



Environmental Issues and Mitigation Measures, Downstream Releases and Related Issues - A Advantages of Hydropower Generation.

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1 INTRODUCTION

BPC is a leading hydropower developing company of Nepal. 12 MW Jhimruk hydropower project is one of the power plants of BPC. It is situated in Puythan district (Fig. 1.1) of Western Development Region of Nepal. The pwerhouse site is located at Darimchour, Nayagaun VDC on left bank of Madi river whereas the headwork is in Khaira VDC in the Jhimruk Khola.



Fig. 1.1: Nepal's map showing Jhimruk Power Plant location

Due to the inter-basin transfer of water from Jhimruk River to Madi River in Jhimruk Hydropower project, the downstream communities of the Jhimruk dam are affected by the project. An Environmental Impact Assessment (EIA) was conducted to find out the impacts and to design an effective downstream mitigation program for the affected downstream villages.

2 SOCIO-ECONOMIC BASELINE OF THE PROJECT AREA

The downstream project affected VDCs includes Khaira, Ramdhi, Dhubang, Biluli, Pakala, Baraula, Raspurkot and Danbang in Puythan district Fig 2.1.

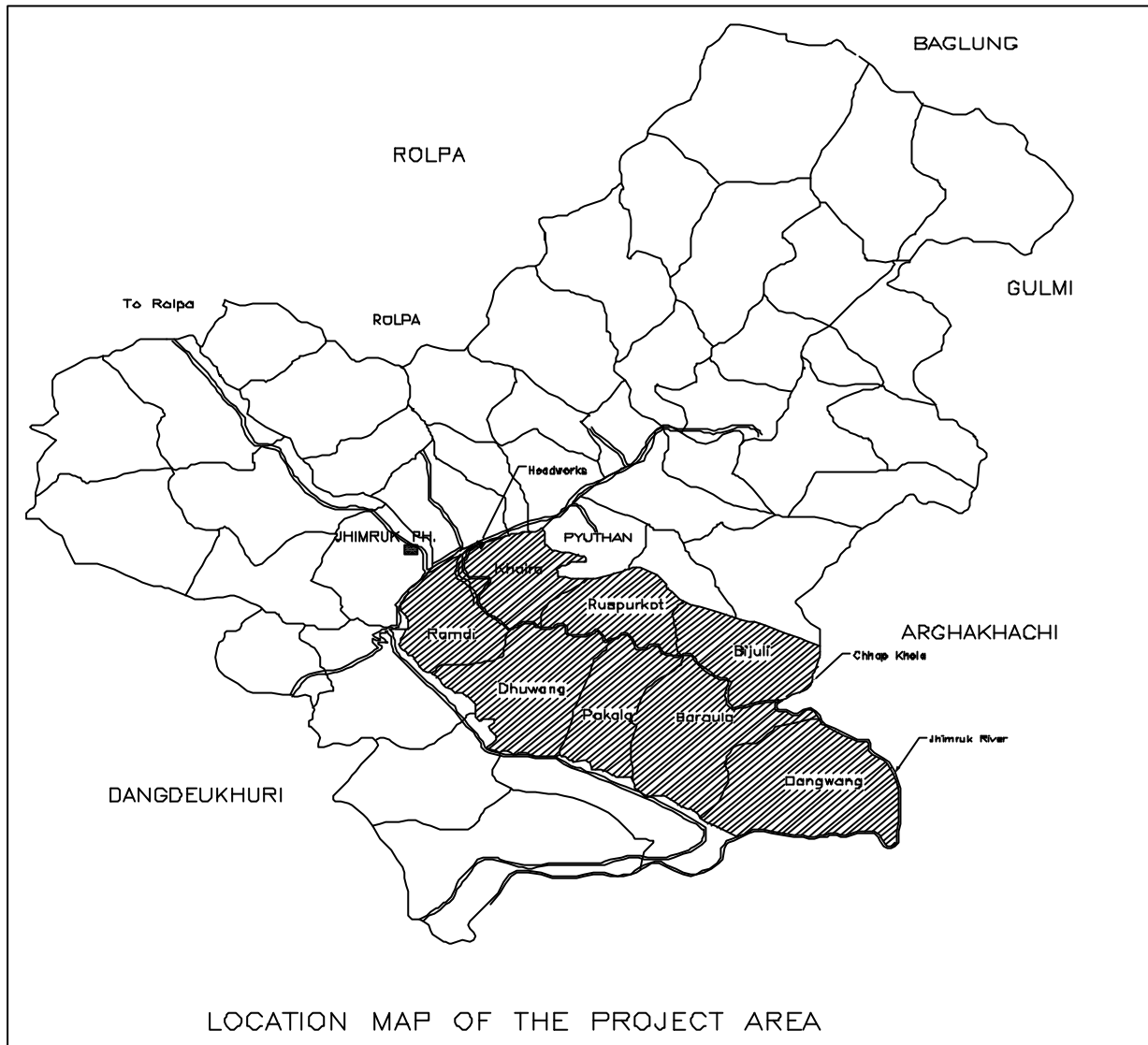


Figure 2.1 Downstream project affected VDCs

The total population of Eight Village Development Committee (VDC) is 28987 (males 13363, females 15624) with an average household size is 5.39 members. The main ethnic groups in the project area are Chettri, Brahman, Magar, Thakuries, Newar and Kami Damai.

The literacy rate for both sexes in Pyuthan district is 46 % . The literacy rate of the project affected VDCs (it means in 8 VDCs) is 52%. This literacy rate is higher than the district literacy rate and little bit lower than the national average of 54% (district profile of Nepal 2004).

Except few villages, sanitation condition is poor due to unsafe drinking water supply and lack of toilet facilities in the downstream village.

The villages are quite scattered in the downstream area of Jhimruk valley (See figure 2.2). Majority of the household are engaged in agriculture. The source of income is basically agricultural products. Local farmers produce three crops in a year, mostly two crops of paddy (rice) and one crops of wheat. Besides, the farmers grow other crops like maize, millet and the cash crops including potato, black grams, etc, as their source of income.

Jhimruk River is the only source of the irrigation for the downstream Jhimruk valley. Agricultural activities are performed manually. The exchanges of the labour system among the neighbouring communities for the agricultural activities are common in the downstream communities.

Figure 2.2 Downstream settlement and agricultural land



Women are normally responsible for the household works. They also work in field for agricultural products. Some of the men are employed in India for their earning. Some men are teachers, businessmen and involved in small businesses to support their families.

The Cherneta- Baraula road, 22.5km downstream of the valley was recently built. The road is still a mud and rough road joins Bhalubang-Bijur road and connects the area with district head quarter . Two small jeeps ply here once a day from Cherenata and back next day.

Jhimruk Khola harbours a wide range of local and migratory fishes. Some of the migratory species are golden mahaseer or sahar (*Tor Putitora*), snow trout (*schizothrox plagiostonus*), katlae (*Aecrossocheilus hexagotepis*).

3 IMPACTS

a. Agriculture production and Irrigation



Figure 3.1 downstream irrigation canal

Almost all village located downstream of the headworks along the Jhimruk Khola has few hectors of low land (Khet) irrigated by the Jhimruk Khola. There are 25 numbers of irrigation systems downstream of the dam facilitating irrigation with a total command area of 365 hectare. All these irrigation systems depend on water from the Jhimruk River. The downstream fields mostly grow three crops in a year. These three crops are winter season wheat, pre monsoon paddy and monsoon paddy. Among these crops the pre-monsoon paddy is affected by the Jhimruk river diversion for energy generation. This pre-monsoon paddy is planted during the dry season of the year when the water level in the river falls deep.

b. Household Income

The loss in the agriculture production is the direct impletion on the income of the household as agriculture income contributed major share in the total house income.

Villages located from the downstream of the headworks site is directly affected by the total diversion of the Jhimruk Khola water.

c. Fish population

The construction of diversion weir across the stream would restrict migration path of the migratory species. Moreover, the diversion of the Jhimruk khola water would likely to discontinue the fish food chain at spawning ground. As a result, the local fish population would be gradually decreased further downstream of the confluence of Chhap Khola or upstream of the headworks. Moreover, it will also effect the local fishermen.

d. Drinking water supply

Out of 24 villages located from downstream of the headworks to the confluence of Chhapkhola, 11 villages would have directly affected by the total diversion of the Jhimruk khola water.

4 MITIGATION MEASURES

a. Downstream water release

Mitigation provision should be made to release the water up to 0.75 Cumsec plus for the irrigation canal from the wire. (At least 10% of the total water to release from the weir side)

b. Change in agricultural pattern

The project will have to encourage to the local farmers to change their cropping pattern. First alternative, the crop such as maize and moong beans could be grown instead of pre-monsoon paddy as these crops water requirement is considerably low (Less than 0.5 l/s/ha.) compare to the paddy. Moreover, agriculture development program should be provided (such as improved seed, Introduction of alternative cash crop, use of fertilizer).

The farmer have to look for alternative income generation to fulfil the loss. BPC has envisaged new to raise the socio-economic status downstream people through integrated rural development approach

c. Employment Opportunities

The alternative could be changed in the agriculture practice or temporary mitigation of the people for the employment.

d. Fish ladder

Fish passes or fish ladder need to be construction to allow the free migration. In order to minimise the impact on the migratory fishes, it is recommend to release certain quantity of water from the weir so that the spawning and nursery beds do not dry out completely. The provision to release about 0.75cumecs of water from the wire would be adequate to keep the nursery and spawning ground wet.

e. Drinking water supply

Water supply is the basic necessary for living. So the construction of water supply schemes have been proposed for all the villagers located downstream of the headworks..

f. Awareness raising program

Awareness raising programme on health and sanitation, toilet construction in cooperation with Local NGOs.

g. Rural Electrification

Priority to given to the affected villages while electricity is distributed

5 CONCLUSIONS AND RECOMMENDATIONS

Therefore, BPC has implemented a number of mitigation programs such as (local employment opportunities, River Training, Canal improvement and construction, Agricultural development infrastructure development, Rural electrification, Drinking water supply and support, Enterprise development, Health and sanitation and forest management programs) in piecemeal approach in the past and present to raise the socio-economic conditions of the affected people.

These programmes have brought many positive changes. Still, lots of activities can be done to enhance their socio-economic conditions further.

The following major tasks have been identified for undertaking under the present project.

- a. Improvement of downstream irrigation systems:
It has been envisaged to rehabilitate and improve 25 irrigation canals in five years.
- b. Income raising program of downstream communities.

It has been envisaged to promote at least 200 farm and non-farm based enterprises at household level.

- c. Improvement in living environment in downstream area.

It has been planned to install at least 1000 numbers of suitable toilets for the downstream community

REFERENCES

- GOEC,CONSULTANT (P) LTD. (1991) Environmental Impact Study to Assess Effects on Irrigation and Ecology Along Jhimruk Khola, .
- MULTI DISCIPLINARY CONSULTANTS (P) LTD.(1999)Socio-economic baseline Survey and Need Assessment Study