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Identification of Condition and Status of Nepal's First Hydropower-Pharping Hydropower

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ABSTRACT
As micro hydropower project is a small scale of project which is specially installed in remote hilly and mountainous areas to provide electricity for lighting facility and agro-processing. Pharping Hydropower is the first and foremost built infrastructure in the sector of hydroelectricity in the history of Nepal. The installed capacity of Pharping Hydropower Plant is 500 KW. Attempts were made to study the condition and status of Pharping Hydropower, present condition, generation capacity, and efforts were made to find appropriate management options to keep Pharping Hydropower sustainable. This study provides historical development of Pharping hydropower, conditions and problem associated with development of Pharping hydropower.

***Keywords:**-Hydropower, pharping, water crisis.*

INTRODUCTION

The schemes of 5 Kilo Watt or less, now, have to be known as Pico. Micro hydropower plants are installed in Nepal's remote hilly and mountainous areas. These are useful to provide electricity for lighting facility mainly. Agro-processing like grinding, hulling, operating radio, television, computers and other equipment are its uses and benefits. The plants up to 1000 Kilo Watt capacity are to be known as micro hydropower as defined recently where as it was limited to 100 Kilo Watt in the past[1].

***Fig.1:**-Penstock Pipeline*

Pharping Hydropower Plant is one of the oldest hydropower plants of Asia and the first hydropower plant of Nepal. The construction of the plant commenced in 1907 and was commissioned in 1911[2]. The plant was inaugurated by His Late Majesty King Prithivi Bir Bikram Shah on May 1911(Jestha 9, 1968 BS, Monday, at 6:30 PM). In total, 900,050 thousand man-days were required to complete the construction of the plant[3]. The plant was equipped with two turbines each of 250 KW. The water for the generation was tapped from Satmul and Sheshnarayan laying steel pipeline with diameter of 44 inch from Satmul and diameters of 10 inch and 9 inch from Sheshnarayan. A reservoir with 200 ft. diameter and 18 ft. depth with the capacity of 528,733 cubic feet was built[4].From the reservoir, riveted steel pipes of 20 inch diameter were used as penstock up to the bifurcation point. An overhead transmission line of 6 miles from the plant to the distribution sub-station at Tudikhel was constructed using steel and

wooden poles. In the transmission line, there are two major crossings of 600 ft. and 900 ft. on Bagmati River.

Fig.2:-*Reservoir of the Pharping Hydropower Station*

The equipment of this plant was a grant from the British Government and other expenditures were borne by Nepal Government in total cost of Rs. 713,273.82; and the breakdown of the cost were Rs.196,324.84 for Pipeline/Headwork/Reservoir, Rs. 156778.31 for Powerhouse/Colony/Tailrace and Widening of Bagmati River, Rs. 36175.80 for Substation/Office/Store, and Rs. 111049.50 of Transmission Line/Street Light/Distribution Line and Telephone Line[3]. The plant was constructed under the overall supervision and monitoring of General Padma Samsher JBR. Executive Engineer Colonel Kishor Narsingh Rana was responsible for planning of the power plant[5].

Description of Pharping Hydropower Plant

Pharping Hydropower is the first and foremost built infrastructure in the sector of hydroelectricity in the history of Nepal. It is matter of pride to know that Pharping is the second hydroelectric project in Asia. The unimaginable project of the time built with the wise use of manpower has passed its hundred years of its existence. Now, it's the time to make the use of this occasion to teach all the Nepalese and to learn by ourselves, who are encountering the energy problem in day to day life, and to develop it as resource center. It's the time to give the message to all that we need to seek opportunity within the crisis.

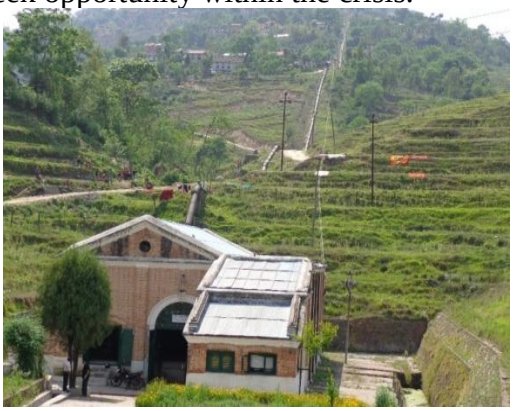

Fig.3:-*Power house of Pharping Hydropower*

Purpose of this Study

The main objective of the study is to know the details about Pharping Hydropower, spread the information about condition of Pharping Hydropower and recommend about its upgrading.

FIELD OBSEVATION AND DATA ANALYSIS

The Pharping hydropower plant was visited & its corresponding responsibilities from where we knew about the history, existing condition, and amount of electricity generated by Pharping Hydropower. We asked them how the Pharping Hydropower operates. We collected the data from the corresponding responsibilities, interacted with the local people of that area. We studied about the positive and negative impact of the hydropower to the environment and living standard of the people. By the interaction with the local people, we knew about the job opportunities created by that hydropower to the local people. By direct observation of the site, we collected following data and detail information regarding Pharping hydropower. The detail information is listed below:

Installed Capacity :500KW
Construction work started :1907AD

Completion of construction work:1911AD
Inauguration: His Majesty Prithivi Bir Bikram Shah Dev.
Involved man days for work : 950,000
Cost: 713,273.82 NPR
Turbine: Pelton Turbine: 2 Nos.
Governor : Milton Oil Governor
Penstock : Riveted Steel pipes of 20" dia. (length 2,538 ft.)
Reservoir : 200' dia. and 18' deep (capacity 528,733 cu. ft.)
Conveyance System: Pipeline: 44" dia. from Satmul.
10" and 9" dia. from Sheshnarayan.
Water Pressure at Turbine : 288 pound /sq. inch
Transmission Line : Length 6 miles, Support - Steel and Wooden Poles.

Fig.4:*-Turbine at power house of Pharping Hydropower*

CONCLUSION AND DISCUSSION

At present condition, the electricity generation capacity of plant is 100KW for an hour per day. The generated electricity is connected to national grid at Syuchatar (Kalanki). According to Vijay Shrestha, a staff of Pharping hydropower, the volume of water in the reservoir is 105000 ft^3. These days, this reservoir is used for supply of drinking water for Lalitpur District. The electricity generated with the use of water resources from Sheshnarayan temple locality and Satmul of Setidevi was been stopped since 2038 B.S. to meet the demand of drinking water of Lalitpur Area. It was re-opened in completing its hundred years and a master plan has been prepared to develop the site as Live Energy Museum with constructions and establishments including scientific research center and model power station of wind, solar, and hydro and as a centenary celebration memorial, inauguration day of this Plant, 9 Jestha is celebrated as National Energy Day to mark the beginning of Hydropower Development in Nepal.

Fig.5:*-Demonstration of equipment by Vijay Shrestha, staff at Pharping Hydropower power house*

The structure is in bad condition and no sign of maintenance has been seen at the

power house. An old machine has been still used. Water crisis at the storage tank due to distribution for drinking water lacks in generation of electricity. The sole responsibility of the hydropower is taken by NEA. Some of the old turbines and generator have been changed and were maintained by NEA.

Fig.6:-*Centenary pillar at pharping*

Fig.7:-*Centenary gate at pharping*

RECOMMENDATION

From the field observation of Pharping Hydropower, we conclude that the hydropower can be more operational if the water level in the reservoir is increased. If properly cared and attention is given, it can be functioned with electricity generation of 500 KW. And it can also recommend making this hydropower as Live Energy Museum and developing the area as research center, tourism place, shooting spot etc. The regular maintenance and observation of Pharping Hydropower will make it sustainable for future.

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