

IMPACT OF KARCHAM-WANGTOO HYDROELECTRIC POWER PROJECT IN DISTRICT KINNAUR, HIMACHAL PRADESH, INDIA

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ABSTRACT: : *Hydroelectric development is a major source of growth of the economy and it helps in the development of economic conditions of the state. Trends for the coming decades will mainly be a major contribution of hydroelectricity to developing countries and rising economies. In climate change mitigation scenarios; hydroelectric power development plays a very important role. Himachal Pradesh is located in the Himalayan region and it is rich in natural sources of water. Present study deals with socio-economic and environmental impacts of the karchham-wagtoo hydroelectric power project in Satluj basin within the district kinnour in Himachal Pradesh. In this paper attempt has been made to study the Hydroelectric Power Project in Karcham-Wangtoo 1091 MW and its impact in the surrounding area. This hydroelectric project is developed on the Satluj River in district Kinnaur, Himachal Pradesh. Data have been collected through primary and secondary sources. Finally the study shows that a renewable energy resource i.e., hydroelectric generation often enhances important social and environmental impact.*

Key Words: *Hydroelectricity development, rising economies, renewable energy sources*

INTRODUCTION

Energy is essential for human life, welfare and sustainable development¹. It is assured that the need of energy will continue to raise, as the global population and modernization exhibit seemingly ever upward trends. Conventional energy is depleting at an alarming pace, though renewable energy seems to prospect a promising alternative². There is an immediate need to explore new and Renewable source of energy, as conventional sources of energy. There are various sources of energy through which energy can be obtained viz., solar energy, Wind energy, Nuclear energy, Thermal power energy and Hydroelectric power energy etc³. Hydroelectric energy is a renewable economic, nonpolluting and environmentally benign source of energy⁴. Hydroelectric power in the Himalayan region is recognised as an important resource for meeting the region's energy demand and in promoting its economic development⁵. Himachal Pradesh is located in the Himalayan region and blessed with natural sources of water. Rivers like Satluj, Beas, Chenab, Ravi and tributaries of Yamuna, flow through the state. Himachal Pradesh is known to its snow fed rivers and rivulets flowing in almost all parts of the state. Himachal Pradesh has been blessed with vast hydro electric potential in its five rivers⁶.

SOCIO-ECONOMIC AND ENVIRONMENTAL RISK IDENTIFICATION IN HYDROELECTRIC POWER PROJECTS

Hydroelectric generation on socio-economic and environmental impact is mainly based on nature and its influence on the ecology of the people in the context of this region. In this context, this study should have an important role play in analysis the potential risks and impact of hydroelectric power generation in Kinnaur. Hydroelectric power generation is considered to be a resource for the renewable energy economy, but hydroelectricity often increases important social and environmental impact. The dam affects the surrounding habitat, stream water science, section chemistry, sediment transport and migratory patterns⁷.

REVIEW OF LITERATURE

Jai-kon li (2012)⁸ studied that importance of the primary development of hydroelectric energy has been discussed based on the situation on China's hydropower development. The Study had related to the climate changes concern the development of new energy become a run of global problem. Hydro energy was also proposed for the related measures of scientific development, such as the importance for development of hydro power, strong elevate of rural small hydropower, proper solution for migration problem. Authors suggest that to promote the comprehensive and sustainable development of the economy and society, it is

necessary to innovate and develop the proper model of hydropower exploitation. In addition, environmental protection should also be given more attention.

Sharma Haresh et al. (2014)⁹ highlighted the social and environmental impacts that arisen from hydroelectric power projects. The dams Construction and operation have been always associated with changes in the social, physical and biological environment. That paper has point out the Some negative impacts of hydroelectric projects includes loss of vegetations, topographical disturbances, changes in rivers flow patterns, involuntary resettlement, health problems, loss of cultural values and marginalization of the local people. It covers upstream, on site and downstream areas and surrounding of hydropower plants. Author has suggested that nongovernmental 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.

Kamal Md. Mustafa (2017)¹⁰ wrote a paper on “**Scenario of Small Hydro Power Projects in India and Its Environmental Aspect**”. Author has given the details of small hydroelectric power projects potential in India which include developed and under developing. That review provided the number of hydroelectric power projects Sites and Capacities in different States of India. That paper has also take out significant issues facing by investors, stake holders and agencies. Government gives Incentives or Subsidies to the Government and Private sector for development of the Small Hydro Power projects. It gives the details of financial support given by Government of India. The study also gives the details of Greenhouse gas emission by various resources.

OBJECTIVE OF STUDY

The main objectives of the study are:

1. To study the effect of power project on natural resources and environment in the study area.
2. To analysis the problems faced by the inhabitants during the construction period.

HYDROELECTRIC POWER GENERATION IN HIMACHAL PRADESH

Hydroelectric power development is the key engine to the economic growth of the State of Himachal Pradesh, as it makes a direct and significant contribution to economy in terms of revenue generation, employment and improving the quality of life. The State of Himachal Pradesh has an estimated Hydro Potential of 27,436 MW out of which 24,000 MW has been assessed as harness able while the Government of Himachal Pradesh has decided to forgo balance potential in lieu of safe guarding the environment and to maintain ecological as well as protect various social concerns. Out of the total harness able potential of about 24,000 MW, a potential to the tune of 21,500 MW already stands allotted under various sectors. Potential of about 10,351 MW has already been harnessed so far under various sectors¹¹. The basin wise potential are Satluj 13,332 MW, Beas 5,995 MW, Chenab 4,032 MW, Ravi 3,237MW and Yamuna 840 MW¹².

GENERAL DESCRIPTION OF THE STUDY AREA

The present study deals with socio economic and environmental impact of the karcham- wagtoo hydroelectric power project in Satluj basin within the Nichar Block, District Kinnour in Himachal Pradesh. Its diversion dam is located at village karcham and the power house is located near village wangtoo. Karchham-wangtoo hydropower project is India largest private sector hydropower project commissioned in 13th September 2011. This project generating capacity of 1091MW¹³. Satluj River is the third largest river of a trans-Himalayan and largest river of Himachal Pradesh. That river originates from the Tibetan near Mansarover Lak¹⁴. Hydropower growth in the district is a big source of economy for the state and its help in the growth of economic conditions of the state. Large number of hydropower projects is undergoing in whole district on the river Satluj and its tributaries. It is joined by various tributaries in Kinnour¹⁵.

IMPACT ON SOCIO-ECONOMIC AND ENVIRONMENT IN KINNOUR DISTRICT

The Hydropower projects have both positive as well as negative impacts on the socio-economics of the study area. Impacts Perceived by the Respondents. There are some ecological problems which impact on environment and social-economic. Some of the impacts and problems faced are mention under table 1.

Table 1. Hydropower Project Impact in Kinnour District.

Sr. No.	Statement	Agree	Disagree	No Opinion	Total	Mean	S.D	Sk
1	Income Generation	36 (72)	10(20)	4(8)	50(100)	1.36	.631	1.57
2	Environment pollution after project	37 (74)	5(10)	8(16)	50(100)	1.42	.758	1.45
3	Social recognition	8 (16)	28 (56)	14 (28)	50(100)	2.12	.659	-.13

4	Improvement in Personality	16 (32)	16 (32)	18 (36)	50(100)	2.04	.832	-.08
5	Improvement in status	9 (18)	14 (28)	27 (54)	50(100)	2.36	.776	-.74
6	Change in Culture	2 (4)	41 (82)	7 (14)	50(100)	2.10	.41650	.71

Source: Field Survey, 2019

ANALYSIS AND INTERPRETATION

Income Generation: It is observed from this table (1) that 72 percent has agreed that income generation after construction of hydropower project. However, 20 percent of the total respondents were disagreed and 8 percent are no opinion with the statement. The table exhibits that that majority (72 percent) of the respondents was agree with the opinion that income generation due Hydropower project. The mean value for Income Generation is 1.36, which means that the respondents use Income Generation to lower extent. The value of standard deviation is 0.631. The income Generation has been found to be Positive skewed. Hence, it can be said that the Income Generation of responses are not equally over the scale which shows high difference among the respondent income generation.

Environment pollution after project: It is observed from the table 1, 74 percent that Environment has been adversely affected due to the project. However, 10 percent of the total respondents were disagreed and 16 percent are no opinion with the statement. The table exhibits that that majority (74 percent) of the respondents was agree with the opinion that Environment has also been polluted after the karchham-wangtoo project. Thus, it can be concluded that respondents were strongly agreed that during construction phase, pollution level in environment has been increased. In case of Environment pollution after project the mean value has been found out 1.42, which shows Environment pollution after project by the respondents. The computed value of standard deviation shows the variation of 0.758. The computed value of skewness is -1.45 which means the Environment pollution after project is negative skewed.

Social recognition: It is observed from the table 56 percent disagree, 16 percent agree and 28 percent are no opinion that social recognition after karchham wangtoo hydropower project. The table exhibits that that majority (56 percent) of the respondents was disagreed opinion that social recognition to those people who living in the region. The value of mean in case of Social recognition is 2.12 which indicate that the Social recognition is high extent. The computed value of standard deviation is drawn to be 0.659. The computed value of skewness shows negative skewness at -0.13.

Improvement in Personality: It is revealed from the table 1, 32 percent disagree, 32 percent agree and 36 percent are no opinion that personality improvement after karchham wangtoo hydropower project. The table exhibits that that majority (36 percent) of the respondents was no opinion that personality improvement after karchham wangtoo hydropower project. In case of Improvement in personality, the mean value has been found out 2.04, which shows higher respondents is Improvement in personality by the hydropower project. The computed value of standard deviation shows the variation of 0.832. The computed value of skewness is -0.08 which means the Improvement in personality is negatively skewed.

Improvement in status: From the table 1 it is estimated that 28 percent respondents have disagreed that status is improved after construction of hydropower project. However, 18 percent of the total respondents were agreed and 54 percent are no opinion with the statement. The table exhibits that that majority (54percent) of the respondents was no opinion with the opinion that improvement in status due Hydropower project. The mean value for the Improvement in status is 2.36 which interprets that on an average the respondents Improvement in status to more than higher extent. There is higher variation in the mean value which is shown by standard deviation as 0.776. The calculated value of skewness is -0.74 which is negatively skewed.

Change in Culture: It is observed from the table 1 that Local culture has been not adversely affected due to the outsiders who come in the region. However, 4 percent of the total respondents were agreed and 14 percent are no opinion with the statement. The table exhibits that that majority (82 percent) of the respondents was not agree with the opinion that culture has also been affected due to the project. In case of Change in Culture after project the mean value has been found out 2.10, which shows higher Change in Culture after project by the respondents. The computed value of standard deviation shows the variation of 0.416. The computed value of skewness is 0.71 which means the Change in Culture after project is positive skewed.

CONCLUSION

Hydroelectric production has increased from the beginning of the 21st century. The advantage of hydroelectricity in Himachal is that the mountains of Himachal are covered with snow for twelve months,

which provides water to the rivers and rain is also in large quantity which is an updated source of fuel supply for hydroelectricity. This paper shows that environmental and people have influence in the study area. The hydropower projects and its impact on development activities have been a regular phenomenon in kinnour. It explained that majority (72 percent) of the respondents was agree with the opinion that income generate due Hydropower project. 74 percent Respondents said that after the construction of hydropower, Environment has been adversely affected due to the project in kinnour district. Majority of the respondents 54 per cent and 36 per cent of the respondents was no opinion that personality and status is improved after karchham wangtoo hydropower project. Majority (82 percent) of the respondents was not agreed with the opinion that culture affected due to the project. Finally concludes that human development is important, which is economically viable, socially equitable and environmentally sustainable. Without sustaining the balance between development and conservation of natural resources, continuous development of the region is not possible.

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