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Eco-tourism and Eco-degradation vis a vis for analysis in Darjeeling Himalaya, West Bengal, India

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Abstract

Eco-tourism is a field which is broadly defined by its term ecology on one hand and tourism on the other. It deals with the activities of a large number of people involved in integral amusement of a specific time for a selected place. A good example is tourists and out comers from different countries and places. It dignifies the amusement of tourists and generates income for the local inhabitants who involved personally or in a group for design and development of the same. But after a long time invasion in the ecosystem, it becomes polluted either by manmade pollutants or by socially. Social pollution is a kind of pollution which is due to wide differences of culture among different group of tourists, economy and misuse of environment day by day. Perhaps it is the ultimate fate of loose bonding among different groups of people. The cause of deterioration of ecosystem is very lucid which may be due to unscientific management or by loss of 'carrying capacity' of the area governed by excessive pressure. Therefore, we need to apply eco-restoration process parallel to stop the eco-degradation process which is essential to smoothly run the eco-tourism. To run eco-tourism successfully and to develop economy better of a particular tourist spot and adjacent areas we need good interactions from both the sides. For the sustenance of the resource, we need to frame a policy that might be a key to master mind a bridge between guests (tourists or out comers) and hosts (local authority or people or a group of people). In this communication, nature and natural resource and their management have been placed which is closely related to eco-tourism and eco-degradation. We, the knowledgeable person should be very realistic rather than opportunistic to stop the eco-degradation process and to establish the eco-tourism in a more sound and prideful way in near future.

Darjeeling is the Queen of hills in West Bengal a part of Eastern Himalaya which attracts people for its uniqueness. Three 'T' is important in Darjeeling *i.e.* tea, tourism and

timber. Tea is available now at Darjeeling but the people are more fascinating to use the term organic rather than common tea. It is because tea gardeners now-a-day using havocs chemical fertilizers and pesticides which hamper the quality of the tea even creating the toxicity of the tea. Secondly, the time is now discriminately goes to the rank of lower category for degradation of land and the forest patch is going to vanish due to different threats. The third one is tourism which is fascinating but now need to use the term eco-tourism instead of tourism because of the fragility of the Darjeeling ecosystem. The first two 'T' imposed threats to the ecosystem therefore to make the ecosystem attractive the eco-tourism is essential now-a-day. It will make the bridge between the unstable ecosystems of Darjeeling and stability of social, structural and behavioral activities of the environment to solve the present problem of eco-degradation.

The forest region classified as the Eastern Himalayan Sub-alpine forest comprises mainly of evergreen conifers with admixture of some broad leaved species[5]. It covers entire Darjeeling not below the down hills of Kurseong and Kalimpong but gradually redundant their structure small to smaller. Example, Tree *Rhodendron* are shrubby in nature at Gorkey, Phalut or Sandakphu. Sandakfu region of West Bengal has its highest peak in North Bengal where as Phalut has 2nd highest peak in North Bengal. Soil, climate, culture, society, environment even eco-processes are fascinating which are the centre of attractions of Darjeeling Himalaya. To rediscover the scenic view of Mt. Kanchenjungha including nature and natural resources the present theme eco-tourisms has been arrived.

The research work on eco-tourism has been developed time to time by different authors. Bhattacharya and Mitra[8] worked on destination image of Darjeeling among the foreign tourists. They include 4 factors in their research *viz*. tourism infrastructure factor (1), natural environmental factor (2), travel environmental factor (3) and social interaction factor (4). Bhutia[10] worked on growth and development of tourism factors in West Bengal. The work of Bhutia emphasized on theoretical framework for tourism development in West Bengal and their associated issues and concerns. Again Bhutia[11] and Das *et al*.[13,17] have worked on sustainable tourism development in hills, Darjeeling, West Bengal and Odisha respectively. It provides the opportunity to take proactive approaches based on broad participation by stakeholders. As a whole the idea is planned programme for sustainable development and to reduce the threat of different kinds.

Eco-tourism is a process to develop economy and manage environment in a managerial way for long term use on sustainable basis. It has its own criteria based on scientific way. One is being ecological and other is economical, but both are virtually interlinked. As we need sustainable ecosystem in an environment so we need more knowledgeable citizens rather than more environmental scientists. It is because we need to formulate the rules and laws to run the process or systems in a tourist spot that is always based on true ecosystem. Virtually any ecosystem in any time goes towards abnormality and hampers the general processes. It is due to the overload in the ecosystem and obviously for loss of carrying

capacity of the ecosystem. Therefore, scientific as well as local management is essential to commemorate the fact hitherto to solve the problems. The out comers and foreigners should be very punctual to follow up the rules framed by authority and the resultant should be predicted by them to make it success. Thus, through this system we can save the ecosystem pristine to stop the eco-degradation process as the process is the outcome of eco-tourism. Some natural products of Darjeeling, their use, long term management, even culture and attributes are common in this eco-tourism. Hope that people of the Darjeeling and out comers as tourists, students, scientists should take care about the eco-degradation as the same is the resultant of tourism. Researchers and scientists should take initiatives to formulate the rules to stop the eco-degradation process. Therefore, we can manage the ecosystem of hill and can run the eco-restoration process to make the eco-tourism sound and meaningful in near future. As a whole scenic beauty of landscape, flora, fauna, monuments, heritage sites, waterfalls, sanctuary, national park and abiotic components attract people. By and large, to visit attractive places and to rediscover the episode time to time; a large number of visitors, tourists from outside and students including researchers meet eco-habitats. Scientific reason and academic purpose is another part of interest that has immense importance which attract special purpose. A good example is colorful flowers of *Rhododendromn arboretum* (Guras) in hilly areas of West Bengal that harbor beautiful bids called tits. It blooms during February to March each year and draw picturesque attention of tourists. Ornithologists, environmentalists, students, researchers, social scientists, ecologists, foresters and Zoologist attracted by the blooming beauty as well as nectarine visitors of the said flower. Asare or *Viburnum* sp. in high altitude attracts a large number of birds for their shelter even for long term nesting[13]. The hilly landscape is also a repository of important medicinal plants which attracts different herbal organizations including academic institutes. To nurture the motif of outsiders (Tourists) eco-tourism is essential. For the preparation of the manuscript, relevanl literature[1-49] has been consulted.

Area under study :

Study area was entire tract of Darjeeling Hills adjacent to Nepal in one hand and Sikkim Himalaya in other. The study includes Kalimpng, Kursong, Mirik, parts of Senchal Wildlife Sanchuaray and Singalila National Park area of Eastern Himalaya. It comprised of some remote villages of Darjeeling Sadar, Kalimpong, some parts of high altitude area including Gorkey, Sandakphu and Phalut.

Regular ecological field trips were performed since 2012 to 2016 in different remote part of Darjeeling along with some foresters, experts and students. Markets were visited in some parts of Darjeeling and in adjacent state Sikkim to know the natural resource even their market demand in hilly areas of Eastern Himalaya.

Some problems and prospects of hill ecosystem were collected after general meeting conducted at village with some local people, political leader persons. Another type of meeting regarding bio-resource and mobilization was conducted at the office of District Magistrate, Darjeeling along with board members of State Bio-diversity Board, West Bengal. Study of literature was done in

library of Darjeeling Govt. College, Darjeeling; Centre for Himalayan Studies, North Bengal University and other libraries available in hills. About Neplai culture and cultural aspects, seminar library of Neplai Department was consulted. Other study resource was collected from website published by different workers in India and abroad time to time. Photographs and some materials were collected from field. Samples and specimens of some kind were also preserved in the College Laboratory of Post Graduate Department of Botany, Darjeeling Govt. College, Darjeeling.

Present study reflects some aspects which is basically depends upon then same problems *i.e.* transportation, transfer of knowledge, water, electricity, food and fodder, landslides, earthquakes, gardening, cultivation-practice, education, health, disease and recovery, sanitation, markets and hats (Weekly markets), primary education, industry and institution interface. Some are burning issues basically interlinking with other along with the great fault of ridge in hills including general land sides from North East states of India to Indo-China, Nepal even the extension of high ridge of Gilgit province in Pakistan. In all hill stations there are same type of problems that can predominantly harm the carrying capacity due to threat of tourism. But for the development of the area, we obviously need tourism which is scientifically termed as eco-tourism. It neglects the basic idea and qualifies the goal of the sustainable development using scientific knowledge in addition to the application of technology. The present paper therefore deals with some sites which have potency to develop eco-tourism but facing a serious problem *i.e.* pollution load, population load and productivity loss. Therefore, we can apply some knowledge to qualify the aspects of tourism using knowledge of eco-tourism.

Kalij Valley waterfalls: A waterfalls at Kalij valley is popular known as Kalij or Rainbow waterfalls under Rongbull side of Darjeeling, West Bengal. The famous attraction of the falls is due to its opaque rainbow in front of the falls that reflects the back side of vegetation covering a height of about 80 ft. A half an hour walk downwards from Rangbull junction or from Sonada Mela ground 45 minutes walking distance that attracts so many visitors. The alternate name of rainbow falls is *Indreni* falls by its Nepali name. Its uniqueness about nature and biodiversity attracts people including the unique bird *kalij* available here as endangered species. The site may be a centre of tourist attraction though students and researchers are frequently visited there. If you come to the site obviously you will discover a divinely satisfaction, joy and peace with adventure and knowledge as the site has its uniqueness. Rainbow Valley Resort is there under Kalij Valley tea Garden.

The Kalij Pheasant (Source: www.net)

The name Kalij valley comes from the Kalij pheasant that are observed frequently in

jungle, bushy forest and shrubby thickets in Himalaya. It is a pheasant or hen like bird found as *least concern type* under IUCN category. The premises are the huge forest patch of Himalaya especially in the peaks of Pakistan to western Thailand. Various colorful birds are available there but in the jungle of Darjeeling, the bird is called Gallopheasant (*Lophura leucomelanos*).

2. Dello, Kalimpng, Darjrrling: It is a beautiful hill station, 8-9 Km from Kalimpong Bus stand. The site has its unique lawn, colorful flowering trees, shored palm, *Thuja* and Kashmiri pine scarred here and there but the boundary occupies by a large patch of Mallingo Bamboo. A view point from the hill top offers a panoramic view of mountain slopes. The unique peaks of Himalaya attract tourists for its scenic beauty. Delo has its bio-park so more attractive site is Dello in compare to Durpin Dara. Artificially constructed ponds are there. The graceful attractive centre Dello is a view point to observe Mount Kanchenjungha and river Teesta.

3. Durpin Dara: The second interesting site of tourism in Kalimpong of Darjeeling is Durpin Dara. A ridge of moderately wavy patch connected two hills in which the town Kalimpopng is situated. The Hill is 1372 nt (4501 ft). Sunset and sunrise from both the hills attract tourists. Students from Schools and Colleges visit frequently Dello and Durpin Dara. It is an observatory point which is nearly 3 km from the town and located south-east of the town connected an awe-attracting and enchanting view of Mt. Kanchenjungha and other snow capped ridges. A panoramic view of Darjeeling, Sikkim, lush green pine filled valley, icy rivers such as riang, Relli, Jelep-la offer a breath taking experience round the year.

4. Senchal Wildlife Sanctuary: It is a valued wildlife sanctuary (Fig. 7) in India and was set up in 1915 in the Darjeeling District nearer to Jorebunglow or nearer to popular hilly railway station Ghoom. It is one of the oldest wildlife sanctuaries of the Country and occupies an area of 38.6 square kilometer with a range of elevation 1500 to 2600 mt. The entry point is located at Jorebunglow or near 6th Mile of Jorebunglow-Mongpoo metallic road. Green pines and variety of trees, shrubs and herbs hosted there along with a large number of wild animals. Wild animals like Black Bear, Deer and venomous snakes available there along with leopard and similar mammals. Baboons are common along the Jorebunglow and Kalimpong road. Mallingo bamboo (Fig. 5) is commonly found in the sanctuary which is a good fodder for 'Red Panda'.

5. Singalila National Park : It is located on the Singalila Ridge of Eastern Himalaya at an elevation of more than 700 ft above MSL. The total area is 78.6 square kilometer and established in the year 1986. The nearest town is Mane Bhanjang. Sandakphu of Singalila is the highest peak (3636 mt or 11941 ft.) while Phalut (3600 mt.) is the second highest peak of Noth Bengal. Abies (Fig. 6), Rhododendrons, *Primula, Prunus, Sorbus* etc. bloom flowers and attracts people round the year. But the problem is leech which attacks people during monsoon and late monsoon. A lush green dhupi pine tree (*Cryptomeria* sp.) scattered over the mindscape of Himalaya which attracts visitors. Along the ridge of mountain Fir trees (*Abies densa*) admixed with ground shrubs daruharidra (*Barberis* spp.)

whispering during trekking. Some patchy land covers with *Potentilla*, *Fragaria* and *Trifolium* that binds soil and protect the land long ever. High altitude indicates the less abundance of Pine trees (Fig. 3) towards the Sandakhphu.

6. Darjeeling: The Queen of the hills has its uniqueness *i.e.* tea industry, spectacular view of Kangchenjunga (Kanchenjungha), the Darjeeling Himalayan Railway (DHIR) a UNESCO World Heritage site attracts people since time immemorial. Besides these, the mall road, Himalayan Mountaineering Institute (HMI), Singamari Rope Way, Padmaja Naidu Himalayan Zoological Park, Shrubbery Park (Nightingale Park), mahakal dara temple, tiger hill, tibetan refuge camp, Lloyd botanical garden, Japanese temple and Peace pagoda, Ava art gallery, Burdwan Raj palace, Pandam tea estate, Jayashree Tea estate, Happy Valley Tea Garden and Lebong Race Course ground attracts visitors. Dhupi pine (Fig. 1), Guras (Fig. 2) and Chimal (Fig. 4) are common trees available here and there.

7. Mirik Lake: A natural water

Figures (Fig. 1 to Fig. 8)

Fig. 1 Landscape showing Dhupi pine,

Fig. 2 Broad leaved *Rhododendron* sp. (Guras)

Fig. 3 High altitude with less abundance of Pine,

Fig. 4 Chimal-A type of Rhodendron tree

Fig. 5 Mallingo Bamboo

Fig. 6 Silver fir-*Abies densa*: Evergreen Conifer

Fig. 7 Senchal Wild life Sanctuary (From Darjeeling),

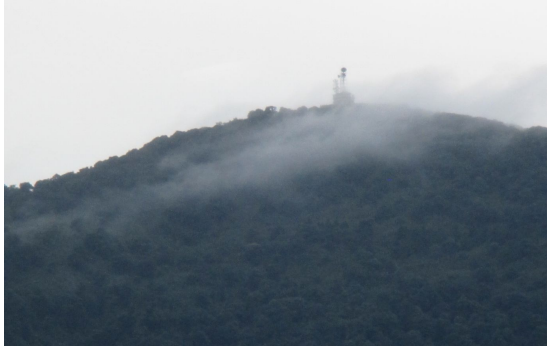

Fig. 8 Tiger Hill from Toong soong area

reservoir at Mirik attracts visitors as it is nearly one and half hour journey directly from Siliguri. Two hours journey via Maiti Nepal, Pashupati is another route from Darjeeling that attracts visitors even a lush green tea gardens whispering to stop few moments while passing by. The Nepali tea shop and momos attracts tourist and visitors to spend time there by. Green environment and clean environment says something to us when we have no anxiety. Mirik lake situated on a valley to attract visitors to ride on horse, as picnic spot, adventure in hill peaks, free movement even for sports. People from Siliguri can enjoy the place in a same day as the site is proximal to the junction station Siliguri or New Jalapaiguri.

Tourist spots must be protected from exotic forces like over gathering that hampers the carrying capacity at a glance. The site must be demarcated by different activities posed by different visitors for various purposes. Illegal activities and destructive means can lead to affect the threshold of a spot that obviously loss the interest of tourism which must be stopped. Need based training to visitors as well as for hosts is essential to reduce the negative interaction time to time. Site demarcation and inclusion of spaces for orientation is essential in eco-tourism. The special actions from Govt.

tourism department, different organizations like Forest Department and Pollution control board (State and Central) is essential to optimize the pollution and proper use of land. Advertisement of Research and Development (RD) through mass media is essential to explore the activities of eco-tourism. Pre-posting of posters and festoons to promote and convey the proper knowledge to the feeder group which is essential to fulfill the programme as a need based way. It is essential to locate the world heritage site, monuments, attractive forest sights, place of wild flora and fauna and indigenous people for the onset of good integrations during visit. It is urgent to convey the message to the feeder group about the fate of tourism, degradation of ecosystem and relation between eco-tourism and eco-degradation. Application of local as well as indigenous technique is essential to manage the fragile ecosystem and get environment economically sound but ecologically sustainable.

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References :

1. Ali, S. (1996). The Book of Indian Birds (Third Edition-Hard Cover), Salim Alin Centenary Edition, Oxford University Press, India.
2. Ali, S and S. Dillon Ripley (2013). Hand Bookn of the Birds of India and Pakistan, 1(10), Oxford University Press India, pp. 3121.
3. Anonymous. (1997). Flora of West Bengal, Vol.-I , BSI, Kolkata, Flora of India, 1997, Series-2
4. Arrow, K. J. and A. C. Fischer (1974). *Quart. J. Econ., 88:* 312-319.
5. Banerjee, S.K; D.K Pal and S.P. Banerjee (1984). Soil characteristic and Floristic composition of some sub-alpine forests of Darjeeling (West Bengal), *Proc. Indian, Nat. Sci. Acad., 50A*(3): 269-277.
6. Bennet, S. S. R. (1987). Name Changes in flowering plants of India and adjacent regions, Triseas Publishers, Dehra Dun, India.
7. Bertini, A. and E. Maritinetto (2008). *Bollettinodela Societa Paleoontologia Italiana*, *47*(2): 105-121.
8. Bhattacharya, D and A. Mitra (2013). *Paripex-Indian Journal of Research*, *2*(9): 222-224.
9. Bray, J. R. and J. T. Curtis (1957). *Ecological Monograph, 27:* 325-349.
10. Bhutia, S. (2014). *AIJRHASS, 14*(4291): 239-246.

11. Bhutia, S. (2015). *Global Jour of human-Social: B Geography, Geosciences, Environmental sciences & Disaster Management, 15*(3): 1-10.
12. Curtis, J. T. (1959). The Vegetation of Wisconsin, University of Wisconsin Press, Madison, WI, pp. 657.
13. Das, A. A and D. Das (2016). *IOSR-JESTFT, 10*(11): 12-34, DOI: 10.9790/ 2402-1011041221.
14. Das, D. (2014). *IOSR-PHR, 4*(4): 53-79, DOI: 10.9790/3013-040453-79, ANED: DOI:05.3013/044053079
15. Das, D. (2015). *Indian J. Applied & Pure Bio. 30* (1): 41-45.
16. Das, D. (2016). *IJIRD, 5* (2): 5-13.
17. Das, D; P. Ghosh and A. A. Das (2017). *IJIRD, 6*(1): 38-46.
18. Das, D and P. Ghosh (2014). *IOSR-JESTFT, 8* (5/1): 1-17.
19. Das, D and B. K. Pramanik (2015). *IOSR Journal of Pharmacy and Biological Sciences, 10*(2): 84-95, DOI: 10.9790/ 3008-102XXXXX.
20. Das, D; B. K. Pramanik and S. K. Mollay (2015). *Int. J. Phar. & Biomedi. Rese.,2*(2): 1-14, *Available online at* www.ijpbr.org
21. Dash, M. C. and S. P. Dash (2010). Fundamentals of Ecology, Third Edition, The *McGrew-Hill* Companies, Tata McGrew-Hill Education Private Limited, New Delhi., pp.1-562.
22. Dennis, J. G. and M. A. Ruggiero (1996). Biodiversity Inventory: Building and Inventory at scale from local to global. In: Szaro, R.C. and Johnston, D.W. (Eds.). Biodiversity in Managed Landscapes., Oxford Univ. Press, Oxford, pp. 149-156.
23. Dice, Lee R. (1945). *Ecology*, *26*(3: 297-302, DOI: 102307/1932409, JSTOR 1932409.
24. Garrett Hardin. (1968). *American Association for the Advancement of Science, New Series, 162*(3859): 1243-1248, 13th December.
25. Greipsson, S. (2011). Restoration Ecology, Jones & Bartlett Learning, USA, pp-387.
26. Groom, M. J; G. K Meffe, C. R. Carroll and Contributors. (2006). Principles of Conservation Biology, Third Edition, Sinauer Associates, Inc. Publishers, USA., pp.-793.
27. Haines, H. H. (1921-25). The Botany of Bihar and Orissa, Vol. I-IV, BSI, Calcutta.
28. Hooker, J. D. (1892-1897). Flora of British India, Vol. 1-VII, BSI, Calcutta.
29. Jorgensen, S. E; Xu, Fu-Liu. and R. Costanza (2010). Hand Book of Ecological Indicators for Assessment of Ecosystem Health, Second Edition, CRC Press, New-York, pp. 484.
30. Mabberley, D. J. A. (1997). Portable dictionary of the Vascular Plants, Cambridge University Press.
31. Mac Arthur, J. (1997). The Economic Valuation of Biodiversity, Its implications and importance in Bio resource planning, and initiations for its regular use in planning conservation projects in India. In: Pushpagadan, P., Ravi, K. and Santosh, V. (Eds.). Conservation and Economic Evaluation of Biodiversity, Vol. 2, Oxford & IBH Publ. Co. Pvt. Ltd., New Delhi, pp. 510-533.
32. MacArthur, R. H. (1985). *Biol. Rev., 40:* 510-533.
33. Margalef, R. (1958). Perspective in Ecological theory, University of Chicago Press. Muller-Dombois and Ellinburgh, H. 1974. Aims and methods of Vegetation Ecology, John Willey & Sons Inc., New

York.

34. Morisita, M. Measuring of inter-specific association and similarity between communities, *Mem Frac Sci Kyushu Uni, Ser E Bio., 3:* 65-80.
35. Muller-Dombois, D. and H. Ellenberg (1974). Aims and methods of Vegetation Ecology, NY: Wiley and Sons.
36. Norton, B.G. (1987). Why Preserve Natural Variety? Princeton University Press., Princeton.
37. Oostings, H. J. (1956). The structure of plant communities, WH Freeman Company., San Francisco, California, USA, pp.32-51.
38. Oostings, H. J and W. D. Billings (1942). *Ecology, 23:* 131-142.
39. Pielou, E. C. (1966). *Jour. of theoretical Biology, 10:* 370-383.
40. Perrow, M. R and A. J. Davy (2002). Hand Book of Ecological Restoration, Restoration in Practice, Vo. 2, Cambridge University Press, ISBN 0521791294, Hard Cover Pack.
41. Rao, R. R. and B. D. Sharma (1990). A Manual for Herbarium Collections, BSI, Brabourne Road, Kolkata-1., 1990.
42. Shannon, C. E and W. Wiener (1963). The Mathematical theory of Community, University Illinois Press, Urban.
41. Prain, D. (1963). Bengal Plants, Vol.-I, (Revised Edn, 1903), BSI, Calcutta.
42. Prain, D. (1963). Bengal Plants, Vol.-II, (Revised Edn, 1903), BSI, Calcutta.
43. Pramanik, B. K and D. Das (2015). *IOSR Journal of Environmental Science, Toxicology and Food Technology, **9***(4): Ver. I (Apr. 2015): 64-77. *www.iosrjournals.org* DOI: 10.9790/ 2402-09416477.
43. Simpson, E. H. (1949). *Nature, 163,* pp. 688.
44. Solbrig, O.T. (Ed.). (1991). From genes to ecosystems: A Research Agenda for Biodiversity, IUBS, Paris.
45. Sorensen, T. A. (1948). *Kongelige Danske Videnskabemes Selskab, 5*(4): 1-34.
46. Stohlgren, T.J. and J.F. Quin (1991). Status of National Resources Data Bases in National Parks: Western Region., National Park Service, Co-Operative Park Studies Unit, Technical Report 44., University California, Davis, CA.
47. UNEP. (1995). Global Biodiversity Assessment, Cambridge University Press, Cambridge.
48. Whittaker, R.H. (1972). Evolution and measurement of species diversity, *Taxon, 21:* 213-251.
49. Wolda, H. (1981). *Oecologia* (Berl.), *50:* 296-302.