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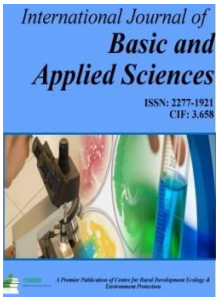

Full Length Research Paper

Changing Pattern of Land Resources and Its Management Options with respect to Carrying Capacity of Hill Stations in India

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ABSTRACT

The diverse geography of India is enriched with variety of flora and fauna and a vast scenic beauty. The hill region of India presents a wide range of opportunities and challenges for the human population living here. The clean and pleasant environment of hills stations attracts tourists round the year. This provides an opportunity to the local community for their livelihood but it also add to the burden on environment of these hills stations. Though, the basic means of livelihood for people in hills is agriculture, but in recent times the focus is slowly shifting from traditional cereal crops farming to high-value cash crops farming such as fruits and vegetables. This has deteriorated the soil fertility and crop productivity. The basic reasons behind this are unplanned settlements, change in land use (crop land scarcity and water scarcity), climate change and extreme events, depletion of natural resources etc. Tourism is also one of the most important factors affecting the land resources of Indian hill regions. The unprecedented increase in population due to high growth, migration and large influx of tourists become a huge challenge for hill towns, which result in heavy pressure on the housing and infrastructural facilities. To understand the negative impacts of tourism in the hill stations, the carrying capacity of these mountain destinations is needed to be determined. For the sustainable use of the land resources, various policies have been formulated by the state and the union government to facilitate better socio-economic growth, development of infrastructure and promotion of ecology in hilly areas.

Introduction

India is a country of great diversity with a wide range of landform types, including major mountain ranges, deserts, rich agricultural plains, and hilly jungle regions. The mountain regions have been spread through-out the country which includes the Himalayan Ranges, Purvanchal Range, Vindhya Range, Satpura Range, Niligiris, Aravalli Range, Western Ghats, Eastern Ghats, Mahadeo mountains. The Indian Himalayan Region (IHR) is spread across 10 States and hill districts of Assam and West Bengal, comprising a length of 2,500 km and width of 250 to 300 km (Aayog, 2017).

IHR, represents highly fragile and vulnerable mountain ecosystems in the country. These ecosystems, among others, have been accorded high priority for conservation and development by the Planning Commission (PC) during the 11th Five Year Plan (Plan, 2006).

During Colonial Era, 80 hill stations were established throughout India to act as summer retreats and resorts for British personnel. These hill stations were developed in the scenic locations and cool climates which can be classified into four regions depending upon their location as Northern hill stations e.g., Shimla, Dalhousie, Mussourie; North eastern hill stations e.g., Shillong, Darjling; Western hill stations e.g., Poona, Mahabaleshwer; and Southern hill stations e.g., Ooty, Coonoor. The factors affecting the hill stations of the IHR include agriculture, urbanization, tourism etc. Being such a fragile region, these land resources are needed to be conserved and their carrying capacity is needed to be accessed and maintained for the sustainable growth of these hill stations.

Problems of Hill Stations in India

The development in hill stations of India can be grouped into four stages - first stage of colonial dominance in which Britishers developed hill stations; second stage after independence, the hill stations became preferred tourist attraction among elites; in third stage these hill stations became a center of socioeconomic development; and a fourth stage, the present one, the over development of hill stations has exerted tremendous pressure on resources. Some of the major problems of hill stations are following:

- Over dependency on tourism
- Unplanned settlements
- Developmental pressure (tourism, urbanization, population growth)
- Change in land use (crop land scarcity and water scarcity)
- Climate change and extreme events
- Depletion of natural resources

Impact of Tourism on Land Resources

Tourism is one of the most important factors affecting the land resources of IHR and other Indian hill stations. The IHR encompasses several sensitive and fragile human-environment systems and ecological carrying capacities are a critical factor for tourism development. Landscape degradation is one of the most important impacts of tourism intrusion in hill stations. The floating population (tourists) visiting the hill stations, most of the times, surpasses the resident population of the hill stations. The population of IHR is approximately 47 million. Whereas, the total number of tourists visiting the Himalayan hill station in 2015 were 136 million, represented in Table-1, which is 3 times more than the local population. In 2011, the density of tourists was 140 km^2 which increased to 226 km^2 in 2015 which is way higher than the density of local people (79 km^2). It is expected that the increased tourism exert higher impacts on local land resources and as of now the intensity of such impacts is not fully understood. Therefore, to understand these negative impacts of tourism in the hill stations, the carrying capacity of these mountain destinations is needed to be determined.

Table-1: Geographical area, Population and Tourists statistics of the Indian Himalayan Region.

Indian Himalayan States	Geographical Area (in Km^2)	Population (Census, 2011)	Population Density (per Km^2)	No. of Tourists (2011)	Tourist Density (per Km^2)	No. of Tourists (2015)	Tourist Density (per Km^2)
Arunachal Pradesh	83,743	1,382,611	17	237,980	3	357,772	4
Assam*	83,743	1382611	17	4,355,885	52	5,516,565	66
Himachal Pradesh	55,673	6,864,602	123	15,089,406	271	17,531,153	315
Jammu & Kashmir	222,236	12,548,926	56	13,143,124	59	9,203,584	41
Manipur	22,327	2,721,756	122	135,083	6	149,429	7
Meghalaya	22,429	2,964,007	132	672,307	30	759,192	34
Mizoram	21,081	1,091,014	52	62,832	3	67,403	3
Nagaland	16,579	1,980,602	119	27,471	2	67,385	4
Sikkim	7,096	607,688	86	576,055	81	743,502	105
Tripura	10,486	3,671,032	350	365,561	35	398,058	38
Uttarakhand	53,483	10,116,752	189	26,070,907	487	29,602,820	553
West Bengal*	3,136	2,098,465	669	23,470,238	7484	71,682,950	22858
Total	**602,012**	**47,430,066**	**79**	**84,206,849**	**140**	**136,079,813**	**226**

**Only includes hill districts of IHR States (Source: Compiled from various reports and Census, 2011)*

Impact of Agriculture on Land Resources

The entire Himalayan range is favorable for growing a wide range of fruits, vegetables and other cash crops. The Himalayan region of India is home to 47 million people (approx.). The region is sparsely populated with an overall population density of 627 per 1,000 ha. Agriculture is the main occupation of the mountain people, providing direct employment to about 71% of the working population. The focus of agriculture in the Himalayan region is slowly shifting from traditional cereal crops to high-value cash crops farming such as fruits and vegetables. This transformation from subsistence systems to commercial agriculture poses new challenges for improving and maintaining productivity and quality. Most agricultural land in the mountain areas is not only marginal in terms of potential productivity, but its quality also appears to be deteriorating as indicated by declining soil fertility and crop productivity. Some of the challenges related to land resources in term of agriculture are presented in Table-2. In hill states, the percentage of agriculture land to geographical area is quite less, the reason is the hilly terrains, snow covered areas and steep slopes. It can also be observed that the North-Eastern states of IHR uses negligible amount of pesticides in agriculture as compared to Western Himalayas. Except Tripura, the degraded land percentage is quite less in the Eastern Himalayan region. Also, the IHR states having more degraded land has now shifting towards organic farming practices, so that the agriculture should become sustainable in times to come. Due to the use of pesticides and inorganic nitrogen fertilizers, many mountain families face food shortages of varying degrees, which contribute to the chain reaction process of poverty–resource degradation–scarcity–poverty. Therefore, it becomes of uttermost importance to discover all possible pathways for sustainable productivity and carrying capacity of the agriculture system to improve livelihood of hill people.

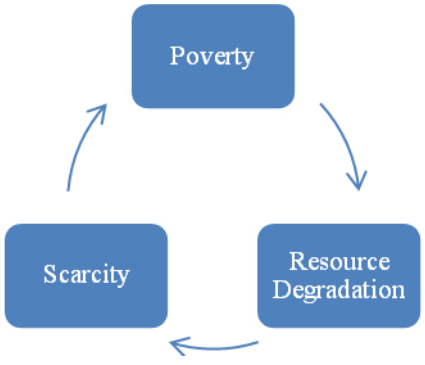

Fig.1: Chain reaction process due to food shortage in the IHR.

Table-2: Agricultural land use pattern in Indian Himalayan Region.

State	%age of Agricultural land to Geographical Area	Pesticide Consumption (Kg/Ha)	Farm Yard Manure (Kg/Ha)	Degraded Agricultural Land (%)	Inorganic Nitrogen Fertilizer (Per Ha)	%age districts with nitrate concentration over permissible limits	Existence of sustainable/natural/organic farming policy
Jammu & Kashmir	5	1.86	3530	9	39	18	Yes
Himachal Pradesh	15	0.37	3792	29	35	50	Yes
Uttarakhand	79	0.12	2078	1	138	23	Yes
Arunachal Pradesh	5	0.06	65	0	0	0	Yes
Sikkim	14	NA	3749	0	0	0	Yes
Manipur	17	0.09	494	2	24	0	No
Meghalaya	47	NA	375	4	0	0	Yes
Mizoram	17	NA	6	2	17	25	Yes
Nagaland	42	NA	5	0	16	0	No
Tripura	26	0.62	2169	64	25	0	No
Assam	43	0.07	227	5	27	0	No
West Bengal	64	0.11	1559	24	82	9	Yes

(*Source*: Veluguri et al., 2019)

Impact of Urbanization on Land Resources

Hill regions are ecologically sensitive zones having lower carrying capacities as compared to plane regions. However, most of the hill towns in India are densely populated with multistoried buildings facing problems such as depletion of green areas, congestion, over-crowding, water scarcity, landslides, pollution of lakes and streams, destruction of scenic beauty and visual stain, which causes the ecological imbalance. Major aspects which control the planning and construction of buildings in hill towns are topography, climatic conditions, orientation, traffic movement, available usable space, source of water supply, natural drainage and paths, but in present context, most of the hill settlements have issues/problems related to these vital issues. Unprecedented increase in population due to high growth, migration and large influx of tourists become a huge challenge for hill towns, which result in heavy pressure on the housing and infrastructural facilities, and lead to construction of more multi-storied buildings in hill towns for residential, office, commercial purposes. The infrastructural facilities like parking facilities, potable water supply, sanitation is presently insufficient to fulfil the demand of increased population. The carrying capacity of most of the hill stations has been exceeded or is on the verge of exceeding, which is needed to be maintained for the sustainable development. For this purpose, various building regulations are formulated (Table-3), as per the terrains of hill stations, for the sustainable development of these hill stations.

Table-3: Regulations for Building Construction in Hill Stations

Town	Type of Building	Area (in Sq. m)	Coverage (%)	Setbacks (in meters)			No. of Storeys	Building height (in meters)
				Front	Side	Rear		
Shimla	Row housing	Above 200		2.50	–	2.00	4	18.00
Dalhousie		Up to 150	70	3.0	–	2	2	11.80
Manali		Up to 120	65	3.0	–	2.0	4	18.80
Srinagar		Up to 100	40	3.0	–	1.8		16.50
Mussoorie		Up to 100	70	2.0	–	–	3	11.00
Mussoorie		Up to 200	65	2.0	–	1.5	3	11.00
Shimla	Semi-detached buildings	Above 200		3.00	3.00	2.00	4	18.00
Dalhousie		150–250	60	3.0	3	2	2	11.80
Manali		121–250	60	3.0	2.0	2.0	4	18.80
Shillong		Up to 200	50	3.0	1.0	1.0	4	19.00
Srinagar		100–150	40	4.5	2.4	2.4	4	16.50
Mussoorie		Up to 300	60	3.0	1.5	3.0	3	11
Shimla	Detached buildings	Above 200		3.00	2.0	2.0	4	18.00
Dalhousie		251–500	55	3.0	2	2	2	11.80
Manali		121–250	60	3.0	2.0	2.0	4	18.80
Manali		251–500	55	3.0	2.0	2.0	4	18.80
Shillong		201–300	50	3.0	1.2	1.8	4	19.00
Shillong		300–400	50	3.0	1.8	2.5	4	19.00
Shillong		400–500	50	3.0	1.8	3.0	4	19.00
Srinagar		150–500	40	4.5	3.0	3.0	4	16.50

Srinagar	200–500	40	6.0	3.0	3.0	4	16.50
Mussoorie	Up to 400	55	4.5	2.0	3.0	3	11
Dalhousie	Above 500	50	3.0	2	2	2	11.80
Manali	Above 501	50	3.0	3.0	3.0	4	18.80
Shillong	Above 500	50	3.0	1.8	3.0	4	19.00
Srinagar	Above 500	40	6.0	3.0	4.5	4	16.50
Mussoorie	Above 400	50	7.5	3.0	5.0	3	11

(Source: Kumar, 2016)

Challenges of Hill Stations w.r.t. Carrying Capacity

Hill Stations possesses numerous challenges during development and post development, in course of defining the carrying capacities of these areas. Presently, most of the hill station are either developed or are developing mode, thus, it may face various challenges as compared to other regions of the country, which may vary in space and time and may include;

- Unscientific exploitation of natural resources for developmental activities
- Soil erosion because of steep slopes and felling of trees
- Shifting cultivation from traditional crops to cash crops
- Faulty agricultural practices resulting from intense use of pesticides, fungicides and fertilizers
- Fragmented and small landholding because of tough terrains
- Heavy pressure on agricultural land due to infrastructure development
- Least diversified economy due to overdependence on tourism
- There is no proper mechanism to assess the count of tourist/visitor/migrants
- Haphazard, unauthorized, unplanned, substandard constructions, linear development along road network and within urban areas

Policies, Practices & Management Options

For the sustainable use of the land resources various policies have been formulated by the state and the union government. The major policies for factors which affect the land resources are described below:

Tourism

National Level

- Sustainable Tourism criteria for India (STCI), 2014

State Level

- **Tourism Policy** (Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Sikkim, Uttarakhand, West Bengal
- **Tourism Plan** (Arunachal Pradesh, Assam, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttarakhand
- **Ecotourism Policy** (Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Mizoram Sikkim, Tripura)
- **Forest Policy** (Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Nagaland, Sikkim, Uttarakhand)

Agriculture

- Essential Commodities Act, 1955
- National Agricultural Policy, 2000
- National Policy for Farmers (NPF), 2007
- Paramparagat Krishi Vikas Yojana, 2015
- National Mission on Sustainable Agriculture (NMSA), 2014

Urbanization

- National Building Code, 2005
- National Land Use Policy, 2013
- Hill Area Development Programme, 2008

Management Options

Tourism:

- Restrict the number of tourists
- Develop infrastructure which blends with the natural surroundings to decrease aesthetic pollution.
- Enforce stricter environmental laws to protect fragile ecosystem.
- Capacity building of stakeholders on negative impacts of tourism

Agriculture:

- Emphasis on organic agricultural practices
- Improved farming practices
- Emphasis on traditional farm management methods

Urbanization:

- Identification of vulnerable areas
- Formulation of strict regulations for infrastructure development
- Emphasis on proper implementation of rules and regulations

Case Study of Demul Village, Himachal Pradesh as Community Based Equitable Tourism Model

Demul (32°10.183' N, 78°10.767' E), one of the remotest villages of the Spiti Valley of Lahaul & Spiti district, is located at an altitude of 4327 m above mean sea level (amsl). The village is located nearly 30 kilometers from Kaza, the headquarters of Spiti valley. As per the 2011 Census, there are 52 households in the village which houses a population of 279 people. Agriculture is the major source of income of the residents of the village. The major crops grown in the village are Potato, Barley and Green Peas. In recent past, with the introduction of Himachal Pradesh Homestay Scheme, 2008, there is development of alternate livelihood option among the inhabitants apart from the traditional agriculture sector.

Demul village is an example of a strong community-based enterprise. The village has a very well-organized system of homestays, which ensures equitable and consistent livelihood to its residents. Travelers are not allowed to stay at a house for more than one night. Next night, some other household (again allotted) will be the host. The soundly composed homestay system, managed by a coordinator (a resident of the village) generates equal opportunities to every household. Every year, half of the houses in the village participate in hosting travelers. Other half gets their turn the subsequent year. This ensures an equitable distribution of income to every house in the village

and a unique experience to travellers. This tourism model advocates the concept of economic equality and social harmony among the residents, ensuring the sustainable growth of tourism in the village. Furthermore, the model helps in restricting the number of tourists visiting and staying at the village, which ultimately assists in maintaining the tourism carrying capacity of the village.

Suggestions and Future Guidelines

For tourism sector, various schemes launched by the state governments and union government aim at making tourism a green and sustainable industry for the coming generation. The various schemes including Sustainable Tourism criteria for India (2014) (STCI) for Accommodation, Tour Operators and Beaches, Backwaters, Lakes & Rivers sectors. The innovative, Responsible Tourism (RT) project in Kumarakom, Kerala has successfully linked the local community with the hospitality industry and government departments, thereby creating a cooperative model for enablement and upliftment of the local people while sustaining eco-friendly tourism. The Homestay Scheme, 2008 of Himachal Pradesh, seeks to draw tourists away from saturated urban areas to less crowded rural areas surrounded by clean and green settings, and providing them an opportunity to discover the hidden beauty of the state.

In case of agriculture sector, the National Mission on Sustainable Agriculture (2014), aims promoting sustainable agriculture through a series of adaptation measures focusing on ten key dimension covering Indian agriculture industry namely; Improved crop seeds, livestock and fish cultures, Water Use Efficiency, Pest Management, Improved Farm Practices, Nutrient Management, Agricultural insurance, Credit support, Markets, Access to Information and Livelihood diversification. Similarly, Paramparagat Krishi Vikas Yojna (2015) aims at development of sustainable models of organic farming through amalgamation of traditional knowledge and modern science to ensure long term soil fertility, resource conservation and assist in climate change, adaptation and mitigation.

In case of urbanization, there is a unique environment (natural and manmade) for development in ecologically sensitive hill stations, which guides all types and patterns of development, and these conditions are not so pronounced in other towns of same size in other regions of the country. Erstwhile, the hill stations of India have faced various problems which include haphazard, unauthorized, unplanned, substandard constructions, linear development along road network and within urban areas. This has resulted in formulation of various policies and programmes, among them Hill Area Development Programme (2008) is for sustainable development of these hill stations. The aim of HADP is to evolve plans and programmes which would kindle socio-economic growth, development of infrastructure and promotion of ecology of the areas covered by HADP.

Conclusion

The Indian hill stations are complex ecological entities blessed with diverse resource base for its inhabitants. These areas provide solace to the tourists visiting from the warm plains and coastal regions of the country, provides livelihood through agricultural processes and houses majority of local and migratory population in city centers. Furthermore, they also support livelihood and developmental activities in the adjacent lowland areas. The three major entities/factors i.e. tourism, agriculture and urbanization, as major actors, are responsible for the altering the land carrying capacity of the hill stations. Thus, making them of prime importance for the sustainable development of the hill stations of India. Policy and reforms should be taken care of and revised as per present need to manage land resources in the IHR w.r.t. carrying capacity of Hill station. The impact of these policies should also be assessed in frequent intervals.

References

A., D.T. (1870). *Geography of India*. W. H. Allen & co. London.

Aayog, N. (2017&. Inventory and Revival of Springs in the Himalayas for Water Security. *Department of Science and Technology, Government of India, New Delhi.*

Banta, P. K. (2005). Shimla-queen of hills: vacuum of natural heritage. *Nagarlok, 37*(3), 24-33.

Brush, J. E., & King, A. D. (1979). Colonial Urban Development: Culture, Social Power and Environment. *The Journal of Asian Studies, 38*(3), 605-607.

GBPNIHESD (2019). Indian Himalayan Region - ENVIS Centre on Himalayan Ecology. http://gbpihedenvis.nic.in/PDFs/FAQ/Indian_Himalayan.pdf.

ICIMOD, (2019). The State of Mountain Agriculture in India. http://ib.icimod.org/record/21708/files/c_attachment_110_1585.pdf.

Jodha, N. S., & Shrestha, S. (1993). Sustainable and more productive mountain agriculture: problems and prospects. *Mountain environment and development–part, 3*, 1-65.

Kotru, R. (2018). Sustainable Tourism in the Indian Himalayan Region: Contributing to Sustainable Development in Indian Himalayan Region. *NITI Aayog, New Delhi.*

Kumar, A. (2015). City profile: Shimla. *Cities, 49*, 149-158.

Kumar, A. (2016). Impact of building regulations on Indian hill towns. *HBRC Journal, 12*(3), 316-326.

Lane, M. (2010). The carrying capacity imperative: Assessing regional carrying capacity methodologies for sustainable land-use planning. *Land Use Policy, 27*(4), 1038-1045.

Moser, W. A. (1991). Design for successful hillside development. *Journal of urban planning and development, 117*(3), 85-94.

Partap, T. (1999). Sustainable land management in marginal mountain areas of the Himalayan region. *Mountain Research and Development*.

Partap, U. (2003). Cash crop farming in the Himalayas: The importance of pollinator management and managed pollination.

Pignatti, S. (1993). Impact of tourism on the mountain landscape of central Italy. *Landscape and Urban Planning, 24*(1-4), 49-53.

Plan, E. F. Y. (2006). The Mountain Ecosystems: Environment and Forest Sector for Eleventh Five Year Plan. *Planning Commission, Government of India, New Delhi*.

Sarma, A. K., Das, S., & Sarma, B (2012). Assessment of Carrying Capacity for Hilly Urban Areas: Applicability of the Concept at the Ground Level. *Environmentally Sustainable Urban Ecosystems, 42.*

Seam, A. K. (1995). General factors for planning a hill town. *Journal of Indian Institute of Architects*, 27-29.

Town & Country Planning office Shimla (2011). Development plan for Shimla planning area

Veluguri, D., Ramanjaneyulu, G. V., &Jaacks, L. (2019) State-wise Report Cards on Ecological Sustainability of Agriculture in India. *Economic and Political Weekly, 54*(27), 19-27. 2021. Shimla.