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The Process Of Development And Landscape Change In South Asia: An Overview Of Transformation Of Himalayan Environment

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Abstract

South Asia being rich in resources is being exploited at a rapid pace due to developmental activities. Uncontrolled development is likely to cause negative impact on the environment. Unchecked industrial and commercial exploitation of the natural resources is detrimental to both environment and economy. The South Asian countries like India, Nepal, and Bhutan are having negative impact on their economy and environment due to the activities like tourism, dam construction. As the increase in developmental activities like dams, tourism is increasing in the Himalayas the landscape of Himalaya is also changing which is a major unit of South Asia. In the paper, the particular attention will be given to Himalayan Geography, Economy, Developmental activities, viz a viz, Himalayan Tourism, Dams , Deforestation due to developmental activities. At the end, the paper will through light on impact of the developmental activities on Himalayan Countries and how it will led to conflicts among South Asian countries in future.

Keywords: Himalaya, Environment, Development, Degradation, Conflict

1. Introduction

Natural resources are the building blocks of development. As natural resources play an important role in development of a region they are being exploited in a ruthless manner. South Asia is blessed with tremendous natural resources like water, forest, mineral resources which if used in a sustainable manner will bring prosperity and development to the region. The Himalayas which forms a major hydro-geographical unit of South Asia is being degraded due to developmental activities. According to Pandit and Grumbine (2012) 132 dams in Indian Himalayas are those due to which nearly 90 percent of valleys and 25 percent of dense forests would be affected. Over 54,117 hectares of forested land would submerge, while 114,361 hectares would be damaged by dam related activities. In Nepal due to economic activities like tourism the forest of the hills which had the crown

cover of more than 70 % in 1964-65 reduced to 13% in 1978- 79. Similarly in Siwaliks and Terai such forests reduced to 12% from 41% and 37% from 44% respectively (Joshi, 1998). Urban growth caused the loss of 5.85% of natural forests during 1981 – 2011 in Uttrakhand (Tiwari and Bhagwati Joshi 2012: 30). Only 36 Percent of Sikkim's total area remains under forest cover, and extensive clear-cutting continues to occur over the past twenty years, Sikkim has acquired one of the highest road network densities in the Himalaya (12 km/ 100 km^2). These developmental activities have resulted in negative impact on the economy of Himalayas. In Nepal, mountain tourism constitutes 20 to 25 percent of total volume of tourism and is mainly concentrated to Everest and an Annapurna region (Nepal 2002: 39) but this has resulted in an increase in the loss of forests as due to the arrival of tourist's fuel wood consumption has increased. In autumn 1997, 9.2 tonnes of fuel wood were burned daily in the 224 lodges in the Everest region (Sharma 2009: 5). This was equivalent to 24 percent of all fuel wood consumption in the region. Huge influx of tourism was also one among the others reasons of the flood which struck Uttrakhand. About 28 million tourists were visiting the state, while the local population is close to half of that. About 37,000 sq. miles area was affected and an estimated loss of Rs.3, 000 crore to its economy[1].

2. Resource and Development: Concept

According to Organization for Economic Co-operation and Development, (2008) natural capital constitutes a quarter of total wealth in low-income countries and natural resources are often the principal source of income of the poorest people. Natural Capital is particularly important in developing countries. It accounts for an estimated 26% of total wealth in low-income countries, 13% of wealth in middle-income countries and only 2% of wealth in industrialized or OECD countries. Economic take-off is being adversely affected by lack of efficient and sustainable management of the natural resource base in countries with poor economies. The full range of economic opportunities is determined by the total supply of capital employed by the economic system including the natural capital, thus determining the wellbeing available to both present and future generations. The economic development will lead to rapid growth of physical and human capital and will result in excessive depletion and degradation of natural capital. The development done by depleting the world's reserve of natural wealth irreversibly will have harmful implications for the wellbeing of future generation (Barbier 2010: 10).

The concept of development has undergone considerable changes over the past half a century. Different scholars have defined it differently based on their philosophy, purpose, context and time. In the field of social sciences the concept of development emerged after the end of Second World War (Harris 2000: 1). Since then the concept has been associated with many disciplines such as social development (Seers 1969: 4), human development (UNDP, 1990), development as freedom (Sen, 1999), economic development (Todaro, 2000), sustainable development (Adams, 2006). However in

[1] *Uttarakhand Flash Floods: Situation update – 2nd July 2013 United Way of India* www.unitedwaymumbai.org/…ds/**Uttarakhand**%20Floods (Accessed on 5/5/2014).

1950s and 1960s the concept of development was uni-dimensional which focused on economic growth but later on a lot of changes came in the concept when the variables

other than economic growth were considered important. In 1950s- 1960s the concept of development was based on economic growth measured by per capita income and average annual growth in national income. According to Gore (2000) the economic focus of development in 1950-60s was a vision of liberating people through structural transformation. According to Ana (2008) the idea behind development was that the growth of the economy would benefit the whole society either by market-driven 'trickle down 'effects, or by state –driven social policy. Focus of development during 1970s shifted from economic growth and gross domestic product (Haq et.al.1981) to 'basic needs' which according to Harris (2000: 3) and Seers (1969: 4) included education, nutrition, health, sanitation and employment for the poor. Less concern was given to economic indicators and more to the quality of life and conservation of the natural environment. There came a dramatic turn in the focus of development in 1980s, development focused on 'structural adjustment', emphasizing liberalization of trade, elimination of government deficits and overvalued exchange rates as well as dismantling inefficient parastatal organizations (Harris 2000: 3) but several researchers and organizations showed dissatisfaction with structural adjustment approach as they found it at variance with the basic needs of the concept of development and hence the focus of development again changed in 1990s focusing on the wellbeing of people. According to UNDP (1999) development is the process of enlarging peoples' choices, and these choices are available to individuals who could lead long and healthy lives, acquire knowledge and have access to resources needed for a decent standard of living. According to Ana (2008) the limitations of the economic growth-based concept of development which viewed income as an 'end' in itself instead of a 'means' to an 'end' was overcome by the concept of development as 'human cantered'.

In 2000, development was globally viewed as multi-dimensional in both conceptualization and reality (Fukada and Parr 2003: 4-5). The international debate on development was dominated by gender empowerment measure (to encourage the participation of women and minority groups in economic, political and professional lives especially in developing countries), protection of the natural environment and the eradication of poverty (UNDP, 1995). This period also witnessed a global commitment to improve the quality of life of people through the Millennium Development Goals. The concept of development today includes all spheres of human wellbeing: social, economic, political, environmental, and gender issues as incorporated in the global efforts in improving human wellbeing (MDGs). According to World Commission on Environment and Development, (1987) Brundtland commission first defined the concept as 'development that meets the needs of present without compromising the ability of the future generations to meet their own needs'. The objective of the concept was to make sure the availability of adequate resources for the population, equal distribution of the resources among the population, economic development, and the environmental protection for the benefit of both present and future generations. Sustainable

development includes all types of economic and social development that shields and boosts the natural environment and ensures social equity (Cobbinah, 2011:152).
However due to attainment of different levels of development by both developed and developing countries the concept of sustainable development has been debated (Osofsky, 2004: 99). Major environmental problems have been generated by developed countries in order to attain levels of growth and if developing countries are allowed to pass through these levels of growth more environmental problems will be generated (Bryner, 1999: 157). As development and environment are interrelated to each other, uncontrolled development is likely to cause negative impact on the environment. Unchecked industrial and commercial exploitation of the natural resources is detrimental to both environment and economy. Environmental degradation is a result of the dynamic interplay of socioeconomic, institutional and technological activities. The process of economic transformation entails exploitation of renewable and non-renewable natural resources which results in environmental degradation in the absence of proper environment conservation mechanism. Environmental changes may be driven by many factors including economic growth, population growth, urbanization, intensification of agriculture, rising energy use and transportation.

3. Geography and Economy of Himalaya

Himalayas the 'Abode of Snow' are the highest mountains in the world with 30 peaks towering over 24,000 feet. Length 2,415 km and Area 750,000km^2 with above 15,000 glaciers. The Himalayas stretch across five South Asian countries: Bhutan, Nepal, India, Pakistan, and Afghanistan. The Himalayan region with the largest snow and ice cover in the world outside the polar regions is one of the most important mountain systems in the world and is referred to as the "third pole" (Schild, 2008) and the "water tower of Asia" (Xu et al, 2009:9). Extending along the northern fringe of the Indian subcontinent, from the Indus River in the northwest to the Brahmaputra River in the east, the Himalayas directly or indirectly affects lives and livelihood of over 300 million people (Schild, 2008).

The Himalayas forms three parallel zones: the Great Himalayas, the Middle Himalayas (also known as the Inner or Lesser Himalayas), and the Sub- Himalayas, which includes the Siwalik Range and foothills and the Tarai and Duars piedmont (an area of land formed or lying at the foot of a mountain or mountain range). Each of these lateral divisions exhibits certain similar topographic and climatic features. The Great Himalayas are the highest zone, consists of a huge line of snowy peaks with an average height exceeding 6100 m (20,000 ft). The Great Himalayan region is one of the few remaining isolated and inaccessible areas in the world today. Some high valleys in the Great Himalayas are occupied by small clustered settlements. Extremely cold winters and a short growing season limit the farmers to one crop per year, most commonly potatoes or barley. The formidable mountains have limited the development of large-scale trade and commerce.

The Middle Himalayas range, which has a width of about 80 km, borders the Great Himalayan range on the south. It consists principally of high ranges both within and outside of the Great Himalayan range. Some of the ranges of the Middle Himalayas are the Nag Tibia, the Dhaola Dhar, the Pir Panjal, and the Mahabharata. The numerous gorges and rugged mountains make surface travel difficult in any direction.

The Sub Himalayas, which is the southernmost and the lowest zone, borders the plains of North India. It comprises the Siwalik Range and foothills as well as the narrow piedmont plain at the base of the mountains. A characteristic feature of the Sub-Himalayas is the large number of long, flat-bottomed valleys known as duns, which are usually spindleshaped and filled with gravelly alluvium. South of the foothills lies the Tarai and Duars plains. The southern part of the Tarai and Duars plains is heavily farmed. The Himalayas may also be divided into three main regions exhibiting homogeneous characteristics in terms of climate, plant and animal life, cultural and social ethos, economic activities and environmental issues.

These regions are:

- Western Himalayas which includes Jammu and Kashmir and Himachal Pradesh.
- Central Himalayas which includes Uttaranchal and Nepal.
- Eastern Himalayas which includes Darjeeling Hills, Sikkim, Bhutan, Arunachal Pradesh and the eastern arc of Himalayas covering Nagaland, Manipur, Mizoram and Tripura.

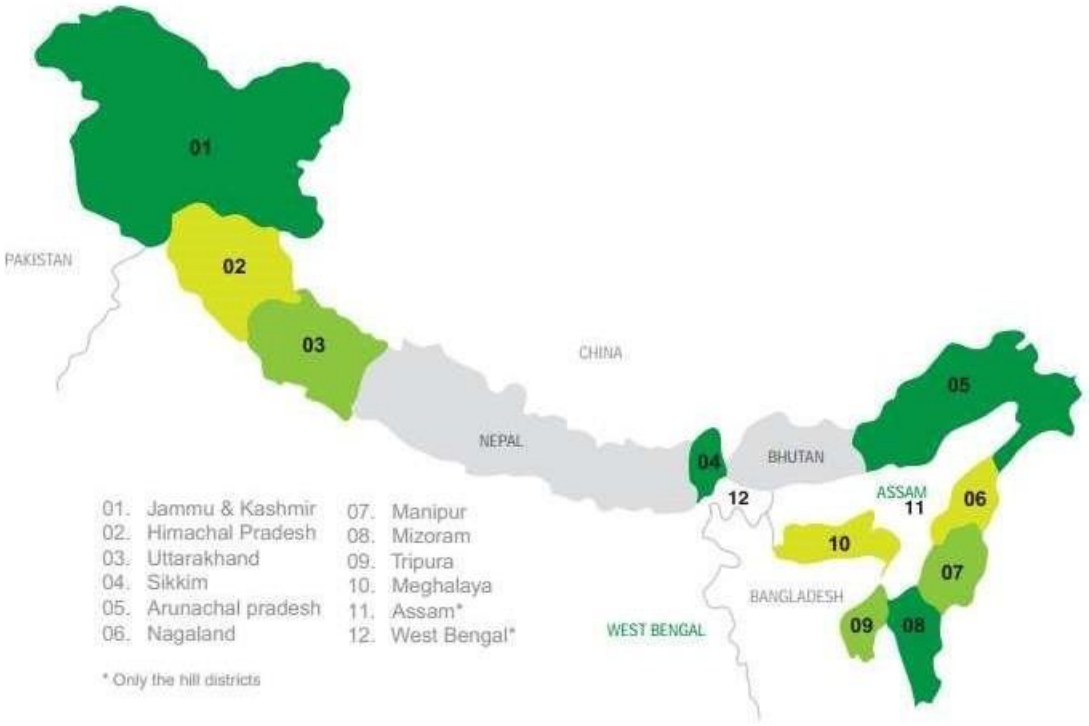

Figure1 - Himalayan Region

(Source: G.B. Pant Institute of Himalayan Environment & Development, 2006)

Much of the Himalayas area is characterized by a very low economic growth rate combined with a high rate of population growth, which contributes to stagnation in the already low level of per capita gross national product. Most of the population is dependent on agriculture, primarily subsistence agriculture; modern industries are lacking and mineral resources are limited. Development of natural resources is also limited due to low skill development opportunities. Most of the Himalayan communities face malnutrition, a shortage of safe drinking water, and poor health services. The

Himalayas play a key role in supporting economy of nations like India, Nepal and Bhutan, which depend heavily on the Himalayas for hydropower, water supply, agriculture, and tourism. The Himalayas has huge hydroelectric potential, but the development of hydroelectric resources requires outside capital investment. Bhutan's export revenue from hydropower contributed 16.3% of nominal gross domestic product (GDP) or 39% of total exports in 2009/2010 (RMA, 2011). In Nepal, agriculture has remained a key economic sector, contributing about 34% of GDP in 2009 (World Bank, 2011) and employing 93% of the workforce in 2004 (ADB and IFPRI, 2009). Himalayan States of India rely on hydropower, tourism, and agriculture for sustaining their economy. According to study released by Government of India in 2012 the Indian Himalayan states alone have over 70% of India's hydropower potential in terms of installed capacity greater than 25 MW. The adverse climatic conditions; unfavourable soil conditions and difficult terrain prohibit agriculture as an important economic activity in the Himalayas. Due to scarcity of productive land and inadequate access to irrigation the income from agriculture is scarce and meagre. Agricultural land is concentrated in the Tarai plain and in the valleys of the Middle Himalayas. The major industries include processing food grains, making vegetable oil, refining sugar, and brewing beer. Fruit processing is also important. A wide variety of fruits are grown in each of the major zones of the Himalayas, and making fruit juices is a major industry in Nepal, Bhutan, and in the Indian Himalayas. However the major economic activity providing livelihood to poor people is tourism. Nearly 2-5 million visitors come to the Himalayas each year for mountain trekking, wildlife viewing, and pilgrimages to major Hindu and Buddhist sacred places [2]. The number of foreign visitors has increased in recent years, as organized treks to the icy summits of the Great Himalayas have become popular. In Nepal about 122,745 direct employments are generated by tourism and recently tourism was the highest foreign exchange earning industry [3]. The major tourism activities that have helped uplift thousands of mountain people out of poverty are trekking and mountaineering. Tourism also creates linkages for growth of other sectors such as traditional handicrafts and agro based businesses and restaurants.

4. Developmental Activities Over Himalaya

4.1. Tourism in Himalayas

Tourism in Himalayas started in 2nd century BC with pilgrims coming from other parts for worshiping of holy rivers and the natural deities. In 19th century the second stage of tourism began when the British discovered the Himalayas as a recreation area. However the modern tourism was started in 20th century. Sir Edmond Hillary and Ten zing Norgay climbed the Everest in 1950 and there from began the mass tourism in the Himalayan

region (Stevens 2003). A decade ago, there were no more than a score of mountaineering expeditions and less than a hundred trekkers visiting the Himalaya every year but now

[2] http://s3.amazonaws.com/zanran_storage/www.isca.org.in/ContentPages/45224720.pdf (Accessed on 4/3/2014).
[3] http://discountpashmina.biz/bridges/3708.pdf (Accessed on 3/3/2014).

per year more than 200 expeditions and over 50000 trekkers visit Himalayas. According to Ministry of Environment & Forests the pace at which tourism is growing is rapid. In 1980, 15000 tourists visited Sikkim but in 2007,

3, 50,000 tourists visited Sikkim. Having a rich natural and cultural heritage the region has indisputable tourist potential, and the tourist flow is increasing at a large pace. Mountain tourism provides opportunities for providing gainful employment, income and other socioeconomic benefits, while at the same time challenges for conserving the rich natural and socio-cultural heritage of the region (Kruk, et al. 2007).

Mass tourism has brought healthcare, education, roads, electricity and wealth to isolated communities in the Himalayas but it has enormous impact on the local environment (Pant et al 1990: 34). The forests are being cleared at an unprecedented rate to provide timber for construction of lodges and fuel for cooking as the local communities have no other option, trees are destroyed to develop infrastructure for tourism activities, the economic benefit gained from tourism encourages local farmers to increase their size of herds of cows, goats, and yaks leading to yet more deforestation. Due to enormous flow of tourist severe problem of waste disposal has occurred. Despite a law from 1979 that requires trekkers to bury out their waste at the Sagarmatha National Park, the amount of waste left behind on the trails and campsites is terrific. About 15 kg of waste is created by 15 people that are non-biodegradable. There are 17 metric tons of garbage per kilometre of tourist trail the Everest is sometimes labelled as "the world's highest junkyard" and the trail to the Everest Base camp as "the garbage trail"[4].

4.2. Dams in the Himalayas

The Himalayan region called as the third pole has extensive glaciated areas after the poles (Hasnain 2009). Himalaya has huge stock of water in the form of snow and ice with a total area of 35,110 km^2 of glacier and ice cover and a total ice reserve of 3,735 km^3. The Himalayan Rivers have great potential to generate hydroelectricity, largest hydropower stations like Bhakra Nangal in India and Tarbela project in Pakistan (Dharmadhikary, 2008) and hence are virtually under bombardment of dams. They are going to have the highest dam density in the world, with over a thousand water reservoirs dotting the mountain range in India, Nepal, Bhutan, and Pakistan (Vindal2013). Majority of South Asian countries like India, Pakistan, Nepal, and Bhutan have built dams to generate hydropower and to store water for irrigation. The Bhakra Nangal on Satluj having installed capacity of 1200 mw was completed in 1962; Pakistan built the 1000 mw Mangla in 1967 and 3478 mw Tarbela dam in 1977. Bhutan built 336 mw Chukha project in 1986-1988 and Nepal built small and medium projects in 1960-70. Being the largest dam orientated area the Himalaya is undergoing a rapid change from global warming for e.g., Tibetan glaciers have receded 196 sqkm (Dharmadhikary, 2008). Using landsat satellite imagery and spatial analysis Pandit of Delhi University and Grumbine of

Kumming institute of China (2012) studied 132 of 292 dams in Indian Himalayas. According to them if the dams are constructed there would be a water reservoir in every

[4] http://lib.icimod.org/record/12369/files/528.pdf (Accessed on 25.12.2013)

3,000 sqkm in the region which is 62 times the global average dam density. According to their study nearly 90 percent of valleys and 25 percent of dense forests in Himalayas would be affected. Over 54,117 hectares of forests would submerge, while 114,361 hectares would be damaged by dam related activities. Deforestation might take 22 flowering plants and 7 vertebrate types extinct by 2025 and 1500 flowering plants and 274 vertebrate species would be extinct according to conservation projections (Grumbine & Pandit, 2013).Sikkim the most species rich state in the country would have the highest dam density (4/1000 sqkm),followed by Uttrakhand and Himachal Pradesh (1.5/1000 sqkm). Ganga basin would have the highest number of dams (1/18 km of river channel dammed) in the world, followed by Brahmaputra (1/35 km) and the Indus (1/36km) (Pandit, 2013). Nearly 90% of the Indian Himalayan valleys would be affected by the dam building and 27% of these dams would affect dense forests. More than 168 dams in Northeast India will have serious impact on life sustaining ecosystems and the sensitive environment. Kazirangha National Park and Manas National Park both being the World Heritage Sites might be adversely affected due to dam construction on the main stream of Brahmaputra. Kazirangha National Park located in the flood plain of Brahmaputra River known for one horned rhino, elephants and tigers and important species of flora and fauna maintains its ecosystem health by interacting with the seasonal flood cycle of the Brahmaputra River. The spilling of seasonal flood waters into Kazirangha national park landscape replenishes the water bodies and enriches the soil with nutrients helping both terrestrial and aquatic ecosystems to clean up and maintain their productivity and this process enables diverse species of wildlife to survive and flourish. Different types of habitat such as grasslands, wetlands and woodlands are dependent on annual washing of the landscape by flood waters for their existence. The large dams on the Siang, Dibang, Lohit and the Subansiri are likely to trigger changes in the flood cycle and hydrological relationship of Kazirangha National Park forests, such changes will significantly affect supply of water, nutrient & silt which is important for sustenance of the Kazirangha National Park[5].

The lower Subansiri Hydroelectric project (2000MW) on river Subansiri, the lower Siang HEP (2700mw) on river Siang (as Brahmaputra is known in Arunachal Pradesh), the Demwe Lower HEP (1750MW) on river Lohit and the Dibang Multipurpose project (3000MW) on river Dibang that are now under different stages of construction may affect the natural hydrological regime of the Brahmaputra river throughout the year mainly by altering the diurnal flow pattern, the frequent changes of water level in the channel, rate of sediment carriage, nature of sediment deposition and river bank erosion in the stretch on which the Kazirangha National Park is located. Diurnal fluctuations in flow discharge and water level due to calculated pattern of release of water from these run-of-the river projects will create a high flow-low flow cycle on a daily scale rather than the natural

seasonal scale. As a result of this high flow-low contrast occurring every day the hydrostatic pressure on the riverine and inner aquatic habitats will vary drastically all

[5] http://www.ercindia.org/files/Aaranyak%20concern-dams%20&%20WHS%20in%20Assam.pdf (Accessed on 25/3/2014).

the time pushing the wildlife of the world Heritage site to severe stress. The 600 MW Loharinag-Pala project being constructed by India, Pakistan, Nepal and Bhutan for Himalayan foothills will provide 150,000 MW of electricity for countries in which power cuts are frequent and demand is growing fast but the dams will have profound effects on the environment and the landscape of the region, directly affecting the lives of millions of people.

Dams in the Himalayan region will transform the landscape, ecology and economy of the region and will displace hundreds of thousands of people.[6]Damming and diversification will also severely disrupt downstream flows and threaten livelihood of entire populations.

5. Developmental Activities Leading to Conflict Among South Asian Countries

5.1. Societal Instabilities and Conflicts

Researchers are just beginning to understand the complex and causal mechanisms between climate change and society, including linkages between natural hazards, water and food security. Spillover effects (refugee flows, ethnic links, environmental resource flows or arms exports) could expand the geographical extent of a crisis and challenge the stability of regions. Climatic changes can add to and intensify other problems such as state failure, the erosion of social order, and the use of violence (for a deeper analysis of this nexus see Scheffran 2009a; Scheffran and Battaglini 2011; Scheffran et al. 2012a). The societal implications of climate change crucially depend on how human beings, populations, social systems and political institutions respond. Some responses facilitate adaptation and minimise the risks, others may cause new problems. Whether and under which conditions climate change contributes to conflict is difficult to answer in general because it depends on a wide range of factors and causal pathways between them. There is a range of possible fields of conflict related to climate change (Scheffran et al 2012c, p.113):

1. Conflicts induced or strengthened by the risks of climate change;

2. Struggle on scientific predictions and uncertainties of climate change;

3. Conflicts in selecting effective mitigation strategies;

4. Conflicts on adaptation to and damage limitation of climate change;

[6] theguardianhttp://www.theguardian.com/environment/2009/mar/13/himalaya-dams(Accessed on 14.12.2013)

5. Conflicts between emitters and victims on the distribution of costs, risks and benefits of climate change (injustice);

6. Conflict on the climate protection strategies, such as nuclear power, bioenergy, or climate engineering.

While the first category of conflicts requires a significant intensity of climate change, the other five may be already imminent at earlier stages. In all conflicts, the actors can apply 'violence as the most extreme form of action' (Ibid. p.113). During the 1990s, several research groups have examined how the scarcity of natural resources, such as minerals, water, energy, fish and land, affects violence and armed struggle. Some basic conclusions can be drawn from these studies (for an overview see Scheffran et al. 2012a):

1. Resource scarcity and environmental degradation can lead to social and economic disruptions that may indirectly become a source of conflict. Typical conflict patterns are resource capture (powerful societal groups try to influence the resource distribution to their favour); ecological marginalisation (resource scarcity and unequal distribution contribute to the impoverishment of marginalised social groups and economic decline); and forced migration (environmental problems drive people into ecologically fragile and conflict prone regions).

2. Environmental change may interfere in a complex way with political, economic and social conflict factors, such as population growth, increased demand and unequal distribution, lacking political legitimacy of governments.

3. A simple and direct relationship between resource scarcity and violent conflicts is difficult to verify. More likely than armed conflicts between states are low-level conflicts between societal groups over renewable resources. The contribution of resource scarcity is often hard to understand and indirect. A number of statements and studies expressed concerns that climate change could contribute to violent conflict. According to WBGU (2008, pp. 2-3) four conflict constellations are particularly prominent: degradation of freshwater resources, decline in food production, increase in storm and flood disasters, and environmentally-induced migration. Others may, however, be also relevant (e.g. biodiversity loss, sea-level rise).

An assessment of quantitative empirical studies on the relations between climatic variables (temperature, precipitation) and conflict-related variables (number of armed conflicts or casualties) provides mixed results (see for details Gleditsch 2012; Scheffran et al. 2012b). There is not sufficient evidence to support clear causal mechanisms between security, conflict and climate impacts. While historical case studies find significant statistical correlations between a changing average global temperature and the frequency of wars (e.g. during the Little Ice Age), for recent decades there is no clear statistical relationship between temperature change and the number of armed conflicts (Scheffran et al. 2012b, p.870).
Most affected by climate change are weak, poor and fragile states, with weak governance structures and inadequate management capacities, which are unable to cope with climate

impacts and therefore are most sensitive to both conflict and climate change (Scheffran 2009a, p. 24). Some regional hot spots (such as Bangladesh, the Middle East and the African Sahel) are more vulnerable due to their geographic and socio-economic conditions, disaster risks and the lack of adaptation capabilities (see Harmeling and Eckstein 2012).

5.2. Security Risks and Conflict Potentials in South Asia and the Himalaya Region

South Asia and the Himalaya region will be significantly affected by climate change. New assessments highlight increasing pressure on natural resources and the risk of natural disasters as some of the main challenges. This region is shaped by extreme environmental conditions. Major changes in climate, water, biodiversity and agriculture (e.g. during monsoon, river flooding in South Asia or droughts in Central Asia) are supposed to have a considerable influence on human security and environmental conflict.

Climate change will significantly affect the region's development chances, add to health problems and already high levels of poverty. Border regions will be prone to tensions due to dwindling resources and migration trends. Some areas are particularly vulnerable due to their geographic and socioeconomic conditions and the low level of adaptive capacity. Selected cases of regionally-specific conflict risks will be discussed in the following section (for a global perspective on climate hot spots, see WBGU 2008; Scheffran and Battaglini 2011).

5.3. Deforestation

Himalaya is abode of rich varieties of natural vegetation. Species and types of vegetation vary according to altitude i.e., subtropical at 6000ft, temperate at 8000 ft, subalpine at 12,000 -13,000 ft and alpine at 16,400 -19,680 ft. This vegetation is source of livelihood of many people living in Himalayas but rapid development over the whole natural landscape has brought several changes in past five to ten decades. 1970s and 1980s were the decades when deforestation was at its rapid pace in India and well as Nepal. In 1990, Nepal had 4817 hectares of forest cover which declined to 3636 hectares in 2010, a loss of 24.5% loss in its forest cover. The forest cover of Bhutan however has increased from 3035 hectares in 1990 to 3249 hectares in 2010. In a report of FAO (1990) it were people who were blamed for the disastrous deforestation as their subsistence livelihood depleted the vegetation rapidly but soon it was realized that the development activities are contributing more to the depletion. Rapid population growth was another factor which contributed a lot. During British rule Himalayan forests were replaced by plantation crops like tea, but the first period of massive deforestation in the Himalayas was the 1850s & 1860s under the twin forces of establishing British control in the upper Ganges and the Indus plains and the penetration of that region by the railways. For almost 20 years the hardwood forests of Himalayas were transformed into highly valuable commodities, Sal and deodar were cut in totally unregulated manner (Tucker, 1987).To support rapidly expanding population of South Asia forests are being cleared to provide cropland. According to Negi (2009:1-5) the forest cover in Indian Himalayan states is only 31.05 percent which is far less than the targeted forest cover of 66 percent for hilly areas

mentioned in National Forest Policy of 1988. According to the report prepared by Forest Survey of India in 2011 the Himalayan states of India is showing declining trend of forest cover which is reflected in the table 1 presented below and an associated figure of forest cover is also given is figure 1.

Table 1. Change in Forest cover in Himalayan states of India (sq km)

Himalayan states	Forest cover	Forest cover	Forest cover	Change in forest cover
Year	2005	2009	2011	2005-11
Arunachal Pradesh	67,777	67484	67410	-367
Himachal Pradesh	14,369	14668	14679	310
Jammu & Kashmir	21,273	22537	22539	1,266
Manipur	17086	17280	17090	4
Meghalaya	16988	17321	17275	287
Mizoram	18684	19183	19117	433
Nagaland	13719	13464	13318	-401
Tripura	8,155	7985	7977	-178
Uttarakhand	24,442	24495	24496	54
Total	202,493	204,417	203,901	1,408

Source: Forest Survey of India, 2011

Fig 2. Forest Cover map of Himalayan states of India(Source: FSI, 2011)

In detailed vegetation mapping of Kangan valley of western Himalayas in Pakistan done by Schickh off (1995) it was reported that there was a 50 percent decrease in the forest cover due to change in land utilization practices in this area. In Bashno Valley of western

Himalayas of Pakistan Ali et al in 2005 found that 50 percent of forests had been cut for road construction. In a report of FAO (1990) forest cover in Nepal on the higher slope declined severely during 1970s and 1980s. The reforestation programmes were very much spontaneous and the foothills regained the cover due to community forest activities but the middle and higher altitudes could not get attention of either government or local people. Important factors responsible for the decline in forest cover are shifting cultivation, mainly in north-eastern Himalayas; expansion of agricultural land due to population pressure; forest exploitation for fuel, fodder, timber, and hydroelectric projects and human settlements.

Conclusion

Development does not only mean economic development but has several other dimensions also. It is the concept of sustainability that makes development more holistic. When natural resources are utilized in the process of development the economic benefit earned through the process must be utilized to restore the loss in every possible manner. Another way is to properly and judiciously utilize the resources in order to make it available for the future. Himalayas is playing various roles in the development of South Asian countries. It has huge potential of hydroelectricity which is still untapped and if harnessed may bring prosperity in a major part of the region but sources like South Asia Network on Dams, Rivers & People reveals that those hydroelectric projects have not got environmental clearances. As SANDRP has been monitoring some clean development mechanism projects and found none of the hydro projects deserve to get clean development mechanism credits as all of them are business projects which will adversely affect people and their environment. SANDRP has found that most of the project design documents are full of dishonest and unsubstantial statements. Tourism is another beneficial economic activity over Himalayas but rapid growth of tourism activities has also ignored the need to protect natural environment in several places. In a nutshell the landscape of Himalaya has experienced major transformation in past decades due to process of development.

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