

ECOSYSTEM SERVICES - LIVELIHOOD LINKAGES OF RENUKA WETLAND, HIMACHAL PRADESH

AN ASSESSMENT FOR INTEGRATED MANAGEMENT



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CHAPTER 1:

Assessment of Ecosystem Services Provided by Renuka Wetland

1.1 Introduction

The ecosystem services (ES) provided by a wetland setting are generally more useful for neighbouring communities as they have easy access to these services and to the resources of the ecosystem. These services have been utilized for decades or centuries, and it is important to categorize them. They contribute to the economic and ecological aspects of the wetland. At national and sub-national scales, ES synergies and trade-offs are used to inform decisions about the use and management of natural resources (Balvanera et al, 2017). The project titled “Assessment of Ecosystem Services Provided by the

Renuka Wetland and the Surrounding Communities’ Dependence on these services for their Livelihood and Cultural Practices” was led by the People’s Science Institute (PSI) in collaboration with the Centre for Ecology Development and Research (CEDAR). The project aimed to understand the relationships between the Renuka wetland and the related stakeholders. The interlinkages between the wetland, communities and related stakeholders; the dependence of local communities on the ES for their livelihoods; the perceptions of changes in the landscape; and the challenges experienced after the declarations of the sanctuary and the Ramsar site and the Institution of the International Fair were the broad areas of the study.



Image 1 Renuka Lake

1.2 Site description

The Renuka wetland is a natural lake located in Sirmaur District, Himachal Pradesh, 672 m above mean sea level, at 30° 36' 36" N, 77° 27' 30" E. It is an oblong-shaped wetland flanked by two parallel steep hills running east–west. It was declared a Ramsar site in 2005 because of its unique biodiversity and ecological character. This natural lake has economic, cultural, scientific and recreational values. Renuka Lake is regarded as a sacred water body by not only the local villagers but people all over the country. According to legend, the lake was formed when sage Parshuram obeyed his father, the sage Jamadagni, and sacrificed his mother, Renuka. An annual fair is held at the lake, and many pilgrims visit this area during this event.

The lake and majority of its catchment area are a wildlife sanctuary, and the entire area is administered by the Forest Department of the Government of Himachal Pradesh.

The Divisional Forest Officer, Wildlife, Shimla is the site manager of the wetland and its catchment. The lake is fed by catchment rainwater runoff as well as several active springs. Both the northern and southern slopes of these hills are covered with dense sub-tropical dry deciduous forests. The biodiversity of the wetland is rich. A survey conducted in the Renuka area found 443 species, from protozoans to mammals (ZSI 2000). The livelihood opportunities available in the area range from agriculture to labour.

1.3 Physical features of the site

The lake water is alkaline at the surface, where the pH value ranges from 8.0 to 8.2. The water is slightly acidic to alkaline at the bottom (pH 6.9–7.4). During the period when the water is stagnant, the mean values of the temperature, transparency and dissolved oxygen levels are 16.5°C, 204 cm and 7.6 ppm, respectively. The lake water

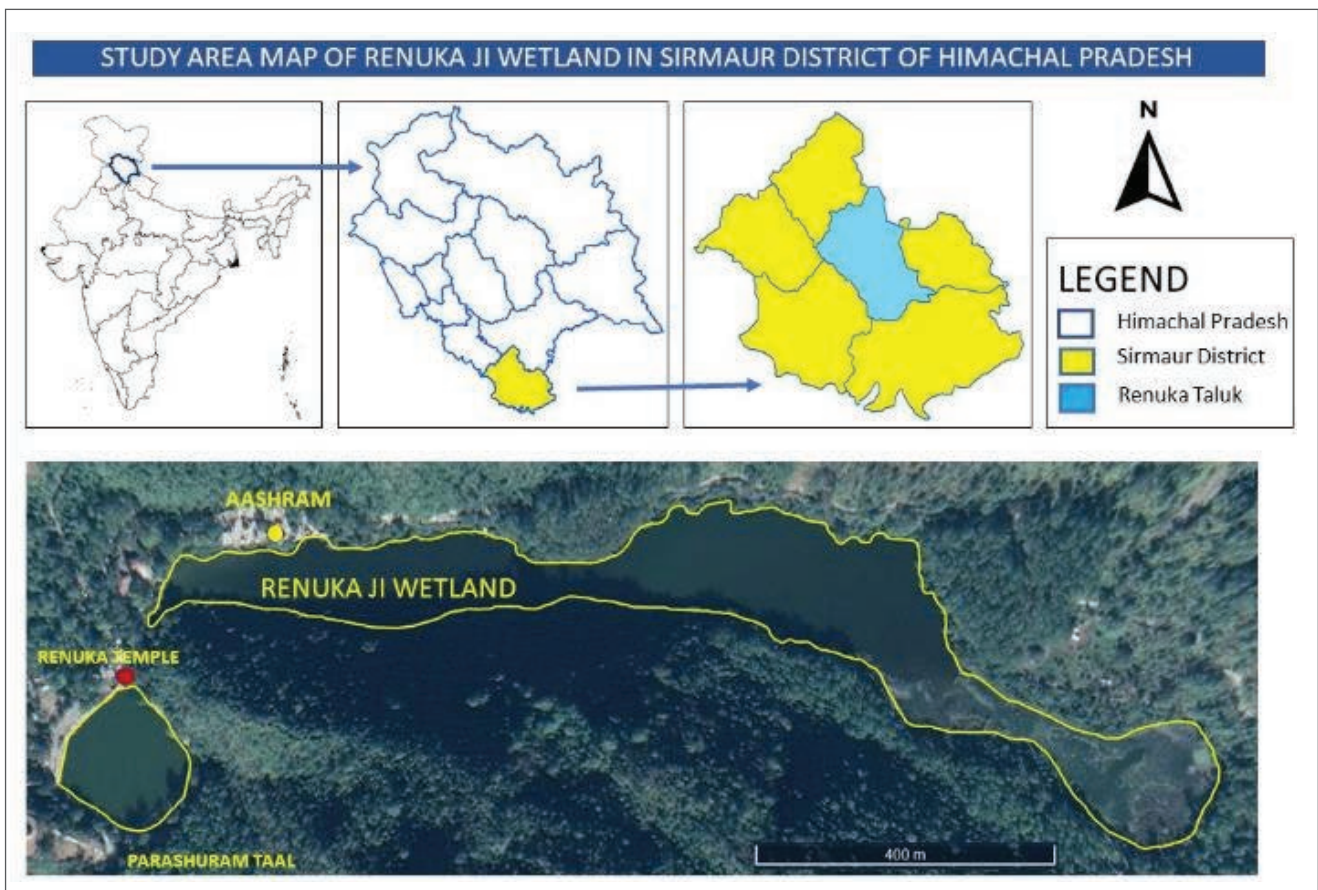


Figure 1 Location map for Renuka wetland

is hard, and the depth of the lake is approximately 13 m. The total catchment area of the lake is around 358 ha. The catchment has sub-tropical vegetation (RIS 2004).

Geologically, the area is a part of the Lesser Himalaya. The basin of Renuka Lake is suggested to be the abandoned course of the Giri River which now flows to the west and south of the lake (Rao 1975). The catchment of the wetland is drained by several seasonal streamlets which receive water mainly during rainy season. The perennial source of water for the lake are springs and sub-surface flows, which are controlled by fractures and faults. Water from Renuka lake flows into a smaller Parshuram Tal through a small channel. Water from Parshuram Tal ultimately drains into the river Giri through a narrow long channel.

The annual rainfall is 1500–2000 mm. The maximum rainfall during the year is from July to September, with 80% of the rainfall being received from the monsoon during July, August and September.

Majority of catchment area is a reserved forest, and it has been declared a wildlife sanctuary. Grasslands, marshy areas, rocky areas and open water are some of the major habitats of the wetland. The vegetation can be classified as hydrophytes, shrubs, climbers and woody plants. The main vegetation comprises bamboos, palms, harar (*Terminalia chebula*) and kacchnar (*Bauhinia variegata*). Exotic varieties, including eucalyptus, have been planted in the area. *Phoenix* spp.,

Ficus religiosa and shisham (*Dalbergia sissoo*) are the dominant trees at the base of the valley, i.e., around the lake. *Anogeissus* spp., beul and kacchnar are found near the ridge. The slopes have a good growth of shrubs such as *Lantana* spp., *Murraya* spp. and *Berberis* spp.. Abundant food, shelter and water are available, and so a number of wild animals, such as the sambhar (*Cervus unicolor*) and barking deer (*Muntiacus muntjak*), and birds, such as the brown-headed barbet (*Psilopogon zeylanicus*), common Kingfisher (*Alcedo atthis*), Scarlet Minivet (*Pericrocotus flammeus*), red-wattled Lapwing (*Vanellus indicus*), little Egret (*Egretta garzetta*) and coot (*Fulica atra*), are found in this ecologically important habitat. There is a preponderance of carnivorous fish in the lake: snake heads (20%), spiny eel fishes (5%) and others (RIS, 2004).

The State Government of Himachal Pradesh declared 402.8 ha of Renuka lake and its surrounding area as Renuka Ji Wildlife Sanctuary in 1964 to protect the rich biodiversity of the area as well as to restrict poaching activities. On 10th September 2021, the Central Government notified an area to an extent varying from 0.38 km to 2.04 km around the boundary of Renuka Ji Wildlife Sanctuary, as the Sri Renuka Ji Wildlife Sanctuary Eco-Sensitive Zone, with area of 16.43 km². With pressure on the wetland increasing through various activities, sound and sustainable management practices must be devised in which all the key stakeholders around the Renuka wetland participate.



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1.4 Key stakeholders

Stakeholders of the Renuka Wetland ecosystem were identified on the basis of their dependence, influence and religious and cultural perspectives.

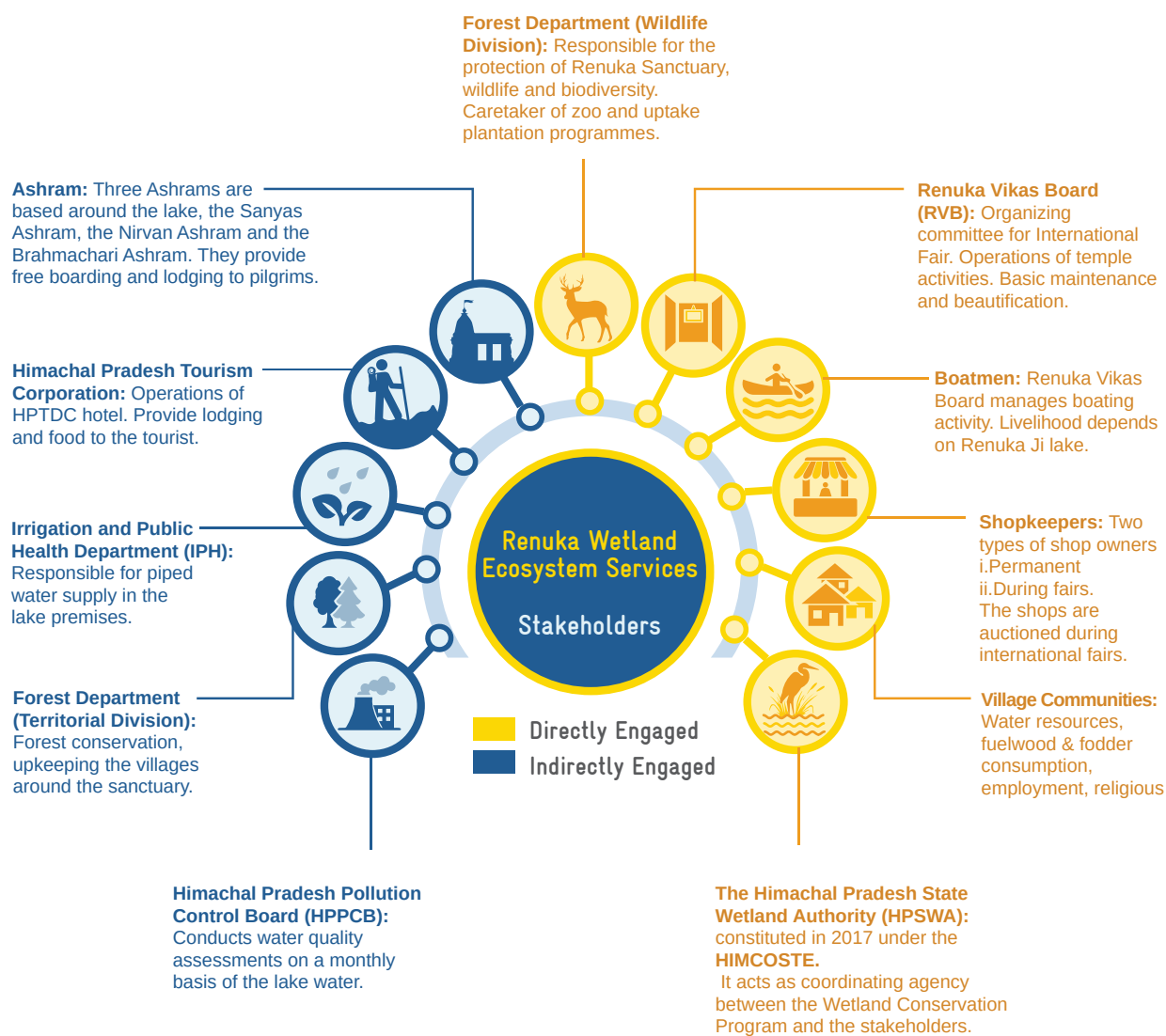


Figure 2 Illustrative image of key stakeholders

1. **Renuka Vikas Board (RVB)** was established in 1984. The purpose of this institution is to organize the International Fair and look after the operations of the temple. The board works for religious beliefs and interests.
2. **Renuka Hotel of Himachal Pradesh Tourism Department Corporation (HPTDC)** was established between 1975 and 1980. It was renovated in 2019. The guesthouse and restaurant provide accommodation, food and parking facilities.
3. **Forest Department (Territorial)** is not engaged directly with activities related to the lake or sanctuary. It works in notified forest lands and villages falling under its jurisdiction.
4. **Forest Department (Wildlife Division):** Renuka Wildlife Sanctuary falls entirely under the jurisdiction of the Wildlife Division.
5. **Local communities:** The communities of the eight neighbouring villages have strong linkages with the Renuka wetland, mostly spiritual and religious relationships with Renuka Lake and the Renuka temple. They are also dependent on the sanctuary and forest lands for their fuelwood and fodder and for their livelihoods.
6. **Boatmen:** Boating activity on Renuka Lake is facilitated by a contractor, who employs people from the neighbouring villages. This activity is the sole source of income for the contractor and his employees.
7. **Shopkeepers:** There are shops (temporary and permanent) around the periphery of Renuka wetland that sell souvenirs. There is also a canteen.
8. **Irrigation and Public Health Department:** This department is responsible for providing the villages and the institutions in the Renuka wetland with drinking water. Different springs are tapped, and the water is supplied through pipes by gravity. This department is also responsible for irrigation facilities, now being introduced in Khala Kyar Panchayat, and for sewerage.

1.5 Developments in Renuka Wetland over time

To understand the changes in the landscape, demography and activities associated with the sanctuary and wetland, a time-trend of the developments in the wetland and its vicinity was developed. Information collected from the time-trend analysis (conducted through consultations with the communities of the eight neighbouring villages and other stakeholders) was evaluated (Table 1).



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Table 1 Timeline of major events in Renuka wetland area.

Year	Events
Centuries back	Renuka ji Temple
1930–1940	Nirvana Ashram
1935	Brahm Ashram
1950	Road development (from Renuka to Sataun)
1950–1960	Structural development of temple
1957	Khala village road
1960	Structural development of ashram
1964	Declaration of wildlife sanctuary
1965–1970	Bridge on Giri River
1970	Development of Sanyas Ashram
1975–1980	HP Tourism hotel
1980	Boating
1980	Water pipeline in Dhar Village
1984–1985	Renuka Vikas Board
1984–1985	Beautification of Renuka Lake
1985	Water pipeline in Khala Village
1985	Development of Parshuram Tal
1987	Zoo
1987	Renu Manch
1988-1989	Fencing around sanctuary
1990	Development of Kubja Pavilion
1992–1993	Soil erosion (after construction of the road in Jamu Koti Panchayat)
1990-2000	Bathing ghats
1994-1995	Water pipeline in Kyar
1995	Cleaning of lake (every 2–3 years)
1995	Canteen near temple
1996–1997	Middle school in Dhar
2000	Animal dispensary in Khala
2003	Middle school in Khala
2005	Declaration of Ramsar site
2005	Road connectivity in Taran
2005–2006	Mahila Bhawan in Kyar
2006	Airtel tower in Dhar
2007	Road connectivity in Dhar
2008	Anganwadi in Kyar
2010–2012	Primary school in Kyar
2012–2013	Parikrama pathway around Renuka Lake
2014–2015	Private school in Bedon
2015	Institution of the International Fair
2015	Nirvana Ashram Gate
2016	High school in Khala
2017	Shops near ashram
2018	Reliance Jio tower in Dhar
2021	Notification of Renuka Ji Wildlife Sanctuary Eco-Sensitive Zone

(Source: PRA activities and stakeholders' consultations)

CHAPTER 2:

Communities—Infrastructure and Socio-economic Profile

Qualitative and quantitative data on village demography, infrastructure, village institutions, land holdings, occupation, sanitation and waste disposal mechanisms and villagers' dependence on Renuka Wetland were gathered using PRA tools such as social and resource mapping. Informal meetings were held with Mahila Mandals and Youth Clubs. Questionnaire surveys were conducted at all the eight villages of Khala Kyar and Jamu Koti gram panchayats during September–October 2020. The collected data were analysed as discussed in the subsequent sections.

2.1 Village demography

There are two gram panchayats (Jamu Koti and Khala Kyar) near Renuka Wetland. Jamu Koti is further away from Renuka wetland and consists of 134 households, with a total population of 1057, of which 525 (49.6%) are male and 532 (50.4%) are female. Khala Kyar has 227 households, with a total population of 1561, of which 814 (52.1%) are male and 747 (47.9%) are female. There are more cattle in Jamu Koti compared to Khala Kyar (except the village of Khala); the latter has more sheep and goats. The cattle, sheep and goat populations partly depend on the reserved forest and sanctuary for fodder, as discussed in subsequent chapters.

Table 2 Demographic details of eight villages around the Renuka wetland.

Gram Panchayat	Village	Total No. of Households	Total Population	Male Population	Female Population	Cows + Buffaloes + Bullocks + Horses/Mules	Goats + Sheep
Jamu Koti	Kathmali	31	232	113	119	112	149
	Lathiana	41	356	182	174	150	185
	Koti	23	223	108	115	136	105
	Jamu	39	246	122	124	128	157
	Sub-total	134	1057	525	532	526	596
Khala Kyar	Khala	66	456	229	227	205	377
	Kyar	60	397	206	191	111	152
	Bedon	24	146	78	68	28	12
	Taran	17	159	89	70	80	114
	Gundanu	30	165	77	88	92	104
	Dhar	30	238	135	103	104	174
	Sub-total	227	1561	814	747	620	933
	Total	361	2618	1339	1279	1146	1529

(Source: Social mapping, September–October 2020)

2.2 Community infrastructure

All the villages of the two gram panchayats are within a distance of 5 km from a motorable road. There are *kaccha* (temporary) roads in these villages. The nearest marketplace is Dadahu market, which is less than 15 km from these villages. The Panchayat Bhawan of the Jamu Koti villages is located in Keran, 10 km or less from them. Similarly, the Panchayat Bhawan of Khala Kyar is situated in the village of Bedon.

Table 3 Details of the infrastructure of Jamu Koti and Khala Kyar panchayats.

Gram Panchayat	Village Name	Community Infrastructure				
		Distance of Panchayat Bhawan (km)	Distance of Primary School (km)	Distance of Secondary School (km)	Distance of PHC (km)	Distance of Temple (km)
Jamu Koti	Kathmali	7	-	7	8	9
	Lathiana	5	5	5	3	3
	Koti	3	3	3	2.5	1
	Jamu	3	3	3	1.5	4
Khala Kyar	Khala	13	1.5	14	14	1.5
	Kyar	13	1.5	12	12	10
	Bedon	1	1	3	3	1.5
	Taran	9	5	10	10	10
	Gundanu	9	2	12	12	10
	Dhar	10	2	12	12	10

(Source: Village survey, September–October 2020)

The primary school of Kathmali, of Jamu Koti, is at present in the village. But for the other villages the primary school facilities are in Keran. The secondary school of Jamu Koti is also situated Keran. Similarly, in Khala Kyar Panchayat, there are primary schools in Khala, Kyar, Dhar and Bedon. However, the secondary school is in Dadahu. There are *anganwadis* in all the villages of both gram panchayats. Overall, the community infrastructure (education and health facilities) is better developed in Jamu Koti compared with Khala Kyar. The community buildings in all the villages are equipped with basic facilities such as toilets. Water is supplied by the Irrigation and Public Health (IPH) Department. Thus, the villages do not depend directly on Renuka Lake for their water.

2.3 Land ownership

Most of the households in the Jamu Koti villages are small holders (32%). The next category is semi-medium holders (27%), followed by medium holders (20%). Kothi and Lathiana (villages of Jamu Koti) have larger numbers of medium farmers.

Most of the households in the villages of Khala Kyar are marginal farmers (41%). The next category is small owners (32%), followed by semi-medium holders (11%). There are more landless households in Khala Kyar compared with Jamu Koti. Almost 70% of the 361 households in the two gram panchayats belong to the landless (6%), marginal (31%) and small holders (32%) categories.

Table 4 Land ownership details of communities of Khala Kyar and Jamu Koti.

GP	Village	Landless		Marginal (<0.32 ha)		Small (0.32–0.65 ha)		Semi-medium (0.65–1.29 ha)		Medium (1.29–3.24 ha)		Large (>3.24 ha)	
		No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%
Jamu Koti	Kathmali	-	-	7	22.58	15	48.4	5	16.1	2	6.5	2	6.5
	Lathiana	-	-	7	17.07	8	19.5	14	34.1	12	29.3	-	-
	Koti	-	-	-	-	5	21.7	6	26.1	11	47.8	1	4.3
	Jamu	5	12.8	5	12.82	15	38.5	11	28.2	2	5.1	1	2.6
	Sub-total	5	3.7	19	14.2	43	32.1	36	26.9	27	20.1	4	3.0
Khala Kyar	Khala	4	6.1	31	46.97	23	34.8	3	4.5	1	1.5	4	6.1
	Kyar	4	6.7	28	46.67	20	33.3	3	5.0	1	1.7	4	6.7
	Bedon	3	12.5	13	54.17	6	25.0	2	8.3	-	-	-	-
	Taran	2	11.8	7	41.18	2	11.8	4	23.5	1	5.9	1	5.9
	Gundanu	1	3.3	9	30.00	14	46.7	5	16.7	1	3.3	-	-
	Dhar	2	6.7	6	20.00	6	20.0	9	30.0	7	23.3	-	-
	Sub-total	16	7.0	94	41.4	71	31.3	26	11.4	11	4.8	9	4.0
	Total	21	5.8	113	31.3	114	31.6	62	17.2	38	10.5	13	3.6

(Source: Social mapping exercises, September–October 2020)

GP: Gram Panchayat HHs: Households

2.4 Primary occupation

The table 5 gives details of the number of households by primary occupation in all the villages of Jamu Koti and Khala Kyar. Overall, 46% of the households of the two gram panchayats are involved in agricultural and animal husbandry activities, and 24% of the households are involved in government service. Other income-generating occupations in these villages include seasonal labour, small businesses (including temporary *prashad* shops around Renuka Lake during the fair), private services, artisanal work and contractors. Renuka Sanctuary provides income-generating activities for some of the households of the two panchayats through contractual employment at Renuka Vikas Board, Forest Department and boating services.

Table 5 Occupational details of communities of Khala Kyar and Jamu Koti.

GP	Village	Service (Government)		Service (Private)		Business		Contractor		Agriculture & Animal Husbandry		Labour		Artisanal & Skilled Labour		Others	
		No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%
Jamu Koti	Kathmali	8	25.8	1	3.2	-	-	2	6.5	13	41.9	5	16.1	2	6.5	-	-
	Lathiana	14	34.2	1	2.4	-	-	-	-	26	63.4	-	-	-	-	-	-
	Koti	3	13.0	-	-	-	-	-	-	20	87.0	-	-	-	-	-	-
	Jamu	6	15.8	1	2.6	2	5.3	1	2.6	16	42.1	8	21.1	2	5.3	2	5.3
	Sub-total	31	23.3	3	2.3	2	1.5	3	2.3	75	56.4	13	9.8	4	3.0	2	1.5
Khala Kyar	Khala	24	23.5	6	5.9	2	2.0	4	3.9	46	45.1	8	7.8	3	2.9	9	8.8
	Kyar	28	37.3	3	4.0	8	10.7	1	1.3	24	32.0	6	8.0	2	2.7	3	4.0
	Bedon	4	16.7	3	12.5	8	33.3	2	8.3	5	20.8	1	4.2	1	4.2	-	-
	Taran	5	29.4	2	11.8	-	-	-	-	4	23.5	4	23.5	1	5.9	1	5.9
	Gundanu	6	22.2	-	-	-	-	-	-	21	77.8	-	-	-	-	-	-
	Dhar	4	9.5	3	7.1	4	9.5	1	2.4	18	42.9	6	14.3	4	9.5	2	4.8
	Sub-total	71	24.7	17	5.9	22	7.7	8	2.8	118	41.1	25	8.7	11	3.8	15	5.2
	Total	102	24.3	20	4.8	24	5.7	11	2.6	193	46.0	38	9.0	15	3.6	17	4.0

(Source: Social mapping exercises, September-October 2020)

2.5 Water resources

The villages of both the gram panchayats use water supplied through pipelines (IPH schemes) and water from the nearest available springs (located within or outside the villages). More than 50% of the households in all the villages have water supplied through pipelines. All the households of Lathiana (Jamu Koti) and Khala and Bedon (Khala Kyar) have water supplied through pipelines. Kathmail (Jamu Koti) has the least coverage (52% of households only) under the pipeline water supply.

During the lean season and monsoon, when supply of water through the pipeline is interrupted for a variety of reasons (including a decrease in the discharges of the sources in summer and damage during the monsoon), the communities become more dependent on the springs. The water available in the villages is sufficient for domestic use in all the seasons.

It was found during the interactions with the communities that all the villages of both the gram panchayats had confidence in the quality of the springs' water. No households reported that they subjected the water to any treatment. Apparently, the extraction of water from the springs has no impact on the wetland as the villages of the two gram panchayats are situated in another watershed.

Table 6 Information about the water resources of Khala Kyar and Jamu Koti.

Gram Panchayat	Village	Percentage of HHs with piped supply	Number of springs in village	Number of springs outside the village
Jamu Koti	Kathmali	52	3	1
	Lathiana	100	1	-
	Koti	96	-	1
	Jamu	72	3	1
Khala Kyar	Khala	100	1	2
	Kyar	92	1	2
	Bedon	100	1	-
	Taran	95	1	-
	Gundanu	84	-	1
	Dhar	90	-	2

Source: Social and resource mapping exercises, September-October 2020

2.6 Sanitation and waste disposal mechanism

More than 50% of the households in all the villages have toilets at home. Khala, Kyar and Bedon (Khala Kyar) are 100% open defaecation-free, all the households having toilets in their homes, with either a septic tank or a soak pit. There is no direct impact on the wetland due to the sanitation and waste disposal methods employed as these villages are situated in a different watershed. But in the long run, with an increase in the number of human settlements, these practices can have an impact on the water quality of the springs that the communities access, leading to an increase in instances of bacterial contamination. More households (26%) in Jamu Koti practise open defaecation, in their own agricultural lands or in seasonal drainage channels nearby.

Table 7 Sanitation and waste disposal practices in Jamu Koti and Khala Kyar.

Gram Panchayat	Village	Sanitation Practices		Waste Disposal Mechanism	
		Percentage of HHs with toilets	Percentage of HHs practising open defaecation	Percentage of HHs burning garbage	Percentage of HHs burying garbage
Jamu Koti	Kathmali	59	41	90	10
	Lathiana	95	5	90	10
	Koti	82	18	90	10
	Jamu	62	38	90	10
Khala Kyar	Khala	100	-	90	10
	Kyar	100	-	90	10
	Bedon	100	-	90	10
	Taran	95	5	90	10
	Gundanu	50	50	90	10
	Dhar	50	50	90	10

(Source: Social mapping exercises, September–October 2020)

90% of the households of these gram panchayats burn the garbage generated by their homes, while the rest bury it near their houses. Waste segregation techniques are not employed in these villages, and the adults are responsible for garbage collection and disposal.

In Kathmali, Lathiana, Koti, Jamu, Khala, Kyar, Bedon and Dhar, 100% of the households depend on LPG and fuelwood (obtained from the sanctuary, reserved forest and farmlands) for cooking purposes. Thirty-six percent of the households of Jamu use kerosene as fuel. 10% of the households of Lathiana, 11% of the households of Jamu and 34% of the households of Bedon use electrical appliances for cooking. LPG cylinders are delivered once or twice a month at the road nearest to these villages.

2.7 Agricultural practices

Only Khala and Kyar (Khala Kyar) have totally irrigated cultivated lands. The water is supplied through a pipeline from the Giri River, nearby, and the rest of the villages use spring water for agriculture. According to the IPH Department, a new irrigation scheme catering to 12 ha of Khala Kyar is underway.

Table 8 Agricultural practices in Jamu Koti and Khala Kyar.

Gram Panchayat	Village	Land Under Cultivation (ha)	Unirrigated Land (ha)	Percent Irrigated
Jamu Koti	Kathmali	17.48	17.48	-
	Lathiana	24.20	24.20	-
	Koti	15.62	15.62	-
	Jamu	14.97	14.97	-
Khala Kyar	Khala	29.00	-	100
	Kyar	29.00	-	100
	Bedon	3.08	3.08	-
	Taran	9.71	9.71	-
	Gundanu	13.35	13.35	-
	Dhar	14.41	14.41	-
Total		170.82	112.82	34

(Source: Resource mapping exercises, September–October 2020)



Photo credit: GIZ

2.8 Fodder sources and grazing pattern

The main sources of fodder of the villages are individually owned agricultural lands, community pasture lands, reserved forests and the sanctuary. Most of the households obtain fodder from multiple sources. In Kathmali and Lathiana (Jamu Koti) and Bedon, Dhar and Gundanu (Khala Kyar) the households are more dependent on the sanctuary and reserved forests as their lands are closer to these areas than are the other villages. The villages of Khala Kyar (except Bedon, due to its proximity to the sanctuary) are more dependent on private agricultural lands, community forests and community pasture lands compared with the villages of Jamu Koti.

Table 9 Fodder Sources and Grazing Patterns in Jamu Koti and Khala Kyar Gps.

Gram Panchayat	Village	Fodder Source					Stall Feeding	Open Grazing	
		Private Agricultural Lands	Community Pastures	Community Forests	Reserved Forests	Sanctuary		Reserved Forests	Sanctuary
Jamu Koti	Kathmali	100	39	20	42	100	-	59	42
	Lathiana	42	13	18	30	100	-	57	44
	Koti	100	100	100	-	-	100	100	100
	Jamu	21	6	8	18	49	-	21	31
Khala Kyar	Khala	100	100	100	-	-	100	-	100
	Kyar	100	100	100	-	-	100	-	100
	Bedon	-	50	-	-	100	46	-	13
	Taran	95	-	100	-	-	100	-	100
	Gundanu	90	90	-	-	90	90	-	90
	Dhar	100	-	100	-	100	100	-	100

Source: Resource mapping exercises, September–October 2020

Most of the households of Kathmali, Lathiana and Jamu (Jamu Koti) practise open grazing (both continuous and on a rotational basis). All the households of Koti practise both stall feeding and open grazing because adequate fodder is available from the farmlands. The households of the villages of Khala Kyar rely mostly on stall feeding (90%), with some rotational grazing in community lands and the sanctuary.

It can be inferred from the foregoing that the basic infrastructure and livelihood practices (except for grazing of livestock during winter and summer by 6 of the 10 villages) of these communities do not cause any significant deterioration of Renuka Sanctuary. The sanitation and waste disposal mechanisms and agricultural practices also do not have any direct impact on the ecology of Renuka Wetland.

CHAPTER 3:

Dependence of Communities on Renuka Wetland's Ecosystem Services for Livelihoods and Cultural Practices

3.1 Dependence on Renuka Wetland for livelihoods

The Renuka wetland and forest play important roles in the lives of the villagers of both Khala Kyar and Jamu Koti panchayats. The villagers depend on the sanctuary and the wetland for fuelwood, medicinal plants and fodder and for the recharge of their water sources. Participatory Rural Appraisal (PRA) activities such as social mapping, resource mapping, matrix scoring and ranking exercises were performed in the villages of the two gram panchayats during September and October 2020. In addition, informal meetings were held with Mahila Mandals (MMS) and Youth Clubs.

MATRIX RANKING AND SCORING

Matrix scoring and ranking was used to prioritize different ecosystem services (categorized as per MEA, 2005 classification). In a group exercise, the villagers were asked to assign scores to the various services provided by Renuka wetland, which were categorized as provisional, supporting, regulating and cultural services. The total scores provided by the different village communities were then added up. The percentile scores were worked out by dividing the score of each category by the total score of all the ecosystem services (Table 10). The category getting the highest percentile score was assigned Rank I, and the category getting the lowest percentile score was assigned Rank IV.

Table 10 Ranking of Ecosystem Services in Jamu Koti and Khala Kyar Gram Panchayats.

Gram Panchayat	Village	Village-wise Percentile Scores			
		Provisional Services	Regulating Services	Supporting Services	Cultural Services
Khala Kyar (near Renuka Lake)	Bedaun	28	34	-	38
	Dhar Taran	6	58	18	18
	Khala	23	36	13	28
	Kyaar	26	32	19	24
	Sub-total (Rank)	16 (III)	45 (I)	16 (III)	23 (II)
Jamu Koti (far from Renuka Lake)	Jamu	4	37	27	33
	Kathmadi	89	-	11	-
	Koti	4	41	22	33
	Lathiana	54	19	18	9
	Sub-total (Rank)	15 (IV)	34 (I)	23 (III)	28 (II)
	Total (Rank)	16 (IV)	40 (I)	19 (III)	26 (II)

(Source: Matrix scoring and ranking exercises, September - October 2020)

The ranking sequence in Khala Kyar was (I) regulating services, (II) cultural services and (III) provisional services and supporting services. The sequence in Jamu Koti was (I) regulating services, (II) cultural services, (III) supporting services and (IV) provisional services. Kathmadi and Lathayana, however, gave higher percentile scores to provisional services as the villagers gather fodder and fuelwood from the sanctuary (as also discussed in Chapter 2).

All the communities of Khala Kyar and those of Jamu and Koti (of Jamu Koti gram panchayat) gave higher scores to regulating services for their contribution to a better environment (rainfall, air and water quality, flood control). Similarly, all the communities of Khala Kyar (located near Renuka Lake) and those of Jamu and Koti gave marginally higher percentile scores to cultural services, realizing their importance in terms of faith and religious tourism. Since, the households of the two gram panchayats have limited access to fodder and fuelwood from Renuka Ji, provisional services were assigned the lowest rank.

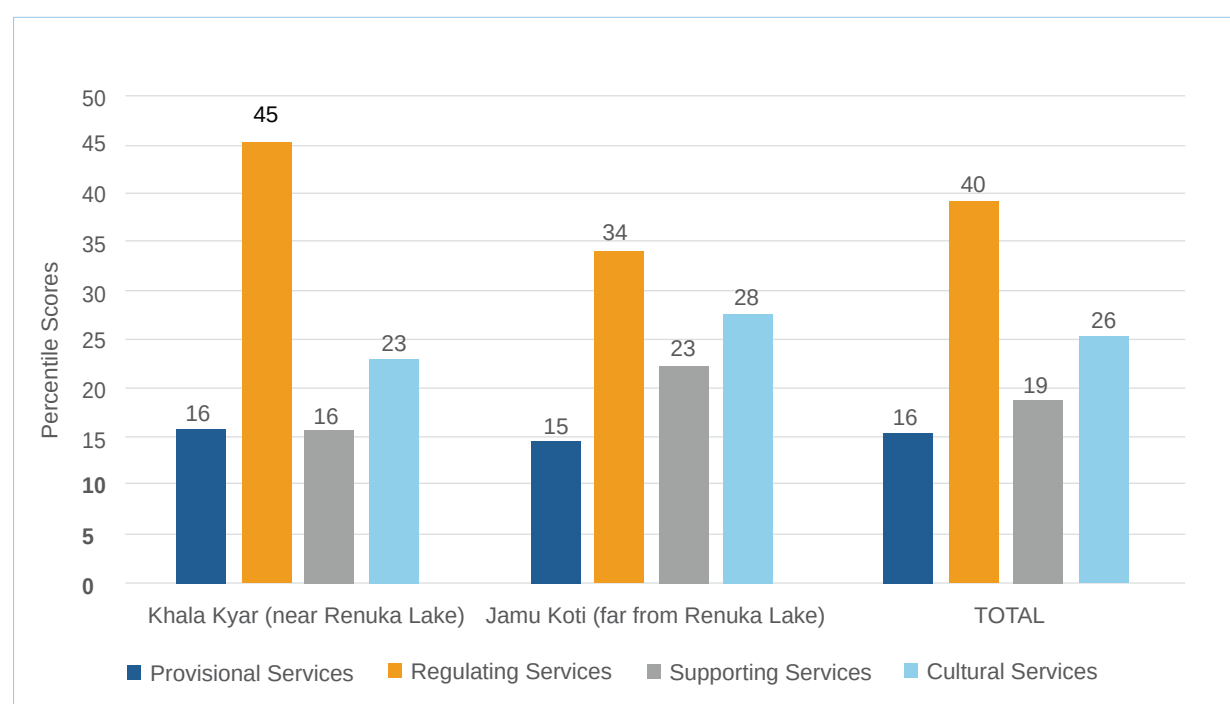


Figure 3 Ecosystem services in Jamu Koti and Khala Kyar

The bar graphs in Figure 3 show clearly that the two gram panchayats are dependent on the Renuka wetland and sanctuary, in decreasing order, for regulating services, cultural services, supporting services and provisional services.

HOUSEHOLD SURVEY ANALYSIS – OBJECTIVE, SAMPLING AND METHODOLOGY

The main objective of the household survey was to find out the perspectives of individual respondents based on gender, age group, caste, occupation and economic category regarding the four ecosystem services. A social census conducted in all the villages of the 2 gram panchayats showed that there are 342 households (out of the total number of 361 households) in the 8 villages. A total of 100 households (~30%) were selected as representative for conducting the household-level survey. Stratified sampling was carried out considering wealth ranking, caste, gender of the head of the household and occupation. A questionnaire was developed and tested before the survey was conducted in the 100 households (September–November 2020).

Table 11 Households surveyed in the villages of Jamu Koti and Khala Kyar

Gram Panchayat	Village	No. of Households Surveyed
Jamu Koti	Jamu	13
	Kathmadi	10
	Koti	9
	Lathiana	13
Khala Kyar	Khala	13
	Kyaar	13
	Bedaun	10
	Dhar Taran	19
	Total	100

In the household survey, the respondents gave scores (maximum of 5) to the services identified in the matrix scoring and ranking exercise. The total percentile scores were calculated for each of the ecosystem service categories by dividing the score of that category by the total of all the scores of the four ecosystem services. A disaggregated analysis was carried out on the basis of the gender, age group, caste and primary occupation of the respondent and the economic status (above or below the poverty line) of the household.

(a) Gender-wise Analysis

The percentile scores of the male and female respondents were calculated (Figure 4) and the ecosystem services ranked as per their perceptions.

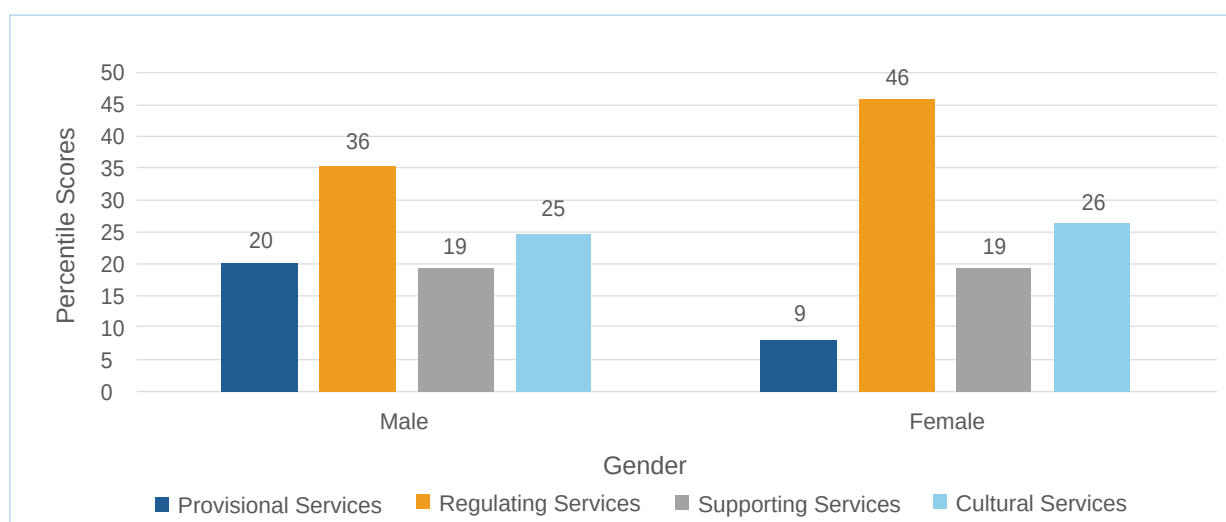


Figure 4 Gender-wise analysis of ecosystem services. Source: Household survey, November– December 2020

The disaggregated analysis shows that both male and female respondents ranked regulating and cultural services higher (as I and II, respectively). Male respondents ranked provisional and supporting services almost equally (III). Their female counterparts ranked regulating services much higher than they did provisional services. Women seem to value Renuka Wetland's regulating services more than they do its provisional services (mainly provision of fodder, which is restricted and seasonal).

(b) Age-wise Analysis

The percentile scores of the respondents were analysed according to four age categories (15–24 years; 25–39 years; 40–64 years; 65 years and above).

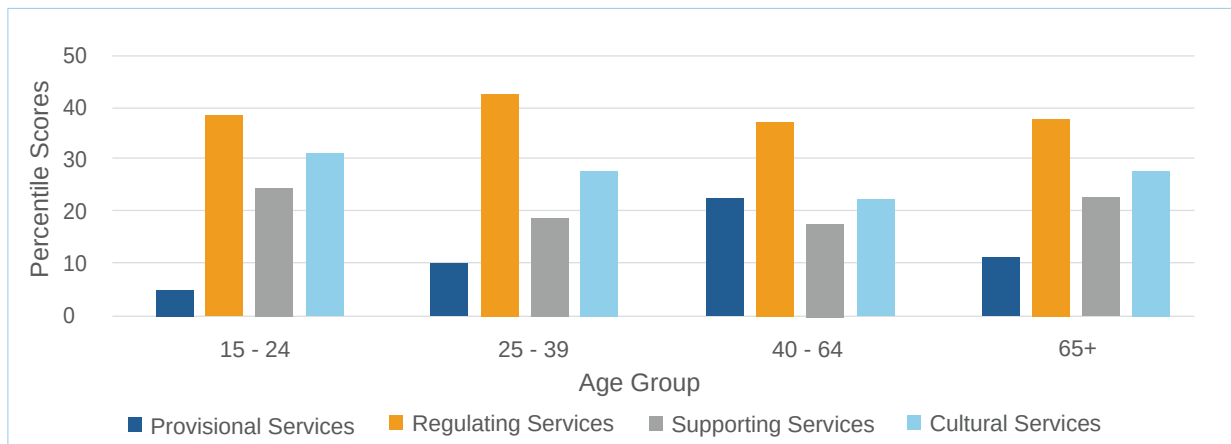


Figure 5 Age-wise analysis of scores of ecosystem services. Source: Household survey, November– December 2020

Regulating services and cultural services were ranked highest (I and II, respectively), which reflects the respondents' understanding of the wetland's contributions towards a better environment, flood control and checking of soil erosion. The rankings also show the religious sentiments related to the lake. All the age groups (except the 40–64 years category) ranked supporting services higher (III) than they did provisional services (IV). Residents aged between 40 and 64 years gave more importance to access to fodder and fuelwood in Renuka wetland compared with biodiversity.

(c) Caste-wise Analysis

The percentile scores of the respondents were analysed according to the two main caste categories, i.e., (i) General Caste and (ii) SC/ST/OBC.

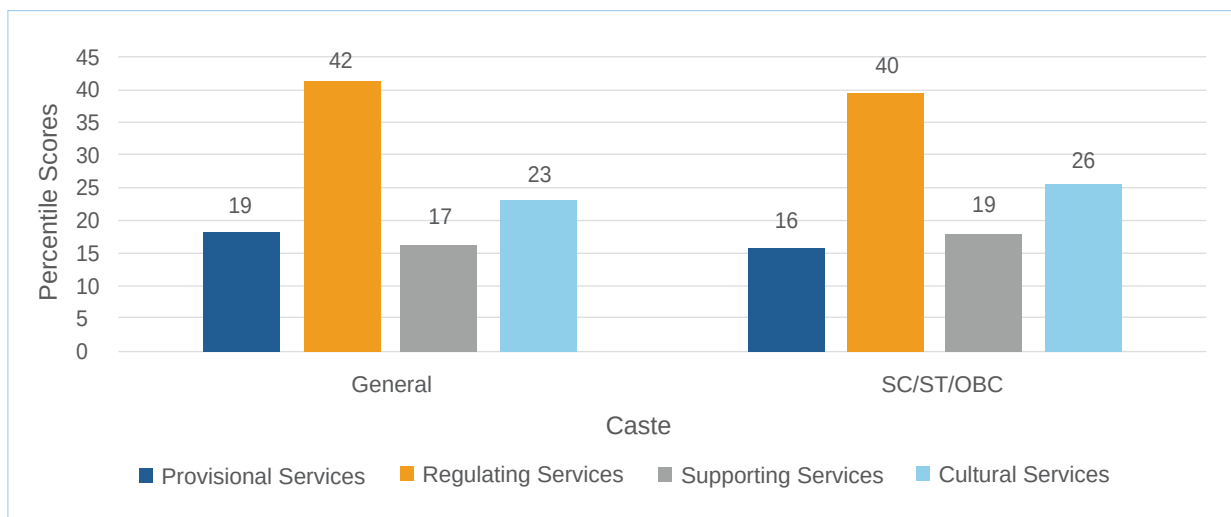


Figure 6 Caste-wise analysis of Ecosystem services, Household Surveys, November- December 2020

The 2 caste categories gave more or less equal percentile scores to the four major ecosystem services. This shows that there is no difference in the perceptions of the different caste categories regarding the ecosystem services provided by the wetland.

(d) Occupation-wise Analysis

The percentile scores of the respondents were analysed according to the major categories of primary occupation, i.e. (i) Service, (ii) Business, (iii) Agriculture and (iv) Wage Labour.

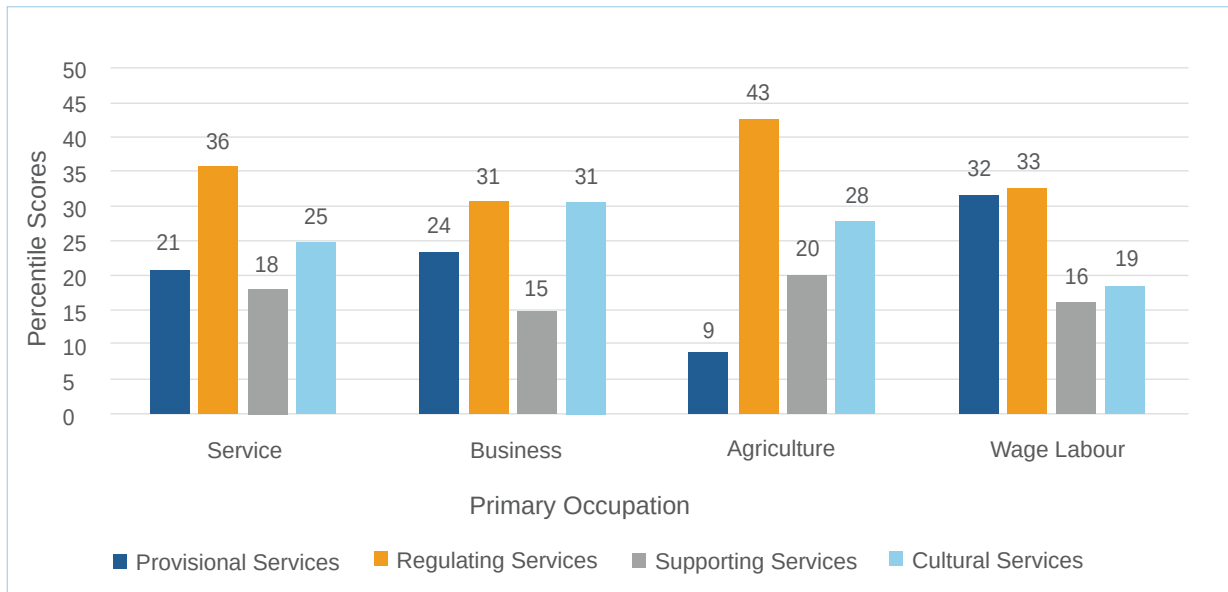


Figure 7 Occupation-wise analysis of ecosystem services (November–December 2020)

All the occupational categories gave the highest rank to regulating services for the reasons discussed previously. Wage labourers were found to be more dependent on Renuka Wetland for provisional services (giving it the highest percentile score among the occupational categories), indicating their higher dependence on the wetland and sanctuary for fuelwood and fodder. Villagers whose primary occupation was agriculture were more interested in the regulating services, which shows that they understand the importance of this wetland in controlling floods and soil erosion. Households depending on the service sector gave the highest score to regulating services, which were followed by cultural, provisional and supporting services.

Households dependent on business gave the highest percentile score to cultural services (equal to the regulating services) among all the occupational categories as they value the importance of cultural tourism to their livelihoods. Around Renuka Wetland, there are permanent shops selling *puja* (worship) items, canteens, souvenir shops and photographic studios, using which people earn their livelihoods. Also, there are hawkers who have temporary shops near the lake. The shopkeepers around the lake are mostly from Khala Kyar. Renuka International Fair has given these communities an opportunity to earn. The shopkeepers earn an average of around Rs. 8225 per month, which amounts to an average annual income of about Rs.1 lakh.

(e) Wealth-wise Analysis

Of the 100 households, 68% reported that they were above the poverty line (APL), while 32% reported that they were below the poverty line (BPL). The APL families are mostly involved in government and private service besides agriculture, whereas the BPL families primarily work as wage labourers besides practising farming. The accompanying graph (Figure 8) shows the percentile scores assigned by APL and BPL households to the four major ecosystem services.

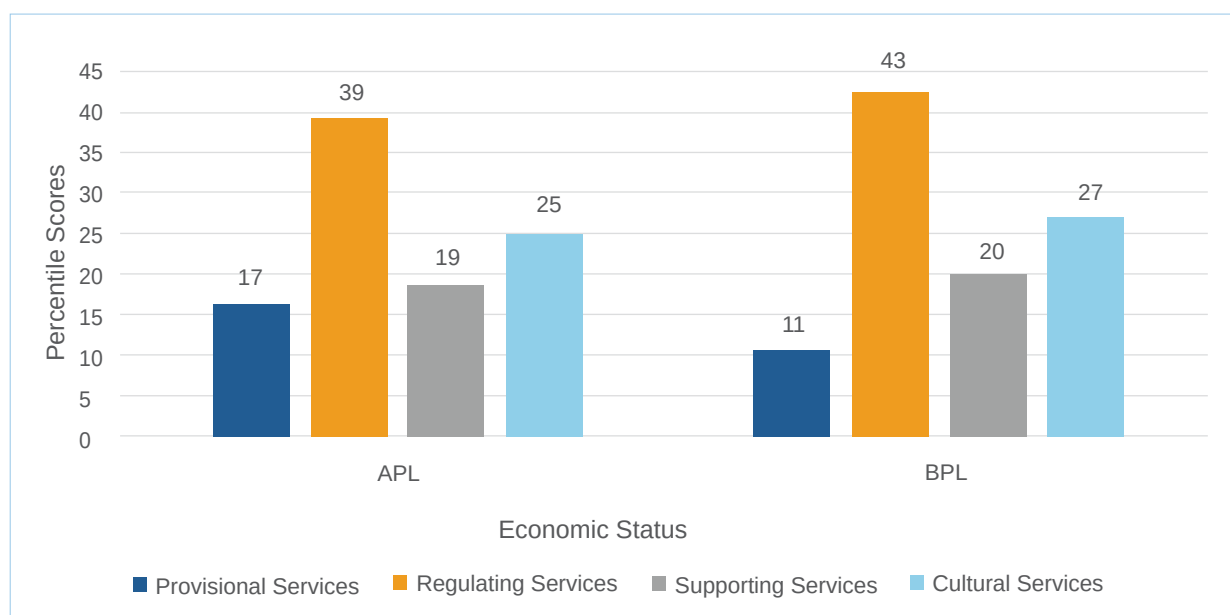


Figure 8 Wealth-wise analysis of ecosystem services, November– December 2020

The analysis shows that both APL and BPL households are dependent on Renuka Wetland for all the four ecosystem services. The rankings assigned by APL and BPL families are the same: they assigned the highest scores to regulating services, followed by cultural, supporting and provisional services.

Because the Renuka wetland and the adjoining area have been declared a sanctuary, many restrictions have been imposed on using forest produce. Although the local communities do understand the significance of protecting a fragile ecosystem, the declaration has had a direct impact on the availability of fuelwood and fodder. Local people said that forest guards make them pay fines almost every month because it is unlawful to extract fuelwood and fodder. Often their daratis (implements used to cut grass and leaves) are confiscated by the guards. The local people also said that the decrease in the availability of fodder has had a direct impact on the livestock owned by them. Number of livestock has drastically reduced in the last few decades as purchasing fodder is an expensive affair. There have even been instances in which cattle have been abandoned by local people because they are unable to feed them.

Economic valuation of all the ecosystem services derived from Renuka Ji was beyond the scope of this study, but it needs to be undertaken separately.

3.2 Cultural and religious practices around Renuka Wetland

There are four major cultural and religious events related to the Renuka wetland: (i) Renuka International Fair, in November, (ii) Maghi Sakranti, in January, (iii) Bisho Sakranti, in April, and (iv) Haryali, in August.

The Renuka Vikas Board, under the District Magistrate, organises the International Fair from Kartik Dashvin to Purnima (in November) every year. The legend behind this event is that Lord Parshuram came from Jamu to meet his mother, Maa Renuka ji. Previously, smaller numbers of people attended the fair at the Renuka Wetland. But from 2015, after the declaration of the International Fair by the Himachal Pradesh Government, the crowds at this fair have grown to around 3–4 lakhs. Apart from local people (from nearby towns and villages), there are visitors from other parts of Himachal Pradesh and from Uttarakhand, Punjab, Delhi, Chandigarh, etc. The local people have additional earnings during the fair. The other three events (Maghi Sakranti, Bisho Sakranti and Haryali) are festival celebrated by the local people of Sirmour District. Details of the impact of the cultural and religious practices have been presented in Chapter 4.

3.3 Village-level institutions and relationships with Renuka Wetland

This section deals with village-level institutions and their relationships with Renuka Ji. The roles of other institutions, such as the State Wetland Authority (SWA), Deputy Commissioner Sirmaur District, Renuka Vikas Board and ashrams, involved in the governance of Renuka wetland are discussed in subsequent chapters.

Three formal institutions in the villages of Jamu Koti are responsible for temple-related activities and other social activities, i.e. (i) Parshuram Temple Committee, (ii) Mahila Mandals (MMs) and (iii) Youth Clubs. In Khala Kyar MMs and Youth Clubs play similar roles.

Table 12 Institutions in the two gram panchayats

Gram Panchayat	Name of Institution	Roles and Responsibilities
Jamu Koti	Parshuram Temple Committee	Management and development of temple
	Mahila Mandals (MMs)	Social welfare works such as cleaning of village paths and water resources
Khala Kyar	Mahila Mandals (MMs)	Social welfare works such as cleaning of village paths and water resources
	Youth Clubs	Conducting sports activities and helping MMs with social activities

The gram panchayats have no separate budgetary allocations for conserving Renuka Lake. However, majority of such activities are managed by Renuka Vikas Board. Group discussions with different stakeholders revealed that there is a lack of co-ordination among these institutions and others responsible for the management of Renuka Wetland.

The aforementioned village-level institutions interact with the gram panchayats on a quarterly basis and with the village communities on a seasonal basis. There are discussions and interactions with the Forest Department only when there are human–wildlife conflicts, forest fires, plantation activities and soil and water conservation works. Interactions with a gram panchayat are through quarterly gram sabha meetings, while the forest administration uses the gram panchayats as a medium for communication in case of any conflict.

These institutions highlighted the issue of lack of community involvement regarding formulation of rules and regulations related to the management of Renuka Wetland and works related to plantation and to soil and conservation measures. The Forest Department hire local contractors for conservation-related tasks, and Renuka Vikas Board does not encourage the participation of local communities in the management of Renuka Wetland. Representatives of these institutions also mentioned a lack of a participatory approach in the forest department's interactions, and complain of a domineering nature of the contractors. To resolve the conflicts among these stakeholders, primarily forest guards and hired contractors, the gram panchayat involved organizes open discussions, special meetings and sessions. There is no formal grievance redressal mechanism in place.

The village institutions suggested ways of protecting the wetland, such as plantation drives on the community lands. They highlighted the need for participatory involvement in protection and plantation measures implemented by the Forest Department and pointed out that responsibilities are assigned to the local people.

3.4 Forest fire management and human–wildlife conflicts

Forest fires are a common phenomenon around the villages of Jamu Koti and Khala Kyar. Villagers reported various reasons for the same, such as cleaning of farmlands by burning weeds and dry grasses and smoking of cigarettes in the forest. The Forest and Wildlife departments are mainly responsible for putting out fires. After the declaration of the sanctuary, the responsibility of protecting the forests and wildlife habitat around Renuka wetland has been with the Forest Department.

Villagers of both the gram panchayats reported several instances of wildlife attacks on their neighbouring farmlands, especially during and after the harvesting of the Rabi and Kharif crops. They did not report any human fatalities but did mention attacks on their cattle. To protect themselves from wild animals' attacks, villagers often visit forests in groups to collect fuelwood and fodder. Also, some of them have installed fencing on their farmlands to protect their crops. According to the villagers, there is no compensation for crop damage. The village communities and the Forest Department were reported to co-operate well in managing human–wildlife conflicts.

3.5 Covid-19 and its impacts

According to the villagers of both Khala Kyar and Jamu Koti, the water of Renuka Lake appears to be cleaner, the fish population seems to have grown, and there is less garbage around the lake because of Covid-19 and the subsequent lockdown. As the numbers of visitors have reduced, the natural wealth of the lake and its premises seem to have improved. This observation is based on the perceptions of the local people as well as the institutions around the lake. On the other hand, Covid-19 has affected their lives and livelihoods negatively to a significant extent. The earnings of daily wage labourers, shopkeepers around the *parikrama*, canteens and local transporters have been affected severely during this. Boating activities have also been affected.

3.6 Challenges around Renuka Wetland

The anthropogenic activities around Renuka wetland are reported to have raised several challenges for the neighbouring communities. Focus group discussions in each of the villages helped identify the associated challenges, and the matrix scoring and ranking method helped prioritize these challenges. The percentile scores of the various challenges were worked out, and the challenges were ranked.

Table 13 Ranking of Challenges in Jamu Koti and Khala Kyar. Source: Ranking and scoring exercise, December 2020

Challenges	Overall Percentages of Scores	Overall Ranking
Siltation	38	I
Poor water quality	26	II
Soil erosion	12	III
Threats posed by wild animals	10	IV
Decline in discharge of water from springs	8	V
Air pollution	6	VI

The villagers felt that two major challenges have emerged in relation to Renuka wetland over the years: (i) siltation of the lake, mainly due to development of roads in the area, and (ii) poor water quality due to increased tourism and improper waste management, especially during the International Fair. Soil erosion from improperly designed roads, especially during the monsoon, and the threat posed by wild animals to livestock and crops were two other challenges identified by the communities. A decline in the discharges of springs in and around this Wetland, ascribed to deforestation and changes in the rainfall pattern, and air pollution due to the increased tourist influx, especially during the International Fair, appear to be new challenges.



Photo credits: Ravi Sharma - unsplash

CHAPTER 4:

Impact of Cultural Activities and Livelihoods on Renuka Wetland

Religious beliefs can have an important influence on human uses of the environment. Traditional pilgrimages to religious sites are evolving into large-scale religious tourism in many protected areas, including wetland ecosystems, across India. Infrastructural development at these sites as a result of a growing influx of visitors has the potential to damage the natural ecological balance seriously. There have been significant changes in the scale and frequency of visits to religious sites over the past few decades, creating undue anthropogenic pressure on the ecology of wetlands.

Wetland ecosystem services (the benefits people derive from wetlands) are closely related to the livelihood activities of wetland-dependent communities, as seen in the previous chapter. The livelihood activities, under varying social, economic and political context, can in turn influence the ecology and sustainability of the concerned wetland.

4.1 Cultural activities associated with Renuka Wetland and their impacts

There are four major events (the International Fair, Maghi Sakranti, Bisho Sakranti and Haryali) related to the Renuka Wetland, as mentioned previously. Before the declaration of the International Fair, only people from neighbouring villages and districts took part in them. But from 2015 onward, after the declaration of the International Fair by the Himachal Pradesh Government, the tourist and pilgrim influx has increased considerably and is around 3 - 4 lakhs annually. People from nearby states come here during this event to earn their livelihoods. The 3 events celebrated by the local people of Sirmaur District do not attract large crowds. Another important cultural activity is that of feeding the fish in the lake, which has been considered a pious work through the years. After conducting participatory exercises with the various stakeholders, impacts of these cultural activities on Renuka Wetland were recorded. Since the International Fair

is a major cultural event, it was regarded as a benchmark for understanding the impacts of cultural activities on the wetland. During the 6 day long event, the pressure on Renuka ji lake and wetland, increases. The area of the parikrama and the Kubza Pavilion where the fair is organised is not adequate to host the large number of people. This ecologically fragile area is subjected to lakhs of tourists in a short, intense period and that creates an increasing pressure on the wetland and its ecosystem. These pressures are both direct as well as indirect, including waste management issues, pollution of the lake water and feeding of fish with unnatural food items.

The adverse impacts of cultural activities on Renuka Wetland have thus manifested in terms of sanitation, waste management and environmental quality. As no carrying capacity exercise has yet been conducted, it is difficult to estimate the negative impacts on the wetland.

SANITATION AND WASTE MANAGEMENT

The basic facilities (toilets, sanitation, drinking water) are inadequate for the International Fair, during which lakhs of pilgrims visit the lake and temple. Construction of toilets, as a non-forest activity, is not allowed because the area is a sanctuary. Some temporary toilets (portable bio-toilets) are installed during the fair, but they are not sufficient. Instances of open defaecation in the forest close to the lake and near the roads have been observed.

The bathing spaces near the ghats contribute further to the pollution of the lake. Villagers have complained about the pollution of the lake and its surroundings after the fair.

The local Youth Clubs of Khala and the MMs of Jamu, Koti, Bedaun and Gudanu take up cleaning activities voluntarily. Villagers suggested that they can also be involved in implementing rules and regulations around the lake during the International Fair. They could be involved in planning and in giving valuable suggestions to the regulating boards of Renuka Wetland.

WATER AND AIR QUALITY

All the stakeholders who were interviewed reported that the environmental quality of the wetland had degraded over the past few years, particularly the water and air. A trend analysis exercise carried out with the local communities and other stakeholders showed that these negative impacts resulted from the introduction of the International Fair.

The lack of sanitation facilities during the fair has resulted in increased open defaecation around the lake. The first rains after the fair cause faecal contamination of the lake water. Both men and women take holy dips in the lake during the fair. These holy dips are believed to purify the soul. A few years ago, pilgrims would also take a sip of the lake water because of its sacredness. Because the water quality has deteriorated, now these pilgrims only take a dip and that too reluctantly. The air quality deterioration reported by stakeholders, especially those belonging to the institutions around the lake, is attributed to the increase in the number of vehicles and the prolonged congestion and traffic during the fair.

4.2 Livelihood activities and their impacts on the wetland

As mentioned in Chapter 2, about 46% of the households of the 2 gram panchayats are involved in agricultural activities and animal husbandry, and 24% of the households are in government service. Other income-generating activities in these villages include seasonal wage labour, small businesses (including temporary *prashad* shops during the International Fair), private services and artisanal and contractual work (Figure 9). Some of the households of the 2 panchayats get contractual employment at the Renuka Vikas Board, at the Forest Department and in the boating services.

The 2 major livelihood activities with impacts on Renuka Wetland seem to be (i) collection of fodder and fuelwood and (ii) recreational boating on the lake.

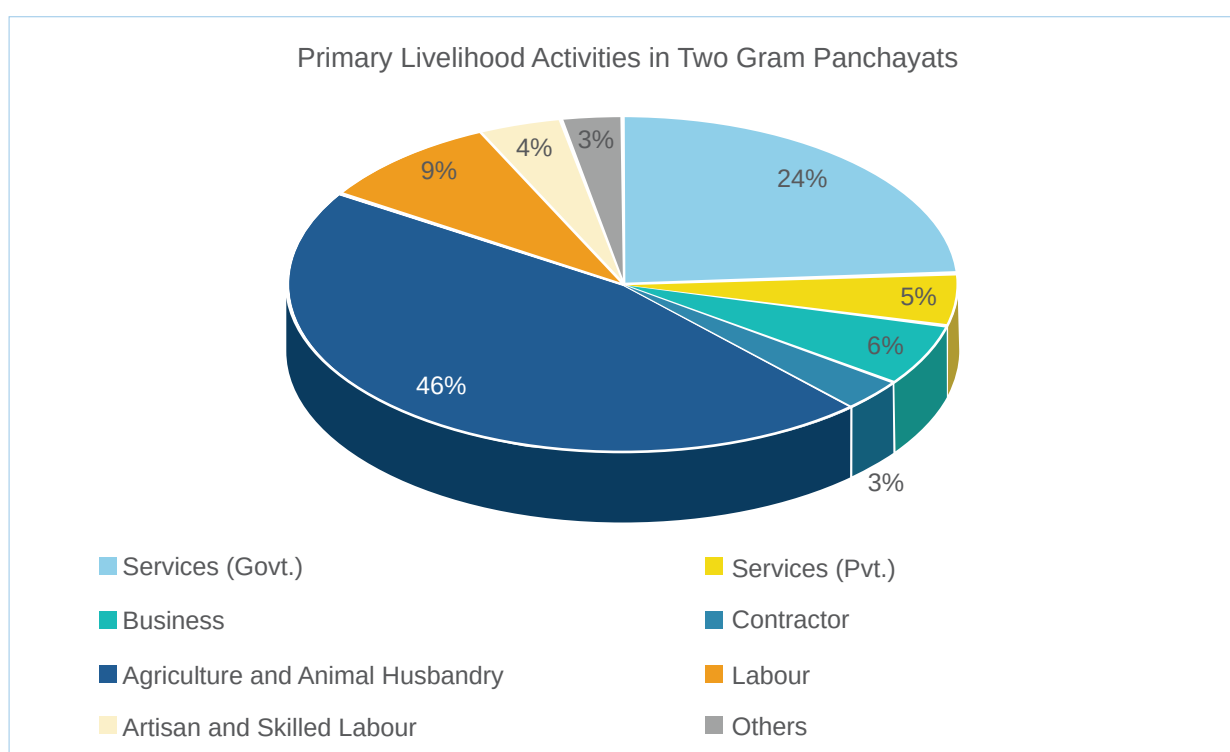


Figure 9 Livelihood activities in the gram panchayats.
(Source: Social mapping, September–December 2020)

FODDER AND FUELWOOD

In Chapter 3, we saw that households (across all occupational categories but especially wage labourers) of the villages in the vicinity of Renuka Wetland enter it for their fodder and fuelwood needs. During the monsoon, cattle are fed near the villages, but in winter and summer, villagers are forced to feed their cattle in the sanctuary, which increases the pressure on the sanctuary. This is done illegally (the area being declared a sanctuary), but it is due to the insufficiency of the fodder available for their livestock. If caught, they are penalised by way of fines or having their implements (sickle) confiscated by the forest guards.

RECREATIONAL BOATING

Boating is a very popular activity with the tourists who visit Renuka Wetland for recreational purposes. The Renuka Vikas Board conducts a bid every two years for awarding the boating contract. During the time of this study, a local vendor from Jamu Koti was holding the contract. The contractor is of the opinion that boating boosts the local economy as it attracts tourists and creates local employment opportunities. But community members and the three ashrams (84% of the stakeholders interviewed) in the vicinity of Renuka Wetland were of the strong opinion that boating should be banned. Renuka Wetland is of high spiritual value for the local community. According to their perception, boating on Maa Renuka (Mother Renuka) is a sinful activity and hurts their spiritual beliefs. A few of the stakeholders said that boating also harms aquatic life present in the lake, which they have seen declining in the past few decades.



Image 2 Boating on the lake

CHAPTER 5:

Institutional Framework for Management of Renuka Wetland

5.1 Key stakeholders

The stakeholders of the Renuka wetland were identified in this study on the basis of their interconnections (such as dependence, influence and religious and cultural perspectives) and responsibilities at the lake and in the management of the sanctuary.



Figure 10 Illustrative image of key stakeholders

FOREST DEPARTMENT (WILDLIFE DIVISION)

The Renuka Wildlife Sanctuary is under the jurisdiction of the Wildlife Division.

Roles and Responsibilities of Forest Department (Wildlife)

- Conservation and protection of wildlife and biodiversity inside Renuka ji Sanctuary
- Plantation drives
- Monitoring poaching activities in the sanctuary
- Checking siltation in the lake and maintaining check walls
- Maintenance and beautification of the precincts of the lake
- Taking care of Renuka ji Zoo, the first zoo in HP
- Imposing fines and penalties for illegal activities

Personnel

- District/Divisional Forest Officer
- Assistant Conservator of Forest
- Range Forest Officer
- Deputy Ranger
- Forest Guards - 5

The Forest Department (Wildlife) plays a central role in the management of the lake and its water quality. The department is responsible for plantation activities along the sanctuary's periphery. It tries to plant fruit-bearing and fodder species during afforestation efforts. The department is not involved in supervising the fair but is involved in waste management after the fair. It has initiated construction of check dams to address the siltation problem.

The department raised concerns about the proposed 40-MW Renuka ji multipurpose project (presently facing multiple legal battles related to environmental and rehabilitation concerns) on the Giri River, 2 km from the Renuka wetland. Since the project was encroaching upon the sanctuary, according to the norms the department had to take up 49 ha of barren community lands (*Shaamlat*) and compensate the landholders involved. A few frontline staff pointed out that no proper study had been carried out regarding the impact of the proposed dam on the Renuka wetland.



Image 3 Members of Wildlife Division (Forest Department)

Among the ecosystem services, the Forest Department (Wildlife) prioritized biodiversity and air quality (supporting and regulatory services, respectively) and recreation and tourism (cultural services).

The Forest Department (Wildlife) does not have any direct income from the lake. One source of income is the letting out of its guesthouse in Renuka Wetland. Earlier they offered a zoo safari through sale of tickets.

As mentioned previously, the Forest Department (Wildlife) does not hold meetings regularly with the local communities. But individuals of the communities approach the department when there are grievances.

RENUKA VIKAS BOARD (RVB)

The (RVB) was established in 1984. The board used to work for religious beliefs and interests. The purpose of this organisation is to organize the International Fair and supervise the operations of the temple. It is also responsible for sanitation and waste management around the lake and temple premises. The Deputy Commissioner of Sirmour District is the chairperson of RVB and thus represents the district administration.

Roles and Responsibilities of Renuka Vikas Board

- Responsible for the cleanliness of the temple complex and for the premises of the board office
- The organizer of Renuka ji International Fair
- The 50–60 lakh people who gather at the International Fair
- Responsible for the sanitation facilities
- Cleanliness of the lake and the premises of the temple (before and after the fair)
- Organizing cultural programmes during the fair
- Inviting tenders for the shops

Personnel

- Member Secretary (DM)
- Board's Chief Executive Officer
- Sweeper
- Chowkidar
- Mandir Priest

Among the ecosystem services, the RVB prioritized air and water quality (regulatory services), carbon reserves (support services) and religious beliefs, recreation and tourism (cultural services).

According to the other stakeholders, the interaction between the RVB and others is limited, except during the International Fair. The boating activity is managed by the RVB. It secured an order from the High Court allowing it to organize boating activity on Renuka Wetland notwithstanding the sanctuary. There has been a lot of protests from the ashrams regards this as the activity hurts the religious sentiments of the neighbouring communities.

3) FOREST DEPARTMENT (TERRITORIAL)

The Forest Department (Territorial) is not engaged directly in activities related to the lake or sanctuary. They work in notified forest lands and villages coming under their jurisdiction.

Roles and responsibilities of Forest Department (Territorial)

- Work in notified forest areas and neighbouring villages
- Plantation drives and maintenance activities in the forest; examining the survival rate of saplings
- Forest fire management
- Protection of the forest and wildlife
- Monitoring illegal activities in forests and along rivers (night raids and check posts)
- Looking at compoundable and non-compoundable offences
- Imposing fines and penalties for these offences
- Engaging with villagers for different activities (e.g., bamboo grafting and plantation, the “*Ek boota beti ke nam*” programme (plants for each girl child)

Personnel

- Assistant Conservator of Forest
- Range Forest Officer
- Deputy Ranger
- Forest Guard

Among the ecosystem services, the Forest Department (Territorial) FD-T prioritized biodiversity and habitat (supporting services) and air and water quality (regulatory services).

The discussions with the Forest Department (Territorial) FD-T indicated clearly that they interacted more regularly with the communities around Renuka Wetland and were interested in working in collaboration with the Forest Department (Wildlife) FD-W for the conservation of the Renuka wetland.

4) THE LOCAL COMMUNITIES

Apart from having a spiritual connection, the local communities enter the sanctuary for livelihood opportunities, for collection of fuelwood and fodder, etc.



As mentioned previously, collection of fuelwood and fodder is restricted, but the communities obtain these resources illegally. They are fined if they are caught by the forest guards.

Seasonal wage labour during the International Fair, daily wage labour, employment in the various institutions in and around the sanctuary and running shops around Renuka Lake are the livelihood opportunities available to the local communities.

The local communities recognized all the ecosystem services of Renuka Wetland - regulating services (air and water quality, carbon reserve, soil retention), cultural services (religious belief, recreation and tourism), supporting services (recharge of springs) and provisional services (fodder, fuelwood and herbs)—in the order of their ranking. Depending on distance from the wetland, the extent of the communities' dependence on the sanctuary differs among the eight villages. The conflicts related to illegal collection of fuelwood and fodder from the sanctuary (between the Wildlife Division and the communities) are resolved informally through dialogues with the panchayats. The ecosystem service that binds all the community members with the Renuka wetland is the spiritual connection with Maa Renuka (Mother Renuka).



Image 4 PRA activities in the Jamu Koti Panchayat

5) ASHRAMS

There are 3 ashrams around the lake: (i) Sanyas Ashram, (ii) Nirvan Ashram and (iii) Brahmachari Ashram. Nirvan Ashram is the ashram that offers free food for all travellers throughout the year.

Most of the work undertaken at the ashrams is done on a voluntary basis, and the volunteers are from the 20 villages nearby.

Among the ecosystem services, the ashrams prioritized religious belief and religious tourism (cultural services) and air and water quality (regulatory services).



Image 5 The three ashrams around the lake periphery

During the International Fair, all the ashrams offer free accommodation and food for pilgrims. According to the ashrams, devotees from across the world contribute donations to a trust that handles all their operational expenses. The rent from the shops around the ashrams provides additional funds.

6) BOATMEN

Shri Randeep Thakur had the boating contract during the study. He had obtained it in 2017. He is a local resident of Bedon (Khala Kyar), but he hails from Jamu Koti. He lives in Bedon so as to be closer to the boating activity.

Among the ecosystem services, boatmen prioritized religious belief, recreation and religious tourism (cultural services), air and water quality (regulatory services) and fodder and fuelwood (provisional services), in that order.

The current tender amount payable to the Renuka Vikas Board is Rs.24 lakhs annually. Shri Randeep Thakur has 20 boats and 5 workers, of whom 2 are from Jamu Koti and 3 from Khala Kyar. The average monthly salaries of these workers are in the range from Rs. 3000 to Rs. 5000. The boating charges for an hour-long ride around the lake vary from Feeding fishes

Rs. 200 (for a two-seater boat) to Rs. 400 (for a four-seater boat). In summer (April–June) the monthly earnings from boating are around Rs.3.5 lakhs, dropping in the off-season to Rs. 45,000 – 60,000.

Tourists can go boating on the lake throughout the year, except during the International Fair though that is the peak time for earning from this activity. This restriction has been imposed to avoid any mishaps during the fair, when lakhs of pilgrims visit Renuka.

7) SHOPKEEPERS

There are various shops around Renuka Lake. The shops include souvenirs shops. These are small, permanent shops and a canteen, which comes under the jurisdiction of the Renuka Vikas Board. The shops around the periphery of the ashrams are owned by the ashrams, and the rent is paid to the ashram authorities.

Among the ecosystem services, the boatmen prioritized recreation, religious tourism and religious belief (cultural services) and water quality (regulatory services), in that order. It is due to the presence of the lake and the temple that they can earn a livelihood.

During the International Fair, temporary shops are put up to cater to the needs of devotees coming from different states. These shops are put up through a bidding process that is coordinated by the RVB. People from neighbouring villages and other states (Uttarakhand, Chandigarh, Punjab, Delhi, etc.) participate in this bidding process. The bids go as high as Rs. 25,000 per plot. Since the bids are high, the local people find it difficult to put up these temporary shops. The amount earned through the bids is used by the RVB to make arrangements for the fair.



Image 6 The canteen at the lake

8) GUESTHOUSE OF HIMACHAL PRADESH TOURISM DEPARTMENT CORPORATION (HPTDC)

The guesthouse of HPTDC was established between 1975 and 1980, and it was renovated in 2019. HPTDC is not engaged directly with the wetland management activities. The guesthouse and restaurant provide parking, food and accommodation facilities.

Roles and Responsibilities of HPTDC Guesthouse and Restaurant	
Accommodation, food and lodging	
Personnel	
- Member Director - General Manager - Cook - Waiter - Housekeeping staff - Gardener	

Among the ecosystem services, the boatmen prioritized recreation, religious tourism and religious belief (cultural services,) and air quality (regulatory services).

9) HIMACHAL PRADESH POLLUTION CONTROL BOARD (CPCB)

The HP State Pollution Control Board is the nodal agency in the state government for the planning, promotion, co-ordination and overseeing of environmental programmes.

The HP State Pollution Control Board carried out tests on the quality of the water of Renuka Wetland. It expressed its concern regarding the decrease in capacity of the lake due to siltation and the increasing pollution load over the years.

Roles and Responsibilities of CPCB, HP
• Conducts monthly water quality assessments at the lake • Classified the lake as fit for outdoor bathing (yet listed Renuka Lake as a polluted lake)
Personnel
• Principal Secretary • Managing Director • Chief Executive Officer

10) HIMACHAL PRADESH STATE WETLAND AUTHORITY (HPSWA)

HPSWA was constituted in 2017 under the aegis of HP Council for Science, Technology & Environment (HIMCOSTE). It is the nodal agency to coordinate the Wetland Conservation Programme. Various departments (Forests, Fisheries, Tourism, Industries) and agencies (HP Environment Protection and Pollution Control Board, universities, Zoological Survey of India) are also actively involved in the Wetland Conservation Programme.

Roles and Responsibilities of HPSWA
• Conservation and restoration of wetlands with the active participation of the local communities • Conservation and restoration of habitats for migratory and resident bird species of the area • Conservation of indigenous fish species • Generation of sustainable livelihood opportunities for the local fishermen • Propagation of eco-tourism in the area to generate employment

11) IRRIGATION & PUBLIC HEALTH (IPH) DEPARTMENT, JAL SHAKTI VIBHAG

Renuka Wetland, Dadahum Parada and Giri Nagar fall under the jurisdiction of IPH Subdivision, Dadahu. The IPH Department is responsible for providing water through gravity schemes to the villages of Khala Kyar and Jamu Koti. Irrigation is another responsibility of the IPH Department. It will launch the first irrigation scheme for Khala Kyar Panchayat (12 acres) soon.

Roles and Responsibilities of IPH Department
• Control all water supply schemes, irrigation schemes, flood control works, sewerage schemes, and hydrogeological projects.
Personnel
• Assistant Engineer • Junior Engineers - 2 • Senior Assistant • Clerk • Surveyor • Water Works Clerk • Complaint Attendant • Peon • Chowkidar • Sweeper

The annual budgets allocated by the institutions for managing Renuka Wetland were not available.

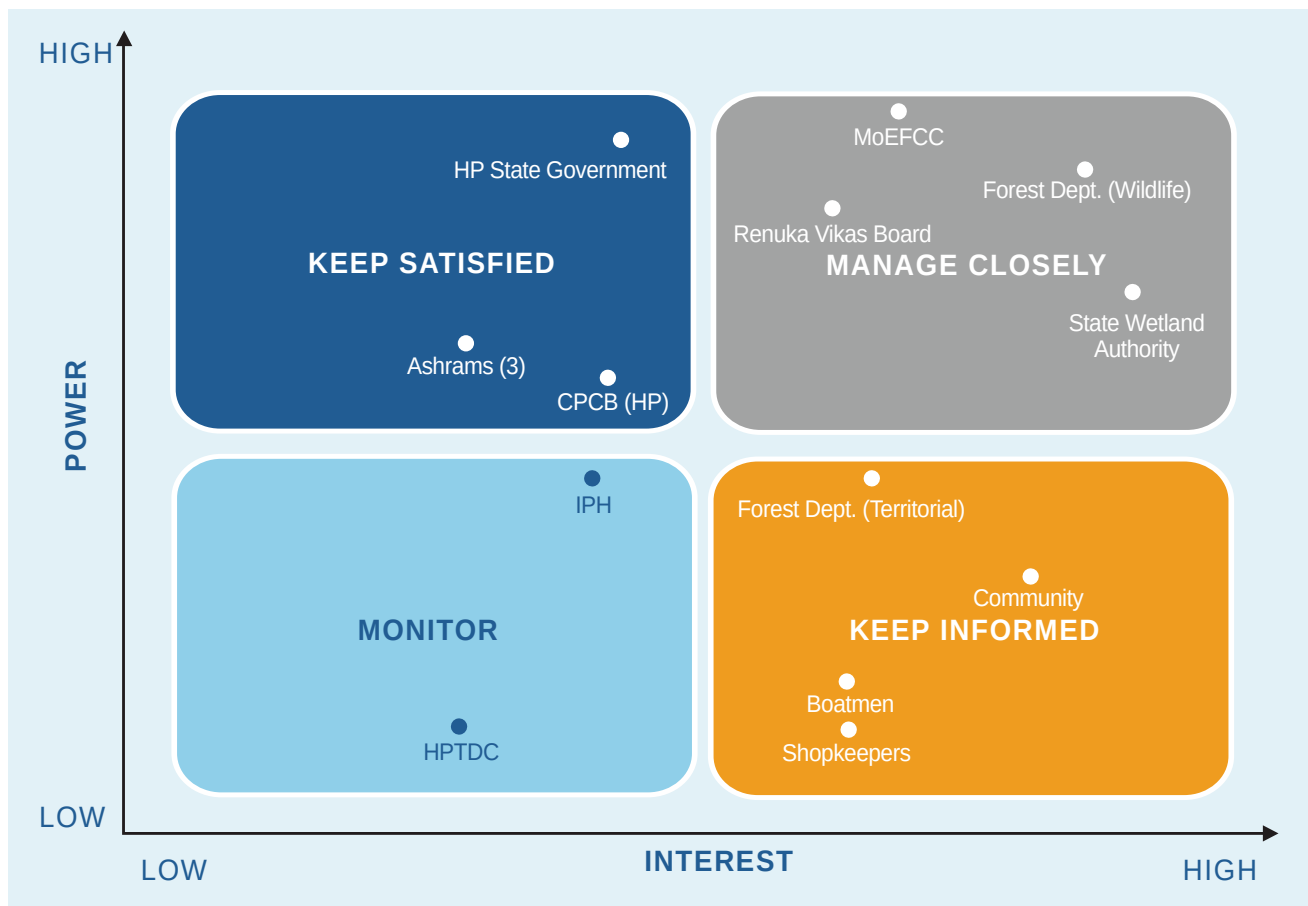
5.2 Stakeholder analysis

“Stakeholder analysis” typically refers to the application of a range of techniques or tools to identify and understand the needs and expectations of the major interests inside and outside a project environment, in this case the Renuka wetland. Understanding the attributes, interrelationships and interfaces among and between project advocates and opponents would assist strategic planning for integrated management of the Renuka wetland.

The analysis helped not only assess much of the risks and feasibility associated with wetland management but also clearly identified the support that must effectively be obtained and retained.

A rigorous mapping exercise was undertaken at the beginning of the study, which helped identify various stakeholders associated with Renuka Wetland. Thereafter, a stakeholder analysis exercise was undertaken on the basis of focus group discussions and semi-structured interviews held with stakeholders. On the basis of the data and information collected, a stakeholders’ matrix was formulated that considered two key variables: (i) the power that translates into the decision-making power that a particular stakeholder holds and (ii) the interest that translates into the extent to which the stakeholder holds a stake in a particular decision.

The stakeholders can be categorized into four main groups as described in the following, and they must accordingly be involved in the management of the Renuka wetland.



HIGH-POWER, HIGH-INTEREST PEOPLE (MANAGE CLOSELY)

Due to the role they play, these stakeholders are the most important ones in influencing key policy decisions pertaining to wetland management at different levels.

The Forest Department (Wildlife) (FD-W) is highly interested as well as powerful because the sanctuary comes under this stakeholder's jurisdiction. As the overall management of wetlands in the country comes under the MoEFCC, it is a highly powerful stakeholder, but its interest is not as high as that of the FD-W. The RVB also has a high stake in the decisions pertaining to the wildlife sanctuary and the Renuka wetland. The district administration is represented in the RVB by the District Commissioner, who is the Chairperson of the board. It may not have as much power as the FD-W does, but it does hold influence over key decisions related to the International Fair. The State Wetland Authority, HP (SWA, HP), which is the nodal agency for coordinating the Wetland Conservation Programme in Himachal Pradesh, has less power compared with the FD-W and the RVB.

One must fully engage this group of stakeholders, especially the FD-W and RVB, in the management of the Renuka Wetland and motivate them to engage with the other stakeholders to make positive changes in the landscape sustainably, with the support of MoEFCC and SWA, HP.

HIGH-POWER, LOW-INTEREST PEOPLE (KEEP SATISFIED)

The first stakeholder of this group is the State Government of Himachal Pradesh. Also in this group are the three ashrams, because they are highly influential in the decision-making process because of their religious and spiritual standing, and the Central Pollution Control Board (the interest of the CPCB is fairly low, but being a government body, it does hold substantial power). The ashram authorities are presently interested only in the religious and cultural activities around Renuka Wetland, while the CPCB's concern is limited to the pollution load in the lake. The state government does not directly intervene in the management of Renuka Wetland and mostly relies on SWA, HP and the RVB to take any measures that are needed.

Efforts should be made to not only keep the stakeholders of this group satisfied but to motivate them to be interested in the Ramsar site and to cover all aspects of Renuka Wetland , i.e., religious and cultural issues, biodiversity conservation, pollution control and local communities' needs. They should be made aware of the inter-linkages between the various aspects of Renuka Wetland . For example, unless the biodiversity and pollution aspects of Renuka Wetland are considered, the religious and cultural significance of the wetland is likely to be impacted, which will have adverse effects on the operations of the ashrams themselves. The ashrams can be very influential in mobilizing the local communities as well as the tourists in the conservation of the wetland, and the state government can cater to the needs of the local communities.

LOW-POWER, HIGH-INTEREST PEOPLE (KEEP INFORMED)

The communities of the eight neighbouring villages, the boatman, the shopkeepers, and the Forest Department (Territory) (FD-T) come under this category. This is a very important group of stakeholders. They have a high level of interest in decisions pertaining to the Renuka wetland and sanctuary. But because of the sanctuary status, they have no power in the decision making per se. Even FD-T tends to stay aloof from the management of Renuka Wetland as according to them it lies in the jurisdiction of the FD-W. The stakeholders of this group took a lot of interest in sharing their perspectives concerning the various ecosystem services that the sanctuary offers, their interrelationships and the changes over different time periods.

Since the stakeholders of this group have been and will be highly affected by any decisions taken with regard to the wildlife sanctuary, they need to be adequately informed about its development. There should be more frequent interactions with them to ensure that no major conflicts arise in the future. They could be very helpful in evolving an integrated wetland management plan and can actively participate in its implementation, provided their needs are also catered to.

LOW-POWER, LOW-INTEREST PEOPLE (MONITOR)

The HPTDC and the IPH are in this category. The HPTDC's boundaries are defined, and it plays no major role in either conservation or policy-related decisions. It is a profit-making entity whose profit depends on the influx of tourists coming to the Renuka Wetland . The IPH has much power comparatively but not as much as to influence key policy decisions pertaining to Renuka ji.

It is critical to monitor the activities of this group of stakeholders and to involve them in the management of the Renuka wetland as well. The HPTDC's guesthouse, for example, needs to adhere to the norms of waste management. Similarly, the IPH Department needs to not only meet the water supply requirements of the institutions in and around Renuka Ji but also take measures for proper sanitation and waste management in coordination with the ashrams, RVB and other stakeholders.

5.3 Stakeholder coordination and decision-making process

It is to be noted that even though the wildlife sanctuary falls under the jurisdiction of the Forest Department (Wildlife) FD-W, various stakeholders depend on the wetland and sanctuary to different extents for ecosystem services. The study clearly revealed, as reflected in the previous sections, that the nature and extent of interaction of Renuka Ji with each stakeholder are different.

At present there is no structured format for meetings between the communities and main stakeholders such as the Forest Department (both Wildlife and Territorial divisions) FD (W&T) and the RVB. It is only during the planning process of the International Fair that the Renuka Vikas Board holds a consultation, two months in advance, that involves all the major stakeholders of the area. Roles and responsibilities in the organization of the fair are discussed and finalised at this consultation.



Image 7 Stakeholders' consultation at the Renuka Vikas Board in January 2020

When the inception meeting was being conducted in January 2020, it was for the first time that all the stakeholders were present on one platform to discuss the issues related to the Renuka wetland and the emerging challenges that needed to be addressed for managing the wetland sustainably.



CHAPTER 6:

Conclusions

6.1 Changes in Renuka Wetland – extent, drivers and impacts

The extent of a wetland can be defined as the spread or size of the wetland. It is usually defined on the basis of indicators such as inundation (permanent or intermittent) and the presence of hydrophytes or hydric soils. Wetland extent delineation can be challenging as the land cover of a wetland may vary from open water to vegetation-dominated areas. The spatial extent is highly variable as the inundated area fluctuates seasonally and with varying environmental conditions.

The land-use change near the Renuka wetland and adjoining areas has been studied thrice. When the sanctuary was declared, when it was declared a Ramsar site and when the International Fair began. These events are important in terms of the development activities that took place in and around the lake and how these affected the ecosystem services that the neighbouring communities and other stakeholders used within the catchment.

SOIL EROSION

Around 1992–1993, the road leading to Jamu Koti Panchayat was topped with concrete. This developmental activity caused the beginning of a soil erosion process in this gram panchayat, leading to siltation at the southern side of the lake. The silt in the wetland is increasing due to soil erosion from part of the catchment. This could eventually make the water unsuitable for wildlife. The siltation has led to the shrinking of the lake itself, and stakeholders such as the boatmen reported that the lake boundary has shrunk. The level of siltation is increasing every year. This is a major problem.

TOURIST INFLUX

The tourist influx has increased after the declaration of the International Fair. The number of domestic tourists from Uttar Pradesh, Uttarakhand, Haryana, Punjab, Rajasthan and Madhya Pradesh has, however, remained the same.

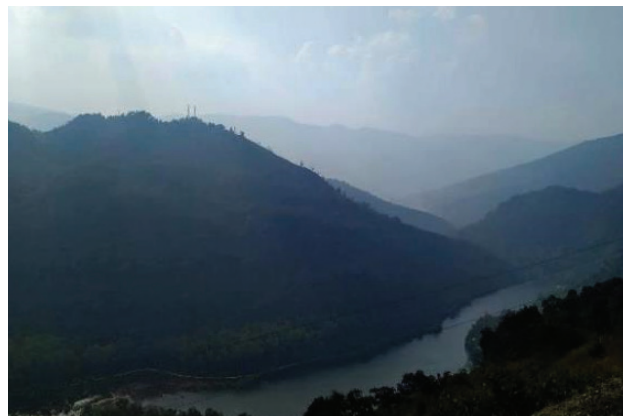


Image 8 Renuka Wetland as seen from the Jamu Koti Panchayat road

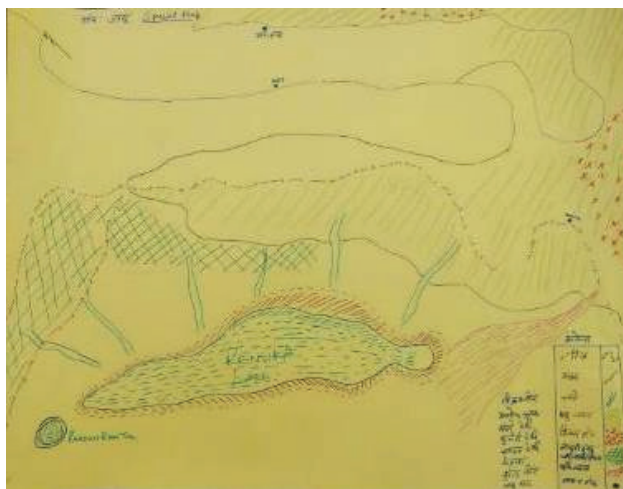


Figure 11 Spatial map prepared by community of village Jamu, indicating soil erosion in the Renuka Wetland

The period of stay of the tourists has altered over time. Earlier, the tourists would come for a month and stay on for recreation and religious ceremonies, but now they come on shorter (even single-day) visits. There is no systematic record of how the tourist influx has changed over time. The evidence is mostly observational. Coverage of the fair in the local media and social media in recent years has been cited as the main reason for the increased tourist influx.

FOREST AND WILDLIFE

The stakeholders reported that there are more instances of forest degradation and forest fires (accompanied by a decreasing trend in winter rainfall). There is an evident increase in summer and a decrease in winter. There are no extreme human–wildlife conflicts. According to the local communities, the numbers of wildlife attacks and crop attacks have increased after

the declaration of the sanctuary, affecting their lives and livelihoods. Stakeholders such as the RVB and the Forest Department (FD) stated that the monkeys in the sanctuary are a menace.

The participatory rural exercises, focus group discussions and household surveys revealed different drivers of change in the ecosystem services of Renuka Wetland. These drivers of change are both natural and human-induced. Increased soil erosion from the catchment and deterioration of the water quality were reported to be the biggest threats. The change is having a negative impact on the wetland and is threatening the sustainability of its ecosystem services. A separate study of the siltation rates, water quality, aquatic biota, etc. needs to be undertaken to understand the nature and extent of the negative impacts temporally and spatially.

6.2 Ecosystem Services

The stakeholders listed various ecosystem services of the Renuka wetland (Table 14).

Table 14 List of Ecosystem Services

Provisioning Services	Regulating Services	Supporting Services	Cultural Services
Fodder	Soil retention	Biodiversity	Religious belief
Fuelwood	Air quality	Habitat	Recreation
Herbs	Water quality	Recharge of springs	Religious tourism
	Carbon reserve		

The provisioning services are limited to the villagers (including local boatmen), especially fodder, fuelwood and herbs. However, because of the restricted use and the conflicts with the FD, they were ranked low compared with other ecosystem services.

Regulating services were ranked the highest by all the stakeholders, in recognition of the contribution of the Renuka Wetland to checking soil erosion (this was mentioned especially by the local communities), improving the air and water quality (ranked high by the FD-W as well as local communities) and adding to the carbon reserve (recognized by the Forest Department and local communities).

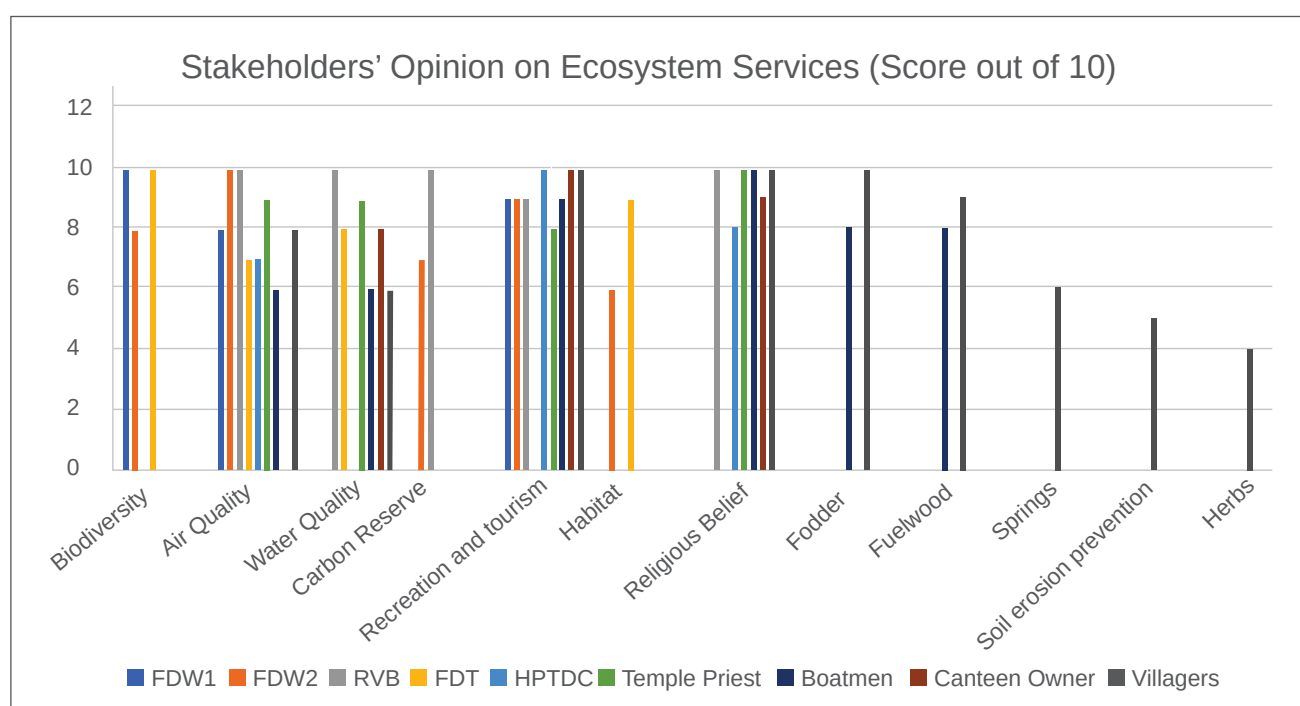


Figure 12 Stakeholders' opinion of ecosystem services. Source: Scoring and ranking exercises

Supporting services (including biodiversity, habitat and recharge of springs) were ranked high by the FD-W as well as by the FD-T. The communities additionally recognized the significance of Renuka Wetland for recharging springs.

The temple priest and ashrams ranked religious belief highest among the cultural services, while the HPTDC ranked recreation and religious tourism highest. Employment (by the local communities, including boatmen, local contractors and shopkeepers) and revenue (by the RVB and ashrams) are some of the other benefits identified by the stakeholders directly related to the cultural services (recreation and religious tourism) provided by the Renuka wetland. The ecosystem services bring a consensus among the stakeholders.

The scores assigned to the different services by the major stakeholders were consolidated and percentile scores determined (Figure 9). The services were ranked in decreasing order of percentile score. The stakeholders gave greater recognition to ecosystem services such as recreation and tourism (Rank I), air and water quality (Rank II and IV, respectively) and religious belief (Rank III). The lower-ranking services were fodder (Rank V), carbon reserve and fuelwood (Rank VI) and habitat (Rank VII). The lowest ranking services were recharge of springs (Rank VIII), prevention of soil erosion (Rank IX) and herbs (Rank X).

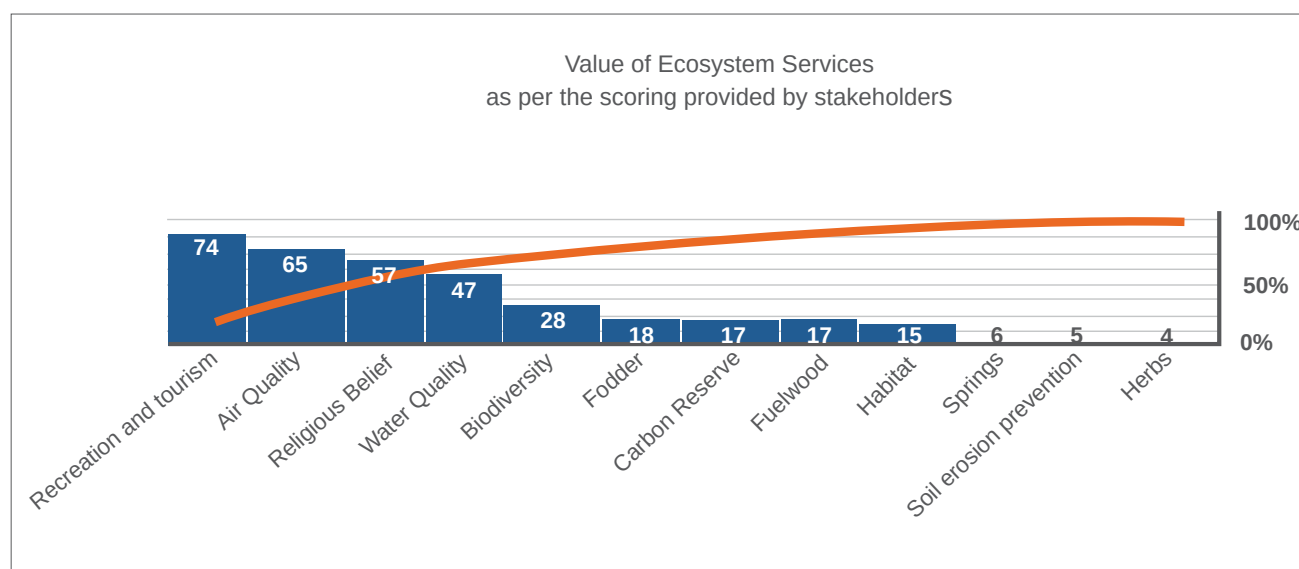


Figure 13 Consolidated weightage of ecosystem services provided by the Renuka wetland.
(Source: Scoring and ranking exercises conducted with different stakeholders)

6.3 Interactions and trade-offs among stakeholders

Interactions and relationships between the different stakeholders with respect to the ecosystem services are likely to result in trade-offs between them and affect the overall management of the Renuka wetland. Semi-structured interviews were held with each major stakeholder to assess the existing interactions and relationships with all other stakeholders and the nature of the trade-offs. The results are shown in Table 15, which indicates how the stakeholders relate with each other (positively, negatively or neutrally).

It can be seen that there are hardly any interactions, and therefore no associations, either negative or positive, in 50% of the cases/pairings. Where there were interfaces, the present relationships among the stakeholders reflected mainly negative relationships (in 72% of the cases), due to conflicting interests in ecosystem services as discussed subsequently. There are very few positive relationships, such as the one between the FD-T and the local communities. The department carries out numerous projects with the help of local villagers,

e.g., Van Samriddhi Jan Samriddhi (growing medicinal plants), Common User Group, *Ek Buta Beti Ke Naam* ('plant a tree in the name of a girl child'), bamboo grafting and plantation drives. The department also provides local employment during the fire and plantation seasons. All these activities help build a rapport and trust among the villagers and the FD-T.

Table 15 Pair-wise Relationships among Stakeholders

FD (W)									
FD (T)	0								
RVB	-	0							
HPTDC	0	0	0						
Ashrams	-	-	-	0					
Boatmen	-	-	+	0	-				
Canteen Owner	0	0	-	0	-	0			
Temple Priest	0	0	-	0	-	-	0		
Local Community	-	+	+	0	+	+	0	0	
	FD (W)	FD (T)	RVB	HPTDC	Ashrams	Boatmen	Canteen Owner	Temple Priest	Local Community
0 hardly any interaction, - negative relationship, + positive relationship									

Another example of a positive relationship is that of the RVB with the boatmen and villagers. The RVB provides these stakeholders opportunities for Renuka Wetland centred livelihoods (boating and running shops in and around Renuka Wetland, respectively). The trade-off here is that there is competitive bidding, including with outsiders. There is also a good relationship between the ashrams and the local communities. This is built upon religious faith and a recognition of the services provided by the ashrams to the visitors. Similarly, since most of the boatmen are local villagers, they have a good relationship with the local communities though the latter were unhappy about the boating activity.

The stakeholders with greater numbers of negative relationships with others include the ashrams, the FD-W, the RVB and the boatmen. The ashrams were seen as polluters of the lake (by the FD-W and the FD-T) and as competitors (by the RVB, the canteen owner and the temple priest). But the ashrams held the boatmen responsible for the deterioration of the water quality of the lake. Similarly, the FD-W, under whose jurisdiction the Renuka wetland falls, is not in the good books of the RVB, the ashrams, the boatmen and the communities. According to the RVB and the ashrams, the FD-W did not seem to be making sufficient efforts to check the pollution of the water and the siltation though they were getting adequate funds. The communities and boatmen (local) held the FD-W responsible for the loss of their right to collect fuelwood and fodder from the sanctuary.

The ecosystem services that generate benefits for only a few stakeholders (recreation, tourism) were perceived negatively by other stakeholders (Figure 12). The monetary benefits accruing to the RVB and related stakeholders of the International Fair (shopkeepers, ashrams, boatmen, temple agencies, HPTDC, the canteen owner) result in negative interactions as well as trade-offs among the other stakeholders. Though recreation and tourism provide livelihood opportunities and economic

benefits, these services have indirect negative impacts on the supporting services (biodiversity and habitat) and regulating services (air and water quality, carbon reserve). These supporting and regulating services are important for the FD-W and the FD-T, as they are the custodians of the Renuka Wildlife Sanctuary. According to the other stakeholders, the pressure on the water body and the land-use changes during the International Fair and the tourism activities that take place throughout the year degrade the land cover, lake water quality and disturb the wildlife in the forest.

Discussions with various stakeholders revealed that the RVB and the FD-W do try to come together to address issues related to the International Fair. These issues are mostly related to waste management, sanitation and logistics for the pilgrims. The internal dynamics between these two stakeholders seems to be fluid and to change continuously. Because of the intersection of a sanctuary, a Ramsar site and a place of worship, conservation and jurisdiction are at loggerheads.

The study highlights adverse effects that the livelihoods, religious faith and employment associated with the recreational value of the sanctuary and lake are having on the regulating and supporting services. The overlap of ecosystem services is going to be counterproductive in the long run. The health of the forests, as well as the lake, is a pre-requisite for the cultural and provisioning services.

6.4 Challenges

The challenges documented through this study are based on the perspectives of all the stakeholders. Each stakeholder was asked to identify the different challenges associated with the Renuka wetland and assign a score to each of the challenges. The scores were consolidated (Figure 14). It is evident that (I) sanitation, (II) waste management, (III) siltation and (IV) water quality are the major challenges perceived by most of the stakeholders.

The idea of sanitation being an issue and a challenge resonated with every stakeholder. It ranked the highest among the challenges. The FD-W, responsible for the health of the lake, is constantly looking for ways to deal with the sanitation issue, especially the lack of toilets during the International Fair. Construction of permanent toilet structures is not permitted in the sanctuary. As a result, there is open defaecation, or unhygienic, badly maintained bio-toilets are used. The tourists are not able to access optimal sanitation facilities, and hence the issue intensifies. The local people too feel that this is a grave problem that has affected their religious beliefs and practices. A few years ago, the lake water was consumed by pilgrims. It is now said to be unfit for the same. Now most of the pilgrims just take a dip, sometimes reluctantly. The lake is suspected to have high levels of bacteriological contamination due to human filth flowing into the lake during the monsoon. Scientific studies need to be conducted on the seasonal water quality of the lake, especially before and after the International Fair, along with studies on the health of the visiting pilgrims.



Photo credit: KunalBharat.Giz

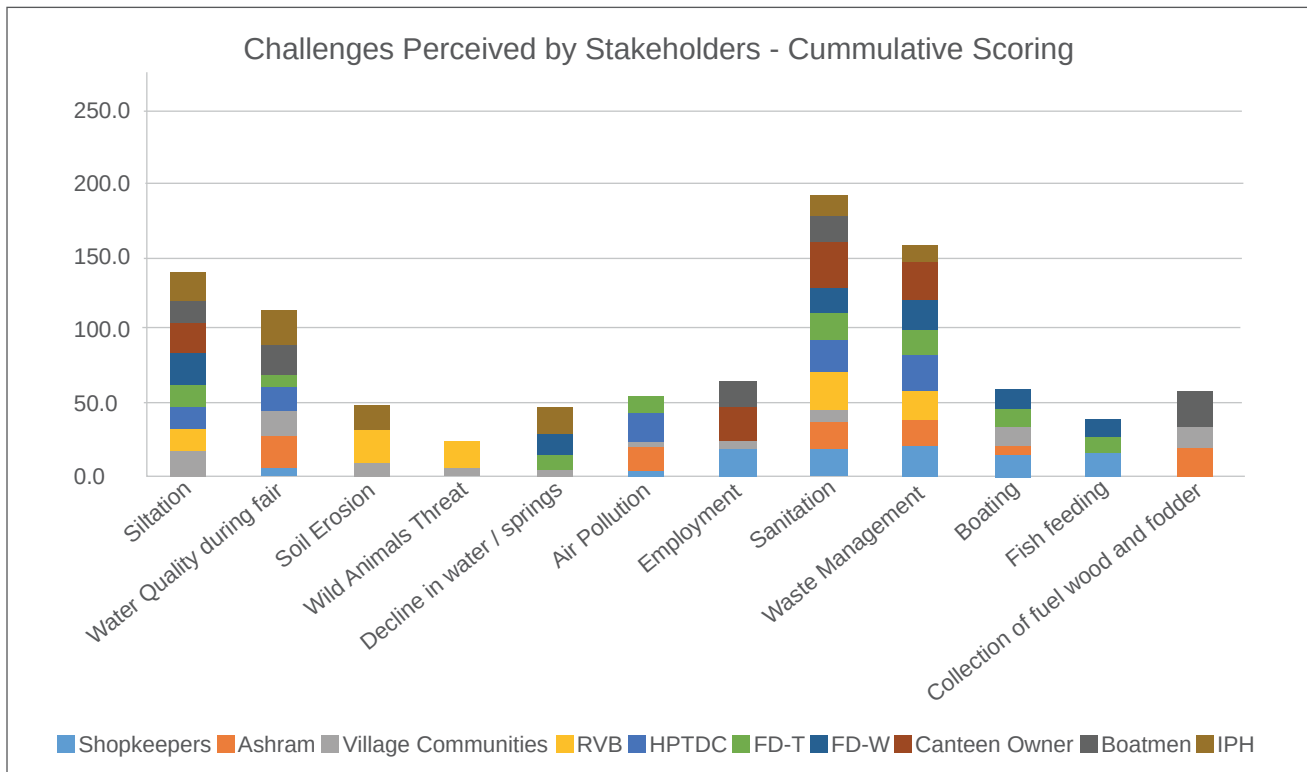


Figure 14 Challenges around the Renuka wetland.

(Source: Scoring and ranking exercises conducted with different stakeholders)

Waste management, ranking second amongst the challenges, emerged as an issue with most stakeholders. The canteen owner was of the opinion that a proper waste disposal mechanism needs to be in place. Otherwise, the waste, especially plastic, gets scattered everywhere. The shops around the lake complained about the same problem. Even though the FD and the RVB have provided dustbins, the use of plastic by tourists has not yet changed. Litter is commonly seen around the lake. The communities reported that it is only in the last 10 years that the use of plastic has intensified. The influx of pilgrims during the International Fair is the main cause. Most of the stakeholders reported that once the fair is over, Renuka Wetland and its surroundings present a disappointing spectacle. The waste management contract is given to a third party by the RVB, and volunteers and employees of the Wildlife Division engage in cleanliness drives after the fair, but these efforts are not sufficient to address the problem.

Siltation ranked third amongst the challenges and has affected most stakeholders to varying extents. Even the local communities face problems in commuting because silt gets deposited on the road, and silt gets washed off their farms. The FD is concerned about the impact of the siltation on the water quality of the lake. The deteriorating water quality of the lake was itself ranked fourth amongst the challenges, as discussed previously.



Image 9 Siltation near the lake and Jamu Koti Road

at the lake for religious reasons is a concern (according to the HPTDC, FD-T and FD-W) and needs interventions. Increased feeding is reported to have impacted the health of the fish and the quality of the lake water. It has also increased the plastic waste generated (due to the packets of Nutrela fed to the fish).

According to the FD-W and the RVB, encroachment is one of the biggest issues, along with unmanaged tourism and waste management. Shops have mushroomed around the lake, and buildings have been constructed in the protected area (see inset in Figure 15). According to the FD-W, the presence of humans and the various human activities (recreation, tourism and livelihood activities) are detrimental to the health of the sanctuary.

For the FD-T, the challenging issues include illegal forest activities, mining, hunting and fires. Some of the stakeholders expressed unhappiness about the boating activity in the lake, either stating it adds to the contamination of water by tourists (as expressed by HPTDC, FD-T, FD-W) or on religious grounds (as expressed by the village communities and Ashrams). According to the local communities, minimal livelihood opportunities have been created for them in the Renuka wetland, and they have lost their right to collect fuelwood and fodder in their own lands (Figure 15). Very few of the local people are hired in the various establishments around the lake or are hired during the fair or in plantation drives.

The various interactions with the stakeholders and the subsequent analysis clearly show that the changes that have taken place, especially in the last 30 years, in the ecosystem around Renuka wetland have resulted in a deterioration of its regulating and supporting services (at the cost of its cultural services). An integrated management plan for the wetland is called for, one in which a balance needs to be maintained between the regulating and supporting services and the cultural services. More scientific studies, awareness generation and capacity building are required. The stakeholders need to be involved more actively.

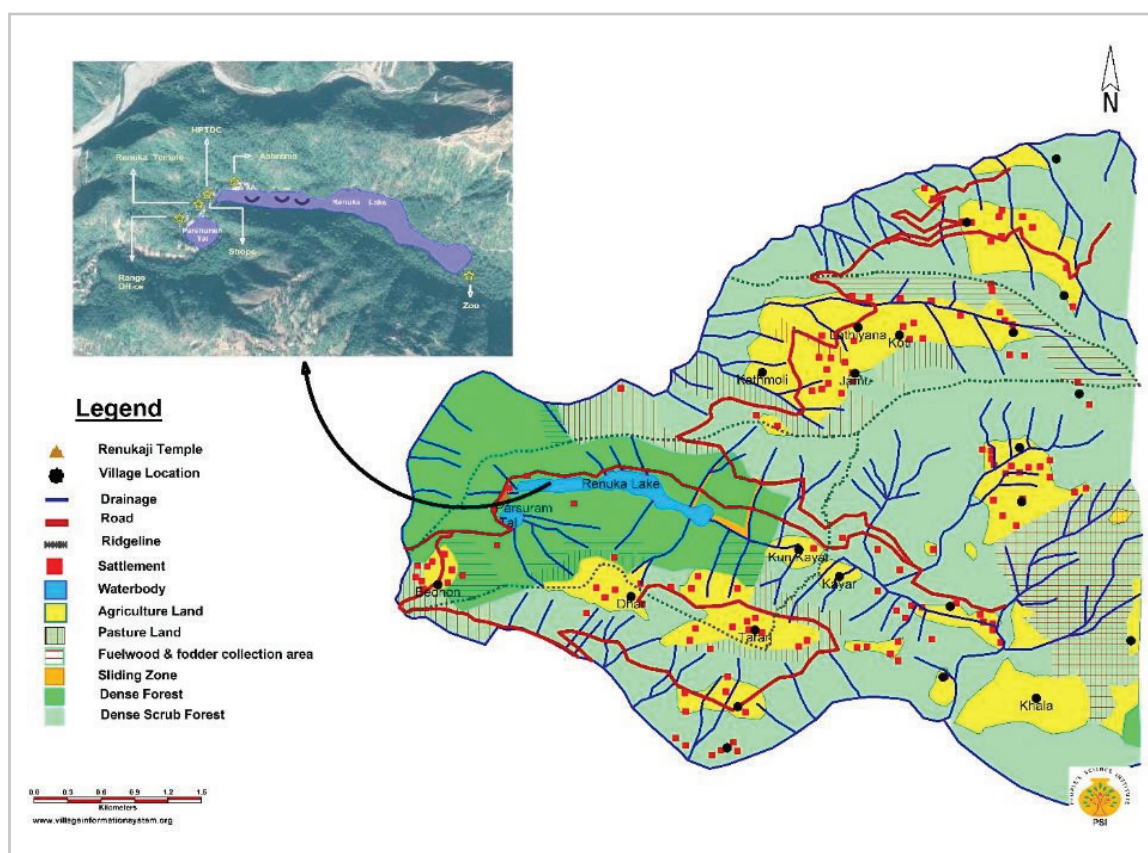


Figure 15 Ecosystem Services in and around Renuka Wetland

CHAPTER 7:

Management Measures for Sustained Supply of Key Ecosystem Services from Renuka Wetland

Wise use of wetlands entails participatory management and conservation decisions that recognize the importance of the ecosystem services provided by them. This wise use is in harmony with the functioning of the ecosystem. The management planning process must consider the full range of wetland components and related services as well as the underlying processes that enable the delivery of these services. The guidelines formulated by the MoEFCC prescribe that a diagnostic and participatory evaluation of wetlands be conducted to define a management framework and specific actions for the wise use of wetlands.

The Renuka wetland is a unique case in point. It is not only a Ramsar site but also a sanctuary. It is a hotspot of religious and tourist activities. The overlaps create a complex system for management. While the Wildlife Division of the FD has jurisdiction over the wetland and Sanctuary area, the other stakeholders like the RVB and the neighbouring communities (including the boatmen and shopkeepers) are also extremely important.

The participatory rural appraisal exercises, focus group discussions, interviews and informal interactions with the stakeholders helped produce a list of recommendations for the management of the Renuka wetland and sanctuary. The outbreak of Covid-19 and the consequent lockdown delayed the consultation to discuss the recommendations from the stakeholders. A hybrid meeting was finally organized on 28 January 2021 to obtain the stakeholders' feedback on the findings and recommendations. Some participants came to the ashram and others joined via video conferencing.

7.1 List of recommendations

These recommendations have been drawn up on the basis of the participatory discussions held with the stakeholders and the follow-up consultation held in January 2021.

Thematic	Sub-category	Recommendations	Stakeholders	Conditions
Livelihood	Fodder and Fuelwood Collection	• Allotment of <i>shaamlat</i> land (community forest land) to communities and providing assistance for growing fodder locally • Allotment of dedicated areas of forest for community use	Forest Department (Wildlife and Territorial), along with Village Forest Protection Committees	Communities will voluntarily contribute to the maintenance of the <i>shaamlat</i> land and follow protocols of fodder collection, which will be decided in a participatory manner
	Employment	• Increased number of wage days to be provided in works related to the sanctuary and wetland to the local communities • Increased number of posts within institutions to be provided to the local communities	Renuka Vikas Board, contractors, Forest Department and gram panchayats	A certain portion of the revenue earned by the Renuka Vikas Board could be contributed to the development of the neighbouring villages

Thematic	Sub-category	Recommendations	Stakeholders	Conditions
	Availability of Toilets	Increased number of bio-toilets during the fair, to cater to the lakhs of pilgrims	Renuka Vikas Board and the Forest Department (Wildlife)	Hiring of regular cleaning staff to ensure that the toilets are maintained. Permission to be obtained from the Forest Department (Wildlife) to install the toilets
Sanitation	Boating	Boating to be shifted to Parshuram Tal to cater to the religious and spiritual beliefs of the locals while providing a tourist attraction and a means of earning a livelihood	Renuka Vikas Board, in consultation with the boating contractors	Boatmen to ensure that no plastics are carried by tourists when they go boating Heavy fines to be levied for breach of rules
Siltation	Plantation and Soil Conservation Measures	- Increased plantation of indigenous species that can help curb soil erosion on the western sides of the hills - Carrying out a plant survival rate exercise every season after a plantation drive by the Forest Department (Wildlife) - Ensuring regular de-siltation of the lake - Building check dams and maintaining them on a continuous basis on the silt side of the sanctuary	Forest Department (Wildlife) and Rural Development Forest Department, along with the local communities	Certain voluntary works (<i>shramdaan</i>) to be taken up by the local communities
Environmental Quality	Water Quality	- Regular water quality assessments and display of data relating to lake water quality for transparency - Undertaking drives to make the lake water clean	Irrigation and Public Health Department, along with the State Pollution Control Board and technical NGOs	Fish feeding to be prohibited Heavy fines to be levied for breach of rules
	Air Quality	- Ensuring a dedicated parking space for vehicles during the International Fair to reduce traffic for locals - Continuous air-quality monitoring and display of air-quality data for transparency - Restrict number of vehicles entering the wetland area at a time	State Pollution Control Board, along with local NGOs	Parking space to be located far from the fair location and pilgrims to be made to walk to the location

Thematic	Sub-category	Recommendations	Stakeholders	Conditions
Water Availability	Supply and Demand Management	• Regular maintenance of pipelines by IPH • Undertaking spring recharge measures to increase discharge • Demand management and creating awareness about water consumption	IPH and Forest Department, along with local NGOs to help create awareness	Adequate attention to be paid to water availability (other than the fair)
Renuka International Fair	Religious Tourism	• Fair to be moved to a location other than near the lake to decrease the pressure on the wetland • Restricting the number of pilgrims coming to the fair and having a cap on the numbers/day • Banning the use of plastics during the fair and encouraging local products to boost the local economy	Renuka Vikas Board, ashrams and the local communities	Alternate camping place near the banks of the Giri River to be explored

7.2 Way Forward

It is important to recognize wetland ecosystem services and livelihood linkages to understand their significance in overall livelihood strategies and motivations for conservation. Understanding the degree to which wetlands contribute to people's livelihoods is crucial for wetland management so that degradation of wetlands is minimized, the benefits that wetlands have for communities are enhanced and wise use is made of them. Biodiversity enables a wetland to deliver wetland ecosystem services (food supply, tourism, livelihood, water regulation and purification, storm regulation and reducing pollution). Wetland managers therefore need to be better informed regarding the biodiversity of the wetland, its role in livelihoods and ecosystem service values and its conservation significance.

Due to the limited interactions during the prevailing Covid-19 pandemic, the recommendations that emerged from the study could not be discussed at length with the stakeholders concerned. The recommendations need to be discussed and consolidated into an integrated wetland management plan (IWMP) for Renuka wetland that will be beneficial for all the stakeholders and that will focus on ecosystem conservation. A detailed study needs to be undertaken to make an estimate of the resources (human and financial) required and to understand the cost–benefit analysis of the recommendations.

Determination of a wetland's extent helps define the geographical scope of management. Detailed extent-mapping is necessary to track wetland loss, assess the wetland condition effectively and identify specific areas requiring management interventions. The finalization of the IWMP would therefore require bringing in agencies with expertise in areas such as biodiversity conservation, environmental quality monitoring, livelihood generation and community awareness generation. Building the capacity of stakeholders will also be required for effective implementation of the IWMP and for putting a participatory monitoring system in place to facilitate decision making in the future.

Consultations with the various stakeholders should be continued during the formulation of the IWMP to ensure ownership and long-term sustainability. Because the sanctuary and a cultural and religious hotspot overlap, many challenges have emerged. A common platform is needed to address these. A Renuka Conservation and Management Platform is therefore proposed wherein all the stakeholders involved can come together for consultations, designing and finalising a manifesto (through participatory approach) to implement the IWMP of Renuka Wetland



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