The Case of Upper Karnali Hydroelectric Project

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Abstract: The Upper Karnali Hydroelectric Project, being one of the most attractive and suitable run-of-river hydropower projects for consumption of the energy in Nepal, should have been developed by Nepal for self-consumption through self-construction and self-financing. The author describes that in Nepal things are not happening in a way to safeguard Nepal's long-term national interest through deriving multiple benefits from modest and gradual way of utilization of better hydropower sites for own sake. Even the meager free entitlements are highly exaggerated in a falsified way to please India instead of striving hard for fulfilling its own need by own efforts.

Keywords: Upper Karnali, PDAs, Hydropower, Nepal

Upper Karnali HEP - One of the most attractive Run-of-River Projects

The Upper Karnali Hydroelectric Project, also known as Karnali Bend project, is located on the Karnali river stretch where the river forms a large loop from the confluence with Ramagad upstream to Lekhpani Khola confluence downstream. It has a very high natural head advantage in a comparatively large catchment as much as 20,120 km^2. With the construction of less than 2.5 km of headrace tunnel, water could be dropped by a height of 131 m (i. e. more than 52 m/km). Any person with engineering or other related backgrounds such as geography, physics, etc. having knowledge of map reading would be attracted by the site. Published records show that the first attention was drawn to this site when Toni Hagen (a Swiss Geologist), who was in Nepal for expedition during nineteen fifties and travelled the most of Nepal on foot (Refer the book "NEPAL – the Kingdom in the Himalayas by Toni Hagen"). The paper # 89 III. 12/7 titled Hydro-electric Resources of India presented by K. P. S. Nair of the then Central Water and Power Commission (CWPC) of India, in the Sixth World Power Conference held in Melbourne in October 1962, has also included the potential of Karnali as 2745 MW at 60 % exceedance probability of flow in the list of economically viable potential sites. Three such attractive sites (two on the Karnali river and one on Andhi Khola-Kali Gandaki loop) identified by the author were also given in the article entitled "Nepal's White Coal" published in the Gorkhapatra dated Magh 24, 2021 BS. However, during conduct of the study of Karnali River Hydroelectric Development undertaken by Nippon Koei Co. of Japan during 1962 – 1966 AD under the financial sponsorship of the special fund of the United Nations proposed a second largest and second most attractive storage project after Karnali at Chisapani, known as Lakarpata High Dam Storage Project. This project had been conceptualized aiming at the utilization of a larger loop formed by Karanli and Bheri Rivers with a longer headrace tunnel of 7.5 km and a dam height of about 200 m, creating a head of 320 m by embracing both the upper and lower loops of the Karnali river (Volume-I: The General Report of Hydroelectric Development of the Karnali River, 1966). Two complete feasibility study reports of Run-of-River projects, in addition to the feasibility report of large Karnali High Dam Storage Project at Chisapani, were also prepared at that time, taking into consideration that the financial circumstances might not permit development of larger most attractive Karnali High Dam Storage Project at Chisapani. They were Karnali (Chisapani) Run-of-River and Lakarpata Run-of-River Projects.

In the sixties, even after the construction of 2.4 MW Panauti and Stage-I Trishuli (9 MW) Hydroelectric Projects, the Kathmandu valley system peak load was only little above 6 MW (see Figure-1 and refer paper # 153 of the Seventh World Power Conference by the author). Under such situation, even conducting of feasibility studies of these large projects was simply a wishful thinking for Nepal, but became possible due to instigation of outsiders coming with financial support (of course, for formality sake, the then government of Nepal must have sent request, without which the financial support could not have happened).

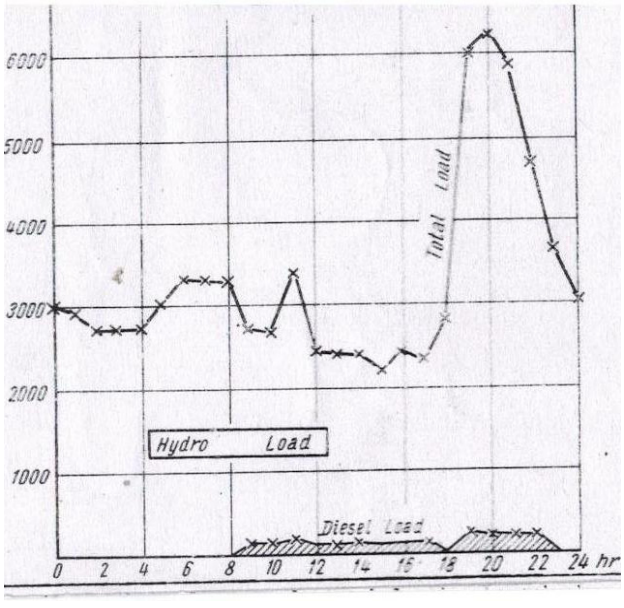

Figure 1: Load at Kathmandu Valley Power System on 29 March 1967

The Study of Upper Karnali Run-of-River Project was for the Nepalese consumption

The serious concern, particularly with regard to Karnali (Upper) Bend site, was shown by the then His Majesty's Government of Nepal only when the Integrated Nepal Power System (INPS) expanded to cover whole east-west length of the country, demand of electricity started to grow in a substantial rate, the Nepal Electricity Authority (NEA) was formed to look after overall electricity sector of the whole country and the World Bank showed interest on conducting the detailed feasibility study of export-oriented large Karnali (Chisapani) Project by associating India. The time was ripe at that time to conduct the study of the modest and attractively sized hydroelectric project, "The Upper Karnali Run-of-River Project" purely for its own consumption, hence, the then HMG/N requested the World Bank in the same financial support package also to conduct prefeasibility study of this project. After the financial resources had been secured, the government authorized the NEA to sign a contract for prefeasibility study of this project as well with the same consultant (Himalayan Power Consultants) that was jointly (Nepal - India - World bank) selected for the detailed feasibility study of large Karnali storage project at the Chisapani site. The study was completed in December, 1989 and recommended for 240 MW capacity. In 1998, the final feasibility study was completed by NEA and CIWEC (Canadian International Water and Energy Consultant), again with the financial support of the World Bank and concluded that it was the most attractive Run-of-River diversion project so far studied with daily peaking capability and high firm energy. The installed capacity recommended at that time was 300 MW. Consequently, recommendations had been made to carry out the detailed design immediately for 300 MW installed capacity for which NEA was making efforts to arrange the finance in order to implement the project (NEA Year Book, F/Y 1997/98).

For Nepal and Nepalese like a Mirage in the Desert

Suddenly, in NEA Year Book of FY 2007/08, this project appeared in the list of export-oriented projects. The statement given in the year book reads "Export-oriented projects such as Arun-3, Upper Karnali and West Seti HEPs have the provision of free energy entitlement for Nepal. The commissioning of these projects will further contribute in augmenting supply capacity". Similar provocation for diverting the attention to Arun-3 Project was done during the time of study of Arun-3 HEP (402 MW) as well, not only killing the easily accessible Sapta Gandaki (225 MW) HEP that was at the threshold of implementation along with a urea fertilizer factory (capacity 275 tons per day) for use of wet season surplus energy from the project, but also delaying the implementation of Kali Gandaki "A" HEP (144 MW). Similarly, the most suitable project for INPS to augment the power supply during the dry months, "The West Seti Storage HEP (360 MW)", for which feasibility study was completed in march, 1987 through the generous support from the government of France, was handed over to SMEC, Australia in 1994 for dedicated export to India stating that the royalty payment and the ten percent free energy to Nepal would be a bonanza. The 38 MW Kankai Storage Multipurpose Project having a high potential for irrigation water supply to 67,500 hectares, for which the feasibility study was completed in 1978 AD has already been shelved. Again, the Budhi Gandaki storage Project, for which prefeasibility study was completed in 1985, has now been undertaken for feasibility study, detailed design and preparation of tender documents as a project of national pride, raising its capacity from 600 MW to 1200 MW. Is it for Nepal? Definitely NOT, because this project may become feasible only when the downstream irrigation benefits in India from the dry season flow augmentation will be accounted for. This study must have also been instigated by India to grasp freely the benefits of dry season flow augmentation, which could be achieved only by submerging the land as much as 6637 hectares of Budhi Gandaki valley and displacing the Nepalese people as many as 45,000. Are not these undertakings for keeping Nepal and Nepalese in blind condition? How Nepal's load-shedding, particularly during non-monsoon months, could be avoided, if most of the energy (above 70%) will be generated in the wet season with the free energy entitlements provisioned in the Upper Karnali and Arun-3 HEPs. They have been, now, designed basically to inject maximum snatchable potential of the sites for use by the Indian system. The Indian power system being based on mixed resources base, the energy from the hydro-source even of the flood water in the monsoon period is valuable for saving the fuel resources required to be burnt for electricity production, and, hence, the installed capacities have been increased.

Real Facts and Figures not Disclosed, whatever published through Media by the Concerned are Falsified

Except for whatever has been published in the media as news or interviews with the concerned, the facts and figures contained in the Project Development Agreements (PDAs) have not yet been authentically disclosed. However, there are basis for proving that the facts and figures provocated by the people in the government or in the concerned agencies through media or interviews are falsified. For example, the topography and average hydrological conditions remain almost constant for a longer period (although presently, there is an indication of climatic change, monsoon cannot be stopped, similarly the dry weather conditions). Based on the facts and figures of past study reports and readily available data, it can well be estimated that the head available at the site cannot be more than 145 m even with the weir structure and gates and the long term average monthly flow availability remains almost the same as in the past study. Under such a situation, increasing the installed capacity to 900 MW does not mean three-fold increase in annual generation as could be generated from 300 MW plant (see Fig.2). For generation of 900 MW, a discharge of about 730 m^3/s is required. Such discharges are available only for four monsoon months from June to

September. Even with utilization of daily pondage, dry season peaking in full capacity for six hours will not be fulfilled for four months from December to March. Considering the environmental release requirements of at least 10% of the flow of driest month, the maximum generation potential of the site will be around 4200 GWh/year.

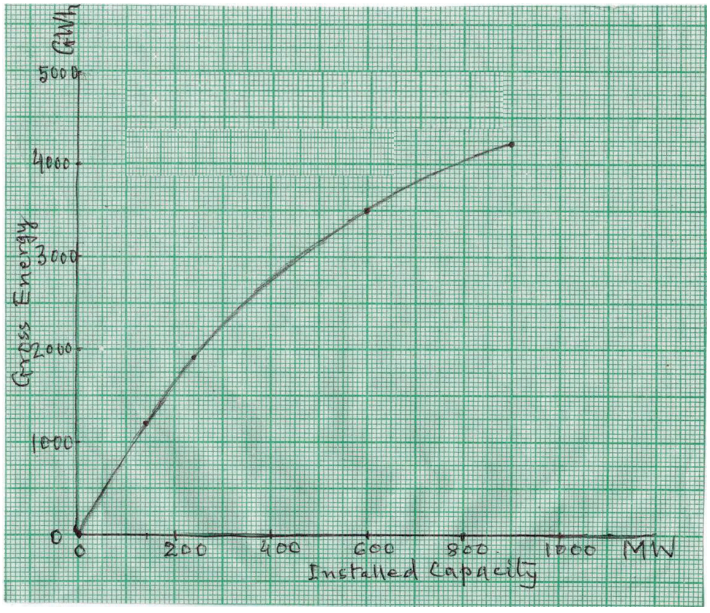

Figure 2: Gross Energy Potential of the Site

Even with the assumption that the scheduled maintenance will be carried out only in dry months, deducting the outages and self consumption of only about 4%, the saleable energy will amount to a maximum of around 4000 GWh per annum equivalent to NRs 24 billion or in 25 years of operation NRs 600 billion with a typical prevailing power purchase rate of US C 6/kWh. How Nepal can receive the benefits of as much as NRs 430 billion within 25 years as stated by CEO of Nepal Investment Board in Rajdhani newspaper of 25 September, 2014, which has an entitlement of only 12% free energy, royalty in around 2.5% and dividend (if any earned) on 27% of free equity meaning only around 8.1% contribution in investment with 30% equity share comprising in overall mere about 1.2% of toal benefit at a typical rate of return of 15% on equity. In the PDA, there seems to have even a unique provision of 50% share to be given to the GMR from the benefit, if Nepal acquires any benefit by developing project (s) at upstream reach (stated in UML's reaction on the draft agreement published in Rajdhani newspaper of 17 September, 2014). These provoked benefits to Nepal are nothing more than the provisions of pump irrigation to Nepal from the western main canal and inundation canal for Sunsari-Morang Irrigation Project under Kosi Agreement and 15 MW Gandak canal power plants under Gandak Agreement. They are just *lollipops* as copmpared to the irrigation benefits India acquired from these agreements (for Gandak project, the irrigation area in India was 3,993,000 acres against 143,900 acres in Nepal in a proportion of about 96.5 to 3.5). The false provocation of avoided cost of costly alternative and NRs. 120 billion of net annual benefit to Nepal from Pancheshwar Multipurpose Project under Mahakali Treaty (Mullyankan, Kartik-Mangsir Issue of 2053 BS) by the decision makers of Nepal Government side at that time is another example of "Yes Sir Attitude". At that time, the then water resources minister even told "The sun, now, will rise from the west".

Future Complications to be faced by Nepal when the Potential 4180 MW upstream Project will have to be implemented

Nepal government/authorities are silent even when they are aware of the fact that there exists a large potential high dam storage site just about 9 km upstream, identified as upstream projects under detailed feasibility study of the Karnali Multipurpose Project at Chisapani. If this site will have to be developed within the agreement period, due to economic reason, the present Upper Karnali plant will have to be demolished (refer Fig 3 and prefeasibility report of 1989). The project backed by the government of India for PDA is definitely going to entangle this potential large upstream storage project as Sun Kosi-Kamala diversion multipurpose project has been made entangled by providing some grant assistance for the study of Sapta Kosi High Dam Storage Project along with Sun Kosi-Kamala Diversion Project, although the Kosi Agreement has clear-cut provision of Sun Kosi diversion.

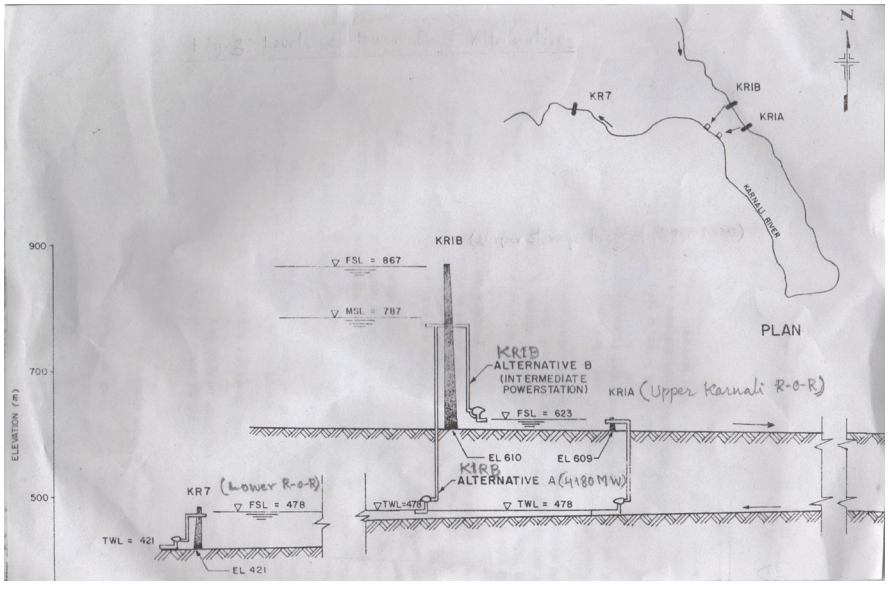

Figure 3: Levels of Power Plant Alternatives

Risk of Entanglement due to Need of Compensation Payment

There is a Nepali proverb *"Paap Dhuribata Karaunchha"* (or Sin speaks from the roof). In one of the occasions in connection with the PDA of the project, the finance minister seems to have warned "if works on any agreed development project are impeded through making them the political issues, compensation for that has to be paid by Nepal, hence, those concerned who impede the project works will bear the responsibility for that" indicating that there is provision of compensation in the PDA (21 September, 2014 Rajdhani). The prevailing opposition from local level political leaders/parties, particularly, relating to re-erection of few fallen transmission line towers by the landslide occurred last monsoon has yet been a great headache for the government, due to which for more than four months the supply from the existing 36/45 MW Upper Bhote Kosi Hydropower Plant has not yet been resumed. Who can guarantee such problem will not prevail in the Upper Karnali HEP! The political atmosphere in Nepal is such that it will not be easy for any government to get away with such problems, creating a risk of entanglement with the compensation issue in a large scale by spiral way.

Wrong Perception of Independent Power Producers and Promoters of FDIs

The Independent Power Producers (IPPs) working in Nepal perceive that the PDAs conducted for Upper Karnali and Arun-3 HEPs open the opportunities to market the surplus power/energy to India. Take the case of West Seti Storage Project-Why SMEC was not successful in marketing such a valuable energy from a reservoir project having also the component of free downstream flow regulation benefits despite continuous effort of almost two decades, in which even ADB appeared as a catalyst- the main reason could not be other than that India does not want that the part of benefits of water resource development in Nepal flows to outsiders/intermediaries. Non-recognition of even the clearly accruable downstream benefits over decades of negotiations in most of the storage projects that are only possible due to allowing of submergence in Nepal territory is also one of the testimonies to that. India's attitude has always been, particularly in respect of water related matters, one sided, whatever negative consequences may arise to its neighbors allowing them to happen. Take the example of Farakka diversion case in relation to Bangladesh and India's actions just on the other side of the Nepal-India border such as construction of embankments/gated structures, heightening of already constructed embankments/ structures along the border, closing the natural flows of rivulets/rivers and submerging the Nepal territory adjoining the border particularly during wet reason. In hydropower sector too, they want to construct by themselves and take the power/energy for their own uses by providing some free *lollipops* to Nepal. Let us wait and see whether the IPPs and FD investors other than Indians can sell to India the power/energy produced from the licensed projects in Nepal.

The Question of Contribution in the Balance of Payment

The cases of PDAs in Upper Karnali and Arun-3 HEPs are simply for the self development and self use of hydroelectricity produced in Nepal by India or GoI-backed Indian companies. Except for the benefits from royalties and entitlements of some free energy and some free share on equity, Nepal has no say on the project. It is not the case of power export by Nepal or Nepalese companies. Therefore, the account of this power trading will not appear in Nepal's national accounting system. How, then, it could be said that it will contribute to reducing the trade deficit! Renowned Nepalese economists, who are speaking in favor of these PDAs, should be able to explain.

Lessons to be Learnt

1. Nepal, too hastily handing over the country's main resource "The Water" to outsiders, particularly to India, tying its own hands and disabling self-development for fulfilling self-requirements through self-construction and self-financing in the hope of meager free entitlements in the form of free energy, royalties and the like. This approach is certainly going to deprive the future Nepalese generation of the huge multiple benefits that could sustainably be accrued through modest and gradual way of development of available resources just continuously satisfying its growing requirements from time to time.
2. The present case of handing over of the Upper Karnali and Arun-3 HEPs, which are among the most attractive Run-of-River projects is definitely a suicidal approach on the part of the government of Nepal. Thank God - the West Seti storage project, which is the most suitable storage type project for INPS in the present day context of Nepal, has been withdrawn from dedicated export orientation. Let us hope that this project will be developed purely for Nepalese consumption.

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