

A Survey on the Benefits Gained from the Satajan Wetland by the Local Community with Special Reference to the Floral and Faunal Diversity

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ABSTRACT: The meeting points between the terrestrial and aquatic habitats are referred to as wetlands. The wetlands are very much unique and naturally productive ecosystems present on this earth. Satajan is a wetland which is situated in the Lakhimpur district in the floodplain of Ranganadi river at an altitude of 94m. Various studies and papers summarized that the wetland harbour's almost about 13 species of migratory birds, 32 species of local birds, 262 species of vascular plants as well as plants having medicinal values. Fish diversity is also remarkable in this wetland. A total of about 42 species of fish have been recorded from this wetland. So, the main aim of this paper is to focus on the benefits received by the local community from this wetland with special reference to the floral and faunal diversity present in the concerned wetland. A survey was done in the Ujani Miri Gaon, the closest village which is in the west of the wetland. During the survey we faced some challenges, as the people of the surveyed village were not that much educated so had to make them understand the aim of our survey and motivate them to give the answers of our question. Moreover, the communication problem of the village cannot be denied.

Keywords: Satajan wetland, Ecosystem, Diversity, Benefits, Floral, Faunal, Community.

INTRODUCTION

India holds a major position among the 12 mega diversity nations in the world. Situated in the heart of the river Brahmaputra is the state Assam- A land of diverse flora and fauna harbouring a variety of life forms. The word biodiversity was coined by Walter G. Rosen in 1986 in the National Forum as Smithsonian Institute, Washington. Biodiversity can be defined as “diversity of life”, which includes variety and variability within and among living organisms and the ecological complexes in which they occur (Alam, 2014). Biodiversity is a boon to human being and its proper care can benefit the present generation to the maximum level and also help to meet the needs of the upcoming generation. Nature has provided us with a natural source which marks as the most productive ecosystems in the world- ‘Wetland’. Wetlands are the transition zones between land and water. At global level, about 12.1 million km² of total area is covered by wetlands accounting for 40.06% of the global ecosystem services value (Costanza *et al.*, 2014). Wetlands account for 1-5% of the total area of our country, among which about 69% is covered by inland wetlands, about 67% by coastal wetlands and about 4% by other wetlands. Different habitats within the wetlands encompasses a range of living organisms. Wetlands harbour animals and plants at global level within the major climatic belts (Alam, 2014). The survival of species in wetland depends upon its nearby vegetation and the water quality (Buckton, 2007).

Wetland is a unique habitat because it shows changes underlying the presence of water for a significant time

which brings a change in the soil, the plant and animal community, also the microbe community. A treaty was adopted in 1971 named Ramsar International Wetland Treaty. The Ramsar Convention has recognized wetlands as the potential habitats which support diverse flora and fauna (Koester, 1989). Wetlands has also emerged as a supportive ecosystem providing livelihood to the peoples living near the habitat (Bhatta *et al.*, 2016). At present, wetlands are considered as the last remains of fresh water bodies on the earth (Prof. Bhagabati, 2010). The remote sensing technique has identified around 3000 big and small wetlands in Assam covering an area of 1400 sq. km. Around 430 wetlands in Assam have been recognized till date among which ‘Deepor Beel Wildlife Sanctuary’ is declared as the largest wetland in Assam (Das, 2021). Wetland and its biodiversity have been facing degradation due to unsustainable development and human population, Natural calamities, Habitat destruction, majorly lack of awareness have worsened this problem (Ramachandra *et al.*, 2002; Bennett *et al.*, 2018; Butchart *et al.*, 2010). One marked wetland of beautiful Assam is the ‘Satajan Wetland’ lying in Lakhimpur district. Various studies have been conducted on the biodiversity of the wetland. During a survey (Gogoi *et al.*, 2019) it was found that annual herbs and therophytes are dominant in Satajan wetland covering almost about 54.20% of floristic species. A diverse group of about 22 species of macro invertebrates have also been recorded in the wetland which have also shown a decline due to domestic sewage

and fertilizer pollutants (Hazarika, 2015). Fish species also add to the beauty of the Satajan wetland. About 42 species of fish have been reported from this wetland, among which the family Cyprinidae has dominated the area with about 30.95% of the total species (Hazarika, 2013). Satajan also acts as a home to various migratory birds. Studies conducted on the water quality of the wetland have suggested the presence of Mg and SO₄ ions in the water which is a major cause of reduction in aquatic vegetation (Bhuyan and Sharma 2022). Various other anthropogenic sources like pollution from industries and households, over exploitation of the wetlands natural resources etc. have been putting continuous pressure to this wetland (Bassi *et al.*, 2014) which needs to be targeted to make the best use of it. The Satajan wetland is surveyed to provide livelihood to almost all the local peoples dwelling nearby by providing ecosystem services (Kakoti *et al.*, 2019). Ramachandra and Kumar (2008) carried out a study on the wetlands of Greater Bangalore of India. During this study they found that the number of water bodies from 1972 to 2007 decreased from 265 to 110, covering a declination of 61% in the wetland. They also observed a 63% decrease in vegetation coverage in Greater Bangalore. Acreman *et al.* (2011) wrote a review paper on trade-off in ecosystem services of the Somerset Levels and Moors wetland. In this review paper they mentioned about the various local, regional as well as global ecosystem services provided by these two wetlands of Southwest England. Barbier *et al.* (2011) wrote a review paper on the value of estuarine and coastal ecosystem (ECE's) services. In this review paper they discussed the number of ecosystem services provided by them. They also discussed about the various benefits provided by the ECE's and mentioned about the estimated economic values or benefits provided by the ECE's services. Engle (2011) wrote a review paper on the provision of ecosystem services by the Gulf of Mexico (GOM) coastal wetlands. In this review paper they mentioned that the GOM coastal wetlands provided a good as well as beneficial ecosystem services. Kumar *et al.* (2011) carried out a study on assessing wetland ecosystem services and poverty interlinkage and sustainable livelihoods. The authors provided a general framework for the ecosystem services. The framework was mainly demonstrated in Chilika Lake and it generally captured changes in ecological characteristics in combination with the poverty status of the local communities that depend on these wetlands. They also observed a reduction in wetland services, as it was a one-directional approach. So, if there was a loss, then it was a loss for the future. Sarma and Dutta (2012) carried out an experiment on the ecological studies of two riverine wetlands of Goalpara district of Assam. During this study, they identified three classes of phytoplankton's, three classes of zooplanktons, almost about 48 species of fish, about six different classes of macroinvertebrates and about twelve species of aquatic macrophytes in both the studied wetlands. They have also observed that the eutrophic condition appeared in both the studied wetlands due to various anthropogenic activities. Hazarika (2013) carried out a survey on the diversity indices of

macroinvertebrates in the Satajan wetland of Lakhimpur district. During this study they found a total of 22 macroinvertebrates which belonged to two phyla, one was phylum Arthropoda and the other was phylum Mollusc. They also observed that almost five orders belonged to phylum Arthropoda, while the phylum Mollusc consisted of one order only. Bassi *et al.* (2014) wrote a review article on the ecosystem benefits, threats, and management strategies of the wetland of India. In their article, they mentioned that the wetlands in India provided livelihood to people as well as it served as a unique habitat for various living organisms. Moreover, it also served as an alternate source for ground water replenishment, irrigation, water supply etc. Deka and Sharma (2014) carried out a study on the status of aquatic macrophytes of the wetlands of Nalbari district of Assam. During this study they found a total of about 137 macrophytic species which belonged to 114 genera and 53 families. They also observed that out of all the identified macrophytes, the family "Poaceae" has been recorded as the most dominant family consisting of 15 species. They have also mentioned that at present the quality of the wetland has been deteriorating day by day. Das (2015) carried out a study on the degradation of wetland environment of Dora Beel of Kamrup district. During this study almost about 49 species of fish has been recorded. They have also found that out of 29 houses surveyed about 49% people were not interested in farming, while about 52% people were interested in farming. Moreover, they have also found that the studied wetland has been under threat due to various reasons like- agricultural intensification, pollution, infested by invasive weeds etc. Moreover, local community people also used the wetland for their livelihood. So, the area of the wetland has been decreasing and the condition of the wetland has also been degrading day by day. Geethu *et al.* (2015) carried out a study on the water quality assessment of the Polchira wetland of Kerala. During this study they observed that except some parameters like pH, BOD, nitrate, and conductivity the remaining parameters like- DO and chloride were recorded to be satisfactory. Bhatta *et al.* (2016) carried out a survey on the ecosystem service changes and livelihood impacts of the Maguri-Motapung wetland of Assam. During this study they have found about 29 ecosystem services which were recorded as essential for the livelihood of the local people. They have also observed that the area was dominated mainly by the ethnic minorities like- Morang, Motok and Kuch with an average household size of about 4.9. Ahmed (2018) wrote an article on the Northeast Now entitled "Picnic, sand mining keeps winged visitors away from wetland in Lakhimpur". In this article the writer mentioned about various picnic parties coming to the wetland, uncontrolled sand mining etc. has led to the gradual destruction of the wetland. Moreover, after 2015, the movement of three passenger trains on regular basis through the track that crossed through the wetland has caused numerous problems to the wetland, especially a decline in the number of migratory bird species. Chaudhary and Ahi (2019) carried out a survey on the biodiversity of aquatic insects in Sagar Lake and they also evaluated the water quality of the lake. During their

survey they observed about 23 taxa during the rainy season. While in winter only 13 taxa were observed and in summer season about 22 taxa were observed. They have also observed a degradation in the water quality of the Sagar Lake. Ahmed (2021) wrote an article entitled, "Assam: Lakhimpur hosts Satajan Bird Festival" on Northeast Now. In this article the writer mentioned that Lakhimpur district administration in collaboration with Lakhimpur Forest Division and various NGOs hosted the first "Satajan Bird Festival" on 10th January of 2021 at Pahumora on the bank of the Ranganadi river. During this program the bird named 'Black Face Bunting' has been spotted for the first time in the wetland. The main aim of this program was to create awareness among the local people. Bhuyan (2021) carried out a study on the environmental degradation of the Satajaan Beel of Lakhimpur. During this study they observed that the Satajan wetland has been facing water related issues like-water quality degradation, pollution of aquatic system and some ecological and geographical issues. The writer has also mentioned that loud sound from picnic parties, construction related works, railway transportation etc. has decreased the number of local as well as migratory birds that used to visit the wetland. Das (2021) wrote an article on The Sentinel on 14th December entitled "Assam's wetlands under threat vanishing fast". In this article he mentioned that almost about 3000 big and small wetlands were present in Assam covering about 1400sq.km. But due to various reasons like- illegal encroachment, invasion of weeds, pollution etc. these wetlands have been under threat.

Phukan (2021) carried out a survey on the ecosystem services provided by the Satajan wetland to the local community people of the Satajan village. Almost 25 households have been surveyed and during this survey the author observed that the Satajan wetland provides a livelihood to almost all the people living in the village. Moreover, the wetland also helps the local people in terms of income or serves as an alternate source of income. Phukan and Kakoti (2021) carried out a survey on the valuation of medicinal plants and cultural ecosystem services of the Satajan wetland of Lakhimpur. During this survey they found that the wetland provided a huge livelihood to the local community people

especially the Mishing tribe dwelling nearby the wetland. They also observed that the evaluated value of wild medicinal plants of Satajan wetland was around Rs. 5,64,000 or 8417\$ only. Saha (2021) carried out a survey on the diversity of the wetland plants of Tripura. During this study the author found about 40 taxa that belonged to 35 genera and 25 families of both aquatic as well as marshland plants from the Khowai river system. Out of all these, only one family with a single species belonged to Pteridophytes, while the remaining 39 species belonged to Angiosperms. Moreover, they observed that out of all the family "Poaceae" has been recorded as the most diverse family.

This paper mainly focuses on the benefits gained from the Satajan wetland by the local people of the Ujani Miri Gaon along with their involvement in the conservation measures undertaken to protect this wetland. For this a thorough survey was carried out by taking 60 households out of 103 households as our sample size. Our study is also an addition to the study of the biodiversity of the Satajan wetland which will add information to the list and help researchers in exploring the wetland and carry out their research work in protecting its diversity.

MATERIAL AND METHODS

Study Area. Our study is mainly focused on the Satajan Wetland or Beel. Satajan is a wetland cum Bird Sanctuary of the North Lakhimpur district of Assam. It is located between 27°12'23.7" to 27°12'40.00"N latitude and 94°03'08.5" to 94°03'08.8" E longitude and about 94m altitude in the floodplain of Ranganadi river. It is one of the last surviving wetlands of that area and it harbours enormous bird species both local as well as migratory species. The wetland is very much diverse in context of both flora as well as fauna also. Currently, this wetland is surviving because of the exceptionally active role of the local community. The "Bird Man of Lakhimpur" Late Mr. Baliram Gogoi was known to have played a great pioneer role in the conservation process of the wetland. After his death in 2018, his son Mr. Lakhidhar Gogoi along with the local people of that area have been contributing as much as possible in order to conserve the Satajan Wetland of Lakhimpur district.



Map of the Study Area (Source: Google Earth, Version: 9.175)

Objectives of the Study.

1. To know about the benefits gained from the Satajan Wetland by the local people of the Ujani Miri village.
2. To know about the various floral and faunal diversity of the Satajan Wetland.

Data Collection. The data collection method used in this paper is the survey method. Raw and primary data were being collected through standard questionnaire from the local people of the Ujani Miri gaon, the closest village from the wetland, which is situated in the west of the

Satajan wetland. Secondary data were being collected from the “Gaonburha” of the Ujani Miri gaon Mr. Binud Mili. The time period of the survey was almost 6 days from 14th of January to 20th of January of the year 2023. We have covered almost about 10 houses per day in order to complete our survey.

RESULTS AND DISCUSSION

From this pilot it was observed that the local community living around the Satajan wetland receives many benefits from the wetland. Significantly, the Ujani Miri Gaon, which is situated in west of the Satajan wetland is chosen for the survey because it is the closest village from the wetland. There are a total of about 103 households in the village with a population near about 490. The name of the Gaon Panchayat (GP) is – Pahumara GP and the name of the block is – Nowboicha Block. The sample survey was carried out by taking 60 households as our sample size. Regarding the main focus of the study, i.e., the benefits gained from the wetland, from our survey it was found that out of 60 households surveyed almost about 52 households are benefited from the wetland which is covering nearly 86.67% like- using various medicinal plants from the wetlands, getting natural herbs for beverage preparation, getting fresh air from the wetland, they also get a recognition as well as name and fame due to the presence of the wetland. The local people of the surveyed village were benefited mainly from the various medicinal plants that are found in the wetland. Out of 52 households getting benefits from the wetland almost about 48 households use medicinal plants from the wetland, which covers nearly about 92.30% (Table 1). Kola kochu, tengesi saak, bor-manimuni, tora paat, durun bon, bon-jaluk, mejenga, dimoru, mosondori, Nayantara, ombe paat etc. are the names of some medicinal plants that they have been using and were told by them during the survey. Most of the people of the Ujani Miri Gaon mainly belonged to the ‘Mishing Tribe’. So, they also mentioned that they get many medicinal herbs from the wetland that helped them to make traditional beverages. During the survey they have also mentioned that they got a name and recognition due to the presence of the Satajan wetland and that is their pride.

The primary source of income of the population of the Ujani Miri Gaon is found to be farming which is almost covering about 63.33%. While on the other hand, the farming and allied activities, services, non-farming activities and pig farm covers around 18.33%, 8.33%, 6.67% and 1.67% respectively (Table 1). Out of 60 households almost about 29 households have employed

person/persons either in government or in private sectors which covers nearly around 48%. Despite of the enormous benefits gained from the wetland almost about 22 households out of 60 have also revealed about the problem they were facing because of the wetland and it covers nearly about 36.67% (Table 1). And the most prominent one according to them is the road problem. They have to face a lot of problems during communication as the road condition is not that much good. The area is also not that much developed as only one Anganbadi and one LP school is currently present and they to travel far for their study purpose. During the survey it was also found that the local people of the village have been dedicatedly working for the conservation of the Satajan wetland. Out of 60 households almost about 21 households are involved in the conservation process of the wetland and it covers almost about 35%. They have also mentioned that many of them are also involved in undertaking various conservative measures like- prohibit fishing in the wetland, they have also put some people who were involved in catching fish from the wetland into the bars, cleaning the wetland, prohibit people from doing toilet and urine in the wetland, helped in organizing the “Fish Festival” held on 2022 in the wetland, making the people aware about the importance of the wetland, prohibit cutting of the trees in the wetland, stopped killing of the local as well as migratory birds, helped in organizing the “Satjan Bird Festival” in 2022 etc.

Late Mr. Baliram Gogoi “The Bird Man of Lakhimpur” has conserved the Satajan wetland by himself for many years. But now, after his death, his son Mr. Lakhidhar Gogoi along with the local community have been serving really good for the conservation of the wetland. The Gaonburha of the Ujani Miri Gaon have also mentioned that apart from fish, there are also abundant number of turtles present in the wetland. At present the fishing is totally prohibited in the wetland. According to his, at present the diversity of fish is an area of concern in the wetland as in 2017 due to severe flood the wetland had lost many species of fish. Now, NGO’s and Government schemes have also been sanctioned to conserve the biodiversity of the wetland. Forest department also visits the wetland, time to time for inquiry. Along with Binud Mili, Lakhidhar Gogoi, Miran Bori, Bipin Morang, Projen Pawe, Anil Morang, Champa Bori, Uday Sankar Hazarika and Bharat Bori have also donated their own plot for the wetland. Recently in 2022 “Bird Festival” have also been organized and celebrated in the wetland.

Table 1: Summary Report of Our Survey.

Parameters	Explanation
% of Employed Present	48% Employed (Out of 60 households about 29 households have employed person/persons)
Primary Source of Income	Farming – 63.33% (Main), Farming & Allied Activities –18.33%, Service – 8.33%, Non-Farming – 6.67%, Pig-Farm – 1.67%
Benefits from the Wetland	Medicinal Plants – 92.30% households (Main), Recognition, Fresh air & Medicinal plants– 16.67%, Beverage making & Medicinal Plants – 10%, Only Recognition – 3.33%, Only Beverage making – 3.33%
Problems Faced Due to The Wetland	36.675 households face problem. The most prominent problem is the ‘Road condition’
Conservation Measures Undertaken (If any)	35% of households are involved in undertaking conservative measures. Like – Prohibit fishing, killing of local as well as migratory birds, cutting of trees etc., cleaning the wetland etc.

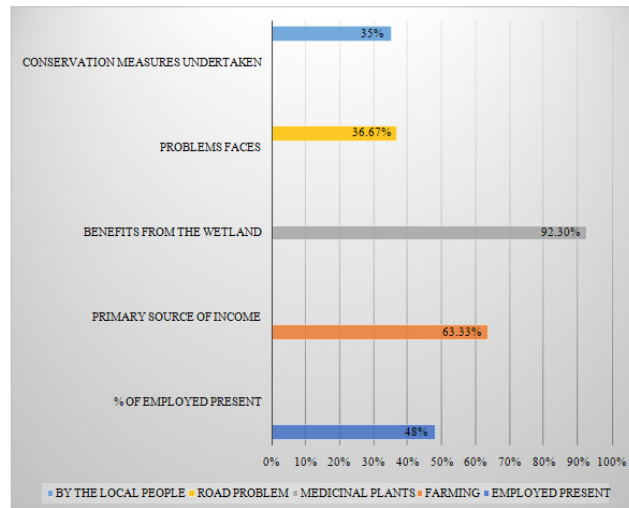


Fig. 1. Graphical Representation of The Summary Report of Our Survey

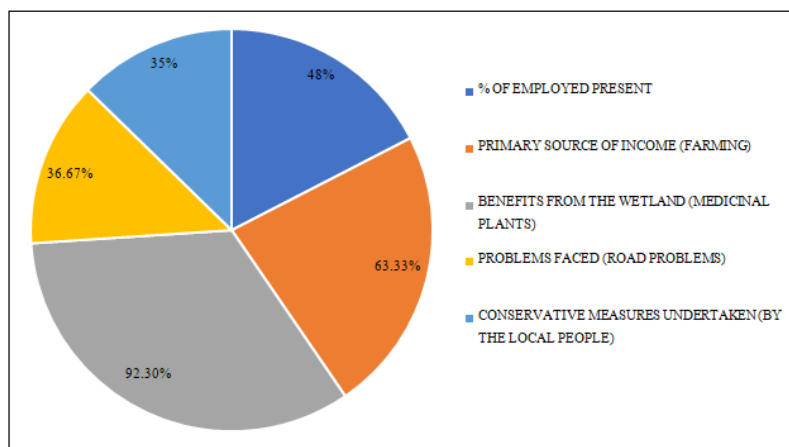


Fig. 2. Pie-Chart Representing the Summary Report of our Survey.

Table 2: Primary Source of Income of The Surveyed Households.

Sr. No.	Primary Source of Income	% Of Households
1.	Farming	63.33%
2.	Farming & Allied Activities	18.33%
3.	Service	8.33%
4.	Non-Farming	6.67%
5.	Pig Farm	1.67%

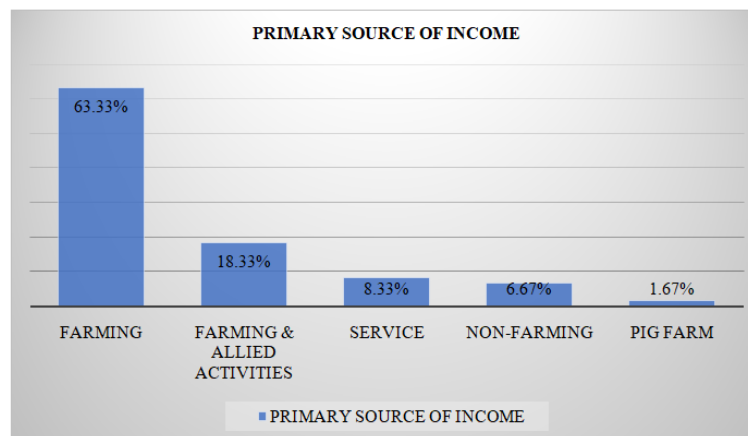


Fig. 3. Graphical Representation of the Primary Source of Income of the Households.

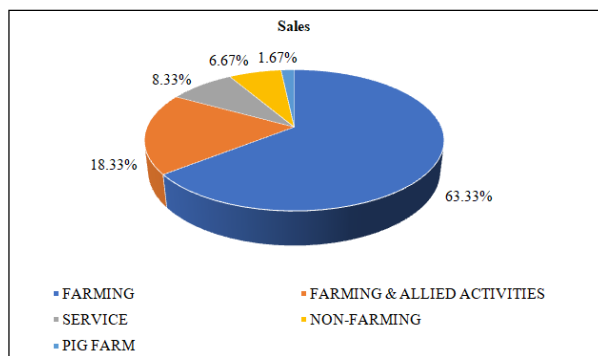


Fig. 4. Pie-Chart Representing the Primary Sources of Income of The Households.

Table 3: Benefits From the Wetland.

Sr. No.	Benefits From the Wetland	% Of Households
1.	Medicinal Plants	92.30%
2.	Recognition, Fresh Air & Medicinal Plants	16.67%
3.	Beverage Making & Medicinal Plants	10%
4.	Only Recognition	3.33%
5.	Only Beverage Making	3.33%

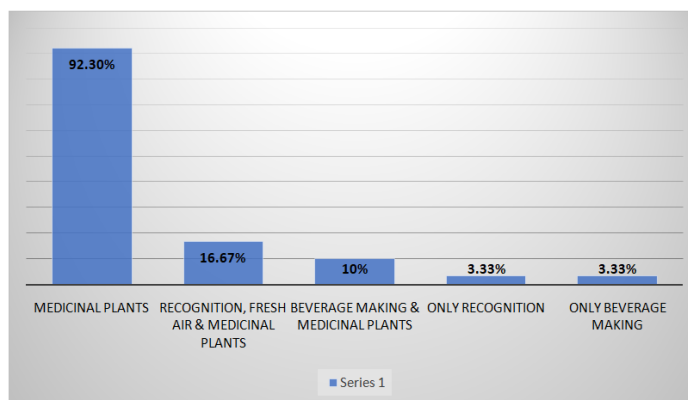


Fig. 5. Graphical Representation of The Benefits Gained from The Satajan Wetland.

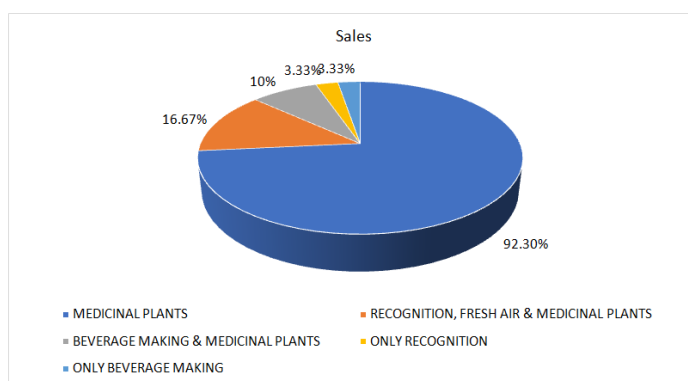


Fig. 6. Pie-Chart Representing the Benefits Gained from The Satajan Wetland

Summary of our survey. Thus, from this survey it was observed that almost about 48% of the households surveyed have employed person/persons either in government or in private sectors. While, the main primary source of income of the maximum households surveyed was found to be farming and it covers around 63.33%. Similarly, out of the houses surveyed it was found that almost about 86.67% households were benefited from the Satajan wetland and out of them

almost about 92.30% households were using the medicinal plants found in the wetland. Despite of the enormous benefits gained from the wetland the local people of the Ujani Miri Gaon also faced problem due to the presence of the wetland. Almost about 36.67% households face problem and the most prominent one is the road problem, as the condition of that area is not that much good. On the other hand, almost about 35% households were involved in undertaking various

conservative measures in order to conserve and protect the Satajan wetland. Gogoi *et al.*, 2019 carried out a survey on the vascular plant diversity of the Satajan wetland. During their survey they have found that the annual herbs and therophytes have dominated the floristic diversity of the wetland by covering almost around 54.2% species and 58.4% species respectively. On the other hand, they have recorded almost about 262 species of vascular plants as well as plants having medicinal values. Out of them only 7 species of plants belong to pteridophytes and the rest 255 species were angiosperms. In their paper they have also mentioned that the wetland is also rich in various ichthyofaunal, avifaunal as well as large number of migratory bird species. Kakoti *et al.* (2019) carried out a survey on the ecosystem services provided by the Satajan wetland of the Lakhimpur district. During the study they have observed that the wetland provides livelihood to almost all the local people dwelling near the wetland, specially the Mishing tribe. They have conducted a survey in the Satajan village taking 30 households as their sample size and have found that the villager often collects wild edible plants both for consumption as well as for earning purpose. And by adopting the marked valuation method they have found that the yearly income of the villager by selling the wild edible plants was nearly 15,22800 INR. Similarly, by adopting the same valuation method in case of fodder (grass) the yearly income was around 108,000 INR. Likewise, in case of fish it was around 20,44,800INR, but at present fishing is totally prohibited in the wetland. Similarly in case of firewood the yearly income was around 5,40,000 INR and in case of medicinal plants it was around 5,64,000 INR. On the other hand, the wetland also serves as a freshwater reservoir, so by alternate valuation method it was found that the wetland serves as an alternate source of water worth about 54,000 INR. So, the author concluded that the wetland provides a much important benefits to the people living nearby it. A same type of survey was also conducted by Phukan (2021) in the Satajan village by taking 25 households as his sample size. Then started their survey by taking 4 parameters – Wild edible plant, fodder (grass), fishes and fresh water by undertaking two methods, one is market valuation method and the other is alternate valuation method. In case of wild edible plant, the yearly income of the village was 83,950 INR. Likewise, in case of fodder (grass) it was around 10,800 INR. Similarly, for fishes it was around 88,200 and for fresh water by the alternate valuation method the yearly income of the village was around 60,000. Bhuyan and Sharma (2022) carried out an experiment on the water quality and change detection of the aquatic vegetation of the Satajan wetland present in the Lakhimpur district of Assam. To understand the quality of water in the wetland the authors have collected water samples from 10 different sites through random sampling. From the study they have found that the wetland has been dominated mainly by two ions, one is Mg ion and the other is SO₄ ion. And by comparing the results obtained from their experiment the authors have

concluded that the aquatic vegetations present in the wetland have decreased from 2016 to 2022 by the rate of almost 2.84 acer or 7.84%. Bassi *et al.* (2014) wrote a review article on the ecosystem benefits, threats, and management strategies of the wetlands of India. In their article, they have mentioned that in India, the wetlands provide a livelihood to the people and it also acts as a unique habitat for the various living organisms like aquatic plants, herbs, migratory birds etc. They also provide some other services like irrigation, water supply, ground water recharge, protection from flood etc. At last, they have mentioned that at present the wetlands present in both rural as well as urban areas are facing various anthropogenic pressure like – pollution from industries and households, over exploitation of natural resources found in the wetland etc.

Chaudhary and Ahi (2019) carried out a survey on the biodiversity of aquatic insects in Sagar Lake. They have also evaluated the water quality of the lake from July 2013 to June 2015. During their survey they have found that almost about 23 taxa of the higher aquatic insect diversity has been observed during the rainy season, while in winter it was only 13 taxa and in summer season about 22 taxa has been recorded from the lake. They have also found that due to the addition of waste from various sources, there is a fluctuation in the diversity of the aquatic insects in the lake. And by summarizing their results they have concluded that the lake has been facing various stress conditions due to various anthropogenic activities. Also, the water quality of the lake has been degrading day by day. Bhatta *et al.* (2016) carried out a survey on the ecosystem service changes and livelihood impacts of the Maguri-Motapung wetlands of Assam. They carried out their survey on 7 villages near the wetland. During their study almost about 29 ecosystem services were recorded as essential for the livelihood of the local people. During their study they have also found that the wetland was mostly dominated by the ethnic minorities like – Morang, Motok and Kuch with an average household size of about 4.9. They have also found that the literacy rate of these villages was 62% with only 5% of the population above higher secondary education. On the other hand, almost about 10% population of these villages were employed in either government or private sectors.

Hazarika (2013) carried out a study on the physio-chemical characteristics of the Satajan wetland with special reference to the fish diversity of the wetland. For analysing the water quality, water samples were collected from different sampling sites from March, 2011 to February, 2012. He found a satisfactory results in all the parameters except the chloride content and the dissolved oxygen (DO) level of the wetland. Moreover, to study the fish diversity of the wetland, fishes were collected mainly during the post monsoon and winter season. Fishes were collected mainly with the help of local fisherman through gill net, cast net, drag net etc. He found a total of about 42 species of fish from the wetland and among them the family “Cyprinidae” has been recorded as the dominant family comprising about 30.95% of the total species. At last, he concluded that

since the chloride content and DO level is comparatively high in this wetland so, it indicates towards the contamination of the wetland due to various sources like – disposal of domestic waste, cow dung etc.

Phukan and Kakoti (2021) carried out a survey on the valuation of medicinal plants and cultural ecosystem services of the Satajan wetland of Lakhimpur district of Assam. During this survey they observed that the surveyed wetland provides livelihood to the local community people especially the Mishing tribe dwelling nearby the wetland. Acreman *et al.* (2011) wrote a review paper on trade-off in ecosystem services of the Somerset Levels and Moors wetlands. In this review paper they mentioned about the various local, regional as well as global ecosystem services provided by the two wetlands. Some ecosystem services provided by them were- grazing for cattle, carbon sequestration, flood water storage, maintenance of biological diversity etc. Barbier *et al.* (2011) wrote a review paper on the value of estuarine and coastal ecosystem (ECE's) services. In this review paper they discussed that the global decline in the ECE's has been affecting the number of ecosystem services provided by them. They also discussed about the various benefits provided by the ECE's. Das (2015) carried out a study on the degradation of wetland environment of Dora Beel of Kamrup district. During this study almost about 49 species of fish has been recorded. They have also found that out of 29 households surveyed about 49% people were not interested in farming, while about 52% people were found to be interested in farming.

Floral and Faunal Diversity of Assam. India is one of the most biodiverse countries in the whole world. Out of 36 Biodiversity Hotspots in the world 4 are present in India only. They are – The Himalayas, The Western Ghats, The Indo-Burma Region and The Sundaland. Since, Assam is situated in the Eastern Himalayan Biodiversity Region which is one of the “Biodiversity Hotspots” of India. So, it is one of the most diverse states of the North-Eastern region of India. It also harbours a wide range of endemic species which is confined to this region of India. Based on its floristic diversity, many eminent research scholars described Assam as the “Biological Gateway” of the North-East. Many migratory bird species also uses the various wetlands of Assam for resting, some also uses it as their breeding ground (Assam State Biodiversity Board. The state Assam has 7 National Parks, 17 Wildlife Sanctuaries, 4 Tiger Reserves, 5 Elephant Reserves and 2 World Natural Heritage Sites. Almost about 3854 species of flowering plants have been recorded in Assam, which covers around 25.12% of total floral diversity of India. The family ‘Poaceae’ have been recorded as the largest family of vascular plants comprising of almost 303 species. Assam also harbours various endemic plants, which are confined and restricted to that region only. Out of 165 floral species that are distributed in some regions of the North-East along with Assam, almost about 100 species are restricted to the land of Assam. According to IUCN from the land of Assam almost about 10 species

of plants have been recorded as “Extinct”, 1 species of plant named *Paphiodelilum specerianum* as “Extinct in Wild”, 284 species as “Critically Endangered”, 149 species as “Endangered”, 58 as “Vulnerable” and about 13 species as “Near Threatened” (Baruah *et al.*, 2023). Assam also harbours a wide range of mammals. The mammalian diversity of the state consists about 193 species which are widely distributed. But some species like – the one horned rhinoceros, water buffalo, pygmy hog, swamp deer, golden langur and hollock gibbon have been strictly distributed and restricted to some protected areas of the state. Out of 15 primate species found in India almost about 9 species of primates are found in the land of Assam. The Hollock gibbon at present is the only ape and the Slow lorries is the only prosimian the state has. Thus, the state serves as the home for almost all the primate species found in the North Eastern region of India. Assam also serves as the home to almost 53.5% of bird species found in India. Out of them almost about 17 species of birds are endemic to Assam and 45 species of birds are also included in the Indian Red Data Book. The state also harbours about 185 foods, sports as well as ornamental fish species. Out of them almost 25 species are identified as threatened and the main cause behind it is over exploitation (Baruah *et al.*, 2023).

Floral and Faunal Diversity of the Satajan Wetland.

Though Satajan Wetland is a small wetland, but it is very much rich in bio-diversity. It is diverse in terms of medicinal plants, vascular plants, migratory and local bird species, fishes and other economically important plants and animals. Though many medicinal plants, vascular plants and fish species can be listed here, but regarding bird diversity it is a matter of concern and further research is very much in need in the near future. According to some survey reports published during the period 2018-2021 almost about 262 species of vascular plants and plants having medicinal values have been recorded from the Satajan Wetland (Gogoi *et al.*, 2019; Kakoti *et al.*, 2019; Phukan and Kakoti 2021). In this paper we have included names of almost 25 vascular plants and 15 medicinal plants found in the Satajan Wetland along with their local name, English name, scientific name, uses and their medicinal uses.

USES OF WETLANDS

At present time wetlands are one of the most important ecosystems which is present in the earth and which provides various benefits not only to the human beings but also to all the living organism present on this earth. Some benefits or importance of wetlands are discussed below:

1. Wetlands are one of the most important naturally occurring productive ecosystem present on the earth. These areas are very much productive in nature and are also rich in various nutrition, fish resources etc. Wetlands also harbours various aquatic plant as well as animal species and serves as a home for various plant and animal species.

Table 4: Some vascular plants recorded from the Satajan wetland.

Sr. No.	Local Name	English Name	Scientific Name	Family	Uses
1.	Bhringraj	False daisy	<i>Ecliptaprostrata</i>	Compositae	It is used to treat skin problems, hepatic problems, spleen enlargement, asthma etc.
2.	Simolu	Red silk cotton tree	<i>Bombax ceiba</i>	Malvaceae	Bark exudates are used to treat worms, diarrhoea, constipation etc.
3.	Jilmil saak	Mexican tea	<i>Dysphania amrosioides</i>	Amaranthaceae	Used to treat inflammatory problems, lung infection, used as analgesics etc.
4.	Lajuki-lota	Touch-me-not	<i>Mimosa pudica</i>	Leguminosae: Mimosidae	Used to treat dysentery, sinus, diarrhoea, piles etc.
5.	Heluka	Soft bollygum	<i>Litsea glutinosa</i>	Lauraceae	Used to make agricultural tools, have inflammatory activity, used to treat edema, rheumatic arthritis etc.
6.	Asoy-bon	Swamp hypericum	<i>Hypericum japonicum</i>	Hypericaceae	Used to treat hepatitis, bacterial diseases, internal haemorrhages, tumours etc.
7.	Pitta paat	Water willow	<i>Justicia procumbens</i>	Acanthaceae	Used to treat coughs, asthma, ophthalmia, acts as antioxidant in stress management etc.
8.	Paniphol	Water chestnut	<i>Trapa natans</i>	Lythraceae	An important plant of Indian Ayurvedic medicine, used to treat problems of kidney, spleen, liver etc.
9.	Pane-seuli	Water snowflake	<i>Nymphaoides indica</i>	Menyanthaceae	Stems are used to make an emollient plaster, used as food etc.
10.	Bonoria-long	Mexican primrose willow	<i>Ludwigia octovalvis</i>	Onagraceae	It is used as a herbal medicine to treat edema, hypotension etc.
11.	Sesu	Wild Berry	<i>Maesa indica</i>	Primulaceae	Used for blood purification, to treat anthelmintic ailments.
12.	Kone-Simolu	Tropical Spiderwort	<i>Commelina benghalensis</i>	Commelinaceae	Used to treat burns, pain, sore throat, leprosy etc.
13.	Jhau-bon	Tamarisk	<i>Tamarix dioica</i>	Tamaricaceae	Traditionally used to treat dental problems, diabetes etc.
14.	Indronil	Ceylon hydrolea	<i>Hydrolea zeylanica</i>	Hydroleaceae	Leaves are used to treat intestinal disorders, household remedy for diabetes, have antiseptic properties etc.
15.	Xoru puni	Common duckweed	<i>Lemna minor</i>	Araceae	Mainly used as a remedy for blocked nose, nasal inflammation, used as homeopathic medicines etc.
16.	Abutenga	Fruiting branch	<i>Antidesma acidum</i>	Phyllanthaceae	Leaves are used traditionally to treat stomach ache of children, diabetes etc.
17.	Bil rai	Yellow cresses	<i>Rorippa benghalensis</i>	Brassicaceae	Leaves are mainly used to treat headache, malaria etc.
18.	Chatim	Blackboard tree	<i>Alstonia scholaris</i>	Apocynaceae	It is used to treat cancer, malaria, jaundice etc.
19.	Bhat meteka	Arrow leaf pondweed	<i>Monochoria hastata</i>	Pontederiaceae	Used to treat nausea, toothache, itching, asthma, cold etc.
20.	Goru-khis	Indian Strawberry	<i>Duchesnea indica</i>	Rosaceae	Used as an anticoagulant, antiseptic, used to treat swellings, skin diseases etc.
21.	Sonaru	Indian Mussaenda	<i>Cassia fistula</i>	Fabaceae	Used to treat blood dysentery, joint pain, migraine, fever etc.
22.	Pani-binna	Water thyme	<i>Hydrilla verticillata</i>	Hydrocharitaceae	Used to improve digestion, circulation, gastrointestinal function, blood sugar control etc.
23.	Khar	Indian Marshweed	<i>Limnophila indica</i>	Plantaginaceae	Used as an antiseptic, infusion of leaves is used to treat dyspepsia, diarrhoea etc.
24.	Tora	Black Ghangal	<i>Alpinia nigra</i>	Zingiberaceae	Used to treat impotence, bronchitis etc., used as an appetizer.
25.	Hurhuriya	Tick Weed	<i>Cleome viscosa</i>	Cleomeaceae	Traditionally used in Indian Ayurvedic medicines, used to treat hypertension, malaria, rheumatic arthritis etc.

(Source: Gogoi et al., 2019)

Table 5: Some medicinal plants recorded from the Satajan wetland.

Sr. No.	Local Name	English Name	Scientific Name	Family	Medicinal Values
1.	Matikanduri	Sisso spinach	<i>Altermathera sessilis</i>	Amaranthaceae	Used to treat bronchitis, asthma, hepatitis, lung troubles etc.
2.	Tengesi saak	Creeping woodsorrel	<i>Oxalis corniculata</i>	Oxalidaceae	Possesses various antioxidant, anti-inflammatory properties, used to treat high BP, rich in Vit. C, improves memory etc.
3.	Durun bon	Ceylon slitwort	<i>Leucas zeylanica</i>	Lamiaceae	Used traditionally to treat inflammation, gout, skin diseases.
4.	Kola kosu	Elephant ear	<i>Colocasia esculenta</i>	Araceae	Used to treat diarrhoea, asthma, internal haemorrhage etc.
5.	Dhekia	Fiddlehead fern	<i>Diplazium esculentum</i>	Athyriaceae	Used to treat diabetes, dysentery, headache, hypertension etc.
6.	Man Dhonia	Fish mint	<i>Houttuynia cordata</i>	Apiaceae	Used to treat pneumonia, lung disease, diabetes, cough etc.
7.	Laijabori	Tropical chickweed	<i>Drymaria cordata</i>	Caryophyllaceae	Used to treat bronchitis, leprosy, tumours, eye troubles etc.
8.	Gondho-bon	Billygoat weed	<i>Ageratum conyzoides</i>	Compositae	Used to treat headache, arthrosis, dyspenia etc.
9.	Bor manimuni	Asiatic pennywort	<i>Centella asiatica</i>	Apiaceae	Used as a blood purifier, used to treat high BP, to enhance memory etc.
10.	Bom chini	Sweet broomweed	<i>Scoparia dulcis</i>	Plantaginaceae	Used to treat stomach-ache, kidney stone, fever, diarrhea etc.
11.	Bobosa-bon	Indian goosegrass	<i>Eleusine indica</i>	Poaceae	Used in traditional medicine as a diuretic laxative, anti-helminthic etc., also used to treat cough.
12.	Honborolua	Caesar weed	<i>Urena lobata</i>	Malvaceae	Used to treat diabetes, malaria, rheumatism, dysentery etc.
13.	Pononoa	Pepper elder	<i>Peperomia pellucida</i>	Piperaceae	Used to treat headache, gout, fatigue, renal disorders etc.
14.	Rangoli-lota	Shrubby Deeringia	<i>Deeringia amaranthoides</i>	Amaranthaceae	Its fruit is used as an anti-cancer, roots are used to treat jaundice, dysentery etc.
15.	Bon-jaluk	Diamond flower	<i>Oldenlandia corymbosa</i>	Rubiaceae	It is used to activate blood circulation, promote diuresis, clear heat and toxins etc.

(Source: Kakoti et al., 2019)

According to Late Mr. Baliram Gogoi (The Bird Man of Lakhimpur), there are almost about 34 local species of birds and among them 8 species are listed here (Species names were mentioned by Mr. Baliram Gogoi) along with their local name, English name, scientific name and their feeding habit.

Table 6: Some species of birds present in the Satajan wetland.

Sr. No.	Local Name	Common Name	Scientific Name	Family	IUCN Status	Feeding Habit
1.	Maniori	Darter or Snake bird	<i>Anhinga anhinga</i>	Anhingidae	LC	Mainly carnivores and feeds mainly on crustaceans, amphibians, fish, invertebrates etc.
2.	Wak bog	Night Heron	<i>Nycticorax nycticorax</i>	Ardeidae	LC	Mainly feeds on fish, insects, small mammals etc.
3.	Xoru murgi hanh	Gadwall	<i>Mareca strepera</i>	Anatidae	LC	Mainly vegetarian and feeds on aquatic vegetation, weeds, seeds, roots, females take aquatic invertebrates during laying period.
4.	Bor kolimurgi	Ferruginous duck	<i>Aythya nyroca</i>	Anatidae	NT	They are basically omnivores and feeds mainly on aquatic plants, insects, molluscs etc.
5.	Kam chorai	Purple moorhen	<i>Porphyrio porphyrio</i>	Rallidae	LC	Mainly feeds on soft shoots of reeds, rushes, molluscs etc.
6.	Phutuki hanh	Indian spot-billed duck	<i>Anas poecilorhyncha</i>	Anatidae	LC	Mainly feeds on grasses, insects, vegetations etc.
7.	Bortokola	Lesser Adjutant Stork	<i>Leptoptilos javanicus</i>	Ciconiidae	VU	They mainly feed on reptiles, frogs, large invertebrates, rodents etc
8.	Horali	Lesser Whistling duck	<i>Dendrocygna javanica</i>	Anatidae	LC	They mainly feed on fishes, snails, worms, plants, grains etc.

*LC- Least Concern, NT- Near Threatened, VU- Vulnerable.

According to a report published in 2013 almost about 42 species of fish have been recorded and identified in the Satajan Wetland (Hazarika, 2013). In this paper we have included about 15 species of fish along with their local name, English name, scientific name, family, IUCN Status and their feeding habit.

Table 7: Some species of fish recorded from the Satajan wetland.

Sr. No.	Local Name	English Name	Scientific Name	Family	IUCN Status	Feeding Habit
1.	Magur	Walking catfish	<i>Clarias batrachus</i>	Clariidae	LC	Mainly feeds on fish larvae, zooplankton, aquatic plants, debris etc.
2.	Kholikhona	Baned gourami	<i>Colisa fasciatus</i>	Osphronemidae	LC	Mostly carnivores and feeds mainly on mosquito larvae, zooplankton, insects, decayed organic matter etc.
3.	Botia	Guntea Loach	<i>Lepidocephalus guntea</i>	Cobitidae	LC	Mostly feeds on insect larvae, small crustaceans etc.
4.	Moa maas	Mola carplet	<i>Amblypharyngodon mola</i>	Cyprinidae	LC	They are herbivores and mostly feeds on phytoplankton.
5.	Puthi maas	Pool barb	<i>Puntius sophore</i>	Cyprinidae	LC	They mainly feed on green algae, crustaceans, insect larvae, rotifers etc.
6.	Pabo maas	Pabo catfish	<i>Ompok pabo</i>	Siluridae	NT	Mostly carnivores and mainly feeds on zooplankton, insect larvae, debris etc.
7.	Singhi maas	Asian stinging catfish	<i>Heteropneustes fossilis</i>	Heteropneustidae	LC	Carnivores and mainly feeds on snails, insects, zooplanktons etc.
8.	Kuchia	Asian swamp eel	<i>Monopterus albus</i>	Synbranchidae	LC	Carnivores and mostly feeds on tadpoles, crayfish, small fishes etc.
9.	Borali	Helicopter catfish	<i>Wallago attu</i>	Siluridae	VU	Carnivores and mainly feeds on small fishes and animals found in the water.
10.	Chanda maas	Elongated glass perch	<i>Chanda nama</i>	Ambassidae	LC	Carnivores and mostly surface and column feeders and feeds on fishes, insects etc.
11.	Nabat	The blue perch	<i>Badis badis</i>	Badidae	LC	Mostly feeds on zooplankton, small aquatic crustaceans, insect larvae etc.
12.	Kanduli	Bronze featherback	<i>Notopterus notopterus</i>	Notopteridae	LC	Mostly carnivores and feeds on small fishes, molluscs, arthropods etc.
13.	Kawoi	Climbing perch	<i>Anabus testudineus</i>	Anabantidae	LC	Mostly feeds on green algae, fish eggs, small juvenile fish, aquatic plants etc.
14.	Goroi	The spotted snakehead	<i>Channa punctatus</i>	Channidae	LC	They mainly feed on crustaceans, fishes, molluscs, insects etc.
15.	Rou maas	Rohu fish	<i>Labeo rohita</i>	Cyprinidae	LC	Omnivores and mostly feeds on zooplankton, while juvenile and adult feeds on phytoplankton, aquatic plants, vegetations, debris etc.

(Source: Hazarika, 2013) *LC- Least Concern, NT- Near Threatened, VU- Vulnerable

2. Wetlands also support the livelihood of the people living near it. Local people can use the various raw materials, foods etc. from the wetland for their livelihood as well as for the earning purpose (Bhatta *et al.*, 2016).
 3. Wetlands also ensure water for the human beings. Globally only about 3% of the world's water is fresh and out of this only about 1% or 0.03% of the total water is available for direct use. So, in this case wetlands serves as the source of freshwater (Secretariat of the Convention on Biological Diversity, 2015).

4. Wetlands also serves as a habitat as well as a breeding ground for various migratory bird species. Various migratory birds also use it as a resting area, breeding area etc. It also provides these birds with various food items (Saha, 2021).
 5. Wetlands also serves as a bed made of sponge, cause, it can hold a large amount of water onto it. And by doing this they can protect us from flood. Since, the state of Assam is a flood prone state of the NE Region of India, so wetlands have much importance in this state.



Plate 1: Picture of the Satajan Wetland.



Plate 2: Pictures during the survey in the Satajan Wetland.



Plate 3: Pictures during the survey in the Satajan Wetland.

QUESTIONNAIRE:

A. About the Village:

1. Name of the Village :
2. Name of the Gaon Panchayat (GP) :
3. Total No. of Population :
4. Total No. of household :
5. Distance of the Village from the Wetland :
6. No. of Schools present in the Village :

B. About the local people of the Village:

7. Name of the head of the family :
8. Total No. of employed present in the family :
9. Primary source of Income :
10. Does they use any Medicinal Plants from the Wetland : YES NO
Names of some medicinal plants:
13. Benefits they are getting from the Wetland :
14. Is there any Problems they have been facing because of the Wetland: YES NO
What are that:
15. Are they taking any measures for the Conservation of the Wetland : YES NO
What are They:

CONCLUSIONS

At present the impact of wetland is very much in the lives of all the living organisms and the future of these organisms too some extent also depends on these wetlands. Currently we can consider wetland as one of the most important and diverse ecosystems present on this earth. Wetland also help to meet various future challenges like – food, water, flood, climate change resilience etc. Though the Satajan wetland is a small wetland in terms of area, but it harbours a plenty of diverse flora and fauna as well as it provides benefits to the local community dwelling around the wetland. Although many conservative strategies are made in order to protect this wetland, but we need to create awareness among the people world-wide about this beautiful nature's gift. A significant place of harbouring beautiful migratory birds, fishes, medicinal plants and so on. The wetland is really a hot area of research and future researches is much needed in order to know more about the wetland as well as to protect this wetland, as it is one of the most important wetlands in that region.

FUTURE SCOPE

The infamous Satajan wetland a paradise of diverse plants and animals is one of the last surviving wetlands of that region. The main objective of the present study was to create more concern among the people by analysing the benefits gained by the local community, so that they can realise and always be motivated towards the conservation of the wetland. This survey wanted to create awareness among the people across the country towards the conservation of this area. By conserving this wetland, a huge number of migratory, non-migratory birds as well as various plants and animals can also be saved and it will ultimately contribute towards a stable ecosystem. So, at present this wetland is a hot topic for future research.

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