*Vol.1 , No.2 , 1-22, April-June, 2013 (ISSN No. 2321-4155)*

**Ecology**

# THE SOCIO-ECONOMIC IMPACT OF HYDRO-PROJECTS: A CASE STUDY OF THE PONG DAM

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## ABSTRACT

*A dam, built to addresses problems of irrigation and electricity, not only displaces people but also affects natural habitat of the area. The local populace, the flora and the fauna are caught up in a swirling vortex that throws up new ways of living, new means of livelihood, and above all, a new ecosystem wherein there is a place for everyone. The construction of the Pong dam on the river Beas in 1974 unleashed cataclysmic changes in the lives of the people living in its vicinity. It created a large reservoir, named as Maharana Pratap Sagar, and in no time, the society and its economy, surrounding the lives of the people, the migratory birds, agrarian system, the aquatic life, all underwent a sea change. The present paper is an attempt to bring into perspective the socio-economic changes and new patterns of life that came in the wake of the construction of the Pong Dam.*


**Keywords:** Avifauna, Fisheries, Hydro-projects, Kangra, Maharana Pratap Sagar, Nomadic Tribes, Pong Dam, Siltation, wetland.

### Introduction

While scholars have extensively written about the adverse impact of hydro-projects on environment and the lives of people displaced, very little has been written on how people make use of the new ecology created after the completion of a project. People have devised ingenious ways of adapting to new ecology, sometimes charting almost a new and unexpected terrain. *Sanjeev Khagaram*[1] and *R. Rangachari*[2] rightly argue that some of the outcomes are not envisaged during the planning of a project. Some of these unexpectedly prove beneficial to the community living in its vicinity as well as ecologically appropriate. In this context, we have chosen the Pong reservoir to explore various dimensions of it for a case study. We shall examine how building this reservoir has affected or altered the ways of living for the people living near it. In this paper, we are analyzing the new ecology created by the Pong dam, and how people made use of this. This reservoir has become an epicenter of various economic activities, which includes commercial fisheries, providing livelihood to many people, including those displaced by the reservoir. The reservoir has also emerged as a wetland area of international importance that attracts birds from various parts of India as well as abroad.

### The History of the Pong Dam

The Pong dam, the focus of this research paper, was constructed as a storage project on the river Beas for meeting the irrigation requirements of Punjab, Haryana and Rajasthan in 1974. This dam was also part of a broader project to maximize the utilization of waters from the three eastern rivers of the Indus system; Sutlej, Beas and Ravi, allocated to India for its exclusive use under the Indus Water Treaty in 1960. After the completion of Bhakra dam in 1964, the focus was shifted to Pong to harness the waters of Beas. The dam

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managed by Bhakra Beas Management Board (BBMB) is located at Pong, a tiny hamlet on the right bank of the river Beas in Kangra District, which was part of Punjab state till 1966. Initially planned as an irrigation project, a power plant was provided for in the final scheme, in view of the increasing demand for power. Six units each of 60 MW were installed at the Pong power plant. The water from the Pong reservoir goes to the Indira Gandhi Canal, which is 649 km long. The canal runs through the areas of Hanumanghar, Ganganagar, Raisinghnagar, Gharsana, Bikaner, Anoopghar, Suratghar, Nachna and Jaiselmer in Rajasthan.

This dam resulted in the creation of a large reservoir, known as Maharana Pratap Sagar, and displaced thousands of people. Later, it developed into a wetland area of international importance that nurtures a wide variety of flora and fauna. The wetlands are now regarded as important conservation sites, which support many endangered species. The reservoir also serves in a variety of ways with a large socio-economic purpose. People who live in its surrounding are the direct beneficiaries, though they also face some undesirable consequences that are often corollary to the emergence of such a new ecosystem.

**The Land Acquired**

With Dhauladhar as a magnificent backdrop, the reservoir presents a spectacular view. The reservoir submerged a large part of the 'Haldoon Valley',[3] which was the 'granary' of Himachal Pradesh. The Pong Dam was constructed in the Tehsil Dehra Gopipur and Nurpur of Kangra District, which was part of composite Punjab till 1966. Total area of land acquired for this project was 75268 acres and out of this 72371 acres got submerged into the reservoir. A total of 115 *maujas* (revenue estates), which comprised 339 *tikas* (revenue villages), were acquired between 1961 and 1965 for the dam to be built to a height of 1410 feet. Out of 339 *tikas,* 223 *tikas* were fully acquired and 116 were acquired partially. Almost 30 *maujas* and 110 *tikas* were fully submerged in the reservoir[4] and the rest were partially submerged. The Pong project is estimated to have affected a population of almost 1,00,000, including a fully displaced population of almost 45,000 persons.[5] In the official reports, the number of total families affected is 30,000[6] and the number of affected landowner families is 20,722.[7] But this does not mean that all these 30,000 families were displaced people. A major part of the population lost their agricultural lands either in parts or whole but retained their homes and villages. *Renu Bhanot* and *Mridula Singh*, on the other hand, argue that the reservoir submerged a population of 1,50,000 spread over 94 villages.[8] This figure does not appear to be tenable, as the Census records do not support it.[9] There is also a misunderstanding about the people who were fully displaced. Further, *Satyajit Singh* argues that 56 percent population displaced by Pong Dam was tribal.[10] This is factually incorrect. Among the affected people, according to the 1971 Census, the percentage of tribal population was almost nil. The area submerged had only migratory tribal population of the Gaddis.

**The People Displaced: The Society and Economy**

The Changs or Girths or the Choudhary, a dominant caste in Kangra, were almost 65 percent of the population displaced. After 1990, they now enjoy the OBC status.[11] They were in possession of good fertile land and were the most indefatigable and hard working people.[12] Their main occupation was agriculture and their women folk worked in the fields and also used to carry wood, vegetables, fruits, milk and other products to the market for sale. They also used to work as Kashtkars (agricultural laborer) on the lands of the high castes Brahmins and Rajputs.

Brahmins and Rajputs formed almost 15 and 8 percent of the displaced people, respectively. Their men folk were partly in government service (mainly army) and partly agriculturists who rarely cultivated their land themselves but engaged the lower caste labourer or the Girths for cultivation. The rest of 15 percent population

comprised other backward castes such as Jats, Dharai, Jhiwar and Mallah (basically fishermen who were found in majority in 2-3 villages close to the river) and other lower castes. These castes had either small or no landholdings and worked either as agricultural laborers or artisans. The Gaddis of Chamba and Palampur used to cross over this valley to use the pastures of Dada Sibba in winters. On their way, they halted to use *shamlat*[13] land of the villages. The village people used to provide them with grains in return for manure gained from the sheep and goats.[14]

Agriculture was the main occupation of the people of the Haldoon Valley, as the land was mostly plain, fertile and well irrigated. Almost 85 percent people tilled their own land, and 15 percent were agricultural labourers or sharecroppers. Some people were in government jobs.[15] The artisans, like the Tarkhan and Lohar or the Carpenter and blacksmith, the Chamar or the shoemaker, Nais (Barber) and Chimbas (Washerman), were paid in grain. But none of these had fixed perquisites and their duties and remuneration used to vary in different parts. The Rakha (Forest-Guard) and the Kohli (in-charge of the mending and maintenance of water courses) were village officials who were paid by grain contributions levied upon each house or plough.

The area submerged had 3 high schools, 8 middle schools and 14 primary schools. It had one government hospital and one veterinary hospital. Two railway stations that disappeared were, Jagatpura and Annoor. There were very few motorable roads and only two buses used to ply - from Pathankot to Dehra and from Talwara to Dehra. People mostly traveled on foot. Many temples were submerged, but the main temple, Bathu Ka Mandir, was relocated at Bani near Indora. Many fairs and festivals were a part of the social life of the area during the post independence period till early 1960's.[16] These People were allotted new land to resettle and were asked to move out but they showed reluctance. Finally, they were virtually forced to move out hurriedly.

**The Wetlands: Landscape and Ecology**

'Wetlands' are basically areas where the soil is saturated with water throughout the year. The term 'wetland' includes a variety of habitats with permanent or temporary water such as the flood plains, shallow water bodies, and ponds, shallow peripheral areas of large lakes and reservoirs and coastal areas. Thus, a water body to be called a wetland has to possess above qualities; all lands with water or all water bodies do not qualify as a wetland. Wetlands have always been important. Agriculture had its beginning in the floodplains and the first human settlement was started close to floodplains. Wetland also provides a variety of resources: food, fodder, fiber and fuel.[17] Wetlands are useful for retaining water, floodwater storage, ground water recharge, source of water like oases in deserts, silt trapping etc.[18] They are also valuable as habitat for wildlife, as a source of economically important biota, nutrient and sediment retention, and carbon storage and also have socio-economic values and cultural, aesthetic and recreational values.[19]

They have certain negative aspects as well. For example, they serve as repositories for a host of undesirable biota. Mosquitoes, molluscs and invertebrates act as vectors of organisms causing diseases like malaria, cholera, and yellow fever. Incomplete decay of organic matter under anaerobic conditions results in the production and release of foul smelling gases, like ammonia and hydrogen sulphide.

Wetlands in India are all the more crucial for human and animal needs as three quarters of India's population is rural, and it places great demands on India's wetland.[20] India has 16 percent of the world's population, and only 2.42 percent of the earth's surface with very few natural wetlands and they are getting reduced due to excessive drainage and reclamation.[21] With continuing losses and enhanced appreciation of the values and functions of wetlands, the Pong reservoir has emerged as an important wetland, which was declared a *'Ramsar Site'* in 2001.

**Pong wetland – A Ramsar Site**

Pong is a man-made wetland and was declared so in 1983. It is the largest standing water body in Himachal Pradesh and has a spread of 310 sq. km. at its maximum. It includes one permanent island (*Ransar ki Ghari*) and several temporary ilets**.** The water level in the reservoir rises to a maximum of 420 m in August-September and then falls to 370 m in summer season i.e. April-July, hereby exposing a draw down[22] area of about 50-220 km. The climate of the wetland is subtropical.[23] The size of the lake and its location on the trans-Himalayan highway and in the extreme north-west of the northern plains make it a suitable habitat for migratory birds entering the plains of India from Central Asia.[24] The main source of water for the reservoir is the Beas River and its tributaries i.e. the Dehar, Gaj, Bhul, Baner and Dheri.[25]

The *Bhakra Beas Management Board* (BBMB, a government undertaking) owns the reservoir. The Forest Department controls the immediate catchment area, which is not a part of the reservoir. All land above 440m, within a 5 km radius of the lake (an area of about 20,000 hectare) is notified as a buffer zone. Because of its biodiversity i.e. migratory birds, fishes and flora, it was declared as Pong Wetland Wild life Sanctuary in 1983 and a wetland of National Importance in 1994. Total area of sanctuary is 30,270 hectare including the reservoir area.[26] Subsequently, Pong reservoir has been declared International Importance-Ramsar Site in November 2002.[27]

It was declared a Ramsar Site on account of its rich water fowl, which consisted of more than 1,15,000 migratory birds belonging to 54 species, fishes of more than 27 species,[28] and also because of the dependence of more than 1500 fisherman families around on the lake for their livelihood. Though now the sanctuary is uninhabited, there are 45 panchayats and 215 villages in the intensively cultivated buffer zone, out of which more than 60 villages are densely populated. The population of the buffer zone is 77,075.[29]

**Avifauna in the Pong Wetland**

The Pong dam is the first major wetland which potentially offers a transitory resting refuge for the migratory waterfowl in north India from Siberia and Central Asian countries.[30] Although some of the bird species are not new to this area and they use to frequent it even before the construction of the reservoir. Way back in the 1920's, *Whistler*[31] had prepared a list of migratory birds in this region. As the *Whistler*'s Punjab plain zone (where the Pong lake is now located) was then intensely cultivated, the birds from Siberia could not come here freely. After the creation of the reservoir, the diversity and abundance of water bird species have increased considerably. Because of the scarcity of this type of habitat in northern India, this vast stretch of open deep waters is of great importance for winter water birds.[32]

This man-made water body has created the following five main types of avian habitats in the reservoir area: mudflats and mud spits, along the receding shoreline formed from October onwards; open deep water; dry sand banks with little or no vegetation; waterside vegetation and swamps below the outfall from the dam; and shallow water at the margin of reservoir.

The entire wetland has no tree cover, but grasses dominate its flora.[33] There is some submerged aquatic vegetation in the reservoir also, but due to the frequent seasonal changes in water level, the shoreline does not support extensive areas of emergent vegetation. The surrounding hillsides still have some mixed deciduous and pine (*Pinus roxburghii)* forest. The islands in the reservoir have been almost completely deforested by the forest department and the labour force.[34] There is an extensive swamp with reed beds and grasslands in the seepage area below the dam.[35] All this now constitutes an ideal setting for migratory birds.

**Figure 1.1**
**Different Avian Habitat**

**Deep Water**

**Mudflats and Mudspita**

**Dry sand bands with no vegitation**

**Water side vegitation and swams below the dam**

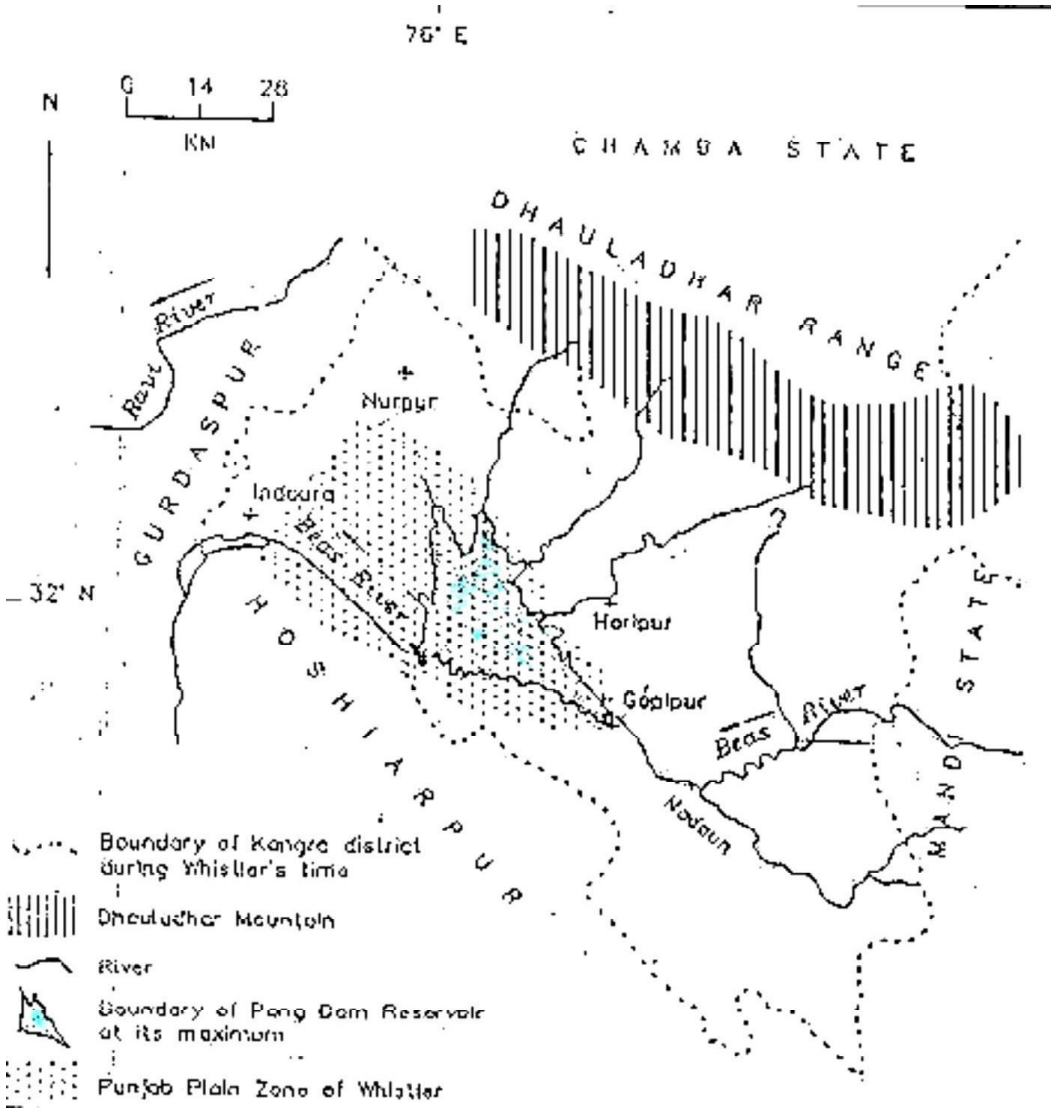
**Shallow water at the reservoir margin**

**The migratory birds**

**Source**: The photo collection of State Council for Science Technology and Environment, Shimla.

**Figure 1.2**

**The Map of Kangra District showing the Pong reservoir and Whistler's Plain zone**




**Source:** Pandey, Sanjeeva (1993). *Changes in Water bird Diversity Due to the construction of Pong Dam Reservoir,* Himachal Pradesh, India, Biological Conservation.

In the early 1920's, *Whistler* had recorded a total of 27 water bird species, with only eight regular visiting species, and the rest occasional visitor or rare. After the formation of wetland, the first waterfowl census was conducted by *Gaston* in 1985.[36] Another census was carried out by *Sanjeeva Pandey* between 1986 and 1995. It recorded a total of 54 species of water birds, of which 39 were common.[37] In 2004, *Den Bester*[38] recorded around 420 species of birds, including the water birds at the wetland, thus highlighting the importance of the area for avifauna. Now the wetland attracts more than 1,50,000 waterfowls of 69 species of water birds.[39] It is a major attraction for bird watchers and biologists.

The red-necked grebe was recorded from this reservoir for the first time in India.[40] The black headed gull, great black headed gull and herring gull, species which are fairly uncommon in non-coastal India, visit the reservoir each winter.[41] *Sanjeeva Pandey* prepared a comparative list of the number of birds seen before (*Whistler*, 1926) and after the creation of the Dam, which is shown in the Table 1.1.[42]

**Table 1.1**

**List of birds observed in the area of Pong Dam in 1924-26 and in 1985-91**

| Birds Group | Species seen by Whistler (1926) | | Present study (1985-91) | |
|---|---|---|---|---|
| | Total no. of species | Common Species | Total no. of species | Common species |
| Shore birds | 10 | 6 | 13 | 10 |
| Ducks and geese | 6 | - | 12 | 12 |
| Gulls and terns | 3 | - | 5 | 4 |
| Large wading birds | 5 | 1 | 15 | 7 |
| Others | 3 | 1 | 9 | 6 |
| **Total** | **27** | **8** | **54** | **39** |

**Source:** Pandey, Sanjeeva(1993). *Changes in Water bird Diversity Due to the construction of Pong Dam Reservoir*, Himachal Pradesh, India', Biological Conservation.

The migratory as well as resident birds are capable of adjusting in any ecological setting, yet they prefer some special habitats. Most of the birds do not stick to only one habitat, but enjoy different habitats, which are well provided by the Pong Wetland.[43] Waterside birds such as wagtails, sand larks and pipits use the mudflats. Swamp habitat below the outfall of the dam is important for waders as well as ducks and coot. The shallow water on the margins of the reservoir provides important feeding areas for a large number of dabbling ducks and some long-legged waders. The sandy banks strewn with small boulders near the reservoir margin are used by stone curlew and pratincoles. The open and deep waters are used by the divers birds e.g. Grebes cormorants; darters etc. Bar headed geese and ruddy shelduck spend most of their time feeding in the draw down area, which is cultivated by local people during the winter. Waterside birds include warblers, babblers, munias, kingfishers and predators, which occur in swamps as well as in several of the other habitat types.[44] Several islands in the lake are being colonized by heronry species for nesting as well.[45]

Pong's attraction does not stop at the wintering waterfowl; it extends to the raptors and scavengers that are found in good numbers here, though they are vanishing from most of the places. The wetland forms an ideal habitat for breeding of the critically endangered Indian white backed vulture. The study team of SCSTE found 6 nests of white backed vultures with chicks in four of them.[46]

The construction of the Pong reservoir has produced suitable habitat for migratory birds. Their number has increased over the years. The ongoing process of fishing, cultivation and grazing has not adversely affected the birdlife yet, but it does pose a threat. Poaching is the main threat, so is the use of pesticides and insecticides by the farmers in nearby areas.[47] The grazing of cattle also poses a problem to the nests and eggs of the waterfowls.[48] The effect of increased avifauna in Pong wetland and on the people living in the periphery has yet not been studied. An intensive study can shed more light on this aspect.

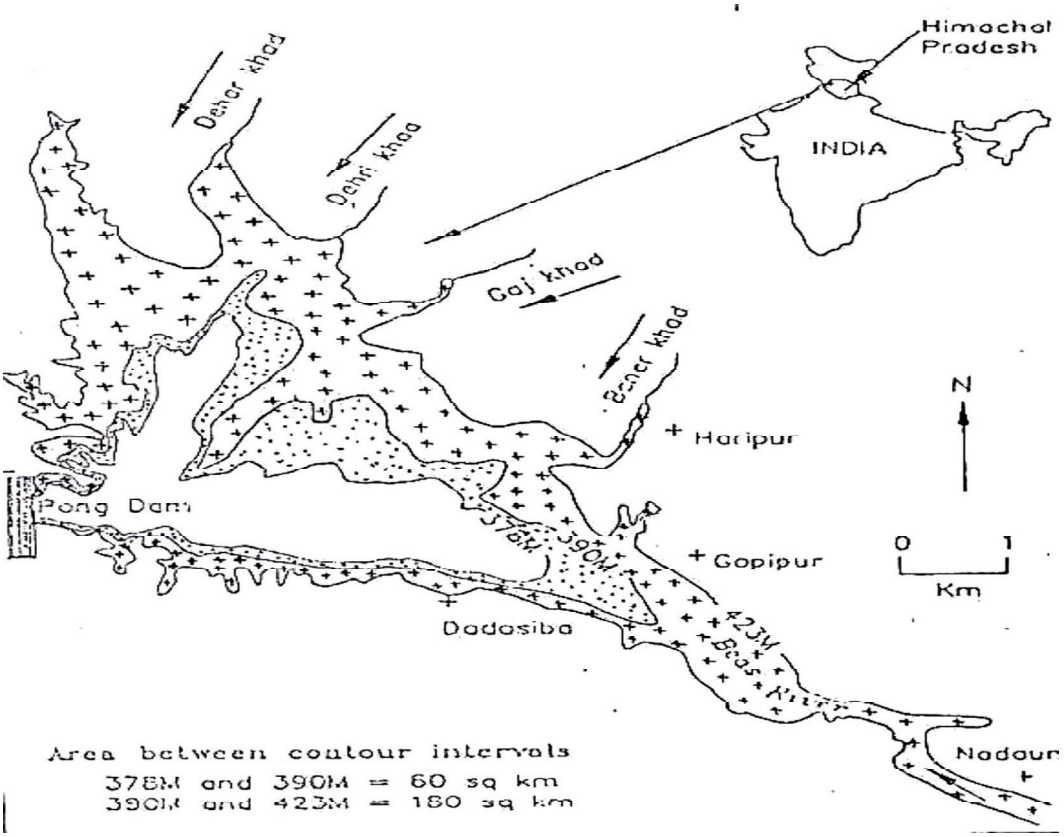
**Wetland and the Cultivation**

A major topographical change that resulted from the building of the Pong reservoir is the availability of the drawdown area of 50-220 sq. km for cultivation. The BBMB has acquired all land that would have

submerged when water level rises up to maximum.[49] But the reservoir is not full throughout the year. For a few months (from December to June) the water level goes down, leaving a big portion of the land exposed. This land is very fertile due to its submergence in water and silt it contains. Many families who had earlier left their lands have returned and again settled down in the periphery of the reservoir and have started tilling this land. Apart from the owners, many other people also eagerly cultivate this area as it gives them additional income. This land is fertile and gives good yield. It is estimated that about 4000 hectares of such land [50] is tilled for the Rabi crop.[51] Once the crops are cut the land is again left for inundation.

**Figure: 1.3**

**Map of Pong Reservoir showing the drawdown area where the cultivation takes place.**




**Source:** Pandey, Sanjeeva(1993). *Changes in Water bird Diversity Due to the construction of Pong Dam Reservoir,* Himachal Pradesh, India, Biological Conservation.

This practice, however, is giving rise to two problems. One, it leads to law and order problem as this is practically no man's land and any one can till it whether the land, prior to the construction of dam, belonged to him or not.[52] Two, the cultivation in the protected area is leading to serious silt problem, reducing the life span of the Dam. The BBMB and the Himachal Government in the year 2003 have taken a decision that the protected area will be fenced and no cultivation will be allowed as it leads to soil erosion and also disturbs the migratory birds.[53] The local people have obviously not welcomed this move, as it hits their additional income. The decision has also not been implemented in full force, as it requires regular and strict monitoring by the local administration which is not easy, given the size of the draw drawn area. And perhaps a sympathetic attitude of the officers towards the oustees also does not help the matter. Little is known about the effect of agricultural practices on the Pong wetland. The use of chemicals fertilizers can adversely affect the biota. But it has not acquired any serious dimensions so far because fertilizer consumption is very low. Cultivation also

disturbs the mudflats and water birds habitat during the winter season. The migratory birds, on the other hand, harm the standing crops mainly the Bar-headed geese and Brahminy ducks.[54]

**Wetland and grazing**

The uncultivated land around the wetland is also used by the villagers as pastures for their cattle during the monsoon season. A study conducted by the State Council for Science Technology and Environment (SCSTE) indicates that, for 6-7 months of the year, fodder for the cattle is procured from the wetland area, and it is a big economic relief for the people living in the vicinity of wetland.[55] The other related benefit of cattle grazing is the dung collection. The fallen dung is collected for fuel by the villagers and not necessarily by the people who own the cattle. This dung meets the need of a family for at least three months. It is also used as manure before the sowing of crops.[56]

**Wetland and Nomadic Tribes**

The creation of the reservoir might have thrown open land as pasture for the cattle of the people living in its vicinity, but has forced the nomadic pastoralists to change the routes of their seasonal migration. Some of them who earlier used submergence area for grazing had to search new places for this purpose.

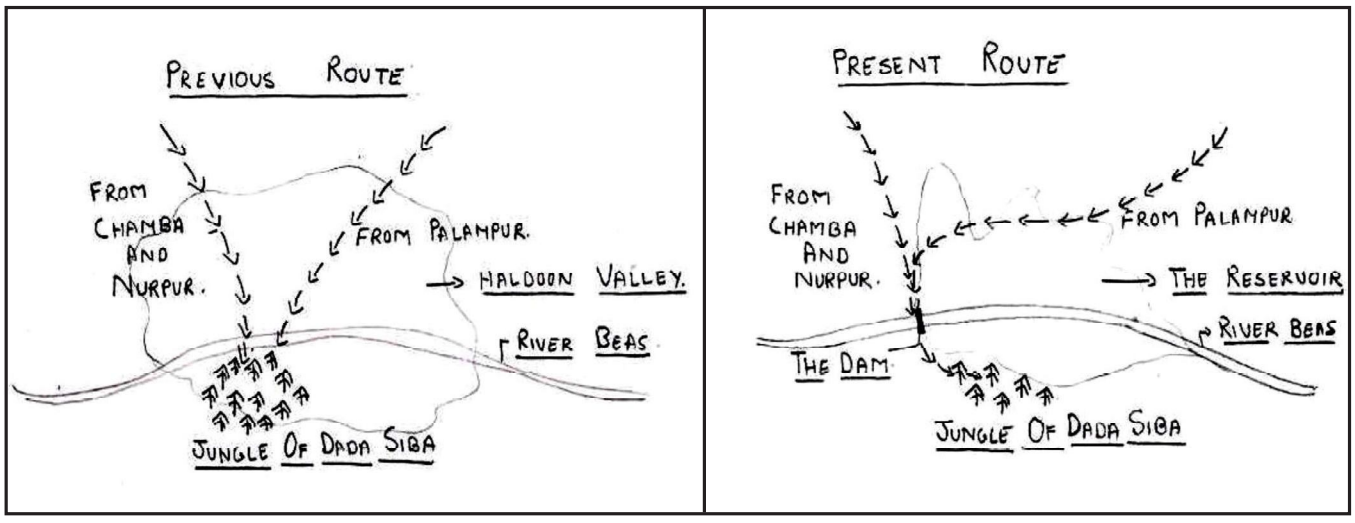
**Gaddi**

The Gaddis are the most well known nomadic pastoralists in Himachal.[57] They reside mostly on the snowy range, which divides Chamba from Kangra. The Gaddi are a semi-pastoral, semi-agricultural people whose main wealth consists of flocks of sheep and goats. The Gaddis have always enjoyed the rights of grazing in the jungles, both in the low hills and in the higher ranges. Prior to the construction of the dam, the Gaddis used to come from Palampur, Baijnath and Chamba, and they used to pass through the Haldoon valley, cross the river Beas and settle in the jungles of Dada Siba in the winters. On their way to Dada Siba, they used to halt on the village *shamlat* land for a day or two. The local people exchanged grains and other necessities for the manure from these Gaddis.[58]

Now, after the reservoir, the Gaddis have lost these halting places. They have to reroute Dada Siba which has increased the distance of their travel. They have also lost some of their grazing land as the jungles of Dada Siba have also been partially acquired and submerged.

**Figure: 1.4**

**Previous and present routes of the Gaddi's**



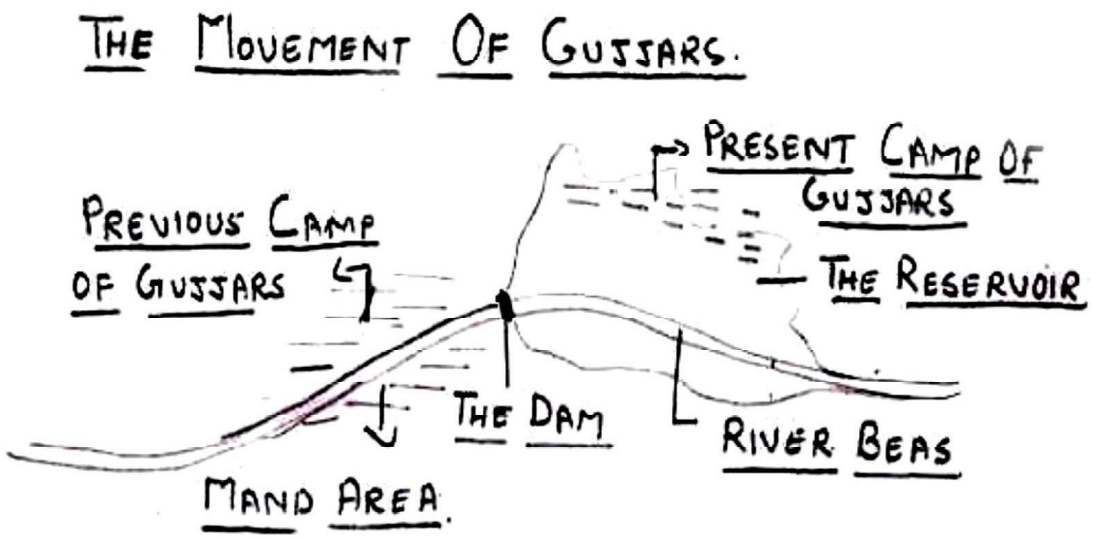
**Gujjars**

In the earlier twentieth century, the Gujjars were the only people in Kangra who sold milk and ghee because they kept herds of buffaloes.[59] There are two types of Gujjars in Kangra, one group has fixed houses and owned pasture. They mainly reside in the Nurpur area.[60] The second group constituted of the Ban Gujjars. They are pastoral nomads spending the summer in the high ranges of the Himalaya, and the winters in the lower hills.

Before the construction of the dam, the Ban Gujjars used to visit the Mand area, which is downstream of the dam. Here the riverbed of Beas was used for grazing. After the dam came up, the area was reclaimed, and it is now cultivated by the owners of the land who earlier did not cultivate it because of floods. The area, which is now under cultivation, is useful because of the growth of 'Kharkana' (a type of grass which is used for making papers). People sell it to the mill-owners of Punjab. So the Gujjars had to look for alternative site as they were no longer welcomed by the people of the Mand area.

**Figure: 1.5**

**Movement of Gujjars**




The availability of grass has also declined. For few years after the construction of the dam, the Gujjars kept on going to the Mand area, but later it was becoming difficult for them. From the year 1984-85, the Gujjars started to visit the drawdown area of Pong Reservoir, because of the open land and green grass. They stay there for 3-4 months from April to July, and as water level starts increasing, they again move out to Nurpur or Pathankot.

The Gujjars live in small groups in the makeshift tents that have a protective plastic covering as the roof and are mostly related by blood.[61] The males look after the herds and females tend to household duties. Each

family supplies 50-60 liters of milk daily to local population for household consumption and tea and sweet stall along the main road.[62] When they move to Punjab, they sell their products there. Some people feel that the movement of Gujjars create problems for the local people and at times create law and order problems as well when they clash with the local people over their movements.

**Wetland and Tourism**

Though the reservoir was never planned as a tourist spot, yet soon the beauty of this huge water body became an object of attraction. The government of Himachal Pradesh drew an ambitious plan for promoting water sports, avifauna, eco-tourism and angling. A water sports complex was built to encourage adventure water sports and also for training of budding sportspersons. Subsequently, a restaurant was built by the Tourism Department, adjacent to the Dam. The sight, no doubt, is beautiful; one can have the view of the dam as well as the reservoir from there, but the place is totally underutilized. A study conducted by SCSTE in 2004 revealed that, due to the lack of publicity and awareness, foreign tourists seldom visit this wetland. Only people from nearby places and that too in small numbers visit the wetland. The main reason being that the people need to seek permission to be there after 5 pm and people coming from Punjab side have to obtain a pass for crossing the Dam and reaching the sports complex. However, the State Government is trying to put the Pong Lake on the international tourist map. A spacious and beautiful restaurant was opened in 2005. The construction of a civil terminal at Pathankot airport in 2007 was likely to give impetus to the flow of tourists to Pong wetland but it did not happen so. The Bhakra Beas Management Board (BBMB) insists on putting restrictions because of security considerations which is a major hindrance in growth of tourism. Now the government, under its ADB funded project to promote Tourism in Himachal, is taking a few measures like upgrading the restaurant and toilet facilities, developing eco tourism facilities at Ransar island in the lake, developing jetty, watch towers and many other things.[63] Only time shall tell the result of these new initiatives. But the point remains that the oustees are mostly not involved in any such plans and for them the lake is a lake with not much tourism benefit attached to it.

**Commercial Fisheries**

Commercial fishing in Pong reservoir was initiated in 1974. A token consignment of 1.3 lakh fingerlings of mirror carp were stocked in the reservoir in June 1974.[64] The total catch during the first year of fishing operation was 98.1 tones and increased progressively, attaining a peak of 794.4 tons in 1987-88, and then declined. It has more or less stabilized around 400 tons by the end of the 20th century.[65] The fish yield from 1974 to 2012 is shown in the **Table 1.2**

The sharp decline in the fish catch after the year 1988 is attributed to the opening of the floodgates by the Dam authorities in that year due to heavy rains, which resulted in the escape of fish in large numbers from the reservoir.[66] But there can be other reasons as well. The construction of a large dam often increases the total amount of fish that can be caught in an area, which in turn bring changes in the location and structure of the fishing industry.[67] When vegetation and soils are flooded by a reservoir, they release huge amounts of nutrients, which nourish a fish population that is suddenly able to expend into an increased habitat, and this results in an increase in the fish yield. After a number of years, however, when the flush of nutrients from rotting bio mass starts declining, the fish catch also starts to decline and in some cases reservoir water become depleted of oxygen and clogged with aquatic plants which decreases fish productivity.[68] Such an example was found in the Kainji Dam where the yield was very high in the initial years; then the yield dropped, it stabilized for few years and now for past 5-6 years it is again declining. A large numbers of fish eating birds visiting the wetland is also considered to be one of the reasons for low yield.

**Table 1.2**

**Total Fish Production in Pong Reservoir from the year 1976 to 2012**

| Sr. No | Year | Fish Production in Tonnes | Sr. No. | Year | Fish Production in Tonnes |
|---|---|---|---|---|---|
| 1 | 1976-77 | 98.114 | 19. | 1994-95 | 370.506 |
| 2. | 1977-78 | 265.464 | 20. | 1995-96 | 329.660 |
| 3. | 1978-79 | 478.929 | 21. | 1996-97 | 397.289 |
| 4. | 1979-80 | 596.018 | 22. | 1997-98 | 414.810 |
| 5. | 1980-81 | 569.210 | 23. | 1998-99 | 359.820 |
| 6. | 1981-82 | 443.218 | 24. | 1999-00 | 453.124 |
| 7. | 1982-83 | 498.840 | 25. | 2000-01 | 428.444 |
| 8. | 1983-84 | 469.963 | 26. | 2001-02 | 390.941 |
| 9. | 1984-85 | 498.960 | 27. | 2002-03 | 379.092 |
| 10. | 1985-86 | 552.664 | 28 | 2003-04 | 396.341 |
| 11. | 1986-87 | 519.171 | 29. | 2004-05 | 411.374 |
| 12. | 1987-88 | 797.359 | 30. | 2005-06 | 421.067 |
| 13. | 1988-89 | 474.753 | 31. | 2006-07 | 387.780 |
| 14. | 1989-90 | 489.205 | 32. | 2007-08 | 405.576 |
| 15. | 1990-91 | 471.797 | 33. | 2008-09 | 416.362 |
| 16. | 1991-92 | 485.503 | 34. | 2009-10 | 369.780 |
| 17. | 1992-93 | 448.380 | 35. | 2010-11 | 330.320 |
| 18. | 1993-94 | 372.715 | 36. | 2011-12 | 285.990 |

**Source:** Data provided by *Gurucharan Singh,* Director, Fisheries Department, Pong Dam, 2012

In the Pong wetland not many studies have been conducted to find out the real impact of the construction of dam on the fish species and the flora of the area.[69] When the commercial fishing was started, not much attention was paid on the life cycles of important fish species. In general the life cycles of many fish species are poorly understood. Where fish species migrate long distances, dams can decimate fish stocks and the diets of the people dependent on fish protein.[70] *Janet N. Abramovitz* writes that the Columbia river Salmon fisheries in North America declined sharply after dams were built on that river.[71] *Abramovitz* has observed similar findings in the Amazon River basin, where many fresh water species have become rare. Salmon fish has almost completely disappeared from the Rhine for almost the similar reasons.[72]

A somewhat similar trend is noticeable in the Pong reservoir. During the initial stages, the fish fauna of the reservoir consisted chiefly of catfishes, minor carps, and a few coarse fishes mainly residual and acclimatized from the river. Gradually certain migratory species started to find it difficult to retain their position in the ecosystem. Of these, three most important are the golden mahseer (*T. putitora)*, Snow trout (*S. richardsonii*) and *L. dero.* The mahseer, which had its migratory run up to Sultanpur near Kullu, has disappeared in this area. The other affected species are *S.richadsonii* and *L.dero.* While the former could not survive in the new environment, the later is struggling to retain its progeny in the reservoir.[73]

**Traditional Fishermen and Fishermen Societies**

Before the construction of Pong Dam on the river Beas, the traditional fishermen in Himachal were not

organized. There were few castes who earned their livelihood by fishing.[74] Their methods were traditional and they were used to riverine fishing. When commercial fishing started in Pong Dam in the year 1975, the fisheries department tried to formulate a concerted plan for the development of fishes and a State level 'Reservoir Development Committee' was set up in 1976.[75] As a first step, it was decided to bring all fishermen under a cooperative fold and only a member of the Co-operative Societies would be permitted to operate nets in the water body. Three Societies with the total membership of 303 fishermen were registered in 1976. By 2007, the number of societies rose to 15 with memberships of 2587 fishermen. No license fees was charged from the fishermen till 1981-82, but later an annual license fee of Rs. 50 was levied on each gill net of 80 m. length. The department also charges 15 percent royalty on the price of the fish caught by each fisherman.[76]

For sale of fish the practice of appointing contractors by open auctioning at the beginning of each year is in vogue. The fish caught by the fishermen is brought to the fixed fifteen landing centers. The contractors pay weekly money to the societies, and the societies pay some royalty to the department. To avoid conflict between the societies regarding the area of operation, the societies and the department of fisheries have divided the reservoir into eight beats demarcated on the basis of area and productivity of water body.[77] Apart from active fishing, other jobs are also provided to more than 1000 families engaged in helping fishermen, like carrying/ transportation, packing of fish, weaving and mending of gears, marketing. Though primarily formed for power generation and irrigation purpose, approximately 4178 tonnes of fish valued at Rs. 1978.69 lakhs were harvested from the reservoir during the last 10 years (1997 to 2007). [78] Prior to the impoundment of the river Beas, a subsistence fishery existed in the river and adjoining streams and the average catch hardly exceeded 2 to 4 kg. per fishermen per day. With the formation of reservoirs, a lucrative fishery started attracting large number of fishermen and the oustees who had no other viable means of livelihood. The fisheries department initiated training courses for operating gears in the deeper waters for fishermen.

Although the fishery department claims that lot many oustee fishermen are now engaged in the fishing activities, there is no evidence to substantiate it. The department never formed any incentive scheme for the oustees of the dam as such or the people who were engaged in fishing profession earlier. A reservoir does create lucrative fishery, but there is no guarantee that local fishermen and the other people who have their livelihood affected by the dam will be able to reap the benefits.[79] Often, it is only outside entrepreneurs and those with experience of open water fishing benefit from it. In Pong Reservoir, the people who are the contractors or the people who are buying the fishes are mainly outsiders, primarily from Punjab. The reservoir no doubt has created lucrative fishery, which is not yielding very good results now as it did during its initial years, but the dam oustees have not directly benefited from it.

**People and Wetland: Perceptions and Experiences**

The people affected by the creation of the Pong reservoir can easily be classified into three separate groups. The first group consists of the people who were fully displaced and who chose to resettle at a different place away from the reservoir. The second group is of the oustees who were also fully displaced but chose to resettle in the peripheral areas of the reservoir and the third group is of the people who were partially affected and continued to stay in the peripheral areas of the reservoir. The last two directly utilize the reservoir and the buffer zone. Naturally the experiences and perception of all the three groups vary from each other.

Most of the oustees who did not go to Rajasthan or could not go to Rajasthan chose to stay back and due to their socio-economic and cultural preferences settled as a group within the district. This led to concentration of oustees in certain pockets of district Kangra.[80] Most of the oustee families have tried to settle down at a place where one or more family member or close relatives had already settled.[81] The main areas where the oustees have settled down are Nurpur, Jaswan, Jawali, Shahpur, Nagrota Surian, Dharamshala and Kangra. Almost

40 percent displaced population settled down within a radius of 20 to 100 km and almost 55 percent within a radius of 5 to 10 km. Only 1 to 2 percent oustees have settled down beyond a distance of 100 km.[82] The reason cited by them was a genuine one and clearly reflected their subconscious attachment to the land, which they had to abandon. The people who moved away from the reservoir area usually bought land at the road-side so that they could have the advantages of infrastructural facilities. Most of the oustees utilized the compensation amount for building up house and buying some agricultural land. In general, economically, the oustee families are self-sustainable as many of them have taken up government service. Further, families who have their murrabas in Rajasthan and are tilling them, have a substantial earning from them.[83]

But almost all the people, especially the older generation, are nostalgic about their previous homes. They all suffer from the complex of being dam oustees and are bitter about the fact that even after 30 years people still call them 'Damu'[84] and do not mix with them freely. The oustees generally interact with the oustee families only, argues Lahri Ram of Shahpur.[85] He also told the writer of this article that in the initial years, there was an incidence in Nurpur where the local people did not allow an oustee family to cremate a dead body, as they were considered to be outsiders. Most of the oustees feel the pang of separation from their loved ones as the whole of displaced villagers did not settle at one place.

The original inhabitants too perceive the oustees as the people who encroached upon their land (and because of which the prices rose sharply), jobs, opportunities and infrastructure. The area under pastures and forests has decreased due to the settlement of oustees as the pressure on natural resources increased.[86] The oustees, however, brought some advantages to the area as well. The infrastructure improved in the areas along with specific development schemes to develop the resettled areas. The money for this development comes out of *shamlat* compensation fund[87] given to the oustees.

The oustees who have settled down in the vicinity of the reservoir are those who got only partially affected and draw many advantages from the reservoir. The State Council for Science, Technology and Environment has conducted some studies to find about how the people availing these resources perceive it.[88] People in general feel good about the reservoir because this has made the place important and attractive for tourists. They also like the arrival of the migratory birds. The birds in general fascinate people when they flock together in lines and make different shapes in the sky. The view is especially beautiful during the sunrise and sunset.

It is alleged that some of the oustees indulge in killing the migratory birds, for their delicious meat or to procure the silver ring around their feet.[89] People use different methods to kill these birds, the most prevalent is to boil the wheat and maize seeds and then to mix poison in them and then scatter them in the fields.[90]

The older generation is of the view that these birds visited the area even before the construction of the dam, though not in such large numbers. It is evident in the old folk tales and songs and they were known as 'kunja'. One of the songs is

**कुंजा जाई बड़िया जरोट, चीटे दंद गुलाबी ओंठ**

However, it is the additional land available for tilling in the drawdown area, which is perceived by them as a major advantage of the reservoir, though they are aware that it is illegal to cultivate it. They also know that it is harmful for the preservation of the wetland. Yet they practice it as it gives them additional income and they justify it on the ground that the government has failed to resettle them satisfactorily. The land is scarce and prices are high, hence there is pressure on the land. The villages on the periphery are quite densely populated and, as Prabhat Kumar of village Dhameta complains, that it is difficult even to attend to the nature's call.[91] The people keep their livestock closer to the house because of scarcity of land to make proper cowsheds, though there is no problem of common grazing land.

The creation of the reservoir provided an opportunity to the people to adopt fisheries for livelihood. But now, with a decline in the fish yield, the people are disappointed and want to switch over to other professions, which hardly exist.

The fully displaced people, however, feel that the people who got only partially affected had a better deal. They retained most of their lands and homes and they also till the draw drawn area of the reservoir for which they have already been paid compensation. The people (among the partially displaced) who have the murrabas and are tilling them and also those who have sold them have had substantial economic gains. The fully displaced people also feel that partially affected people were able to manage their murrabas more efficiently because they did not have to bother about the new home and family.

**Fish fauna in Pong Wetland**

The construction of a dam might hamper the migratory run of the natural fishes, disturb their natural biota and deplete their numbers, but the Pong dam has brought major change in the status of fisheries in this area. Fishing was a regular profession for many castes like the Jhiwar, Mallah and Darein for many centuries mainly in the villages adjacent to river. The river Beas was full of many fish species; the most important being the Mahsir (barbus tor). The Kangra district came under the Fish Regulation in July 1916, and since then the fishery was regulated and the problem of 'poaching' was tackled to a certain extent.[92] People including the big zamindars resorted to poisoning and using explosives for the purpose of killing fish throughout the district and especially during the months of May and June when the river and streams were low. Under the Fisheries Act of 1914, the licenses were given to the people, leading to an improvement in overall condition of fisheries and commercial fishing.[93] People started realizing the blunder committed by their folly of poisoning the fishes, which in turn poisoned the whole stream as well.

Prior to the construction and completion of the reservoir, a detailed study on ecology and fisheries of the Beas had never been done. However a list of fishes of the Kangra district is given in the Kangra Gazette of 1924-25.[94] *G.C.L. Howel* (1916)[95] also prepared a list of fishes of river Beas from Beas kund to Largee a stretch of approximately 150 km.

**Conclusion**

The Pong Wetland has emerged as a combination of lost and new opportunities. While the older generation prefers to live in past, the new generation has adapted well to the present scenario. Some have made good use of the opportunity thrown up by commercial fishing, and some others are waiting for eco-tourism to emerge as a new opportunity. From the ecological point of view, many changes are discernable. The old equilibrium has given way to the new one. While construction of the reservoir disturbed fresh water fisheries, the reservoir has become a breeding ground of many new species. The net losses and gains are difficult to measure, as no one has studied this aspect carefully. Similar is the case of avifauna. It seems that many of endangered species come over here, and hence the area has been declared '*Wetland Ramsar Site'*. Wetland is significant from the point of view of the preservation of bio-diversity. However, as has been discussed above, there are conflicts between the reservoir authorities and people on various issues. The agrarian activities of the people of the surrounding areas lead to siltation in the reservoir.

To address the problem of siltation, watershed development projects have been launched with an intention to prevent soil erosion along the watershed of the main river and its tributaries.[96] However, many of the problems stated above cannot be solved unless people that live in the vicinity of the reservoir are made partner in its management.

The Pong Wetland is a unique and important development from the ecological point of view but somehow

the enthusiasm of the academicians, scientists, government officers, and environmentalists is not shared by the common men who will only develop an interest if the wetland delivers incremental income to them. In fact, the recent decline in fish production is a major disappointment for the people in the area. The locals will start showing care and concern towards the migratory birds only if their advent is integrated with a tourism promotion plan, bringing economic gains to the population. Only when the area receives tourists along with the birds, will the common men await the arrival of them as eagerly as those who study them for academic interest. Obviously the conservation cannot be given preference over the survival of the people. Conservation strategy for biota or wildlife can only succeed if it takes into account the well being of locals. Only then the conservation can become the concern of the local people, as it is that of the scientist.[97]

## Notes

1 He has cited many examples to show that the performance and experiences of the large dams in the world is much more varied and complex than is generally assumed. Some of these projects arguably produce social and environmental benefits as well. Sanjeev Khagaram, *Dams and Development: Transitional Struggles for Water and Power.*

2 R. Rangachari in his book *Bhakra-Nangal Project,* praises Bhakra for fulfilling promises it had made to the nation and for producing certain advantages which were not even envisaged, like the massive breeding of the fishes in the Gobind Sagar Lake

3 Barnes, C. R., *Kangra Settlement Report*, 1889, Lahore Printing Press, p. 58.

4 'Status note on Pong Dam' Undated, File No. A **45**, Pong Dam Branch, D C Office Kangra District Statistical Report 1971, based on the Censes Report of 1971.

5 According to the 1971 Census Report, a total of 90 villages got fully submerged in the reservoir and the total population of these villages was 31,425. The Office of the D.C. R&R, Raja Ka Talab, has provided almost similar data. Although some partially submerged villages also displaced its population and some villages were displaced for the construction of other allied works. The displaced population can be around 45 thousand.

6 The figure seems to be exaggerated, because according to the revenue records and the data provided by the D.C, R&R, the population of the landless people was very low and not 30% of them affected families.

7 File No. A **45**, Pong Dam Branch, D C Office, Kangra.

8 Renu Bhanot and Mridula Singh, 'The oustees of Pong dam: Their search for a home', in E.G. Thukral, ed., *Big Dams, Displaced people: Rivers of sorrow; Rivers of change*, Sage publication, New Delhi, 1992, p. 108.

9 The total population of Dehra Gopipur Tehsil with an area of 1282 sq. km. was 2,13,458 in the year 1971. The population of the tehsil was almost uniformly distributed. Hence, one forth area cannot contain about 60 percent of the population. It is unlikely that the population of a part of the Tehsil with an area of 300 sq. km., which was submerged, be 1,50,000 Further, the numbers of villages affected was 115 and fully submerged was 30.

10 Satyajit Singh, *Taming the Waters, The political economy of large dams in India*, OUP, Delhi, 1997 p. 192.

11 *District Statistical Abstract of Kangra District, 1991-2002*, Dharamshala.

12 Barnes, *Kangra Settlement Report*, p. 40.

13 Common land of a village or group of villages.

14 *A socio- Economic Profile of Gaddi Habitat of Kangra District*, Directorate of Economics and Statistics H. P. Shimla.

15 Bhanot and Singh, 'The Oustees of Pong Dam: Their search for home', p. 108.

16 Data based on the official records and the local people as told during the many interviews I undertook in

the months of May, July, October and November, 2003.

17 A. Lee Foote, Sanjeeva Pandey, and Naomi T. Krogman, 'Process of Wetland Loss in India', *Environmental Conservation,* 23(1): 45-54. *A Preliminary Analysis of the Environmental Economics of Pong Dam*, July 2004 to December 2004, Sponsored by State Council for Science, Technology and Environment, Government of Himachal Pradesh, Bombay Natural History Society, 2005, p. 6.

18 S.N. Prasad, 'Conservation of Wetlands of India – a review', *Tropical Ecology* 43(1): 173-186, 2002.

19 Gopal, 'Wetland Functions and Values', in Gopal ed., *WWF-INDIA'S Hand Book of Wetland Management*, p. 5.

20 Foote, *et al* 'Process of Wetland Loss in India', p. 46.

21 Sanjeeva Pandey, 'Changes in Water bird Diversity Due to the construction of Pong Dam Reservoir', Himachal Pradesh, India, *Biological Conservation,* 1993, p. 127.

22 The difference between two surface levels of a reservoir i.e. the minimum water level and the maximum water level of the reservoir.

23 S. Singh, A. Kothari and P. Pande*, Directory of National Parks and Sanctuaries in Himachal Pradesh.* Indian Institute of Public Administration, New Delhi, 1990, pp. 67-9.

24 'Integrated Management Action plan of Pong Wetland', p. 31.

25 Singh, et al., *Directory of National Parks and Sanctuaries in Himachal Pradesh,* pp. 67-9.

26 Notified as 30,729 ha, but re- estimated by IIPA/Environmental Studies Division as 32,270 ha using digitized maps.

27 It is known as 'Ramsar Sites' because the Convention on Wetlands was signed in the Iranian city of Ramsar in 1971. 'Ramsar sites' are those included in the List of Wetlands of International Importance maintained by the Ramsar Convention. In July 2002, there were 1,179 Ramsar sites in 133 countries, covering 102,126,760 hectares. To qualify as a Ramsar site, a wetland has to meet strict criteria-it must be-a wetland, that is, a representative, rare or unique wetland type and/or a wetland that is particularly important for conserving biological diversity. 'Pong Wetland-Ramsar Site', an unofficial report prepared by the State Council for Science, Technology, Environment Himachal Pradesh, Shimla, 2003.

28 *Trends of Fish Catches from Pong Reservoir, During 1976-77 to 1994-95*, A booklet published by the Directorate of Fisheries Government Of Himachal Pradesh, Bilaspur, 1996, p. 10.

29 Data obtained from the Census of India, 2001.

30 *A Preliminary Analysis of the Environmental Economics of Pong Dam*, July 2004 to December 2004, Sponsored by State Council for Science, Technology and Environment, Government of Himachal Pradesh, Bombay Natural History Society, 2005, p. 28

31 Whistler was the Senior Superintendent of Police of Kangra District who had divided Punjab into five zones and perhaps the first to prepare the list of migratory birds in Punjab Plain zone in 1924-26. The Birds of Kangra District Punjab. *Ibis,* Part I July, pp-521-28, Part II, October, pp. 724-83.

32 Pandey, 'Changes in Water bird Diversity', p. 127.

33 *A Preliminary Analysis of the Environmental Economics of Pong Dam*, p. 10.

34 S. Pandey, 'India: Pong Dam Lake', in *A Directory of Asian Wetlands*, ed. D. A. Scott. IUNC, Cambridge, pp. 392-3.

35 Gaston, 'Report on a visit to Pong Lake', p. 8.

36 A.J. Gaston, 'Report on a visit to Pong Lake', 2-3 December, 1985. Unpublished report with the Wild Life Department Kangra, p. 8. Gaston is a member of Canadian Wildlife Service, Ottawa.

37 Apart from waterfowls, a total of 220 bird species were also recorded. A detailed study was undertaken by Sanjeeva Pandey from 1986 onwards to study the changes in bird diversity. See his article 'Changes in Water bird Diversity Due to the construction of Pong Dam Reservoir, Himachal Pradesh, India' *Biological Conservation*, 1993.

38 A young Dutchman, Jan Willem den Besten, came to Macleod Ganj in 1996. He studied and documented the birds throughout the district from 1997-2003. J. W. den Besten, *Birds of Kangra*, Moonpeak Publishing, 2004, p. 23.

39 V. K. Singh, Conservator, Wildlife Dharamsala, File Name 'Birds in Pong Wetland', in the Dharamshala Office.

40 Gaston. et al, 'Sighting of red –necked grebe on the Pong dam Lake Himachal Pradesh', pp. 676-77.

41 Apart from Red necked grebe, there are many other species which are sighted more commonly at Pong wetland namely: bar headed geese, northern lapwing, ruddy shelduck, pintail, common teal, mallard and coot. However, four species- common crane Grus grus, black ibis Pseudibis papillosa, black necked stork, Ephippiorhynchus asiasticus and white necked stork Ciconia ciconia- reported by Whistler under the 'rare' category do not figure in the study conducted by Sanjeeva Pandey. Pandey, 'Changes in Water bird Diversity', p. 128.

42 After this no attempt has been made by any organization or an individual to prepare a new list.

43 'Integrated Management Action plan of Pong Wetland', p. 32.

44 Pandey, 'Changes in Water bird Diversity', p. 127.

45 *A Preliminary Analysis of the Environmental Economics of Pong Dam*, p. 28.

46 Ibid., p. 31.

47 According to Mr. V. K. Singh, the Wildlife Department of Himachal Government has also formed an anti-poaching group comprising local volunteers in order to keep a vigil on poachers and it has succeeded in catching a few of them. The department is also working on the improvement of habitat for these migratory birds and feeding them is also being taken care of. Interview on 23rd September, 2012.

48 *A Preliminary Analysis of the Environmental Economics of Pong Dam*, p. 29.

49 Taking 1410 feet as the highest point of submergence, BBMB acquired all the required land and the people have been fully compensated for it. But the reservoir (except for one time) has never been filled more than a height of 1390 feet, thus there is an area of 20 feet in the periphery of the reservoir, which was acquired but was never submerged. The people of this area were not really affected and they continue to till their lands for which the compensation has already been paid.

50 This figure was calculated by the study team of SCSTE for their Economic Survey of the Pong wetland after consulting the Dam authorities and the Wild Life Department. *A Preliminary Analysis of the Environmental Economics of Pong Dam*, p. 25.

51 Ibid.

52 The Sub Divisional Magistrates of Nurpur and Dehra are often called upon to solve many disputes regarding the possession of this drawdown area as it causes not only law and order problem but also caste and community tensions.

53 *A Preliminary Analysis of the Environmental Economics of Pong Dam*, p. 26.

54 Rajini Bala and Jagdev Singh of village Haar, Trilok Thakur of village Malela, Sushma Devi and Bibi Sabeera of village Batela, Anita Devi of village Jharar, Naseeb Singh of village Kohlari and many more like them feel that the migratory birds harm the standing crops and pollute the houses and fields through their viscera. Information gathered during our field trip on 7th and 8th September, 2011.

55 Sanjay Sharma, Study of Social Economic and Ecological Interaction of Local People in the catchment of the Pong dam Wetland. By State Council for Science, Technology and Environment, H.P., 1997-98. *A Preliminary Analysis of the Environmental Economics of Pong Dam*, p. 28.

56 Ibid.

57 District Gazetteer, Kangra District 1924-25, p. 176.

58 The manure of the goat was considered to be more fertile then the other manure, District Gazetteer, Kangra District 1924-25, p. 266.

59 Ibid., p. 265.

60 Lyall, 'Settlement Report of District Kangra', 1968, Lahore, p. 39.

61 The largest group is found in Suneth and adjoining area.

62 *A Preliminary Analysis of the Environmental Economics of Pong Dam*, p. 25.

63 Details of the proposed activities are provided in ADB's *Inclusive Tourism Infrastructure Development Project, Himachal Pradesh, TA7014: IND.*

64 Trends *of Fish Catches from Pong Reservoir, During 1976-77 to 1994-95*, p. 10.

65 Data provided by Mr. Gurucharan Singh, Director, Fisheries Department, Pong Dam, 2012.

66 *Trends of Fish Catches from Pong Reservoir, During 1976-77 To 1994-95*, p 5

67 Deudney, D., *Rivers of Energy: The Hydropower Potential,* World Watch Paper 44-June 1981, p 17.

68 McCully, P., *Silenced Rivers: The Ecology and Politics of Large Dams,* Orient Longman, Delhi, 1996, p 171.

69 L.K. Sehgal , 'Brief report on impact of construction and completion of Beas Project on liminology and fisheries of river Beas'. National Research Center on Coldwater Fisheries, Haldwani, U.P. p 36.

70 Deudney*, Rise of Energy,* p 17.

71 Janet N. Abramovitiz, 'Sustaining Fresh Water Ecosystem' in the Lester R. Brown, ed., *State of the World,* New York, p 60.

72 ibid; p 63.

73 *Trends of Fish Catches from Pong Reservoir, During 1976-77 to 1994-95*, p.9.

74 As has been discussed in the beginning of this section.

75 When commercial fishing was initiated in the Bhakra reservoir in the initial years from 1964 -1975, the department issued license @ Rs. 10 per gill net and fishermen were free to dispose their catch as they wished. This, however, failed to develop a commercial fishing of appropriate size and hardly benefited the fishermen. Hence, the commercial fisheries in Pong was taken more seriously and in an organized manner. www.himachalnic.in,/fisheries.

**76** Data provided by Mr. Gurucharan Singh, Assistant Director, Fisheries Department, Pong Dam, 2007.

77 www.himachalnic.in,/fisheries.

78 Dr. B.D. Sharma, Director Fisheries, Bilaspur, File name, 'Fisheries in Pong reservoir'.

79 McCully, *Silenced Rivers,* p. 172.

80 Some oustees have re-settled in District Bilaspur as well.

81 *Socio- Economic status of Pong Dam oustees in Kangra Himachal Pradesh.* A study conducted by the Department of Agricultural Economics, Himachal Pradesh Krishi Vishvavidalaya Palampur, Publication No. 91, October, 1996, p. 6.

82 Ibid., p. 16.

83 Ibid., p. 23.

84 The oustees who have settled in different parts of Kangra are called by the local inhabitants of that area as 'Damu' in a derogatory manner.

85 Lahri Ram is the Ward member in Shahpur and was Sarpanch of the submerged village Panjaral. Interviewed on 8th September, 2011, Shahpur.

86 *Socio- Economic status of Pong Dam oustees in Kangra Himachal Pradesh,* p. 28.

87 The corpus of this fund is increasing as the awards under Section 28A keep on maturing.( For details see Chapter 6 ) The developmental grants are released on the recommendation of District Level Pong Dam Advisory Committee. The Revenue Minister heads the Committee and some representatives of oustees are nominated as non-official members. File no A-45 II, Pong Branch D.C. Office Kangra.

88 Sanjay Sharma, Study of Social Economic and Ecological Interaction of Local People in the catchment of the Pong dam Wetland. By State Council for Science, Technology and Environment, H.P., 1997-98, Panchayats interaction on Pong Wetland & Its Resources on the eve of 'World Wetland Day', by State Council for Science, Technology and Environment(SCSTE), H.P. 12th February , 2002.

89 The endangered species in Siberia are monitored and a silver tag is tied on their feet with their individual number for identification.

90 Study of Social Economic and Ecological Interaction of Local People in the catchment of the Pong dam Wetland.

91 Resident of village Dhameta that is adjacent to the reservoir. Interviewed on the 8th September 2011.

92 *District Gazetteer, Kangra District 1924-25*, pp.23-25

93 ibid; p 25

94 A list of the fish found in the Kangra District during 1924-25 was made in the District Gazetteer of Kangra District, pp. 21-22

95 G.C.L. Howel, 'The making of A Himalayan trout water'. *Journal Bombay Nat. Hist. Soc*. 24(3) : 317-28

96 The wetland area falls in Integrated Wasteland Development Programme (IWDP)-II and III of District Kangra in Dehra, Paragpur and Fatehpur Development Blocks. File no. A-1/03 , DRDA Kangra (D.C. Office)

97 For details on the nature of conservation policy see M.Gadgil and R. Guha, *Ecology is Equity*, Delhi, 1995.

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**16.** File Name *'Birds in Pong Wetland'*, in the Dharamshala Office.

**17.** File name, `*Fisheries in Pong reservoir'*, in the Fisheries office at Talwara.

**18.** File named *'Detail of Pong Dam Rehabilitation'*.

**19.** File No. A **45** II. File No. B **63**, Name `*State Level Pong Dam Advisory Committee Meetings'*.

**20.** File No. A **45**.

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