B) Ecotourism Regulations

- (1) Movement of visitors and support staff is prohibited outside the designated nature trails and designated camping sites.
- (2) Lighting of fire, cooking and "hot lunch" is not permitted on day treks.
- (3) Movement of pack animals (horses, dzos and yaks) is prohibited into notified conservation zones.
- (4) Movement of pack animals (horses, dzos and yaks) is prohibited on day treks.
- (5) The "code of conduct" or conservation code for trekking in forest areas has been notified by the State Government under the "Sikkim Wildlife (Regulation of Trekking) Rules 2005". The punishment and penalty for violation of the same has also been detailed therein.
- (6) These ecotourism regulations shall be enforced by the forest officers in coordination with the Ecodevelopment and Joint Forest Management Committees.
- (7) Other than forest officers, the Ecodevelopment Committees (EDC), Joint Forest Management Committees (JFMC), registered Non Governmental Organizations (NGO), Himal Rakshaks and the trekking service providers shall be authorized to detect offences under these rules and arrest the offender if there is reason to believe that he will abscond. Any person so arrested shall be handed over forthwith to the nearest forest/wildlife office.
- (8) These provisions shall apply in addition to the laws relating to forests, environment, wildlife and biodiversity.

Tholung – Kishong Conservation Zonation

Notified vide No: 1976/F

Dated: 11/12/2006

Conservation of the Musk Deer (*Moschus chrysogaster*), Himalayan Tahr (*Hemitragus jemlahicus*), alpine birds like Himalayan Monal, Snow Partridge, Blood Pheasant and endangered medicinal plants of the high altitude alpine ecosystem, and their habitat alongwith other flora, fauna and alpine ecosystems in North Sikkim is of utmost importance.

Flagship species

Conservation Zonation

Musk Deer

(*Moschus chrysogaster*)

Panch Pokhri (Lungdoh Nay) in Upper Dzongu, North Sikkim by declaration of 27 square kilometer of the Khangchendzonga National Park (1.51% of the total area of KNP) as the Panch Pokhri (Lungdoh Nay) Musk Deer Conservation Zone (PPMDCZ).

Himalayan Tahr

(*Hemitragus jemlahicus*)

Dawathong in Upper Dzongu, North Sikkim by declaration of 12 square kilometer of the Khangchendzonga National Park (0.67% of the total area of KNP) as the Dawathong Himalayan Tahr Conservation Zone (DHTCZ)

Alpine birds

Thepa la in Upper Dzongu, North Sikkim by population mostly Himalayan Monal, declaration of 5 square kilometer of the Khangchendzonga Snow Partridge and Blood Pheasant National Park (0.28% of the total area of KNP) as the Thepa la (north east) Alpine Birds Conservation Zone (TABCZ)

Medicinal Plants

wild germplasm

Thepa la in Upper Dzongu, North Sikkim by the declaration of 1.4 square kilometer of the Khangchendzonga National Park (0.08% of the total area of KNP) as the Thepa la (south west) Medicinal Plants Conservation Zone (TMPCZ). It envisages the creation of *insitu* field gene banks of inter and intra specific diversity of medicinal plants across the alpine zone of the Eastern Himalayas.

Conservation Importance and Values

The steep rocky ridge running north south and separating the watersheds of Rimpi chu in Upper Dzongu and Lachen chu has been traditionally free from grazing by both sheep and yaks. The upper reaches have extensive pristine alpine sedge meadows which offer prime habitat for endangered mountain ungulates, alpine birds and medicinal plants. Highly nutrient *sun buki* (*Kobresia capillifolia*) formed extensive meadows. Availability of other fodder plants like Ganar (*Heracleum sp.*), Cheeru (*Pleurospermum sp.*) and Khokim (*Rheum acuminatum*) further enrich the value of these meadows. The presence of a number of *urars* (caverns) provides cover from inclement weather for wild ungulates.

This area has a population of Musk Deer and Himalayan Tahr and is also important from the point of view of studying the impacts of pastoralism, since it has a very limited grazing history by domestic livestock. Valuable medicinal plants like Kurki (*Picrorhiza kurrooa*), Bikh (*Aconitum ferox*), Bhutkesh (*Anemone polyanthes*) and Khokim (*Rheum acuminatum*) are also abundantly available.

Baseline Habitat Survey during summer of 2006

The local community of Dzongu jointly with The Mountain Institute, Forest Department and the Mutanchi Lom Aal Shezum NGO conducted a habitat survey during July 2006. During this survey the nature trail, camping sites and wildlife critical habitats were identified.

Vegetation sampling was conducted during based on (1 X 1 meter quadrat) sample plots with the sampling stations at Dawathong, Tholpe and Kishong. This alpine landscape in the conservation zone can be categorized as follows:

S. No.	Landscape Property	Value
1	Habitat Type	Tussock forming Sedge Meadow
2	Aspect	South west
2	Biotic Pressure	Very limited history of grazing or collection of medicinal plants traditionally. Status is pristine.
3	% vegetation cover	90 %
4	% cover of palatable plants	80% (dominated by <i>Sun buki (Kobresia capillifolia)</i>)
5	Species richness (no of species per sample plot of 1m ²)	11
6	Valuable fodder plants	<i>Sun buki (Kobresia capillifolia)</i> , <i>Bhalu buki (Kobresia duthiei)</i> , <i>Rani buki (Festuca vallesiaca)</i> , <i>Suire buki (Juncus sp.)</i> , <i>Ganer (Heracleum sp.)</i> , <i>Kenjo (Rheum nobile)</i> and <i>Harkat (Carex nivalis)</i>
7	Evidence of key wildlife (direct and indirect evidence)	Musk Deer, Himalayan Tahr, Snow Partridge, Himalayan Monal and Blood Pheasant
8	Valuable medicinal plants	<i>Kurki (Picrorhiza kurrooa)</i> , <i>Bikh (Aconitum ferox)</i> , <i>Bhutkesh (Anemone polyanthes)</i> and <i>Khokim (Rheum acuminatum)</i>

These meadows should be given highest conservation importance and kept free from competition from domestic livestock. The group came across four red fox and four himalayan tahr at Upper Dawathong and just after crossing Dawathong pass. We also sighted a musk deer above Nikashe Pokhri in Panch Pokhri area. South east of Thepa la was rich in alpine birds specially snow partridge, blood pheasant and himalayan monal. While after crossing the pass the north western aspect had a pocket of extensive *Kurki (Picrorhiza kurrooa)* meadows.

Existing legal status and threats

All the four Conservation Zones fall within the Khangchendzonga National Park which is notified under the Wildlife Protection Act -1972 and Musk Deer, Himalayan Tahr, Himalayan Monal, Snow Partridge and Blood Pheasant are all protected under Schedule I of Wildlife Protection Act-1972. The team also detected in one of the caves one sack full of snares (*paaso*) at Thepa-la possibly for hunting musk deer and pheasants. After crossing Thepa la we also came across a decayed makeshift *Bhattis* which the local resource persons inform was used to dry *Kurki* before taking it to the adjoining villages.

Boundaries

The boundaries of the four conservation zones is as follows:

Panch Pokhri Musk Deer Conservation Zone (PPMDCZ): Declaring this area within the KNP, with the following borders:

North	Thepa la ridge (is contiguous with the eastern boundary of the Thepa la Medicinal Plants Conservation Zone and the Alpine Birds Conservation Zone)
East	4000m contour
South	Follows the 3000 meter contour till it meets the
West	Follows the 4000 meter contour till it meets the Khola Urar stream
Total Area	27 square kilometers (1.51% of the total area of KNP) This conservation area includes the areas around Khola Urar, Surgey Danra, Ghumne, Shyarbey, Chongripaley, Sukey Pokhri, Dhurd, Mool Dhunga, Patey Bhanjyang, and Kasturi Urar.

Dawathong Himalayan Tahr Conservation Zone (DHTCZ): Declaring this area within the KNP, with the following borders:

North	Dawathong Chu
East	Follows the 4000m contour
South	Trekking Trail (is contiguous with the northern boundary of the Alpine Birds Conservation Zone)
West	Follows the Dawathong ridge
Total Area	12 square kilometers (0.67% of the total area of KNP) This conservation area includes the areas around Khola Urar, Surgey Danra, Ghumne, Shyarbey, Chongripaley, Sukey Pokhri, Dhurd, Mool Dhunga, Patey Bhanjyang, and Kasturi Urar.

Thepa la Alpine Birds Conservation Zone (TAB CZ): Declaring this area within the KNP, with the following borders:

North	Is contiguous with the southern boundary of the Dawathong Himalayan Tahr Conservation Zone
East	Follows the Thepa la river
South	Trekking Trail (is contiguous with the northern boundary of the Alpine Birds Conservation Zone)
West	Follows the Thepa la ridge till the pass
Total Area	5 square kilometers (0.28% of the total area of KNP)

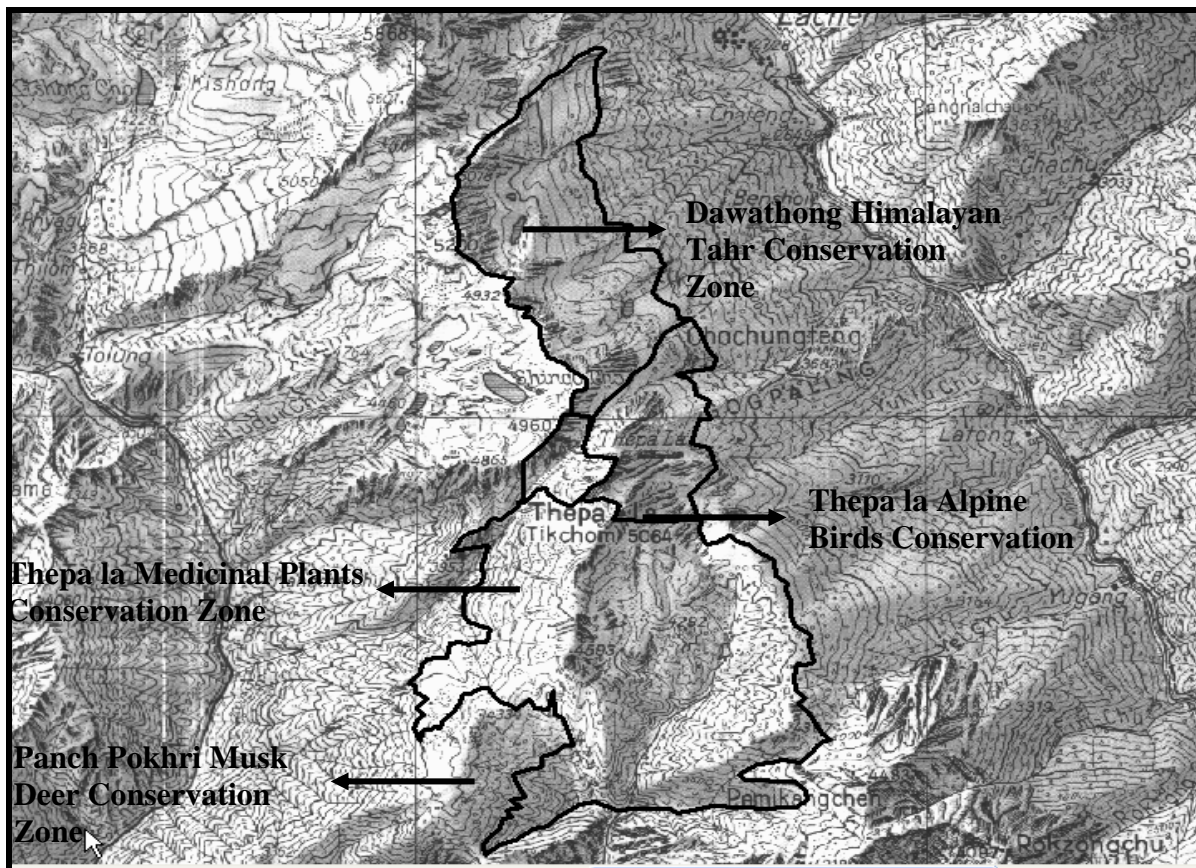
This conservation area includes the areas around Khola Urar, Surgey Danra, Ghumne, Shyarbey, Chongripaley, Sukey Pokhri, Dhurd, Mool Dhunga, Patey Bhanjyang, and Kasturi Urar.

Thepa la Medicinal Plants Conservation Zone (TMPCZ): Declaring this area within the KNP, with the following borders:

North	Follows the 3500m contour
East	Follows the Thepa la ridge
South	Follows the Long chu along the river
West	Follows the 3500m contour
Total Area	1.4 square kilometers (0.08% of the total area of KNP)

This conservation area includes the areas around Khola Urar, Surgey Danra, Ghumne, Shyarbey, Chongripaley, Sukey Pokhri, Dhurd, Mool Dhunga, Patey Bhanjyang, and Kasturi Urar.

Map of the conservation Area



Key Issues in the Conservation Management Plan

(A) Conservation Initiatives

- (1) Publicity of these regulations by installing adequate signages at Bay, Lingza, Leek, camping sites and the conservation zone.
- (2) Informing the travel agents, tour operators, herders, panchayats, pack animal operators, trekking service providers, Himlal Rakshaks, JFMC/EDC and NGOs about these regulations.
- (3) Capacity building of field staff of forest department, travel agents, herders, pack animal operators, Himlal Rakshaks, Panchayats, JFMC/EDC and local NGOs.
- (4) Annual census / survey of the population, distribution and status of musk deer, himalayan tahr, alpine birds, medicinal plants and other indicator flora and fauna in this conservation zone shall be conducted.
- (5) Encourage focused conservation and recovery programs for the musk deer.
- (6) Regular patrolling jointly with the local community, JFMC/EDC and Himlal Rakshaks especially during monsoons and winters should be conducted to ascertain instances of poaching and status of other threats and controlling them.

- (7) Setting up of a wildlife intelligence network
- (8) Involvement of reputed NGOs in wildlife research, conservation and monitoring
- (9) These conservation initiatives should be incorporated into the existing schemes and programmes of the Khangchendzonga National Park and Khangchendzonga Biosphere Reserve in order to provide adequate funds for implementation of this zonation and conservation management plan.

(B) Conservation Regulations

- (1) Movement of pack animal (horses, dzos and yaks) is prohibited throughout the year.
- (2) No camping by tourists within this conservation zone is permitted.
- (3) Lighting fire or cooking food is permitted only at the designated campsites.

(C) Legal provisions and penalty

- (1) Pack animal (horse, dzo and yak) operators or yak herders who enter into this conservation zone shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned pack animal operator or yak herder shall be banned from entering in the forest areas of the state for a period of five years.
- (2) If tourists or support staff violate the conservation regulations then the concerned travel company organizing the trek or in its absence the group leader of the trekking party (hereinafter referred to as "trek manager") shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned "trek manager" shall be banned from trekking or organizing trekking in the forest areas of the state for a period of five years.
- (3) The compounding officer shall include all forest officers not below the rank of a block officer. The compounding officer may order reward to be paid to a person who renders assistance in the detection of the offence or apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money. The compounding officer may meet up the expenditure incurred for detecting the offence and apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money.

Narsing Conservation Zonation

Notified vide No: 1977/F

Dated: 11.12.2006

Conservation of the Himalayan Tahr (*Hemitragus jemlahicus*) and endangered medicinal plants of the high altitude alpine ecosystem, and their habitat alongwith other flora, fauna and alpine ecosystems in West Sikkim is of utmost importance.

Flagship species

Himalayan Tahr
(*Hemitragus jemlahicus*)

Conservation Zonation

Kayung in Upper Pokhri-Narkhola, West Sikkim by declaration of 29 square kilometer of the Khangchendzonga National Park (1.63% of the total area of KNP) as the Kayung Himalayan Tahr Conservation Zone (KHTCZ)

Medicinal Plants wild
germplasm

Relli in Upper Pokhri-Narkhola, West Sikkim by the declaration of 7.5 square kilometer of the Khangchendzonga National Park (0.42% of the total area of KNP) as the Relli Medicinal Plants Conservation Zone (TMPCZ). It envisages the creation of *insitu* field gene banks of inter and intra specific diversity of medicinal plants across the alpine zone of the Eastern Himalayas.

Conservation Importance and Values

The steep rocky ridge running east west and separating the watersheds of North Sikkim (Dzongu) and West Sikkim (Tashiding) has been traditionally free from yak grazing. The upper reaches have extensive pristine alpine sedge meadows which offer prime habitat for endangered mountain ungulates, alpine birds and medicinal plants. Highly nutrient *sun buki* (*Kobresia capillifolia*) forms extensive meadows. The presence of a number of *urars* (caverns) provides cover from inclement weather for wild ungulates. Inaccessibility due to tough terrain has made most of this area almost free from biotic interference.

This area has a population of Himalayan Tahr and is also important from the point of view of studying the impacts of pastoralism, since it has a very limited grazing history by domestic livestock. Valuable medicinal plants like Kurki (*Picrorhiza kurrooa*), Bikh (*Aconitum ferox*), Sharmaguru (*Lomatogonium sp.*) and Khokim (*Rheum acuminatum*) are also abundantly available.

Baseline Habitat Survey during summer of 2005 and 2006

The local community of Pokhri, Narkhola, Karjee, Mangnam and Labdang jointly with The Mountain Institute, Forest Department and the local NGOs conducted a habitat survey during 2005 and 2006. During this survey the nature trail, camping sites and wildlife critical habitats were identified.

Vegetation sampling was conducted during based on (1 X 1 meter quadrat) sample plots with the sampling stations at Kayung, Tholpe and Kishong. This alpine landscape in the conservation zone can be categorized as follows:

S. No.	Landscape Property	Value
1	Habitat Type	Tussock forming Sedge Meadow
2	Aspect	South west
2	Biotic Pressure	Very limited history of grazing or collection of medicinal plants traditionally. Status is pristine.
3	% vegetation cover	95 %

4	% cover of palatable plants	80% (dominated by <i>Sun buki</i> (<i>Kobresia capillifolia</i>))
5	Species richness (no of species per sample plot of 1m ²)	7
6	Valuable fodder plants	<i>Sun buki</i> (<i>Kobresia capillifolia</i>), <i>Bhalu buki</i> (<i>Kobresia duthiei</i>), <i>Rani buki</i> (<i>Festuca vallesiaca</i>), <i>Suire buki</i> (<i>Juncus sp.</i>), <i>Aconogonum molle</i> (<i>Thotne</i>) and <i>Kenjo</i> (<i>Rheum nobile</i>)
7	Evidence of key wildlife (direct and indirect evidence)	Himalayan Tahr, Snow Partridge, Himalayan Monal, Blood Pheasant and Flying Squirrel
8	Valuable medicinal plants	<i>Kurki</i> (<i>Picrorhiza kurrooa</i>), <i>Bikh</i> (<i>Aconitum ferox</i>), <i>Bhutmeksh</i> (<i>Anemone polyanthes</i>), <i>Pakhanbhed</i> (<i>Bergenia purpurascens</i>) and <i>Khokim</i> (<i>Rheum acuminatum</i>)

These meadows should be given highest conservation importance and kept free from competition from domestic livestock. The group came across four Himalayan Tahrs at Upper Kayung chu and Yung kharka. We also sighted flying squirrel, snow partridge, blood pheasant, himalayan monal in the same area. After crossing Kenjo taar we came across a pocket of extensive Kurki (*Picrorhiza kurrooa*) meadows along Laduwa khola.

Existing legal status and threats

All the four Conservation Zones fall within the Khangchendzonga National Park which is notified under the Wildlife Protection Act -1972 and Himalayan Tahr, Himalayan Monal, Snow Partridge and Blood Pheasant are all protected under Schedule I of Wildlife Protection Act-1972. At Laduwa khola we also came across a decayed makeshift *Bhatti* which the local resource persons inform was used by the yak herders to dry *Kurki* before transporting it to the adjoining villages.

Boundaries

The boundaries of the four conservation zones is as follows:

Kayung Himalayan Tahr Conservation Zone (KHTCZ): Declaring this area within the KNP, with the following borders:

West	Follows the Rungdung ridge (Deorali pass)
East	Follows the 4000m contour
South	Follows the 4000m contour
North	Follows the Kayung ridge
Total Area	29 square kilometers (1.63% of the total area of KNP)

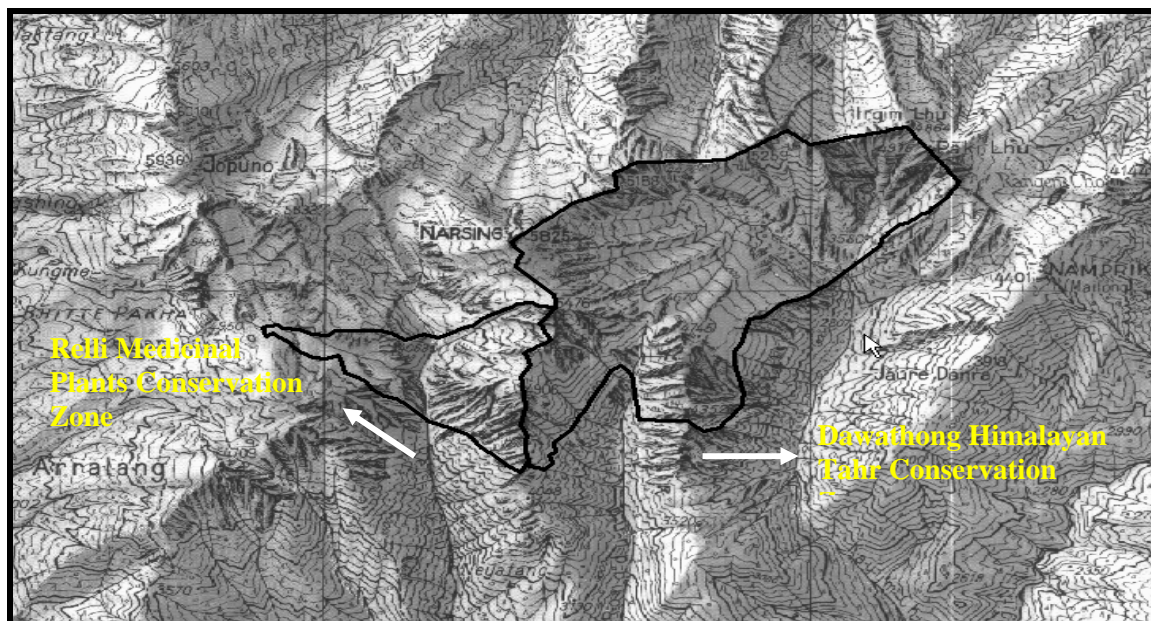
This conservation area includes the areas around Chongri, Panch-pokhri, Yung kharka, Thulo Pathichaur, Sano Pathichaur, Lametaar, Azaguth, Upper Kayung chu, Nikashe, Deorali pass.

Relli Medicinal Plants Conservation Zone (TMPCZ): Declaring this area within the KNP, with the following borders:

West	Relli river (mathlo taar)
East	Follows the Rungdung ridge (Deorali pass)
South	Follows the 4500m contour
North	Ridge at the foot of Mt. Narsing
Total Area	7.5 square kilometers (0.42% of the total area of KNP)

This conservation area includes the areas around Deorali pass (Rungdung Himal), Kenjo taar, Laduwa khola, Lower Relli taar, Upper Relli taar.

Map of the conservation Area



Key Issues in the Conservation Management Plan

(A) Conservation Initiatives

- (1) Publicity of these regulations by installing adequate signages at Rabong, orong, Tashiding, Pokhri, Mangnam, camping sites and the conservation zone.
- (2) Informing the travel agents, tour operators, herders, panchayats, pack animal operators, trekking service providers, Himal Rakshaks, JFMC/EDC and NGOs about these regulations.
- (3) Capacity building of field staff of forest department, travel agents, herders, pack animal operators, Himal Rakshaks, Panchayats, JFMC/EDC and local NGOs.
- (4) Annual census / survey of the population, distribution and status of himalayan tahr, medicinal plants and other indicator flora and fauna in this conservation zone shall be conducted.
- (5) Encourage focused conservation and recovery programs for the musk deer.
- (6) Regular patrolling jointly with the local community, JFMC/EDC and Himal Rakshaks especially during monsoons and winters should be conducted to ascertain instances of poaching and status of other threats and controlling them.
- (7) Setting up of a wildlife intelligence network
- (8) Involvement of reputed NGOs in wildlife research, conservation and monitoring
- (9) These conservation initiatives should be incorporated into the existing schemes and programmes of the Khangchendzonga National Park and Khangchendzonga Biosphere Reserve in order to provide adequate funds for implementation of this zonation and conservation management plan.

(B) Conservation Regulations

- (1) Movement of pack animal (horses, dzos and yaks) is prohibited throughout the year.
- (2) No camping by tourists within this conservation zone is permitted.
- (3) Lighting fire or cooking food is permitted only at the designated campsites.

(C) Legal provisions and penalty

- (1) Pack animal (horse, dzo and yak) operators or yak herders who enter into this conservation zone shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned pack animal operator or yak herder shall be banned from entering in the forest areas of the state for a period of five years.
- (2) If tourists or support staff violate the conservation regulations then the concerned travel company organizing the trek or in its absence the group leader of the trekking party (hereinafter referred to as "trek manager") shall be punishable with a fine which shall not be less than five thousand rupees but may extend to ten thousand rupees apart from the compensation for the damage caused. Provided that in case of a subsequent offence the fine shall not be less than ten thousand rupees and may extend to twenty five thousand rupees apart from the compensation for the damage caused and the concerned "trek manager" shall be banned from trekking or organizing trekking in the forest areas of the state for a period of five years.
- (3) The compounding officer shall include all forest officers not below the rank of a block officer. The compounding officer may order reward to be paid to a person who renders assistance in the detection of the offence or apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money. The compounding officer may meet up the expenditure incurred for detecting the offence and apprehending the offender out of the sum of money accepted as fine not exceeding twenty percent of such money.

Narsing Himal Trek

Notified vide No: 1978/F

Dated: 11/12/2006

Narsing Himal Trek comprising of the designated nature trails and designated camping sites as mentioned below is included in the already notified Singalila Ecotourism Promotion Zone in West Sikkim. This zone will now comprise of five approved trekking trails. The designated nature trails and designated camping sites in the Narsing Himal Trek are as follows:

Trek No.	Trek Name	Designated Nature Trails in Forest Area	Designated Campsites in forest area
1	Narsing Himal Trek	The nature trail from Pokhri and passing sequentially through Halalay, Thumki, Duri Urar, Barsey Dara, Sukay Pokhri, Phedi Urar, Thulo Pathichaur, Tin Dovanay, Chongri and Rani Taar.	Thumki herders Camp, Duri Urar, Thulo Pathichaur, Chongri herder's camp, Rani Taar
	Entry Point: 10 th Mile, Borong road-head		
	Exit Point: 10 th Mile, Borong road-head	The permitted day treks include Chongri herder's camp to Panch Pokhri .This trek passes through important holy place namely Panch Pokhri	
		This trek passes through the wildlife sensitive habitats namely the Kayung Himalayan Tahr Conservation Zone and Laduwa khola Medicinal Plants Conservation Zone	
		Pack animals (horses, dzos and yaks) are not permitted on this trek. Lighting fire or cooking food is permitted only at the designated campsites and not during day treks.	

Table 11.3 TREKKING ROUTES OF SIKKIM

Sl. No.	Name of Important Trek	Places Covered	Suitable Month for Trek
1	Monastic Trek	Pemayantse-Sangacholing, Khedchopalri-Dubdi -Sinon-Tashiding - Ralong	March-May/Oct-Dec
2	Rhododendron Trek	Naya Bazar-Hilley/Soreng Dentam- Pemayangtse Varsey	March-May
3	Khangchendzonga Trek	Yuksom-Bakim-Tsokha- Dzungri-Lamune and Back	Mid March-Mid May Mid Oct to Mid Dec
4	Coronation Trek	Rumtek-sang- Yangang Rabongla- Tashiding- Yuksam	Oct-Dec
5	Areylungchok-Dzungri Trek	Labdong-Kasturi Urar- Chamrey-Thangsing- Lamune- Dzungri- Yuksom	Mid March-Mid May Mid Oct to Mid Dec
6	Yambong Singalila Trek	Nambu- Chongri- Yambong- Dzungri-Thangsing- Lamune- Dzungri- Yuksom	Mid March-Mid May Mid Oct to Mid Dec
7	Narsing Himal Trek	Borong- Pokhri- Thumki- Phedi Urar- Tin Devanay and Rani Taar	Mid March-Mid May Mid Oct to Mid Dec
8	Tholung - Kishong Trek	Bay- Tholung- Tholpe- Dawathang-Shingo- Thepala- Pach Pokhri	Mid March-Mid May Mid Oct to Mid Dec

Source: Sikkim in Brief 2005, DESME

Guidelines for Lake Conservation in Partnership with Gram Panchayats and *Pokhri Sanrakshan Samiti's* in Sikkim

Notified vide No. 355/F

Dated: 31.7.2006

The lakes in the state have immense Environment, ecological, cultural, spiritual and economic importance and are important ecotourism destinations, offering important livelihood opportunities to the local communities. The impacts of unplanned tourism, unregulated pastoralism and other human activities pose a serious threat to the long term ecological security of these lakes. The lakes of the state are located in remote, high altitude areas and securing the long term future of these lakes is largely dependent on the active participation and involvement of the local community.

With the need to directly involve the local *Panchayati Raj* Institution which is the constitutional body at the village level in conservation efforts and decentralize and democratize decision making to the *gram sabha*, the State Government has deemed it expedient to work in partnerships with *Gram Panchayats* and *Pokhri Sanrakshan Samitis* for the purpose of protection and conservation of the lakes in the state.

The composition, functions, duties, powers, ecotourism benefits and restrictive measures pertaining to such *Samitis* shall be as follows:

IDENTIFICATION, CONSTITUTION, CONSERVATION PLAN, CAPACITY BUILDING AND FEDERATION

(A) Identification of the lake

- (1) Lakes which need conservation action shall be identified by the Divisional Forest Officer, Territorial Division, (hereinafter referred to as the Divisional Forest Officer), local communities or Non Governmental Organizations where the local community is willing to offer their cooperation in the protection and conservation of the said lake.

(B) Constitution of the *Pokhri Sanrakshan Samiti* (PSS)

- (1) The PSS shall be constituted by the gram sabha in consultation with the concerned Ward Panchayat Member and the Divisional Forest Officer.
- (2) Where the gram sabha feels that it itself or any existing village based institution is capable of performing the functions and duties of the PSS, this institution will be designated as the PSS. Otherwise the PSS shall be constituted with those households who are living in the vicinity of the lake. Every family living in the vicinity of the lake shall, however, have the option of becoming a member of the PSS, if such family including the female members is interested in the conservation of the said lake. There shall normally be a joint membership of each household, i.e. husband becoming member, wife automatically becomes a member and vice versa.
- (3) It is proposed that the Ward Panchayat Member be the ex-officio President of the PSS however if the gram sabha feels otherwise then they may appoint a suitable person to this post and shall also designate a member secretary from amongst the members of the PSS.
- (4) The president shall apply to the concerned Range Officer for registration. The Divisional Forest Officer on the recommendation of the concerned Range Officer shall register the PSS in his office.
- (5) After registration of the PSS, the gram sabha shall appoint *Pokhri Rakshak(s)* or lake Guardian(s) from amongst the members of the PSS and provide him / her with photo identity card(s).

- (6) The President shall convene the meetings of the PSS as per the scheduled procedure. There shall be a minimum of four meetings of the PSS in a year on a quarterly basis.
- (7) The concerned Gram Panchayat and the Forest Department shall extend all necessary support and help to ensure the smooth and proper functioning of the PSS.
- (8) In case of any conflict within the PSS, the Assistant Conservator of Forests, Territorial in consultation with the Panchayat President shall resolve the conflict amicably.
- (9) However the legal status, land tenure and ownership of the lake and its catchment area shall remain unchanged.

(C) Preparation of the lake Conservation Plan

The Divisional Forest Officer and the PSS shall jointly with the support of State Environment Agency and other governmental and non governmental organizations prepare the lake Conservation Plan within one year of the registration of the PSS, which shall contain the following:

- (1) A map in 1:25,000 scale of the lake along with its immediate catchment area which shall constitute the *Pokhri Sanrakshan Shetra* or the lake Conservation Area of the PSS.
- (2) A baseline quantification of the quality of water of the lake in a quarterly manner.
- (3) A baseline quantification of the threats and impacts on the lake like solid waste disposal, sanitation and sewerage, catchment degradation, siltation, eutrophication unplanned tourism infrastructure etc.
- (4) A baseline quantification of the status, distribution and population of key wildlife species like water fowl and their habitat.
- (5) A baseline quantification of the numbers and seasonality of the tourist arrivals and the benefits accrued from ecotourism.
- (6) A conservation action plan which shall lay down the activities to be carried out in the forthcoming year with detailed physical and financial targets, process to be followed as well as a timeframe.

(D) Capacity Building of the Pokhri Sanrakshan Samiti (PSS)

It shall be the duty of the Forest Department to carry out the institution building and capacity building of the PSS in administration, accounts, socio-economic survey and biological survey works. The divisional forest officer shall provide all necessary guidance to the PSS to carry out their duties and functions as and when requested by them. Other governmental and non governmental organizations are also encouraged to support this human and institutional development effort.

(E) Constitution of the State Level Federation of the PSS

The *Rajya Pokhri Sanrakshan Sangh* (or the State Lake Conservation Federation) shall be a state level federation comprising of the presidents of the PSS all over the state. The PCCF cum Forest Secretary shall convene atleast one meeting of this federation along with other stakeholders annually to discuss various issues related to lake conservation and related livelihoods in the state.

FUNCTIONS

- (1) The PSS shall maintain a member's register showing necessary particulars of the members of the PSS e.g. Name, Parentage, Age, Address, Number of family members etc.
- (2) The PSS shall maintain a minutes book wherein proceedings of the meetings held from time to time as well as the proceedings of the Annual General Meeting of the PSS and *gram sabha* will be recorded under the signature of the Member-Secretary.
- (3) The PSS shall maintain one bank account, namely PSS revolving fund account in any nationalized bank or the State Bank of Sikkim. The President and member secretary shall jointly operate this account. The President shall be responsible for maintaining this account and submission of annual audit reports from a statutory auditor to the Range Officer, the Divisional Forest Officer, District Collector and the PCCF cum Secretary of the Forest Department.
- (4) The PSS, and the divisional forest officer shall jointly with the support of State Environment Agency other government and non-governmental organizations prepare the Annual Lake Conservation Plan comprising of the map, water quality, threats, wildlife, ecotourism and conservation action plan.
- (5) The funds accrued in the PSS revolving fund account shall be used to pay honorarium to the *Pokhri Rakshak(s)*, setting up of an effective garbage management system, preparing and publishing the Annual Lake Conservation Plan, capacity building of the PSS so that they can discharge their duties and functions more effectively, conservation of birds, wildlife and their habitats, restoration of the *Pokhri Sanrakshan Shetra*, financial audit, administrative expenses and for community development works as detailed in the Annual Lake Conservation Plan.
- (6) The PSS shall once every year in the *gram sabha* provide details of the functions, duties, and ecotourism benefits of the PSS. The *gram sabha* in this meeting shall also carry out the social audit of the PSS revolving fund account and the activities of the State Environment Agency regarding implementation of the current Annual Lake Conservation Plan. The Annual Lake Conservation Plan for the forthcoming year shall also be presented and approved by the *gram sabha* after incorporating their suggestions if any. Concerned Range Officer, Territorial shall be an observer in this meeting. A copy of this approved Annual Lake Conservation Plan shall be provided by the PSS to the concerned Range Officer, Divisional Forest Officer, District Collector and the PCCF cum Secretary of the forest department annually.

DUTIES

The duties of the PSS shall be as follows:

(A) Protection and Conservation

- (1) To ensure protection of the forests, environment, wildlife and biodiversity in the *Pokhri Sanrakshan Shetra* through members of the PSS jointly with the Forest Department staff.
- (2) To ensure that the migratory and residential birds and other flora and fauna or their habitat is not disturbed.
- (3) To protect the soil and moisture conservation works, Afforestation works, signages and other infrastructure within the *Pokhri Sanrakshan Shetra*.
- (4) To bring to the notice of the Forest Department of any kind of developmental activity being initiated within or adjoining to the *Pokhri Sanrakshan Shetra* at the earliest.
- (5) To carry out awareness and education drives, for sensitizing and capacity building of the local community for nature conservation.
- (6) To provide assistance and statistics as and when required by the Forest Department.

(B) Assistance in Ecotourism

- (1) To ensure that the tourism within the *Pokhri Sanrakshan Shetra* does not cause problems related to garbage, firewood use, sanitation or disturbance to birds, wildlife or their habitat and results in

- equitable economic benefits to the local community.
- (2) To provide prompt and quality service to the visitors.
 - (3) To ensure that the shop keepers, hotels, guides, pack animal operators etc (hereinafter referred to as ecotourism service providers) and the visitors follow the Code of Conduct.
 - (4) To explain to all the visitors about the code of conduct to be followed within the lake. It shall be the duty of the PSS to ensure responsible behaviour of the visitors and the ecotourism service providers.

POWERS

- (1) The President shall provide Photo Identification card to the *Pokhri Rakshak(s)*, after the registration of the PSS.
- (2) The *Pokhri Rakshak* shall have power for apprehending forest and wildlife offenders, incase they feel that the offender may escape. All such offenders apprehended, shall be handed over to the nearest forest office without any delay. They shall also be authorized to protect the infrastructure and facilities within the *Pokhri Sanrakshan Shetra*. In return the Divisional Forest Officer must guarantee prompt and appropriate action on the issue, and keep the gram sabha updated on the action taken.
- (3) The members of the PSS shall within six months of their registration pass a resolution indicating the Code of Conduct to be observed within the *Pokhri Sanrakshan Shetra*. Penalties for the violators of this code shall also be specified in detail. This code of conduct shall be passed by the concerned *gram sabha* and approved by the Divisional Forest Officer who shall ensure that none of the provisions are in contravention to any of the existing legislations. This total penal amount shall be credited in the PSS revolving fund account.
- (4) However the Divisional Forest Officer shall have the authority to annul any orders passed by the PSS in this regard and take fresh cognizance of the offence incase the due procedure of law has been violated.
- (5) All government departments shall seek the prior informed consent of the PSS before undertaking any development or tourism project in the *Pokhri Sanrakshan Shetra*.

ECOTOURISM BENEFITS

- (1) The PSS shall be authorized to levy and collect the *Pokhri Sanrakshan Shulk* or the Lake Conservation Fees of Rs 10/- per tourist per day. Printed and numbered fee receipts shall be provided to all the tourists after collecting the fees.
- (2) This fee so collected shall be credited into the revolving fund account of the PSS atleast on a monthly basis and 50% of it transferred in to the bank account of the State Environment Agency. However the total fund shall be used as per the approved Annual Lake Conservation Plan.

PENAL ACTION, DISSOLUTION and RECONSTITUTION

- (1) Failure to comply with any of the fore-mentioned conditions may entail penal action and/or cancellation of individual membership and/or dissolution of the PSS as the case may be as stated in subparagraphs (2), (3) and (4) below:
- (2) The *gram sabha* shall be authorized to take penal action against the PSS.
- (3) The Divisional Forest Officer shall be entitled to take appropriate action including dissolution of the PSS on the grounds stated above on the recommendation of the *gram sabha*.
- (4) The Divisional Forest Officer shall initiate the constitution of a new PSS, if any PSS is dissolved in the manner as mentioned above.

State Environment Agency

Notified vide No: 2541/F

Date: 28/03/2006

At the State level, an autonomous body namely "State Environment Agency" is constituted in order to coordinate all activities related to environment such as environment education, environment awareness, environment information, etc.,. The composition of the Committee is as below and all the committee members are ex-officio members of their respective postings in the Government department. The quorum for the committee is seven for the purpose of approving and sanctioning.

S. No.	Designation	Position in the Committee
1	PCCF cum Forest Secretary	Chairperson
2	Addl. Principal Chief Conservator of Forests (Environment)	Member
3	Deputy Inspector General of Police (Range)	Member
4	Conservator of Forests (Environment)	Member
5	Director Education	Member/State eco-club coordinator
6	Member Secretary SPCB	Member
7	Managing Director STDC	Member
8	Joint Secretary, Motor Vehicles	Member
9	Joint Secretary, UD&HD	Member
10	Senior Accounts Officer, Forest	Finance officer
11	DFO (Environment and Pollution Control)	Member Secretary

The Duties and Responsibilities of the State Environment Agency

1. To co-ordinate and implement the activities relating to the environment education, awareness and information, etc., through appropriate agency at state level.
2. To monitor the implementation of all the projects and activities relating to environment education, awareness and information, etc.,
3. To examine and recommend any proposal on the mentioned subject matter in the state for funding by the state, GOI and other agencies.
4. To suggest mechanism to improve the environment through environment information, education and awareness.
5. To maintain accounts under the committee and regularly audit their expenditure and submit report to the appropriate agency.
6. To monitor the activities of the District Environment Committee, National Environment Awareness Campaign, Eco-clubs in educational institutions, NGOs funded by the government agency for the purpose of environment awareness, education and information.
7. The state eco-club coordinator shall ensure timely implementation of the eco-club programmes in the schools and submit report to the Committee.
8. To carry out any other function relating to environment education, awareness, information, etc.,

District Environment Committee

At district level, an autonomous body namely "District Environment Committee" is hereby constituted in order to co ordinate all activities related to environment such as environment education, environment awareness, environment information, etc.,. The composition of the Committee is as below and all the committee members are ex-officio members of their respective postings in the government department. The quorum for the committee is eight for the purpose of approving and sanctioning.

S. No.	Designation	Post
1	Conservator of Forest (Environment)	Chairperson
2	District Collector	Member
3	Superintendent of Police	Member
4	Divisional Forest Officer (Territorial)	Member
5	District Development Officer, Rural Management and Development	Member

	Department	
6	District Planning Officer, Zilla Panchayat	Member
7	Divisional Forest Officer (Wildlife)	Member
8	Divisional Forest Officer (Social Forestry)	Member
9	Deputy Director, Tourism	Member
10	District Representative from Urban Development and Housing Department	Member
11	Representative from Motor Vehicles Department	Member
12	Two representatives from district NGOs– to be selected every year by other committee members.	Member
13	Divisional Forest Officer (EPC)	Member
14	Joint Director, Education. HRD Department.	Member/ District Eco-club coordinator
15	Divisional Forest Officer (LU & E)	Member Secretary

The Duties and Responsibilities of the District Environment Committee

1. To co-ordinate and implement the activities relating to the environment education, awareness and information, etc., in the District.
2. To monitor the implementation of all the projects and activities relating to environment education, awareness and information, etc., in the district.
3. To motivate educational institutions, NGOs and any other organization in the district to involve in environment awareness, education and information activities.
4. To suggest mechanism to improve the environment through environment information, education and awareness to the State Environment Agency.
5. To maintain accounts under the committee and regularly audit their expenditure and submit report to the appropriate agency.
6. To execute projects, schemes, etc., approved by the State Environment Agency.
7. The district eco-club coordinator shall ensure timely implementation of the eco-club programmes in the schools and submit all reports regarding eco-club to the committee.
8. To monitor the activities of the National Environment Awareness Campaign, Eco-clubs in educational institutions under National Green Corps, NGOs funded by the government agency and for the purpose of environment awareness, education and information, etc.,
9. To work in coordination with the State Environment Agency to perform all the functions relating to environment awareness, information and education.
10. To any other functions relating to environment education, awareness, information, etc., entrusted by the Government or the State Environment Agency.

Financial Mechanism

Any assistance for programme relating to the environment education, awareness, information, etc., from Government and other agencies for the state will be implemented through the State Environment Agency. The State Environment Agency will have institutional bank account operated jointly by its Chairperson and Member Secretary. The state committee shall utilize the District Environment Committee for execution of all activities relating to the district. All funds/assistance relating to the district related activities have to be transferred to the District Environment Committee for execution at the district level. The District Environment Committee will also have institutional bank account operated jointly by its Chairperson and the Member Secretary. The State Environment Agency shall be the approving and sanctioning authority for the state level and the District Environment Committee for district level. The committees shall ensure auditing of the accounts of both the bodies annually by a Government recognized Chartered Accountant.