

CONSERVATION OF BEGAN LAKE, NEPAL: A CASE OF CONFLICT TO COLLECTIVE ACTION IN RESOURCE SHARING (MULTIPLE WATER USE)

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ABSTRACT

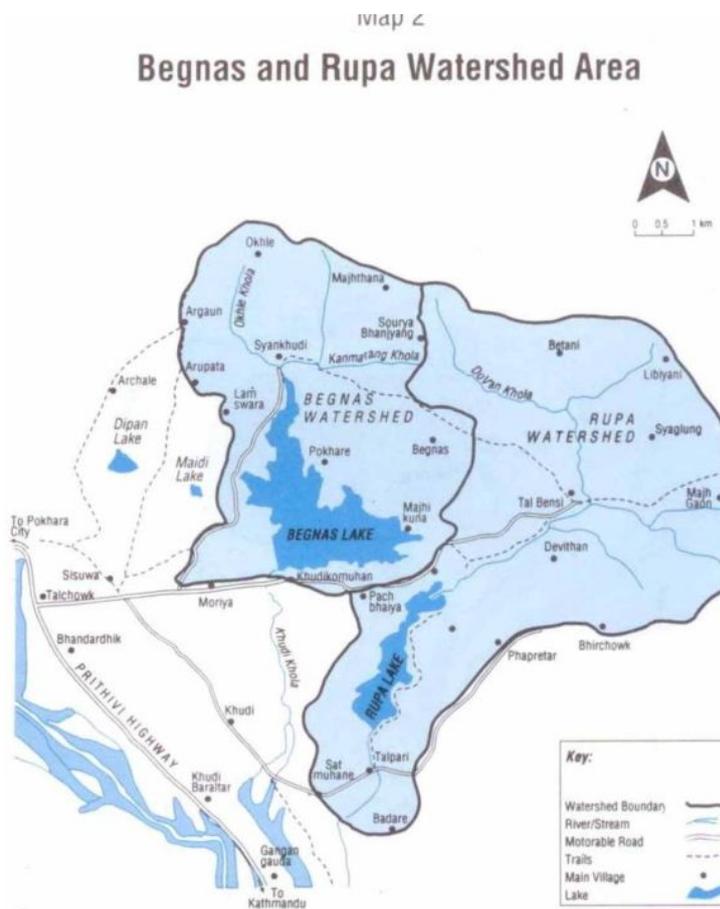
Collective action institutions devise the governance of common property resources wherein the resource users collectively develop rules and roles for resource sharing and conservation of the resource base. When this institutional arrangement is absent, or latent in delivering the governance role, it leads to conflicts that may consequently result to degradation of the resource. Therefore, institutional arrangement for governance is the key to sustainable natural resource management.

Begnas Tal, a lake believed to have formed due to tectonic movements in Pokhara valley, is a unique natural resource base catering to a range of products and services to multiple users. The users of lake have multiple objectives, often in contradiction to each other, hence producing conflicts in resource sharing. Further, the involvement of multiple stakeholders in the extraction of products and services from the lake and associated natural resources for economic gains, without defined obligations towards conservation and management of the lake creates a *lassie-faire* situation. If this situation persists it may result to serious degradation of the lake and the natural resources in the lake's watershed. Realizing this potential threat to the lake and the natural resources in the periphery, initiative has been made in constituting a multiple stakeholders' platform to function as collective institutions of all users. This institution has yet to make visible contributions to the management of the lake, nevertheless an initiative has been made to this end.

This case study looks into the dimensions of conflicts resulting from resource use by multiple stakeholders in Begnas lake. The questions that this case study intends to focus are: i) what are the different forms of resource use from the lake and lake's watershed and how these uses relate to livelihood of multiple users depending on the lake?, ii) how are the resource use by multiple stakeholders, with differential objectives of economic gains, translating into conflicts in resource sharing?, iii) how are the conflicts in resource use producing threats to sustainable management of the lake and associated resources and therefore the need for collective institution for the governance of the lake.

INTRODUCTION

Begnas Tal is a highland freshwater lake located in Pokhara Valley, in the western mid-hills of Nepal. Administratively the lake falls in Lekhnath Municipality, which is a growing township close to Pokhara Sub-Metropolis. Pokhara is an important tourists' destination and commercial center, known for panoramic views of snow peaks- Machapuchre, Annapuran and Dhaulagiri, and eight tectonic freshwater lakes in the valley- Phewa Lake, Begnas Lake, Rupa Lake, Maldi Lake, Khaste Lake, Gunde Lake, Deepank Lake and Kamal Pokhare. Among these eight lakes only first three are important for the economic value and biodiversity.



The total area of Begnas Tal is 373 ha that also includes shallow areas associated to marsh and rive fields located to the eastern, western and northern shore line of the lake. The elevation of the lake is 650 m amsl. Major inlet stream to the lake is Syankhudi Khola which is a seasonal stream flowing only during the monsoon. The outlet stream is Khudi Khola. The average depth of water in the lake is estimated to be 6.6 m with the water surface elevation 655.7 m abmsl.

The total area of Begnas watersheds that feeds water and sediment to the lake is 49km², which includes ecologically and culturally diverse landscapes, natural resources and settlements of people. As such the watershed includes three

distinct landforms- steep to very steep hills slopes to the north, valley floor to the south and south-west and the Begnas Tal located at the confluence of these two landforms. The elevation ranges from 600 m amsl in the south to 1,440 m to the north. The climate of the areas is sub-tropical in the valley floor that gradually changes to warm temperate climate to the north. The mean annual temperature is 19.3⁰C with the highest temperature in July-August (25.5⁰ C) and the lowest temperature in January (13.2⁰C). The mean annual rainfall of the area is 3,710 mm. The variation of physiography from south to north produces numerous micro-climates suitable for diverse land uses.

The biodiversity of lake includes 22 native and 7 exotic fish species and wide ranging aquatic plants and algae. There are unidentified filamentous algae along the shallow parts of the lake that make the lake suitable habitat for aquatic fauna. Among the lakes' aquatic plants, five species of floating macrophytes and three species of emergent rooted plants have been recorded. In addition seven species of reed like plants have been recorded growing in the shallow shorelines and marshes along the lake.

Major settlements and commercial centers around Begnas Lake include Sundare Danda, Pachbhaiya, Tal Khola, Syankhudi, Talbensi and Satmuhane. All these settlements are located along the road linking the area to Kathmandu-Pokhara highway. Gagangauda, Khudibaraltar, Bhandardhik, Talchowk, Sisuwa and Moriya Chowk are growing settlements and market hubs along Kathmandu-Pokhara Highway. There has been significant increase in the population in all these settlements after 1970s. In fact many of these settlements came into existence after the construction of Kathmandu-Pokhara highway in 1960 and Talchowk-Tal Bensi link road. There are also settlements to the north of lake, on the hills, that include Sano Tundo, Piple, Sal Danda, Thulo Tundo, Lamaswara, Arupata, Pokhare and Majhi Kuna. The population in these settlements is not dense. In fact there is trend of migration of people from the hills in the north to the valley floor that has been continuing since 1960s.

ISSUES FACING THE LAKE

This section discusses the patterns of use of the natural resources associated to Begnas Tal and its watershed and the quest in the resource use by multiple users. In portraying the pattern of resource use by multiple users, the effects produced on the lake and associated resources, supporting or contracting the sustainable resource management

Table-1 Salient Features of Begnas Irrigation System

System Components	Characteristics	Remarks
Dam: Type Length Height	Earthen with clay core 160 m 10 m	
Reservoir: Average Depth Maximum Depth Area Dead Storage	6.6 m 10.6 m 373 ha 3.6 m	
Intake: Gated orifice		
Main Canal: Cement-Concrete Lined Total length Design Discharge	9.36 km 8 m ³ /s	
Branch Canals:		FMIS merged to the system in 1999
Numbers	4	
Branch # 1	Length: 3 km; Area: 200 ha	
Branch # 2	Length: 3.8 km; Area: 150 ha	
Branch # 3	Length: 3 km; Area: 200 ha	
Branch # 4	Length: 1.3 km; Area: 50 ha	

Source: Filed Survey

objective have also been identified.

Development of Irrigation Infrastructure for the Valley Floor: In 1988, Khudi Khola which is outlet stream of Begnas Tal was blocked by constructing an earthen dam, 160 m in length and 10 m in height. An irrigation canal off-taking through gated orifice intake was also constructed. Begnas Irrigation System, was designed to serve total of 600 ha of land in the valley floor with 9.36 km long main canal and 4 branch canals. The cost of development of the dam and the irrigation system was supported by Asian Development Bank. The salient features of the irrigation system are presented in Table-1.

The dam and the irrigation infrastructure at Begnas are under ownership and control of Department of Irrigation. A Water Users' Association (WUA) has been constituted in the system for operation and management of the irrigation scheme under participatory irrigation management policy of the government.

The construction of dam and the irrigation scheme led to two important changes in Begnas Tal, which have important implications to resource sharing in the lake. Firstly, with the construction of the dam the lake area increased from 224 ha to 334 ha. The changes in the physical parameters of the lake before and after the construction of the dam, based on bathometric analysis of the lake, is presented in Table-2.

Table-2 Changes in the Physical Parameters of Begnas Lake, 1978-1993

Parameters	1978 A.D.	1993 A.D.
Altitude (amsl)	650.0	50.0
Area (ha)	224.0	373.0
Length (m)	1,700.0	-
Width (m)	1,500.0	-
Depth (m):		
Maximum	7.5	10.6
Average	4.6	6.6
Watershed Area (km ²)	20.0	20.0
Volume of Storage (m ³)	10.2x10 ⁶	17.9x10 ⁶
Inlet Stream	Syankhudi Khola	Syankhudi Khola
Outlet Stream	Khudi Khola	Khudi Khola

Source: Ferrow and Swar (1978); Rai et al. (1993); Oli (1996)

The lake was seriously degraded prior to dam construction due to siltation and encroachment in the lake shore areas for cultivation of rice. There were big shallow areas with dense growth of aquatic macrophytes near the inlet and outlet. The World Conservation Monitoring Center (WCMC) had considered the lake to be degraded to warrant any fruitful conservation effort (WCMC, 1992). The increase in the storage areas and depth that was possible after the construction of the dam created distinct opportunity for fishery and use of the lake for boating and recreation. On the other hand development of irrigation scheme for the downstream use led to a new claim on the water stored in the lake that was in conflict to fishery and recreational uses of the lake.

Migration from the Hills to the Valley Floor: Migration of people from the hills to the valley floor started with the opening of Kathmandu-Pokhara highway that was initiated during 1960s. The construction of this highway led to accelerated urbanization in and

around Pokhara. Urbanization in Pokhara and development of settlements around the lake during this period led to denudation of primeval forest around Begnas Lake. The loss of forest cover affected local economy due to limitation created on the availability of fuelwood and supply of organic manures and biomass for crop farming and animal husbandry.

It is important to understand here that farming in the hills is characterized by symbiotic relationship between forest, crop production and animal husbandry. Forest is source of organic manure for crop land and livestock depends on the availability of fodder and forage from the forest. When the forest cover declines this traditional symbiosis starts breaking that seriously hampers both crop cultivation and animal husbandry.

Agricultural enterprise throughout the watershed, and especially in the hills to the north of the lake, is traditional and pre-dominantly rainfed. There are only a small number of scattered farmer managed irrigation canals that supply water to limited areas and intensive crop cultivation is limited to only these areas. Otherwise most of the watershed area is under maize-millet farming. As such the households' economy depends heavily on livestock rearing, both for sustenance and supplemental income. The loss of forest cover that started during the 1960s and continued to accelerated rates during 1970-1980 led to serious degradation of opportunity for livestock raising due to reduction in availability of tree fodder and forage. This also had consequence on productivity of crops due to limitations on the availability of manures.

After the mid 1980s, the concept of community forestry was revitalized in the Begnas lake area and reforestation and watershed management activities were pursued by the Department of Soil Conservation and Watershed Management under Begnas Tal- Rupa Tal Integrated Watershed Management Project (BTRT) during 1983-1994. As a part of the project activities reforestation was carried out in total of 612 hectares of denuded areas throughout the watershed under community forestry program. The project also organized 83 community forest users' groups (FUGs) in the watershed to protect and manage the forest resources. This led to restoration of forest cover and fodder blocks in the area and the ecosystem has been regenerated.

Contrary to the ridges and slopes to the north of the lake, the valley floor is agriculturally prosperous due to fertile soil and opportunity for irrigation. This has created opportunity for year round crop cultivation. The valley floor with flat terrain and heavy soil creates opportunity for growing irrigated rice. Rice has special significance in the life and economy of people in Nepal. Rice is staple food for majority of Nepalese and in fact the prosperity in the Nepalese households is valued in terms of number of months in year rice is eaten in a family. This opportunity in the valley floor has been triggering continued migration of people from the upland to the valley floor.

In addition to the upland to lowland migration that has been occurring at local level, urbanization and increased trade and commercial activities in and around Pokhara has been attracting people from other parts of the country to come to settle in the area. Pokhara has been a favored residential destination for the people retired from British

Armed Forces with the establishment of a recruitment center for British Armed Forces in ????. In fact most of the settlements along Kathmandu-Pokhara highway, close to Begnas, are those of retirees of British Army.

Drinking Water Transfer from Upland to Lowland: The area in the valley floor does not have economically exploitable groundwater reserve, therefore only source of drinking water in the settlements in the valley floor is spring and stream water transported from upstream watershed of the lake to the valley floor. As stated earlier, the settlements in the valley floor and the population residing there has been increasing continuously since 1960s. Most of these settlements have developed drinking water schemes with water tapped from numerous streams and springs from upstream watershed of the lake. These schemes have worked out their own arrangement for accessing water from spring and stream sources. The investments of the development of these schemes have come from different sources, including contributions of the community as well. For many of the schemes the pipelines have been laid across the lake. As of now as many as ??? community drinking water schemes are known to exist in the valley floor.

Though no information is available as to what volume of water is transported through these schemes from the upstream watershed to the valley floor and how is this water transfer affecting the lake, the water thus diverted is definitely cutting down the flow reaching the lake through surface and sub-surface flow. The effect of this water diversion is expected to be more critical for dry season recharge of lake.



Promotion of Fishery in Begnas Lake: Nepal Agricultural Research Council (NARC) established a fish research center in ??? adjacent to the dam in Begnas Tal. The establishment of this center has been under Integrated Fishery and Fish Culture Development Project taken-up during 1975-???? Under financial and technical assistance of UNDP and FAO. The project intended promotion of lake and enclosure fishery in the lakes in Pokhara Valley to enhance

livelihood opportunity of the people depending on lake fishery. The project introduced exotic fish species in the lakes, introduced plank boats for fishing and provided technical support in the promotion of cage and enclosure fishery.

The Fishery Research Center in Begnas maintains 50 fish ponds where breeding and production of fingerlings of exotic fish species are undertaken. The center derives water for the fish ponds through a siphon from the lake. The center has also introduced four exotic fish species in the lake that include: Common Carp (*Cyprinus carpio*), Silver Carp

(*Hypophthalmichthys molitrix*), Bighead Carp (*Aistichthys nobilis*) and Grass Carp (*Ctenopharyngodon idella*). The center has also introduced other fish species which are widely grown in the Teri region and known for their quality meat, such as, Rohu (*Labeo rohita*), Bhakur (*Catla catla*) and Naini (*Cirrhina mrigala*). Swar and Gurung (1988) have estimated 85% increase in the fish production in the lake after the introduction of exotic species. No conclusive study results are however available on the effect of biodiversity of indigenous fish species with the introduction of exotic species in the lake.

The promotion of fishery in the lake had significant effect on the livelihood of the people depending on the lake. There are 45 fishermen families, locally called *Jalharis*, who live along the lakeshore and whose livelihood depends entirely on fishing in the lake. They make fish catch in the lake and also rare fishes in cages and enclosures in the lake. In addition, there are 15 other families who are engaged in cage and enclosure fishery in the lake. There are cages and enclosures created in approximately 2 ha area of the lake. These cages and enclosures are private properties within the lake while the lake fishery functions as common pool resource.

The households whose livelihood depends on fishery in the lake have organized a Fishery Cooperative to regulate fish production and management in the lake and also organize fish marketing. The fish catch made in the lake, and also produced in cages and enclosures, are brought to the cooperative which fixes the rate and also makes arrangement for marketing. Of the total amount of fish sale, Rs. 2 per kg on fish catch of lower than 3 kg, and Rs. 3 per kg on fish catch larger than 3 kg goes towards the common fund of the cooperative. In addition the middlemen/contractors making purchase of fish from the cooperative is required to pay Rs.1 per kg. on total amount of sale. This fund is used by the cooperative for purchasing fingerlings to renew the fish stock in the lake and in the management of the cooperative. The cooperative also issues license to the *Jalharis* to develop cage and enclosures in the lake.

With the promotion of fishery in Begnas lake, the income made by *Jalharis* and other families depending on fishery in the lake, has increased significantly. The average monthly income of a *Jalhari* family, with 4 to 5 persons in the family engaged in fishing, has increased to Rs. 5,000.00 pre month. In the peak of fish catch season, particularly in winter, the income goes as high as 20-25 thousands per month.

There are other households who are indirect beneficiary of the fishery promotion in the lake. These include restaurant and hotel operators who serve fish recipes to the visitors, and people engaged in bulk and retail marketing of fish catch from Begnas Lake. There are at least ??? small restaurants and hotels in the lake side which cater food and beverages to the visitor. Most visitors coming to Begnas do not like to miss the tasty fish recipes sold in these shops.

Tourism and Recreational Use of Lake: The current tourism and recreational use of the lake is limited to boating in the lake and the people coming for day out and picnic on the lakeshore. Majority of the visitors coming to visit the area are people from adjoining

cities and towns. The flow of tourists' from the foreign countries has been almost negligible unlike their flow in Phewa lake.

At present there are 80 plank boats operated in the lake which are used in fishing and also for boating in the lake by the visitors. Most visitors coming to the lake side enjoy boating. The flow of the visitors to the lake continues throughout the year though the frequency is high during September- November. There are no records available on the number of visitors, however, on an average 250 visitor per day visit the lake during the peak season (September-November) and 50 visitors per day visit during off-peak season. Most visitors during September-November come for picnic on the lake side because this is festival season when most schools and colleges are closed for Dashain holidays.

Current use of lake for tourism is almost subsistence in nature. This has been due to lack of infrastructure and facilities for tourism and promotional activities. The proximity of this lake to Pokhara and peace and tranquil environment creates enormous potential for tourism promotion. The shoreline of Phewa lake is becoming overcrowded due to accelerated construction of hotels, motels and restaurants. Begnas can be better place for the tourists who want to be away from the crowds while being near to the city's amenities. In order to profit from this opportunity a local entrepreneur (Dreamland Pvt. Ltd.) has proposed to build a resort with 19 luxury houseboats in Begnas lake. However, this proposed has not been sanctioned by the government due to possible adverse impact on the Lake Environment and socio-economics of the area (Oli, 1996).

The Issue of Lake Ownership: The legal status of the ownership of the lake and the surrounding is unclear. In fact different legislations relating to the ownership of natural resources are conflicting to each other. For example, The Water Resources Act (1992) entails that ownership all forms of water resources in the country are vested to the state. The act also makes provision for licensing and registration to grant usufruct right for any form of water use. The dam and irrigation infrastructure that has been developed in Begnas are within the control of Ministry of Water Resources and Department of Irrigation. The Water Users Association (WUA) constituted to undertake operation and management of Begnas Irrigation scheme, being a registered organization under Water Resources Act, has the usufructory right for irrigation use of water from the lake. Contrary to this, the Forest Act (1993) under its watersheds regulates development activities.

The Local Self-Governance Act (1998), empowers local authorities (Municipalities and Village Development Committees) with ownership right over natural resources within their territory. This applies to lakes, ponds and other water bodies that are within the administrative boundaries of the Municipalities and Village Development Committees (VDCs). Under the provisions of this Act the ownership of the lake would go to Lekhnath Municipality. The Aquatic Life Act (1961) delegates the harvest and management of lakes to Ministry of Agriculture, with some autonomy to the VDCs.

IMPACTS

The Emergence of Conflict from Multiple Use of Lake's Resources

The claims on lake water in Begnas and the conflicts emerging thereto can be looked into at two levels- i) at the level of Begnas Watershed wherein the hill slopes to the north, the water body of Begnas Tal and the valley floor are integral components, and ii) at the level of the lake itself wherein current appropriators of water involve irrigators on the downstream, Fish Research Center, fishermen community and the boat operators. The dimensions and magnitude of conflicts at these two levels narrated hereunder.

Conflicts at the Watershed Level: The hill slopes to the north of the lake is the area that sheds water into the lake. This water passes through surface and sub-surface flow to the lake. Therefore, hydrologic characteristics of this area that control the processes of surface and sub-surface flow of water reaching the reservoir would be crucial to maintaining the storage volume in the lake in any given year. Though the area receives fairly large amount of rainfall (3,710 mm), around 80% (2,965 mm) of this rainfall is concentrated in four months from June-September. This would mean that storage volume in lake during monsoon is mainly through surface flow that quickly reaches to the lake through network of seasonal streams. The quantity of storage in the lake in the dry season

Table-3 Land Use in Upstream Watershed Competing and/or Complementing Water Storage in Begnas

Land Use in Upstream Watershed	Effect on Water Production		Remarks
	Wet Season	Dry Season	
Community Forestry	-	+++	Good forest cover reduces wet season flow but enhances recharge to maintain dry season flow
Crop Land: i. Irrigated	--	--	Irrigation would mean water withdrawal reducing amount of water reaching the lake
ii. Rainfed	--	0	
Drinking Water	-	--	Withdrawal of water in community drinking water schemes can reduce the dry season supply to lake
Livestock	-	-	Water consumption in livestock raising is not very high

Note: Negative Effect (-): low (-); moderate (- -); high (- - -). Positive Effect (+): low (+); moderate (+ +); high (+ + +)

would however depend on the intensity of downstream use and the quantity of water reaching the reservoir through sub-surface flow originating from the watershed. The hydrologic characteristics of the watershed controlling the total quanta of water reaching in the reservoir would be crucially linked to the land use and land cover types in the watershed. A good forest cover would help reducing the surface runoff, enhancing the process of groundwater recharge that would recharge the lake through sub-surface flow links.

The land use activities in the upstream watershed competing and/or complementing the water production in the lake are presented in Table- 3. Community forestry in the watershed has definitely contributing role to water storage in the lake. Forest cover in the community forestry area is expected to reduce the intensity of surface runoff and sediment transport from the watershed while enhancing the groundwater recharge to maintain dry season recharge of the lake. Water use in irrigated farming and water diversion in community drinking water schemes in the settlements, in the upstream watershed and in the valley floor, are expected to reduce significantly the dry season flow of water in the lake.

Another significant land use activity that is likely to have serious effect on reservoir water quality and environmental sustainability of the lake is increasing use of agricultural chemicals and pesticides in the irrigated farming in the upstream watershed. These are the areas which are subjected to year round crop cultivation and have high intensity of use of chemical fertilizers and pesticides. The growth of population and commercial activities in the valley floor have created demand for vegetables and the irrigated areas in the upstream watershed due to their suitability for year round vegetable cultivation, the farmers in the area have switched from cereal based farming to vegetable based farming. The intensity of use of chemical fertilizers and pesticides has also increased significantly. Though no data is available on intensity of use of chemicals in agriculture in the upstream watershed to make a before and after analysis on changes in the lake water quality, however fishermen involved in fishery in the lake have started noticing instances of fish mortality. There was large scale fish mortality during 1993 and 1994 due to a fish disease called UES (Ulcerative Spizootic Syndrome) which specially affected the local fish species. The disease persisted for two months probably due to water pollution resulting from increasing organic and chemical activities in agriculture in the upstream.



Conflicts Resulting from Water Appropriation: The construction of the dam and irrigation infrastructures of Begnas Irrigation scheme was started in 1985 and the irrigation was possible beginning the monsoon season of 1988. As discussed earlier the construction of the dam led to restoration and rejuvenation of the lake

that was seriously degraded due to continued siltation, shranked storage area and volume, heavy growth of aquatic weeds near the inlet and outlet and encroachment by the people.

After the construction of the lake, the storage area of the lake increased by 1.7 times, storage depth increased by 1.5 times and the storage volume increased by 1.7 times.

The construction of the irrigation scheme was to provide year round irrigation in 600 ha to the farmers in the valley floor, in the south and south-west direction of the lake. Prior to the construction of the dam, the farmers in this area were diverting water from Khudi Khola, the outlet stream originating from overflow and drainage from the lake, in a farmer managed irrigation system to irrigated about 50 ha of land. At the time of the construction of the dam and the irrigation infrastructure this traditional use of water was not taken into account. Since the construction of the dam reduced the water supply in Khudi Khola, these prior appropriators of lake water for irrigation raised their concerns that was accommodated by providing them access to irrigation through a new branch canal.

Begnas Irrigation scheme was under administrative and management control of District Irrigation Office of Kaski District until 2002 A.D. The office had deputed an Engineer, an Overseer (Junior Engineer) and three Dhalpas (Gate Operator cum Water Guards) who were responsible for reservoir operation and releasing water for downstream use. In 2002 A.D., Water Users' Association (WUA) was constituted in the scheme under participatory irrigation management policy of Department of Irrigation. Accordingly organizational development activities for WUA was carried out with functionaries elected/nominated at the branch and main canal levels. The main committee was made responsible for acquisition of water from the source and its allocation to the four branch canals in the system wherefrom the branch committees were made responsible for subsequent distribution to the appropriators.

In order to release water for downstream irrigation use the reservoir level is monitored on daily basis and the overseer and Dhalpas responsible for the operation of intake maintain daily records of reservoir level. Maintaining minimum acceptable reservoir level is always ensured while making decision on release of water for downstream irrigation use. The release of water for irrigation use during the monsoon is not a problem because the area receives large amount of rainfall and the lake is almost full throughout this period. However, utilizable volume for downstream irrigation is seriously constrained during dry season beginning November. The dry season irrigation use conflicts with fishery and boat operation that need a minimum level of water to be maintained in the lake. Further, evaporative loss of water from the lake is also high during the dry season. Evaporation pan data recorded at Pokhara indicate the rates of evaporation to be lowest during December (1.7 mm/day) that starts increasing gradually beginning February reaching to peak in May (5.5 mm/day) and declining again with the onset of monsoon. (Oli, 1996). Since dry season storage in the lake is limiting, and minimum reservoir level is required to be maintained for fishery and boat operation, only limited release is made for dry season irrigation. As a result irrigation is possible only in only about 290 ha (48.3% of the service area) in the dry season. The water is delivered to the branch canals in a rotational schedule during this period.

The main committee functionaries collect demand for water from different parts of the command area which they discuss with the irrigation officials responsible for the

reservoir operation. The volume of water to be released is decided jointly by the WUA functionaries and the irrigation officials. The *Jalharis* involved in fishery and boat operators are generally not consulted while making decision on water release, however the minimum water level in the lake is always ensured in making the release. No consultation with the *Jalharis* and boat operators in deciding upon the reservoir release is for two reasons- firstly that the concern for maintaining the minimum water level in the lake is always respected in deciding upon the release and secondly that the *Jalharis* and Boat Operators are not organized to make any collective influence on reservoir operation. Though with the existing arrangement of reservoir operation and release of water for downstream irrigation use there have not been incidences of conflicts, the *Jalharis* and Boat Operators occasionally do make verbal complaints to the irrigation officials and WUA functionaries on decreasing water level due to irrigation releases.

The Fishery Research Center is another appropriator of lake water. It is maintaining 50 ponds that need running water supply throughout the year. This does not involve large water withdrawal to conflict with other lake uses. Since this research center has contributed to enhancing livelihood of the fishermen by providing them supply of fingerlings of fish exotic fish species and technical knowledge for fish raising and fish harvesting, they generally respect the water released in the center.

Formation of Multistakeholders Platform in Begnas

Begnas Tal exists as distinct natural resource, creating distinct economic opportunities to a range of lake users- i) forest users' groups in the upstream watershed, ii) irrigation water users in the valley floor, iii) community drinking water users in the settlements both in the upstream watershed and the valley floor, iv) *Jalharis* engaged in lake fishery, v) boat operators, vi) tourism entrepreneurs operating hotels and restaurants in the around lakeshore, vii) local government and viii) development agencies. The lake continue to exist as a common pool resource though claims on the lake ownership are fuzzy in the absence of distinct legislations. The local government agencies that have more direct linkage to the lake in terms of governance and management roles are District Development Committee (DDC) of Kaski District and Lekhnath Municipality. Both these institutions stake claim on the lake resources by virtue of Decentralization and Local Governance Act (???) empowering them authority towards management of lake and natural resources in the periphery. Their roles, to date, on the conservation and management of the lake and its' natural resources are rather indirect. Their focus has been more on promotion of infrastructure (road, electricity, water supply and sanitation) development for tourism promotion and issues licenses to the hotel, restaurants and other tourism entrepreneurs. Among the development agencies, Department of Irrigation has more direct role in the lake management because reservoir operation and management of the dam and the irrigation infrastructures are within the control of this agency.

The role of current users of the lake (irrigators, *Jalharis*, boat operators, community water supply users and tourism entrepreneurs) are engaged more on the products and services from the lake for economic gains, and they, as such do not have defined obligations for conservation and management of the lake and associated resources. The

84 CFUGs responsible for the management of forest resources in the upstream watershed are only group of stakeholders that have some lake conservation role. Their role in forest conservation contributing to maintaining upstream hydrology for lake recharge and reduced siltation has been positive towards lake conservation.

Therefore, though the lake exists as a common pool resource contributing significantly to economic gains made by multiple stakeholders, there is no defined institutional arrangement for the lake governance. This is a situation of “free riding” and if allowed to continue it would result to serious degradation of the lake and its resources.

In 2006-2007, International Water Management Institute (IWMI), Stockholm Environment Institute (SEI) and Institute of Water and Human Resources Development (IWHRD)-Nepal carried out study on sustainable management of natural resources in Begnas Watershed. The study was part of Community - Based Water and Forest Management for Sustainable Livelihoods of the Poors in Fragile Upper Catchments of the Indus– Ganges Basin. The action research component of the study involved formation of a multistakeholders’ platform for sustainable management of natural resources in Begnas watershed. The study team carried out series of consultations with the stakeholders and the government agencies besides policy dialogues at National Planning Commission, Ministry of Water Resources, Ministry of Forest and Soil Conservation and Ministry of Local Development. In this attempt a meeting of all stakeholders was called on September 15, 2008 at Begnas Lake to discuss the possibility of organizing all the stakeholders in the multistakeholders’ platform. This led to formation of a 13 member *ad-hoc* committee of Begnas Tal Multistakeholders’ Organization (Sharma, 2009). This organization is expected to function as collective action institution of all stakeholders in organizing the resource sharing arrangement. The organization is yet to make its presence visible in the lake management. The only activity known to pursued by this organization to date has been preparation of an action plan for fishery promotion in the lake wherein concept of forming a fishery cooperative has been brought about by this organization. The plan is yet to receive approval of the government agencies and the stakeholders.

CONCLUSION

Nepal’s government has done management of the Begnas lake for irrigation and promotion of fishery with the introduction of exotic fish species. Initially degraded lake condition was improved both in terms of forest cover in watershed, reduction in siltation, and increase in water volume. Such management ensured the access of downstream community with nominal leverage of water tax. Recreation values of lake increased for local tourism through boating, picnic and hotel operation. Though, it also created local conflicts among diverse stakeholders for the uses of water resources. A collective actions of various stakeholders was realized before conflict culminated into tragedy of commons. A multistakeholder forum has been created for appropriation of lake water management at Begnas. Yet the maturity of this forum is simply a start, the impacts it will generate depend on how it deals on lake governance.

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