*International Research Journal of Social Sciences*_____ ISSN 2319–3565
Vol. **3(2),** 21-25, February **(2014)** *Int. Res. J. Social Sci.*

Assessing the Impact of Hydroelectric Project construction on the Rivers of District Chamba of Himachal Pradesh in the Northwest Himalaya, India

Haresh Kumar Sharma[1,3] and Pawan Kumar Rana[2, 3]
[1]Department of Social Work, Punjabi University, Patiala, Punjab-147002, INDIA
[2]Department of Botany, Punjabi University, Patiala, Punjab-147002, INDIA
[3]Collective Efforts for Voluntary Action (CEVA), Head Office Killar, Pangi, Chamba-176323, HP, INDIA

Available online at: www.isca.in, www.isca.me
Received 23rd December 2013, revised 12th January 2014, accepted 8th February 2014

Abstract

During the last few years back, hydroelectric projects in hilly areas have attracted attention concerning the social and environmental impacts that have arisen from such hydroelectric power projects. Construction and operation of dams have always been associated with changes in the social, physical and biological environment. Some of the negative impacts of hydroelectric projects include loss of vegetations, topographical disturbances, changes in rivers flow patterns, involuntary resettlement, health problems, loss of cultural values and marginalization of local people. The impacts due to hydropower development, especially of reservoir and dams are always extensive in term of space. It covers upstream, on site, and downstream areas and surrounding of hydropower plants. Generally that all the hydroelectric projects in Chamba district have been given all attention regarding its technical design and economical issues of the project and very least or almost negligible attention on social and environmental factors, which are much more important in context to the remote, tribal culture rich and very high earthquake sensitive zone of Chamba district of Northwest Himalaya.

Keywords: Hydroelectric power projects, compensation, NGOs, pangi valley and bharmour.

Introduction

Himachal Pradesh is known to its snow fed rivers and rivulets flowing in almost all parts of the Himachal Pradesh. The Satluj, Yamuna, Beas, Ravi and Chenab are the main rivers in the Himachal Pradesh. Recently Himachal Pradesh, has been marked as the 'Power state' with a good potential to produce electric energy. The pressure is not just to make electric power, but to make clean power with good technology use which is less damaging and more environmental friendly. The protests in a number of localities of study area have indicated that these projects are damaging livelihood and environment in different ways. While the large and medium hydroelectric projects have been in the line of fire for their harmful environmental impacts, the small hydroelectric projects of less than 5 MW capacities seem to have escaped the lens. However these small hydropower plants also influence the microclimate as well as spatial distribution of macro invertebrate of the project site and surrounding area of hydro power projects[1]. Each dam site may have its own unique set of geologic and geotechnical challenges since the design requirement are different for dams of different size, purpose and hazard potential classification[2]. More than 400 projects have been allotted and 43 are already commissioned in the Himachal Pradesh. Further the government of Himachal Pradesh to achieve optimal harnessing of the available potential and to identify new Hydro power Potential in the State. The total power potential of various river basins in the state is estimated as 27,436 MW, which is available in five river basins with some micro projects. The basin wise potential are Satluj (13,332 MW), Beas (5,995MW), Chenab (4,032MW), Ravi (3,237MW) and Yamuna (840MW). The Himachal government has taken several initiatives to encourage private sector participation in small hydroelectric power plants development. Attractive incentives for independent power producers, in the form of easy land acquisition procedures and speedy clearances have been ensured but still poor affected families are awaiting various legal clearances and compensations[3]. What has been overlooked is that a large number of projects are sanctioned but what affects local livelihood of remotely located poor and tribal communities and fragile biodiversity ecosystems in numerous ways is overlooked by government. In several palaces, these rivers and streams support the traditional irrigation channels and watermills. In many villages of the study area the streams even supply drinking water to the inhabitants[4]. In case of small hydroelectric projects even no environmental clearance from the Ministry of Environment and Forests is required. The critical clearances that are required at the state level include the techno-economic clearance and those from the Irrigation and Public Health Department, Fisheries Department and Public Works Department. But there are no procedures and regulations in place at the state level to ensure a cost benefit analysis with an environment and social impact assessment of hydro projects. Two main types of hydroelectric power project are:-

Reservoir Hydro Power Projects: Most commonly, hydropower dams partially block the water flow of a river to create a reservoir with the capacity to store water. Larger reservoirs can buffer greater fluctuations and flow over a longer time period to provide

both base and peak power generation, while smaller reservoirs typically provide only base power generation because of the impacts of variable discharge rates. Reservoir dams are found in worldwide distribution in different countries.

Run-of-river Hydro Projects: Run-of-river dams utilize some or all of a river's flow to produce electricity without impounding any significant amount of water to upstream. As a result, run-of-river facilities have no storage capacity to buffer fluctuations in water flow. These facilities provide only base power generation hence lacks the ability to store water for periods of peak demand. Run-of-river hydropower is found most commonly in North America Europe and Asia. Run-of-river systems do not rely on a reservoir. Generation capacity can vary significantly depending on seasonal river flows. Run-of-river schemes can vary in size significantly but many are relatively small and so often not grid connected.

Methodology

To explore the community perceptions about the impacts of the Hydro Power Projects, we used qualitative social research methods, including interviews. Initially at each research site, we selected 6-8 key informants among the members of the gram sabha (village level council), Non Government Organizations and interviewed them to provide general background on the sites. 10 to 15 individual interviews were conducted in each village in different block of Chamba district. Field research and interviews were conducted with key persons of affected area and during our field visit in Chamba district from May to October during 2012-2013 including Pangi and Bharmour two tribal blocks of Chamba district. We used snowball sampling to select and interview villagers who could supply information on impacts of hydro power projects. Interviews were structured by using topic guides, and data were transcribed to a word processor after the each interview. We collected some secondary data from government and private sources, including the Hydro Power Project construction companies. Discussions were held with some interviewees on the results of our analysis as a means of validation of our interpretations.

Results and Discussion

Hydro Projects in Chamba: The Himachal Pradesh is mainly mountainous with a number of perennial streams and rivers like Ravi, Satluj and Beas etc. forming the drainage system. The Chamera dam series is constructed on the Ravi River and supports the hydroelectricity project in the region. It is located near Dalhousie. The reservoir of the dam is the Chamera lake. After completion of the first phase, the Chamera dam generates 540 MW of electricity. The second stage of Chamera dam *i.e*. Chamera-II generates 300 MW of electricity. From the year 2012, the 3rd stage of Chamera Dam i.e. Chamera-III is also under operation and generating 231 MW (3x77) of electricity. Chamera Hydro Power Project Stage-I is run-of-the-river scheme located in district Chamba of Himachal Pradesh. The reservoir behind the dam extends to 18 km upstream of river Ravi and 11 km along the river Siul also. The surface area of the reservoir is approximately 9.5 sq. km. The project has an installed capacity of 540 MW (3X180 MW) and has already generated a total of 20,190 million units till June 2003 since its commissioning in 1994 against the cumulative target of 16,084 million units and is proving to be a great boon for the northern region of India by providing reliable and peak power. The negative impacts of hydro power projects on the indigenous water mills, which have been the barrier of *Hatt and Gharat Culture* of hills, meaning thereby the watermills are the focal point of meeting the villagers and discuss the problem of all sorts and find the solutions thereof by seating in the watermills[5]. The present research is an attempt to study the impact of hydro power projects in Ravi and Chenab basin of District Chamba. Ravi river has a total catchment area of 5,451 sq. km and 154 sq. km in Himachal Pradesh. This basin lies between the Pir Panjal and Dhauladhar ranges of Himalayas. The potential capacity of Ravi river has been assessed 2,294 MW out of which 1,038.5 MW has been commissioned so far through four commissioned power projects in Chamba district i.e. Baira suil (198 MW), Chamera-I (540 MW), Chamera-II (300 MW). In other words it can be stated that this basin has been heavily targeted for the hydroelectric power development since 1980s with the installation of NHPC's first hydroelectric power generation plant with the name of Baira Suil Hydroelectric power project. A number of power projects in Chamba district in Ravi and Chenab basin are either installed or proposed to be installed. The following table is presenting a clear picture of such of developmental activities in Ravi basin in Bharmour, Chamba and Chenab basin in Pangi Valley (table-1).

Hydro Power Projects need land for their construction, which in turn may relocate the inhabitants of that locality and affect their livelihood. Bharmour and Pangi valley are two very remote and tribal areas of district Chamba. This is one among the most backward and poorly developed districts of India and is situated in the cold desert region of the North-west Himalaya. The altitude in these areas ranges between 1,950 m to 4,000m[6]. Heavy snow fall and semi arctic like climate make the living very tough here. The fragile nature of oldest crystalline basement of the Himalaya is very sensitive in case of landslide and any disaster[7]. The Lanco and Hul projects (table-2), local people managed to get the damages compensated and an agreement was signed for the same as well as compensation to watermill owners but the compensation are yet to be fulfilled. Most of the cases revealed that the agreements were mostly signed between the company and the village panchayats and there was no government agency to monitor the company. So in the case of the *Lanco* and *Hul* projects also it was shared that the concern in not just for the loss of rights over the current scenario but of the future planning also of the poor and affected families. In both the areas local irrigation schemes have been proposed by the Panchayats but the water has been given away for hydroelectric projects, which means that generation of energy is a priority and agriculture and other development related schemes are not properly applied for the upliftment of society.

Table-1
The Power Projects on Ravi and Chenab Basin in Chamba District

S.No	Name of Power Project	Name of River and Nalla	Classification	Commissioned Capacity(MW)	Type of Hydro Power Project
1	Chamera-I	Ravi	Large	540.00	Run-of-river
2	Chamera-II	Ravi	Large	300.00	Run-of-river
3	Chamera-III	Ravi	Large	231.00	Run-of-river
4	Kutehr	Ravi	Large	360.00	Run-of-river
5	Sindi	Ravi	Large	120.00	Run-of-river
6	Bara Bangal	Ravi	Large	160.00	Run-of-river
7	Dugar*	Chenab	Large	236.00	Run-of-river
8	Sach Khas	Chenab	Large	149.00	Run-of-river
9	Purthi	Chenab	Large	300.00	Run-of-river
10	BairaSuil	Baira Suil	Large	198.00	Run-of-river
11	Bhuri Singh	Saal Nalla	Micro	000.45	Run-of-river
12	Tundah-I	Tundah nullah	Small	015.00	Run-of-river
13	Tundah-II	Tundah nullah	Small	030.00	Run-of-river
14	Bharmour	Budhil	Micro	000.02	Run-of-river
15	Garola	Garola nullah	Micro	000.05	Run-of-river
16	Holi	Holi nullah	Small	003.00	Run-of-river
17	Sal Stage –I	Sal nullah	Small	008.25	Run-of-river
18	Sal Stage –II	Sal nullah	Small	002.25	Run-of-river
19	Lanco Budhil	Budhil	Medium	70.00	Run-of-river
20	Bharmour	Budhil	Medium	45.00	Run-of-river
21	Harsar	Budhil	Medium	60.00	Run-of-river
22	Kugti	Budhil	Medium	45.00	Run-of-river

*Proposed Hydro Power Project

Table-2
Major affected villages under Lanco Hydro power project as per Government record

S. No	Most affected Villages under Lanco Hydroelectric project	Name of Panchayat	Population
1	Seri	Bharmour	535
2	Bharmour	Bharmour	1,077
3	Sachuin	Sachuin	684
4	Gaggal	Ghared	189
5	Ghared	Ghared	567
6	Lunni-Dhudenka	Ghared	178
7	Khanni	Khanni	423
8	Lahal 1and2	Khani	553
9	Rehala	Garima	203
10	Fannar	Garima	256
11	Sirdi	Pulan	846
12	Sathali	Pranghala	230
13	Rajour	Pranghala	135
14	Garola	Garola	845
Total Population			**6,721**

Assessment based on present research programme: i. People living in and around the project area needed resettlement due to submergence of land because of construction of project. A number of families affected due to acquisition of land for project construction and several became homeless or landless and needed resettlement. Besides this there were other environmental Impacts like submergence, deforestation, loss of flora/fauna, soil erosion etc. ii. After the natural Calamity in Uttarakhand in 2013, Supreme Court of India directed to Government (Central and State) that no more hydro power projects construction in the hilly states. Run of the river projects typically involves construction of tunnels through mountainous

areas. In this case the mountains happen to be the Himalayas, which are still rising and still very fragile. In the past, hydroelectricity projects involving the construction of tunnels (including *Chamera-II, Chamera- III, Lanco* and downstream of the *Kuther* hydro power project in the same river valley) have resulted in immense loss and hardships to the local people on account of natural water sources drying up and houses developing cracks. Once a natural water source dries up, it is difficult to make available the same quantity and quality of water to the local people. iii. The proposed large hydro power projects can create such problem like blasting activity that would be carried out for constructing these tunnels shall create dust clouds which have known to destroy rich horticulture and agriculture of entire areas. iv. Despite provisions for muck dumping, the muck generated from tunneling is usually deposited indiscriminately by project proponents who creates immense ecological hazard, disruption of transport and irrigation channels, forest loss and danger of flooding. v. These hydro power projects involve diversion of numbers of hectares of forest land which includes areas under tree cover and natural pastures that are used by the local people for grazing cattle. The local economy in this area inhabited by the Gaddi, Gujjar and Pangwal tribal people revolves around animal rearing and pastures are a critical common resource. The link between nature and society is central to the religious belief of the tribal people of hills. Affecting nature's cycle is intrinsic to a cosmology that imbues all natural phenomena with spiritual life, so that the hills, trees, stones and crops actively intervene in people's daily life. The conjunction of the natural, spiritual and social worlds can be seen in the collective performance of the most important tribal ritual[8]. While diversion of forest land for the projects would mean loss of livelihoods for the forest dependent people, the projects have no mechanism for compensating these people in perpetuity for the losses that they would suffer. The loss of trees for the projects would also contribute to local deforestation, accelerated soil erosion and carbon emission[9]. vi. Large-scale execution of hydro power projects has wreaked havoc on Himachal Pradesh environment and the state is on the verge of ecological disaster as flow of major rivers is being diverted into tunnels leaving its original bed dry. People in the power surplus hill state are opposing the hydro projects as they fear losing their agricultural land and natural water resources besides degradation of environment. Experience from other hydro power projects in the state, especially in Bharmour, reveals that the local natural water sources get disturbed and often dry up as a result of the tunneling activity for hydro projects. Companies are least bothered about the people in the affected areas as their sole objective is to earn profit. vii. Hydropower is the power comes from the extraction of the energy of water cycles, for example the energy from water falls from dams. Hydropower can produce renewal energy by does not require any fuel, and also does not directly emit any greenhouse gas. So, this technology is seen to be an environmental friendly resource. But it is still have some hidden risks, such as the failure of the Banqiao dam in China. This accident killed more than 1,71,000 people and made almost a million of people to be rendered homeless. The cause of this accident might be the quality of constructions. The quality of materials for construct dams have to be of very high, because any breakage in dams can create very large scale of damage of plant, human, and animals[10].

The Impact of Hydro Power Projects on Horticulture /Agriculture: Hydropower development adversely affects the productivity of agriculture by degrading or depleting a number of natural resources that constitute vital agricultural inputs. Perhaps the most obvious way hydropower development restricts agricultural productivity is by reducing the supply of agricultural land. A loss of forest land, both as a direct and indirect is result of hydropower development, which further constrains horticulture productivity. Deforestation affects horticulture by accentuating flood and drought events and destabilizing soil[11]. Throughout the district people attribute the decrease in crop production, air pollution, decreased precipitation, water percolation and lack of moisture in the soil due to establishment of hydro power projects[9]. People's opinion is that if we have our apple orchard, why are the power projects destroying them and forcing us to take up daily wages jobs.

Conclusion

Hydroelectric Projects can cause several problems, even though they burn no fuel. By building dams on rivers may permanently alter river systems and wildlife habitats. Fishes and other river fauna may no longer be able to swim upstream. Also no doubt hydropower projects have made an important contribution to the human but such developments had significant impacts on local livelihood and the environment. The local issues must be taken into consideration. The policies should be framed by accurate examination of local sites so that the proportionate balance between biotic and its components of the environment can be maintained and the potential capacity of rivers can be utilized properly. Before sanctioning any other power project, the World Commission on Dams recommendations must be taken into consideration, which has stressed four fundamental values regarding the dam building viz., equity, efficiency, participatory decision-making, sustainability and accountability. The non-governmental organizations should come forward with full time participation to protect the environment and by taking appropriate strategies and to make the local people aware about their rights and environment. It is also recommended that a state level interdisciplinary committee on hydro power be constituted with eminent expert like basin planner, botanist, hydrologist, environmentalist, ecologist and socio-economic experts.

References

1. Xiaocheng F., Tao T., Wanxiang J., Fengqing L., Naicheng W., Shuchan Z. and Qinghua C., Impacts of small hydropower plants on macroinvertebrate communities, *Acta Ecologica Sinica*, **28(1)** 45-52 **(2008)**

2. Tabwassah C.A. and Obiefuna G.I., Geophysical and

Geotechnical Investigation of Cham Failed Dam Project, Ne Nigeria, *Research Journal of Recent Sciences*, **1**(**2**), 1-18 (**2012**)

3. Agarwal A., A Socio-Psychological Survey of the Rehabilitation Oustees of Tehri Dam. An Unpublished M.Phil Dissertation, Department of Psychology. Shimla: Himachal Pradesh University **(2000)**

4. Williams A. and Porter. S., Comparison of Hydropower Options for Developing Countries with Regard to the Environmental, Social and Economic Aspects, **(2006)**

5. Slariya M., A Study of Impacts of Hydroelectric Power Projects on Ecology and Society in Chamba District of Himachal Pradesh. Ph.D. Thesis. Bareilly: MJP Rohilkhand University, **(2009)**

6. Harnot S.R. and Verma R.P., Himachal at a Glance, Shimla: Minerva Book House, **(2004)**

7. Sharma M., Mishra Sunil K. and Tyagi S., The Impact of Torrential Rainfall in Kedarnath, Uttarakhand, India during June, 2013, *International Research Journal of Environment Sciences*, **2**(**9**), 34-37 **(2013)**

8. Routledge P., Voices of the Dammed: Discursive Resistance amidst Erasure in the Narmada Valley, India, *Political Geography,* **22**, 243-270 **(2003)**

9. Joshi V., Submerging Villages: Problems and Prospects. Premnagar: Ajanta Publications **(1987)**

10. Fish E., The Forgotten Legacy of the Banquiao Dam Collapse, *Economic Observer Online-In-depth and Independent,* **(2008)**

11. Economic Survey of Himachal Pradesh. Shimla Department of Economics and Statistics, **(2003-04)**

12. Mathur H.M., A New Deal for Displacement People: Orissa Resettlement Policy, *Social Change*, **38(4), (2008)**