

# Local Perceptions and the Political Ecology of Dams, Nepal.

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## Abstract

The dams, especially large dams, have been the topic of debate in environmental development discourses at present. Some donor agencies (for example, The World Bank) are taking their support back from the projects constructing large dams, viewing and judging the protest against these large dams in the local as well as global context. In this way, the dams has been politicised which became a part of the political ecology studies. The main purpose of the paper is a comparative analysis of the political ecologies of two dams in Nepal. Small dams are positively perceived by the local people in contrast with the large dams considering the extent of the negative impacts they have. Local people agree that other benefits, e.g., drinking water, irrigation, swimming, bathing/washing and extraction of sand/stones are very less affected by the small dam. Locals blame destructive fishing methods like poisoning and electric fishing for the deterioration of biological condition of the river water, not solely the dam. Their active participation in the management of river resources through local government indicates that they are aware of the consequences of bad practices of fishing activities in the river. The trend has been directed in the favour of small dams as viable alternatives to the large dams so that they become manageable.

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## **I. INTRODUCTION AND BACKGROUND**

The field political ecology is very broad and rather sprawling, the central concern of which is to understand the relationship between social and environmental change (Adams, 2001) having political power as the central focus (Derman and Ferguson, 2002). The politics and the environment, the core issues of the political ecology, are intimately associated everywhere. Political ecology in the context of Third World helps to explain the politicised environment and the role of diverse actors fighting for social justice and conservation of environment (Bryant and Bailey, 1997).

The purpose of this paper is to make a comparative analysis of the political ecologies of two dams in Nepal, the Arun III dam, a large hydroelectric project and the Tinau dam, a small project. Study of local peoples' perceptions to the small dams is also an aim of this paper.

In the first part of the paper a review of some issues related to river water resources in Nepal is given. In the second part, I discuss the political ecology of Arun III dam mainly based on the secondary data sources. Third part contains the detail account of the political ecology of Tinau dam based on my field investigations in Nepal. The fourth part of the paper is a comparative discussion of the political ecologies of the two dams. This is followed by a brief conclusion.

Dams are now becoming the burning issues in environmental and development discourses. Most of the dams in the world (approx. 48 %) are developed for irrigation, only 20 % (approx.) are for the hydropower and many others (approx.30 %) are multipurpose dams including water supply, flood control, recreation, fish farming

etc. (Lecornu, 2002). Large dams are being criticised (Bryceson, 1988; Lerer and Scudder, 1999; Thomas and Adams, 1999) and opposed in many countries (Turaga, 2000; Sarkar and Karagoz, 1995) and the donor agencies were withdrawing their support from such projects. Withdrawn of the support by the World Bank from Arun III project from Nepal is one of the examples of such a case (Escher, 1995).

It is a reality that Nepal is one of the richest countries in fresh water resources having many potential rivers for hydropower generation and irrigation. And there is a myth that Nepal has a very good water supply with heavy annual rainfall that can support large water projects, which are beneficial and best option for the country (Lumb, 2001). But the fact is that up to 93 % of total annual precipitation occurs within a short period of time (June to September); and up to 37 % of the total annual rainfall has been recorded within 24 hours rainfall period (Thapa and Khanal, 2002). Such a kind of rainfall does not allow much water to percolate in the soil and simply sweep away as flood and does not become available in rest period of the year.

## II. POLITICAL ECOLOGY OF ARUN III DAM, NEPAL

The Arun III dam, the first in a series of three dams to be built in Arun valley, is a massive hydroelectric project to be constructed in a remote eastern part of Nepal. This dam is very costly that could have many adverse effects e.g., undermine Nepal's economy, dissipate indigenous population, and destruct flora/fauna irreversibly (Udall, 1995).

A coalition of Nepalese NGOs, the Arun Concern Group, filed a case in October 24, 1994, against the World Bank in the Inspection Panel<sup>α</sup> claiming that The World Bank violated its policies and procedures during the preparation of the project (Udall, 1995). The Inspection Panel issued a memorandum to the executive directors of The World Bank on December 16, 1994, indicating the violations of the policy and recommended further investigation. Finally, on February 2, 1995, the executive board of the bank decided to pursue further investigation agreeing with the Inspection Panels' report (Desai, 1999).

This controversial dam is coming back in effects again with doubling the capacity (402 Mw at present). Arun Concern Group is now not active against the hydropower project since it is now taken over by the private American company; and the group is inspecting and monitoring the work on their own way (Nepali Times, 19-25 July 2000).

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<sup>α</sup> An independent panel to investigate complaints from people directly affected by the bank projects from the borrower countries

### III. POLITICAL ECOLOGY OF TINAU DAM

#### 3.1 The Tinau Dam

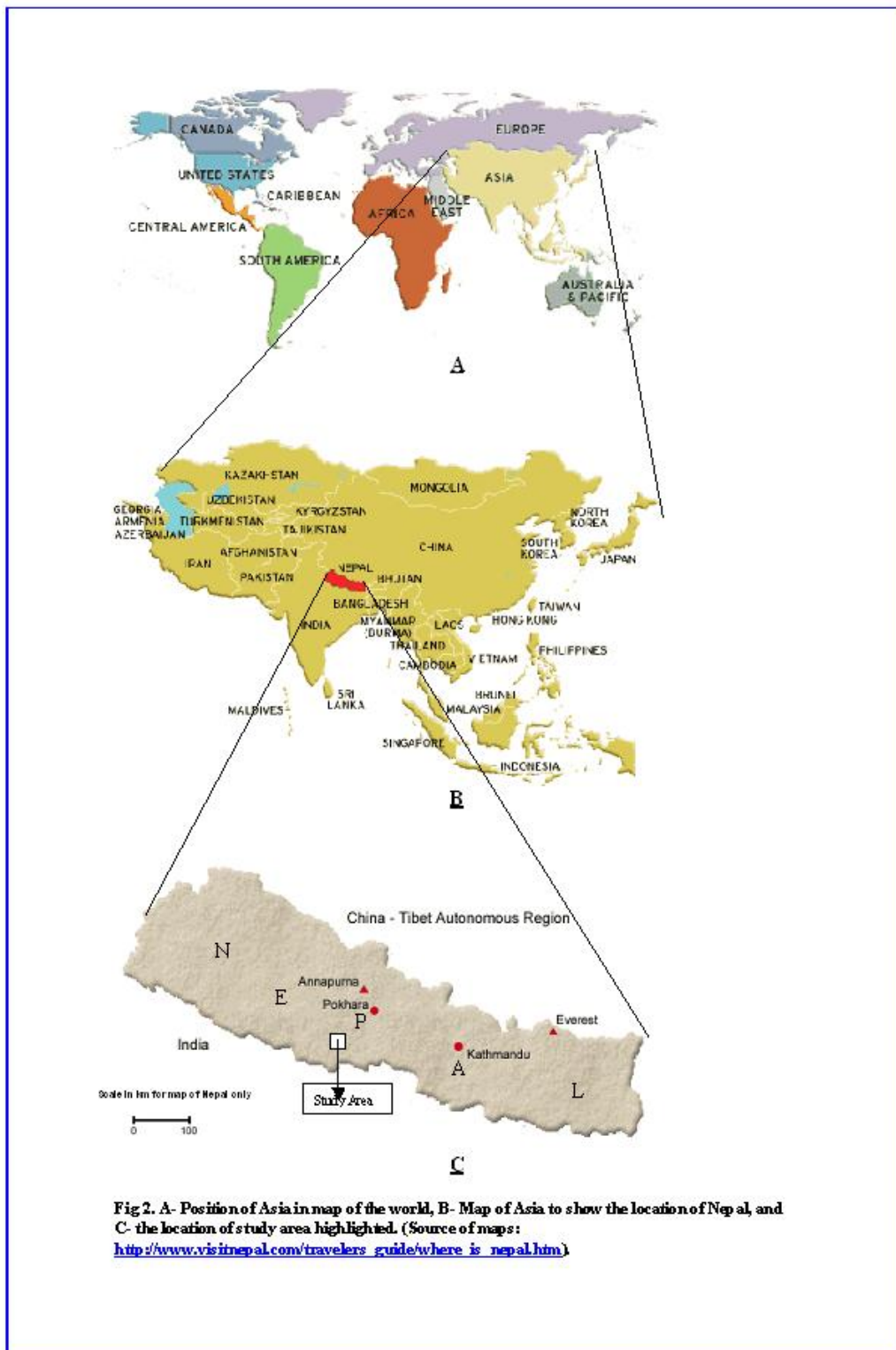
The rivers of Nepal can contribute immensely in benefiting the local people as well as the nation because many of them do not dry up even in the dry periods of the year. Tinau River, in the middle part of the country, is one of the rivers that do not dry up in the winter period though water level reduces considerably. This river has given benefit in a large extent in terms of electricity and irrigation. Besides, local people are also benefiting from the river for drinking, washing/bathing, swimming (recreation), fishing, extraction of sand/stones etc. The calculation of the value of riverine resources is difficult on the basis of conventional economical theory and it depends on who calculates it (Lansing et al., 1998).

A report of The World Commission on Dams (1997) defines large dams as having a height more than 15 meters with some exceptions. Tinau River has a diversion dam of about 8 meter high (fig 1) for hydroelectric purpose (capacity 1025 kw) at Dovan located at the foothills of Himalayas in west Nepal (fig 2). It has been started to build in 1965/66 and completed after 11 years. The sediment load transported by water in monsoon season is extreme with respect to volume as well as size of particles (stones) that causes severe damage to the dam (Støle, 1992). The dam had been swept away due to a flood in 1981, which was reconstructed immediately (Ministry of Population and Environment/Nepal, 2000; Støle, 1992).



**Fig 1. Eight meter high Tinau River dam without impoundment (photo taken in October 2002).**

Tinau River starts from the watersheds of Mahabharat range of mountains in Palpa district, west Nepal. It then flows to the south covering approximately 95 km in Nepal. Finally, it passes to India and mixes to the Ganges River to open in the Bay of Bengal.



A four km stretch of the river, including the dam, was selected for the present study. This stretch of the river area does not have many settlements because of very difficult terrain. However, there are some villages upstream and downstream of this part of the river. There is a municipality, a highly populated area, about 4 km down of the dam where hilly region merges with the flat terai region. We targeted the people who visited our study area as the respondents for our survey.

### 3.2 Background of the Surveyed People

Among the surveyed river users, 90 % were males and 10 percent were females. Most of them (70 %) were between the ages of 10-30 years (fig. 3). Half of the respondents had the knowledge of reading and writing but did not attend the schools. Educated people (having college education) seldom visited the river for direct benefit, e.g., fishing, sand/stone collection etc.

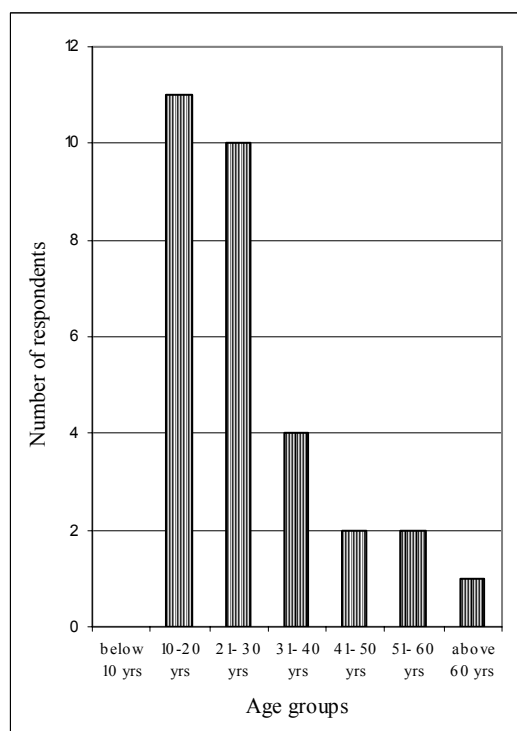


Fig 3: Different age groups participated in the questionnaire survey.

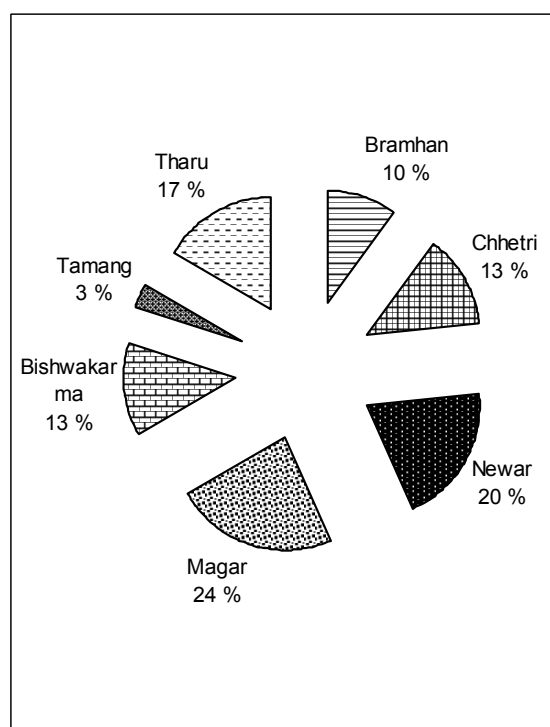


Fig 4: Percent composition of surveyed river users.

Diverse ethnic groups were participated in the use of riverine resources in one or the other aspects among which magar, newar, tharu, chhetri, bishwakarma, brahman and tamang were the representatives for this study (fig 4). Most of the users belonged to government services, students, and labourers. None of the surveyed people were fully engaged in fishery or agricultural profession.

Size of family members varied from 3 to 8. Five respondents had 8 members in their families who belonged to labourers. Nobody had his own fishing pond, however, 57 % respondents fished in the river to utilize the catch for their own family. Twenty percent used river water for irrigation from nearby areas. They used stones and tree branches to build temporary and small dams for irrigation. No body knew if there is presence of other permanent dams in the river.

### 3.3 Organisational Pattern

The dam was built and operated by Butwal Power Company (BPC) owned by United Mission to Nepal (UMN) and Government of Nepal (HMG/N). Later on it was handed over to Nepal Electricity Authority (NEA), a government organisation, for operation and maintenance (Støle, 1992). Local people are not involved in the

management of the dam directly. The riverine resources like fishes, sand and stones, however, are managed by the local government to some extent near the dam area. Dovan Village Development Committee (VDC) does not allow free access to the people for the sand/stones extraction and fishing activities. It takes a fee of Rupees 50 per day for the fishing throughout the day. Fishers from outside come to the area and use non-destructive methods of fishing, which is regularly monitored by the authority of VDC (personal communication to the VDC authority).

### **3.4 Impact of Dam on the Utilization of River Resources:**

All interviewed respondents had knowledge of the existence of hydroelectric dam in the study area. Eighty percent were happy with the dam but 20 % were not so happy. Thirty seven percent agreed that there was no difference in benefits they get today and they used to get before the establishment of the dam, e.g., cleaning/washing, drinking, fishing, irrigation, extraction of stones/sand, and recreation etc. But three percent did not know about all these benefits before the establishment of the dam. Eighty three percent answered that there was no reduction in the water level downstream to the dam but 13 % answer negatively; and the rest did not know.

#### **3.4.1 Extraction of River Resources**

##### **Sand and stone:**

Forty seven percent of the people were extracting sand and stones for their domestic use directly or indirectly. Forty percent knew about the extraction of the sand and stones from the river though they did not directly involve. Twenty percent were buying these things from the market. It is said that local people themselves were engaged in extraction of these materials (57 % of the respondents agreed). Some key informants mentioned that sand/stones was extracted by the contractors after bidding in the local government (Village Development Committee). But the authorised body does not allow the contractors to extract sand/stones from the places nearby dam and bridges. Respondents did not believe that there was any change in the facility to extract sand/stones after the establishment of the dam.

##### **Fish:**

Two third of the respondents answered that they do fishing in the river and one third mentioned that they do not fish at all. No one is using paddy fields, ditches, swamps and ponds for fishing. Regarding the knowledge of fishing implements used: 100 % of the people knew hook and line, 93 % were aware of the electric fishing, 77 % had the knowledge of cast net and hammering, 73 % knew poisoning activities, 37 % knew about dynamiting, 27 % knew duwalo thunne (divert the channel for fishing), and only 10 % responded positively towards Khunga (made of bamboo) as the fishing implements used in the river. Fishermen used bags (of any kind), Dhadiya (a special kind of bamboo basket), Buckets and Seel (a rope or wire) for collecting the fishes. Ninety seven percent of the respondents agreed that men are engaged in fishing. Similarly, 40 % mentioned as children and 13 % as women involve for the fishing activities too. Generally they spent 1 to 2 hours in fishing whereas professional fishers devoted more time. Sixty percent did not know where they could get the maximum catch but others felt that they could get maximum catch from the stone crevices, which they thought as breeding places for fishes. Thirteen percent had the preference to fish below the dam to get more catch. Fifty seven percent agreed that

they prefer Sahar fish (*Tor spp*), 37 % like Buduna fish (*Garra spp*) and the rest prefer Rohu (*Labeo spp*). All respondents had a common voice for the good fishing season that was April.

### **3.5 Fishing Practices and the Dam: Which is More Destructive?**

The local people participating in the group discussions agreed to some extent that the fish population in the area is decreasing qualitatively as well as quantitatively. They gave their opinion that the fishing practices like poisoning and electro-fishing and dynamiting are more destructive to the aquatic life than the dam itself. In their opinion, migratory fishes can move above the dam in rainy season when flood creates a way to the upstream. Thirty three percent did not think that dam is causing harm to the migration of fishes upstream of the dam. They also claimed that some fishes could easily climb through the walls of the dam because these fishes have sucking discs on their ventral side for clinging on rocks.

Eighty percent feel that there is no reduction in the total fish catch before and after the establishment of the dam. Twenty percent think that use of poison may be the main cause for reduction in the total catch in fish, if any. There are few (7 %) who regard dam as the cause for change in the amount of fish catch. The dam was regarded as an obstruction for certain migratory fishes by 53 % and the rest do not take dam as serious problem for fish migration.

One of the respondents (watch man of the dam) gave his views very logically as: “Watershed of this river is very fragile and soil erosion is one of the worst phenomenon that degrades the quality of soil as well as water. Soil erosion is also enhanced by the steep terrain of the area that speeds up the velocity of water. Dams, especially this kind (small), are very useful for controlling the velocity of water that, in turn, controls the flow of large particles downstream. Many such dams are needed in this river, which in one hand, produces environmentally friend energy and in the other hand, helps to protect the nature”. He thus emphasized the importance of such dams and blames harmful fishing practices for the reduction in the quality of the river water. He further adds, “I am here in this watch place since the establishment of the dam. I used to drink the water directly from the river few years back. But, I saw many fishers using poisons and killing fishes by batteries as well as by direct current. They also use explosives in the pool region for fishing. These trends are responsible for the degradation of the river water quality. Nowadays, I do not drink the water directly from the river and am using water from another source.”

### **3.6 Dams and Pollution in the Tinau River**

We also conducted a parallel study in the same river for measuring the biological conditions of the river water above and below the dam to investigate the impact on aquatic organisms. The result indicated that the area just above the dam has significantly affected by the dam in terms of biological condition (Sharma et al., 2003), which fell under lower water quality criteria. Use of pesticides and fertilizers in the watershed of this river for agricultural purposes is high. At the same time, use of pesticide and herbicides for fishing in the river were also prevailing in the area, though it is not allowed.

Local people were not much aware of the quality of river water. The Butwal Municipality, an urban area near the river, is supplying drinking water from this river approximately 4 km below the dam. This part of the river has moderate water quality (Sharma et al., 2003) in terms of biological conditions.

#### **IV. POLITICAL ECOLOGY OF LARGE DAMS VS SMALL DAMS: A DISCUSSION**

##### **4.1 Why Are Large Dams Being Criticised?**

The difference in attitudes, interests and priorities among different stakeholders towards the large construction projects (e.g., dams) is the main cause for interface conflict among them (Awakul and Ogunlana, 2002). Conflicts also arise due to restriction of public involvement and participation, and restriction of public access to final environmental impact assessments reports (Olokesusi, 1998). There are many examples that constructions of large dams have adversely affected the large section of the population provoking social unrest and forcing them for acting politically. Arun III in Nepal, Narmada Dam Project in India are few of the examples in south Asia. The centralised decision to built China's Three Gorges Dam on 1992 is another example that will adversely affect millions of Chinese citizens for decades that could incline them to react politically (Jackson and Sleight, 2000). However, such conflicts were not found on small-scale dams. It is likely that the extent of conflicts on small dams is so small that they do not take political shape. In the context of present study, such a conflict is not prevalent and construction of dam is not a major issue in Tinau dam area.

The World Commission on Dams (WCD) has several recommendations for dam buildings in the less developed countries (LCDs). Large dams have often been debated considering cost benefit analyses from different approaches like anthropocentric and eco-centric. Conservation of aquatic biodiversity is also one of the important issues in such debates. Generally the analyses were skewed in favour of the developed countries and against the developing countries, which creates conflict among interest groups (Brown, 1998). Members of Nepalese Committee on Large Dams commented the report of WCD by mentioning that the recommendations cannot be adopted as guidelines as such until the debates on large dams will take a definite shape (ICOLD, 2001). The same report has been criticised in another way by stating that it could take many years to achieve the study requirements if we follow the recommendations of WCD, which ultimately would delay the pace of development (Gagnon et al., 2002). Better alternate opportunities (e.g., markets, communications, education, small scale technologies etc.) can be provided for the conditions needed to develop local resources that could be cheaper as well as environmentally sensitive (Thomas and Adams, 1999). Withdrawn of support by the World Bank from Arun III project in Nepal on the recommendation of the inspection panel is one of the good examples in the local context which forced the government of Nepal to negotiate with the World Bank for the smaller, cheaper and better alternatives (Escher, 1995). Emergence of this controversial project after about 10 years is actually a subject of the hot national political debate and two main political parties are responsible for it (Nepali Times, 2000).

The Large dams are also opposed in the global context considering their adverse effects (Sarkar and Karagoz, 1995; Turaga, 2000). Such issues often come to the media which are one of the many sources influencing the decision making process of the government (de Loe, 1999). Resettlement and rehabilitation of the people to other places is also one of the major sociological problems associated with the large dams (Adams, 2000; Baker et al. 2000; Turaga, 2000).

#### **4.2 Small Dams: Direct Benefit to the Locals**

Some developers believe that the era of small hydro has arrived considering them one of the most promising energy resources (Osborne, 2002). The popular reasons for booming up of the small hydro are the negation of fuel costs, concentrated and predictable energy source, technology efficiency, low operation/maintenance costs, and reduced environmental impacts in comparison to larger hydro (Osborne, 2002; Paish, 2002). Such low cost small hydro systems were developed and tested from the mid-1970s onwards in Nepal (Paish, 2002).

Most of the local people were happy with the existing Tinau hydroelectric dam in their area with a thought that it would, at least, benefit some people without harming others. They were in agreement that the dam has not negative impacts in the utilization of river water for different purposes, e.g., cleaning/washing, drinking, fishing, irrigation etc. There is not huge social problem like relocation of the people from the reservoir area, which is often a problem associated with the large dams. This might be another reason for local people responding in favour of the Tinau hydroelectric dam.

The study area is very good from the fisheries point of view because it harbours many delicious cold stream fishes. Twenty-one species of fishes were recorded from this part of the river out of 35 species of fishes (Sharma and Shrestha, 2001). Local people's thought, regarding the change in total amount of fishes, seems to be contradictory among them. This might be due to the fact that they are not professional fishers and have not much idea about the fishes and its markets.

Local people are aware of the consequences of the destructive fishing methods and sand/stones extraction from nearby the infrastructures like dams and bridges. The management of the riverine resources by the Village Development Committee, e.g., regulations in fishing activities and ban of sand/stone extractions in their area is a proof for that. The fishing methods like poisoning, electro-fishing and uses of explosives are more harmful for the quality of water than construction of the dam. The locals are totally against the use of such methods in the river for they are using water for drinking from the same source.

Construction of hydropower dams comes on the 4<sup>th</sup> priority based on the utilisation of the water resources in Nepal (Water Resources Act, 1992). This act also says that the hydroelectric projects should have minimum adverse effect on the environment and should also benefit the local people directly.

## V. CONCLUSION

Large dams are mostly the subject of hot debate and take political shape because of high costs that could show impacts on the national economy of a country. Arun III project in Nepal is a classical example in this case which is back again after the withdrawal of support from the World Bank in 1995.

Local people have positive perceptions of the hydropower dam in the Tinau River because they do not see harmful impacts on their livelihood. The reduction of the quality of river water is mainly due to improper practice of fishing techniques like poisoning the river water, explosives and electric fishing rather than the dam. However, there is small-scale impact of the dam on river water quality immediately above the dam. This impact is very small in comparison to the impacts of large dams.

The World Banks' agreement and implementation on the recommendations made by the inspection panel is a positive landmark on the support of small dams as a good alternative. It does not necessarily mean that large dams are harmful in every aspect but it indicates that small hydro is the better option in many respects. There should always be the selection of better alternative as a solution while implementing the development projects.

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