

Environmental Impact Assessment of Kol-Dam Hydropower Project – A Case Study from Himachal Pradesh, India

Himachal Pradesh is endowed with hydroelectric potential of about 27436 MW on the five river basins namely Satluj, Ravi, Beas, Yamuna and Chenab. The basin wise potential are Satluj (13,332 MW), Beas (5,995 MW), Chenab (4,032 MW), Ravi (3,237MW) and Yamuna (840 MW).

Although, hydroelectric projects provides opportunities for economic development but also have the potential to adversely affect the livelihood and well-being of local as well as downstream communities in the area. Construction of such projects in this ecologically sensitive Himalayan state has threatened the long term sustainability of the regional bio-diversity, carbon sink and moderate climate.

Construction of big dams leads to population displacement as well as change in land use pattern, socio-economic systems, agro-socio-forestry systems, and traditional ecological practices. Hence studies on monitoring & determining the impact of hydropower projects on people and other resources existing on and around the sites of such projects are necessary for developing plans and policies to rejuvenate the degraded resources. The acquisition of private land along with setting up of the project has been resulted in changes of socio-economic aspects and lifestyle of the local people. Looking in to this, the present investigations have been attempted to study the impacts of Kol-dam hydropower project on local people and their overall economy.

Study Area

Kol-Dam hydropower project is located between $31^{\circ}21'54''$ to $31^{\circ}05'13''$ N latitude and $76^{\circ}51'31''$ to $77^{\circ}23'51''$ E longitude on Satluj river, in Himachal Pradesh. It covers some part in Mandi and Bilaspur of the state.

Sampling and Data Collection

The study based upon the primary information collected through field survey by

doing proportionate random sampling of villages. Multistage simple random sampling technique was used to select the study area .

Finally five target villages were selected. 10 per cent households were selected randomly in each village and a pretested questioner was used as a tool for gathering the information on socio-economic aspects like loss of assets (residential structures, commercial structure, cattle shed); land holdings (cultivated area owned, pasture, uncultivated barren land & waste land); cropping pattern; livestock inventory; inventory of tree species on farm land; different sources of income including both on-farm & off-farm sources etc

. Land is the basic resource, which can be allocated for different farm and non-farm activities for maximization of household income depending upon its nature and type. Land inventory and its utilization pattern, before and after project implementation period in the sampled households have been analyzed. There was a loss of total land holding per family in the range of 33.07 to 64.46 per cent in affected villages. However in case of cultivated land there was a loss in the range of 36.15 to 67.36 per cent in sampled villages. In case of pasture, maximum loss of 60 per cent was in Kasol. It was recorded minimum (7.50 %) for village Jamthal. Similarly it is also reported that 1600 hectare of cultivable land and 2000 hectare uncultivable pasture land occupied by Tehri dam project in Garhwal Himalayas of Utrakhand.

Total area under crop was decreased in the range of 67.36 to 36.15 percent in affected villages . In a similar study conducted by Katochet on impacts of NathpaJhakri project in Kinnaur and Shimla district of Himachal Pradesh they also reported that area under cultivation and current fallow had decreased by 5.82 and 42.78 per cent after the implementation of the project as compared to before project implementation. Similar impact had been reported by Adams, due to Bakolori dam on Skoto river, where the cropped area decreased from 82 per cent to 53 per cent. Chau, K C in his study “The Three Gorges project reported that this megaproject affected wholly or partly, 19 cities and counties, 238 km farmland, 50 km orange groves, as well as displacement of about 1, 1,31,800 people.

Developmental projects like power projects have adverse effects on the ecology of a region and also one of the responsible factors for the extinction of land races of flora and fauna. The respondents of the study were enquired about their perceptions

regarding the loss of tree species and revealed that submergence of land resulted in the loss of trees (fodder, timber, fuel wood and fruit) from villages' farmland in the range of 37.45 to 80.60 per cent in affected villages. It is evident from the table that maximum 83.24 per cent of timber tree population was lost in village Kasol followed by Harnora (46.74 %), Kyan (44.07 %), Ropa (37.45 %) and Jamthal (34.18 %). Execution of the project work has accelerated extinction of flora as compared to before project implementation periods. Similarly, the loss of trees due to hydropower project was also reported in project report;

Environmental studies for Vishnugad hydro-electric project, a total of 6153 trees were lost due to project. As far as the total livestock per family is concerned, there was a substantial decrease in the livestock population which ranged from 52.50 to 59.60 per cent. Construction of dam leads to the loss of fodder due to submergence of farmland, pasture/ghasni land which ultimately resulted in decrease in livestock population in each village. Dam also resulted in loss of assets i.e residential structure, commercial structure and cattle-sheds to the extent of 33.33 to 66.67 percent in different villages.

Total asset lost due to project was maximum (66.67%) in Kyan followed by Kasol (45.45 %), Harnora (41.67 %), Ropa (38.46 %) and Jamthal (33.33 %). This was due to the fact that earlier villages were located nearest to the dam as well as at lowest altitude than the later one where large area was submerged. Overall there was a decrease in income ranged from 42.86 to 81.17 per cent from on-farm sectors (agricultural crop & livestock) and an increase in off farm (jobs and private business) income ranged from 13.33 - 48.33 per cent has been observed in the affected villages. Environment Sustainable Development Center conducted a survey & estimated that before resettlement the income of people living in Yali reservoir area in Vietnam and reported that the average annual income of households from agricultural crop, livestock before resettlement was about 6.4 million Vietnam dollars which has decreased after resettlement to 3.5 million Vietnam dollars.

Conclusion

It has been concluded from the present investigations that dam construction have resulted in loss of on-farm income sources like agriculture land, farm land trees

and livestock population as well as associated income of project affected families from these resources was also affected in the study area.