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RAVISHMENT OF THE MOUNTAINS A MYTH OR REALITY: POLICY AND LIVELIHOOD DEBATES RELATED TO HYDRO POWER PROJECTS IN HIMACHAL PRADESH, INDIA

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Abstract: *This paper focuses on debates between policy and livelihood issues related to hydroelectric projects in Himachal Pradesh. It has tried to investigate two parallel perspectives i.e., government policy, planning, and management of hydroelectric projects on one hand and issues related to the degradation of the physical and human environment on the other. It has tried to deconstruct the political economy behind the development of power projects in Himachal Pradesh as an integral part of government policy and later the contestations coming up due to various environmental and livelihood issues in the region. In the progression, it has evaluated the government's role in the development and progress of the Himachal Pradesh state through hydroelectric projects and a counter-argument by environmentalists and people associated with it. The statements are supported by the analysis and description of different news reported in local newspapers of Himachal Pradesh.*

Keywords: *Fragile ecosystem, hydroelectric project, livelihood*

Introduction

Dealing with the energy crisis is one of the major global challenges due to limited resources. The production of energy is a crucial driving force for the socioeconomic growth of a country. Conventionally thermal energy used to be the source of energy but its production from coal especially during and after the industrial revolution exhausted many coal reserves besides creating environmental problems. Increased levels of pollution due to fossil fuels, and requirement of high-security measures for the production of nuclear energy, and perceived risks associated with it made mandatory the development of a safe and cleaner source of energy. According to the Hydro Power Policy 2006, the Government of Himachal Pradesh, this century would be dependent on the availability of adequate, reliable and quality power at competitive rates. The fact is that development cannot be denied and hence, the growing population and consequent expansion in economic activities require continuous development of the power sector. India has vast potential for hydroelectricity due to its topography, ample perennial glacial resources, and high seasonal precipitation, which supply water to rivers almost annually. Himalayan topography provides rich sites for the construction of dams and hence generation of hydroelectricity.

Although the development of hydropower is necessary for mitigating energy crises it has always remained contested as 'Upstream downstream' (Bandyopadhyay and Gyawali, 1994; Blaike and Muldavin, 2004), 'dam vs development' or 'who gains and who suffers' debates. Some of the negative impacts are associated with large-scale impoundment types of hydroelectric facilities such as the submergence of land leading to deforestation, dislocation of inhabitants, and loss of biodiversity (Werthessen, 2014). This is evident in countries such as China, Brazil and India. The Three Gorges Dam along the Yangtze River in China is one example that produces up to 22,500 MW of electricity but has associated negative effects such as landslides and massive deforestation (*ibid*.). International Energy Agency (IEA) has considered hydro energy as one of the essential components of sustainable development and an efficient and environment-friendly form of energy as compared to carbon-based systems as it reduces greenhouse gas emissions (*ibid*.). Therefore, its management is important for both environmental protection and water as a major development issue (Elver, 2006). The Theory of the Himalayan Environmental Crisis is much connected to "Upstream downstream" debates which claim that the resource use practices of upstream users have serious detrimental costs to those downstream which is true for the Hindu Kush-Himalaya region. Increased anthropogenic activities resulting in the extension of cultivation onto fragile[1] steeper slopes and clearance of forest for various purposes are identified as the cause of accelerated erosion, sedimentation of river beds and reservoirs, increased flooding and sudden changes in river courses downstream e.g., Kosi, Brahmaputra, Sutlej, Beas, Ganges, and Upper Yamuna in India and the Yangtze in China (Blaike and Muldavin, 2004). Himachal Pradesh is facing both upstream mismanagement and downstream population pressures from surrounding states. This has become a cause of misery for the native population.

Due to a lot of focus on anthropogenic causes over the years, the theory of the Himalayan environmental crisis got much importance but the degradation of the Himalayas is also due to natural erosion going on due to its uplifting. Being young fold mountains, they are still growing which leads to large-scale mass wasting and consequent adding of sediments into the rivers.

Himachal Pradesh is situated in the northwestern part of the Himalayas. It has abundant water resources with a total identified hydro potential of 20386 MW. The potential is one-fourth of the country's total potential (Himachal Pradesh Towards Green and Inclusive Development). Some of the goals which the state has achieved are the highest electrified household ratio in

[1] Fragile ecosystem is vulnerable in terms of the physical environment which include land, water, forest, air quality etc. The frequency of hazards like mass wasting, large-scale erosion, landslides etc. also increase in the process of infrastructure creation. For more details refer (Pandey, 2002).

India, the first hilly state to achieve 100 percent electrification of census villages, low electricity tariff, and extending electricity even in one of the highest altitude areas (Hydro Power Policy 2006). Due to the development of multipurpose projects production of food grains in the state has increased from around 0.7 million tonnes in 1966-67 to about 1.4 million tonnes in 2003-04 and the production of fruits and vegetables has increased from 0.05 million tonnes (1966-67) each to 0.7 and 0.9 million tonnes (2003-04) respectively (*ibid.*).

Although Himachal Pradesh is one of the leading states of India in terms of socio-economic indicators and hydroelectricity is one of the major sectors of its economy, the other side of the story is a different version revealed by many protests and media reports. In one of the leading newspapers of India an article titled 'Hydel projects taking a toll on forest' (The Tribune, 30th November 2010, page-4), talks about the report of the 13th Finance Commission which is based on the 'India State of Forest Report (SFR)-2009' of the Forest Survey of India. The report confirms the failure of Himachal Pradesh in protecting green cover in comparison to other Himalayan states for which it was given the least 'green bonus' on the basis of existing green cover. The neighbouring state of Uttarakhand with 53,483 sq km of the geographical area has maintained a better forest cover despite a higher population and less geographical area as compared to Himachal (55,673 sq km). Himachal has only 14,668 sq km (26.35 percent) of forests whereas Uttarakhand has 24,495 sq km (45.8 percent) under forests (*ibid.*). Similarly, many other protests (dealt in the section 'Causes of Unrest among People and Government Stand') reveal peoples' apathy and their anger against the government.

1. Hydro Power Projects in Himachal

Himachal Pradesh has suitable geographic conditions and five major drainage systems Chenab, Rabi, Beas, Sutlej, and the Yamuna which are important for the development of hydroelectric potential which is about 25 percent of the total hydel potential of India. Hydropower development has been taking place in the state even before the state was granted full statehood in 1971. It started with the establishment of the Chamba project in 1908 (0.45 MW capacity) and a small project at Chaba (1.75 MW capacity) near Shimla in 1912. Shanan near Jogindernagar in district Mandi, Nogli in district Shimla, Gharola in district Chamba, Shansha, and Billing in district Lahaul & Spiti were other earliest projects. The Himachal Pradesh government has always taken care of some factors benefiting the state and its people such as benefit to the local economy, construction of infrastructure for the development of local areas, and reducing pressure on forests by reducing dependency on fuelwood. These were also included in the government policies of Himachal Pradesh. According to Hydro Power Policy, 2006, Himachal Pradesh has a total identified hydro potential of 20386 MW out of which about 6150 MW has been harnessed in different sectors (State, Central, Joint, Private, and under Himurja). At present, there are 13

hydropower projects running in the state, six in the central and joint sector and 19 in the private sector with a combined generation capacity of 5,809.1 MW. Some of the projects had to be abandoned due to environmental concerns. These are Baspa-1, Gara Gossain, Gharopa, Chamba and small hydroelectric projects in Tirthan Valley with 450 MW capacities (Hydro Power Policy 2006). A detailed account of various hydroelectric projects of the state and their power potentials has been given by Singh and Gupta (2018).

The topography and climatic conditions of Himachal Pradesh do not allow growth of other sectors of the economy and hence, the development of the power sector is taken to be one of the major potentials for accelerating the rate of socio-economic development and long-term financial security of the state, by the government. This responsibility was passed on to the Electricity Industry which was supposed to provide adequate power at an economical cost while ensuring reliability and quality of supply. For achieving rapid development of the electricity industry and creating opportunities for the locals, the state government decided to evolve its own 'Hydro Power Policy' in view of the conducive environment provided by the Electricity Act, 2003 and the 50,000 MW Hydro initiative of the Ministry of Power of the Government of India. Various goals to be achieved under this policy were the generation of the operational capacity of 15,000 MW by the end of the 11^{th} plan; continuing equity participation in the joint venture; making investor-friendly policies for attracting private investment; creating employment opportunities for the bonafide residents of Himachal Pradesh and allotting them small hydro-electric projects of the capacity up to 5MW; protecting the rights of local inhabitants for irrigation and drinking water requirements by ensuring availability of minimum flow of water; addressing the problem of ecological imbalance and environmental degradation by adopting suitable remedial/mitigating measures at the cost of the project and achieving development of the local area by constituting a local area development committee to be financed through power projects and achieving electrification of all left out households (*ibid.*). Another important goal was to make the power sector a major source of revenue for the state by way of allotting the projects on (BOT) build-own-operate and transfer basis by inviting global bids for projects above 5MW and up to 100 MW for a period of 40 years and in turn the projects supply free power during that period and thereafter will revert back to the state government free of cost. In the State Water Policy also clear guidelines for the project, planning has been made necessary keeping in mind the equity and social justice with regard to water usage and distribution, socio-economic aspects and issues such as environmental sustainability, resettlement and rehabilitation of project-affected people and livestock, public health, dam safety, likely impact of a project during construction and later on human lives, settlements, occupations, needs of downstream users involvement and participation of beneficiaries and other stakeholders at the project planning stage, assuring drinking water supply, hydropower development and irrigation networks, needs

of the flora and fauna, environmental impact assessment and cost-benefit analysis of major and medium scale projects by independent agencies (State Water Policy).

Himachal Pradesh is one of the states that has most actively implemented the Hilly Hydro Programme and provided an example of rapid economic growth. It has carefully adopted a methodology for identifying potential sites using available hydrological data, topographical maps, and satellite information and over 2000 potential sites in the Himalayan and sub-Himalayan regions. A careful river flow modeling for estimation of the hydropower potential of any location and selection of best sites was also used with the help of Software Hydra-HP (prepared by the Alternate Hydro Energy Centre in Roorkee, India and the Centre for Ecology and Hydrology in Wallingford, UK). In the Himalayan Chief Ministers' Conclave Indian Himalayas: Glaciers, Climate Change and Livelihoods named as Shimla Declaration on Sustainable Himalayan Development Shimla, October 30, 2009, the members emphasized that maintaining ecological flows in rivers is equally important as generating power in the future. They were concerned about the impacts of climate change on Himalayan glaciers, heavy rains and flash floods which could lead to changes in the hydrology of the rivers. Himalayas act as the watershed for India and therefore they emphasized the need for evolving methods for comprehensive impacts of projects at a basin level. They agreed to set up a joint working group for the management of these issues and emphasized the requirement of technological interventions with Research and Development. In these mountainous areas where a large number of hydel plants have grown Catchment Area Treatment Plans are required whereby bio-engineering solutions based on traditional production systems should be considered (Shimla Declaration on Sustainable Himalayan Development Shimla, 2009).

Causes of Unrest among People and Government Stand

> "It's simply rape of the mountains …… You see, thousands of trees have been axed in the name of constructing projects and the river (Sutlej) and other water channels are being used to dump the project debris….. Several areas are facing water shortages and most of the traditional water sources have dried up due to massive construction……. The indiscriminate use of explosives for the tunnel construction has also increased the risk of landslides and is endangering the rural people inhabiting this geologically sensitive mountain."

(http://www.thaindian.com/newsportal/enviornment/himachal-hydro-projects-run-into-peoples-protests-with-image_100380961.html)

The above statements given by Mr. R. S. Negi (a retired Indian Administrative Service officer who is settled in Nesang village and is the head of the *Him Lok Jagriti Manch*, a people's

movement in Kinnaur) draw everybody's attention and raise an alarm towards the severity of forest degradation and related negative impacts of hydroelectric projects in that region.

Failure of government and companies to stick to environmental and rehabilitation norms, livelihood issues of locals and displaced, and emotional, religious and historical sentiments of people attached to rivers are the main reasons for local peoples' protest, conflict and unrest and this has forced them to get organized against these projects. The article (dated 21st August 2010 in Dainik Bhaskar) titled *'To Nahi Dikhengi Nadiyan'* points out the fact that not even a single river in the state will flow more than 8 kilometers in length without a break in the flow when the total potential of 20000 MW will be exploited. According to government policies, the number of major schemes on major rivers in the state will grow to 115 in 2020 apart from many other small schemes. Most of the schemes will be developed in Shimla, Kinnaur, Kullu, Lahaul & Spiti, Sirmaur and Chamba and the maximum on Sutlej i.e., 15. The above reasons forced local communities in Kullu and Chamba to protest against the construction of hydroelectric projects e.g., in Chamba, under the *'Saal Ghaati Bachao Sangharsh Morcha'* people have been protesting against Hull Hydro Project in the Saal Valley since 2005. According to August 13 (IANS) Ravi, a major drainage system in Himachal Pradesh will lose a 67 km long stretch in the next couple of years in Chamba district due to its diversion through tunnels for hydropower generation for four run-of-river hydro projects- Bajoli-Holi, Kuther, and Chamera II and III. Similarly, the tribals of Kinnaur are much annoyed because of the shrinkage of water channels that are connected to their livelihoods. Clashes over water rights between villagers and project management are becoming common as most of the tributaries of the Sutlej have been allotted to companies for power generation. The 1,000-MW Karcham-Wangtoo hydro project, 100-MW Tidong, 195-MW Kashang, 402 MW Shongtong-Karchham and 100-MW Shorang are among the major hydro projects under execution on the Satluj in Kinnaur district. The dumping of project debris is another serious problem as is pointed out by Guman Singh (an NGO activist) that the entire stretch of the Sutlej near the Karcham-Wangtoo project has been used for dumping. The then Chief Minister Prem Kumar Dhumal told IANS: "The government was alive to the problem and it had directed the pollution control board to ensure scientific dumping of the debris." (http://www.thaindian.com/newsportal/enviornment/hydro-projects-could-make-ravi-river-stretch-disappear_100411599.html).

The headline which appeared in Tribune on November 30, 2010 (page-4) 'Hydel projects taking a toll on forest'- reveals that 9,131 hectares of forest land has been diverted for non-forestry purpose from 1980, when the Forest Conservation Act came into force, till October 31, 2010, and another 900 hectares is in the pipeline. Maximum green cover has been diverted due to hydroelectric projects with a diversion of 3,929 hectares, followed by transmission lines (2,226 hectares), roads (1,691 hectares) and mining (819 hectares). Over 11 lakh trees have been

axed for hydroelectric projects and transmission lines. According to the website (http://www.thaindian.com/newsportal/enviornment/hydro-projects-could-make-ravi-river-stretch-disappear_100411599.html) the high court had initiated Suo motu proceedings after the media reported that about 10 lakh trees have been axed during the execution of 150 mini and mega hydropower projects in the state since 1990. According to forest department estimates, over 9,000 hectares of forest land has so far been diverted to non-forest use out of which 7,000 hectares are for hydel projects. In the Himalayas, 54 percent of watersheds were in the category of very high or high priority for urgent soil and water conservation. The forest cover of Himachal Pradesh as interpreted by the satellite data shows its extent to be 12,521 sq km, while revenue and legal definitions put the figure at three times that area (Blaike and Muldavin 2004: 532).

Bhakhra and pong projects displaced thousands of people from these areas. One lakh hectares of agricultural land has been submerged (mentioned in Dainik Bhaskar dated 21st August 2010). Lalit Mohan mentions in The Tribune, (Chandigarh, Saturday, August, 28, 2010-page-4) in an article titled 'Pong Dam outsees still await compensation' that the entire land in Bacholar village was acquired for the construction of the Pong Dam but people have been waiting for three generations for rehabilitation. He further mentions that according to the Deputy Commissioner of Kangra, 2,505 Pong Dam outsees have not been allotted any land as yet by the Rajasthan government. This issue becomes critical and more sensitive as the land allotted is physically and culturally far away from their parent place. The land in Ganganagar district in Rajasthan was supposed to be given to the Pong dam outsees but locals have encroached upon this land.

The issue of mass wasting has been mentioned in Dainik Bhaskar dated 3rd September, 2010-page -1 in an article *'Chattane Khiskane se Khatre me Kacharang'*- which focuses on the fact that the construction works of the 5 MW project, has led to the activation of sliding off rocks in the Kachrang village of Kinnaur.

An article by Kuldeep Chauhan in The Tribune, dated December 15, 2010 (page-3) titled 'Mandi's solid waste finds a way into Beas' and another in Dainik Bhaskar Dated 1st October 2010 (page-15) *'Beas me roj fenka ja raha das quintal kachra'*- reveals the fact that lack of solid waste treatment has led the garbage to flow into river Beas through the *nalas* (local name water flowing into channels). This has caused the degradation of the environment and pollution of drinking water.

Another issue of sedimentation has been reported in the Bhakra dam which was now 50 percent more than assumed by Dhar (2000 cf. Blaike and Muldavin 2004: 532).

The various factors affecting the hydro potential are slope instability, high sediment discharge, extreme inflow, and vulnerability of structures to seismic activity. 'Ecological and

hydrological data are unavailable and recent developments are biased in favor of macro-projects for the benefits of industry and the economy of the plains' (Bandyopadhyay and Gyawali 1994: 1). The other factors such as political rivalries within the region, social dislocation, and inadequate rehabilitation have extended the disasters from natural to human dimensions and a neglect of the mountain inhabitants (ibid.). In the process, urban societies and industries benefited while remote mountain societies and subsistence farmers on the plains and foothills had to bear much of the cost (ibid.). Therefore, there is a need for a balanced development that is sensitive to every issue. Now formulating policies and maneuvering the projects has become difficult due to their complexities. Dams have not only been debated due to various social, political, and environmental issues but the economic viability of the large-scale projects is also being questioned. Macro projects such as the Tehri Dam of India and China's proposed Three Gorges Dam have become matters of global concern. Embankments on the Meghna have been blamed for enhanced flooding in Bangladesh (Huda 1989). Similar constructions in North Bihar and Nepal have raised questions, not only about the long-term sustainability but about the basis of the technological interventions themselves.

The perceived and actual risks associated with the construction of big dams such as threat to ecology of an area, earthquake risk, submersion of fertile land, and rehabilitation of the displaced people poses challenges in front of policymakers, technologists, and planners. The 'upstream and downstream', 'who gains and who suffers', and 'dams vs development' have now become common debates. Not only this, but a correct estimation of river load and lack of ecological and hydro-geomorphologic knowledge hinders decisions which are very important in the case of Himalayan Rivers which are known for their highest sediment loads in the world and their variability (Bandyopadhyay and Gyawali 1994).

In the early 1970s, international organizations gave technical, financial and institutional assistance to developing countries, generally without giving adequate consideration to adverse environmental effects or long-term sustainability (Elver 2006). After becoming a fully-fledged state in 1971 Himachal Pradesh had to develop its natural resources for its economic development and hence, a necessity was felt for the construction of dams as hydropower became one of the important sectors of its economy. The state started receiving grants from the center as it was given the status of a special category state. Initially, the Congress party and the policies framed by first Prime Minister Jawaharlal Nehru influenced the growth and development of India. The main focus of the Congress party was on central planning for private and public sector activities and it emphasized socialist policies for encouraging industry and reducing imports (Cashin and Sahay 1996: 124). To boost economic growth rapid development of its hydro potential was taken as a major step in the policies. Large water projects such as dams, irrigation canals, and hydroelectric power stations were seen as a part of the developmental process (Elver

2006). Here issues such as associated environmental concerns and damage to neighbouring countries were neglected (ibid.). The second important factor was the economic cost-benefit analysis and the logic of market efficiency and the gains in productive capacity attributable to innovative technology which was supported by international financial institutions, such as the World Trade Organization (WTO) and Bretton Wood institutions (ibid.). This was basically to benefit the private sector actors although it was realized that they would fail in solving the local issues (ibid.).

The State Energy Development Agency, Himurja, has been given the authority to develop 5 MW directly in hydro development projects. Although Himachal has achieved the goal of fulfilling its local demand for electricity it is also one of the fifteen states that have announced policies to promote private sector involvement in the generation of electricity. A model power purchase agreement has been prepared and agreed upon so that the developer has some certainty regarding the level of revenue to be expected.

The major concern is about the fact that with only one-third of its total potential harnessed the state has faced a great environmental loss and hence the severity of degradation will be much higher with the exploitation of the available twenty thousand MW potential.

Managing Water Resources for Sustainable Development

In (Shimla Declaration on Sustainable Himalayan Development Shimla, 2009) it was recognized that the Himalayas shape the climate, hydrology, and soil fertility of much of South Asia, and therefore, preserving the ecological and environmental sanctity of the mountains is not only of paramount importance to mountain inhabitants but also for the region as a whole

Equity has become an important concept in water allocation in the past decade. As pressure on water resources increases, ensuring equity between economic, social and environmental sustainability will become a major challenge (Wallace et al. 2003). Over the past 100 years, economic development has been dominated by infrastructure, with water allocation focused on intensive agriculture, hydropower generation, and industrial and domestic supply (Wallace et al. 2003). There has been a repeated tendency to neglect the needs of the rural poor, who, more than any others are dependent on natural resources and functions of ecosystems. More equitable allocations of water for poor peoples' needs have to be met by redistribution from other sectors, although the quantities involved are relatively small. Catchment-based IWRM (Integrated Water Resources Management) provides a framework within which water resources can be managed more holistically as suggested by Wallace et al. (2003). Efficient and equitable

use of water and representations by various people in decision making should be made the basis of policies for sustainability.

Another issue regarding these projects is abandoning the construction midway as mentioned in Dainik Bhaskar (Dated 15 September, 2010-page-1) in an article 'Janta ke 600 crore rupe pani me doobe' which highlights the fact that after spending 600 crores of rupees on 600 MW power project of Loharinag Pala on Ganga river near Gangotri in Uttrakhand it has to abandon apart from lots of environmental losses in the fragile zone by the construction of tunnels and barrages in 10 km area by NTPC (National Thermal Power Corporation) for five years. Not only this but for removing the structures erected by NTPC again crores of rupees were being spent.

"The effect of large-scale cutting of trees, dumping of muck and diversion of river water over the entire basin has not been studied by the government so far. There is a need for studying the impact of the report recommends that the government should declare some areas as "protected zones" to help maintain ecological balance and also conduct studies to know the carrying capacity of each river basin project on flora, fauna and the ecosystem," the report pointed out (http://www.thaindian.com/newsportal/enviornment/hydro-projects-could-make-ravi-river-stretch-disappear_100411599.html).

The Tribune, Chandigarh, Tuesday, August, 31, 2010-page-4- 'Master plans for river basins soon'- Pratibha Chauhan- with irreparable damage to the environment due to power projects and cement plants in various river basins, the forest department is getting individual plans prepared for the Beas, Ravi and Chenab on the lines of Sutlej. Sutlej basin has suffered extensive damage due to mega power projects and road construction. With studies pegging the loss of trees during the past 15 years to seven lakhs, concern has been voiced not only by environmentalists and voluntary organizations but by government officials also. The government may declare some vulnerable areas as 'eco-sensitive zones' and no more projects are allowed in those e.g., Spiti valley and most parts of Kinnaur. 'Having a master plan for each river basin will help us adopt a comprehensive approach rather than preparing individual catchment area treatment (CAT) plans for each project, as is the practice now,' said a senior forest official.

Conclusions:

The Himalayas are still growing due to tectonic activities which make them fragile and seismically more active. Therefore, all kinds of development and anthropogenic activities are to be managed in a very sensitive and sustainable manner. Studies by Sah and Pande (1987) and Sati (2006) talk about Himalayan degradation in the form of its carrying capacity, soil erosion and deposition of silt in streams, abandoned agricultural activities, and drying up of natural water

springs due to heavy pressure of both human and livestock population. As management of water resources in the Himalayas is not only important for its own ecology but for the entire earth therefore, a careful study of its hydrology is required with the help of satellite data and assessment of local issues and possibilities. Over the past years it has been found that the flow of rivers is not uniform due to variations in the amount and intensity of rainfall and hence while making policies data from various disciplines should be collected such as on people, climate, vegetation, rainfall, soil, land use and hydrology, etc. Hence, an integrated and multidisciplinary approach should be adopted for hydro project development by considering all social, environmental, and economic aspects. Also, technical and engineering aspects are to be strengthened by using maps prepared on remote sensing data, watersheds, assessment of flow and sediments, etc. Instead of big projects focus should be on small manageable micro-projects and the well-being of mountain people. Without substantial rethinking, the possibility for sustainable utilization of this great natural resource is remote, and the prospects for the dissipation of vast resources, and even irreparable damage, are considerable (Bandyopadhyay and Gyawali 1994). This debate cannot be concluded as the economic and environmental concerns are both necessary for the survival of humanity and the planet earth. Therefore, a close examination of issues at the society-technology-ecology interface like the perception of risk in developing societies, livelihood issues, social aspects of people to be dislocated, technical expertise, ecological balance etc. is needed for proper policy formulation and its execution. Indigenous people should be made aware about their rights and engaged in political decisions and management of resources.

As water is directly related to all sectors of economy it should be managed well so that its continuity and quality is maintained for future generations. People should be educated about its judicial use and professional, political and managerial decisions should take water as a central component in the sustainable management of an overall ecosystem (Kgathi 2002; Swatuk 2003). All bodies such as NGOs and media should understand their responsibility by not sensationalizing ignorant people but helping them understand their rights and duties.

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