

International Journal of Arts, Humanities and Social Studies



ISSN Print: 2664-8652
ISSN Online: 2664-8660
Impact Factor: RJIF 8
IJAHSS 2024; 6(1): 104-108
www.socialstudiesjournal.com
Received: 08-02-2024
Accepted: 11-03-2024

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Study on tourism development and related landscape change in the wetland areas of Dal Lake, Srinagar, Jammu, and Kashmir: A theoretical review

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DOI: <https://doi.org/10.33545/26648652.2024.v6.i1b.103>

Abstract

The paper aims to identify the changing landscape pattern in the Dal Lake region due to the tourism development and related livelihood practices. Dal Lake is of paramount importance and its contribution to the tourism sector is immeasurable. Its location, scenic beauty, enchanting surroundings, floating gardens, shikharas (small ornamental boats) and houseboat services make this lake more attractive and important compared to other wetlands and tourist destinations. Tourists are very enthusiastic and invest a lot of time and money to enjoy the natural beauty and services. This lake occupies an important place in the valley as its physical location makes it more attractive than other lakes. The study also analyses the major changes between land use classes. There was significant land exchange between different land use classes in the study site. This study identifies the major land use or land cover layers of Dal Lake region. This study also focuses on the problem related to tourism development and related landscape changes that exist within and around lake water.

Keywords: Landscape change, tourism, wetland, Dal Lake, land conversion, shrunk, threatened

Introduction

The Dal Lake region of Kashmir is one of the largest bodies of water in Kashmir and a world-famous tourist attraction that also enriches country's economy through tourism, agriculture, and fishing. Moreover, it was an important source of food and water for the people of the Srinagar. Dal Lake is very famous for the beautiful landscape that attracted tourist all over the World. This large wetland experienced a decrease in area due to losing land to agriculture, residential areas, and plantations/orchards. Similarly, the area under lake water decreased during the study period, resulting in a decrease in the area of agricultural land, wetlands, residential areas, and plantations/orchards. This clearly shows that the pattern of land conversion in which lake water is converted to wetlands and then used for agriculture, orchards, and housing.

Dal Lake provides a bunch of services like food, fish, plants, wildlife habitat, flood control, erosion control, water purification, carbon sequestration, and recreational, environmental, and cultural opportunities. This refers to the tourist attractions that was mention in different education and research (Aronsson, L. 1994.)^[1]. Inhabitants of Dal Lake uses this wetland for agriculture, fishing for domestic and commercial purposes. Different studies have mentioned that many livelihoods and economy exist by using various wetlands and their resources and sustainability of use (Aronsson, 1994; Christensen, 1994; Singh *et al*, 2000; Bossel, 2001; Rather, 2004; Reed, Dougill and Baker, 2008; Nengroo, Bhat and Kuchay, 2017)^[1, 2, 3, 9, 11, 13, 14]. Old stories of Kasmir of entire Hindu Kush Himalayan region depicts that during the Mughal period, Emperor Jahangir was praised for her beauty and was given as 'If there is a paradise on earth, it is this, this, this, this'. It was noteworthy that the tourism sector contributes to the state's revenue of Jammu and Kashmir by creating employment and career opportunities and accounts for 6.68% of the state's gross domestic product (Economic Survey, 2017)^[4]. Natural tourist spots such as wetlands and natural reservoirs attract many tourists and are a source of economic vitality in different parts of the World. It was identified in many literatures that nature-based tourism spot is used for different purposes in terms of creation of job opportunity, resource utilization as well as for habitation purposes

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(Fazal and Amin, 2011; Dar, 2014) ^[5,6]. Therefore, the study aims to examine the conservation and management of natural recreational areas, such as wetlands, is an important prerequisite for determining the level of tourism and leisure activities in a location. Wetlands such as coral reefs, lakes, and reservoirs are considered important tools as tourist attractions in any country (Wetlands Conservation and Management Regulations, 2017, JKLWDA, 2009) ^[12]. They engage in a variety of income-generating activities, including tour guides, boat transporters, fishing, and vendors. It was reported that tourism in India has great potential for income growth and job creation. In particular, tourist destinations in India's Jammu and Kashmir region attract both domestic and international visitors and generate significant economic benefits.

The study aims to provide insights into the trends in tourist flows and changing ecosystems and environments. The sustainability of Dal Lake depends on its cultivation and environmental management. Therefore, the authors analyse and compare both demand and supply aspects of lake use. This lake attracts tourists from all over the world with its unique features such as floating gardens, fishing, and bird watching. There are many sightseeing spots along the lake. Therefore, population growth, invasion, contamination of domestic and commercial environments, increased agricultural activities, eutrophication, and weed infestation threaten its existence. Some of the report shows that every year, thousands of open water channels of lakes are converted into hanging gardens and other landforms. This large amount of nutrients is mainly obtained from the tributary basins of Srinagar city. The overarching conclusion from these studies is that the lake is under severe anthropogenic pressure, causing both reversible and irreversible damage. Therefore, these threats require sustainable solutions.

Objectives

- To identify the tourism values of the Dal Lake in Jammu and Kashmir, India that play a key role in economic development.
- To find out the demographic status of the surrounding areas of study site- Dal Lake- A wetland is a place of tourist attraction.
- To identify the major problems and management strategies for sustainability of the Dal Lake.

Methods and Materials

The data for the study has been obtained from both primary and secondary sources. The primary data has been collected by conducting a survey of the Dal area with the help of questionnaire and the secondary data has been obtained from various government departments such as Tourism Department, Lakes and Waterways Development Authority (LAWDA) Srinagar, Municipal Corporation Srinagar (SMC), Srinagar Development Authority (SDA), and University of Kashmir (Uok) Srinagar etc. The data used to create the land cover were obtained from the 1980 urban planning map of Srinagar city. This study was conducted in and around Dal Lake, which is located in the fragile hill ecosystem of the Kashmir Valley. Some information has been acquired from Houseboat owners Association. The study was supplemented by secondary data from various published and unpublished sources such as "Economic Survey of Jammu and Kashmir," reports of Lakes and Water

Ways Development Authority and Jammu and Kashmir census reports. This study is an attempt to investigate the impact of the unique community of Dal Lake.

Study Area

Dal Lake is an urban freshwater lake in the Himalayas with several river basins and a major tourist attraction. This lake is known for its two characteristics like beauty and ecological importance. The study site is located in Srinagar city, the summer capital of the Indian state of Jammu and Kashmir. The lake is located between 34°06'N latitude and 74°52'E longitude, and situated at an altitude of 1587 meters in between two hills, home to the famous Shankaracharya temple and Hari Parbat temple. The total area of Dal Lake is approximately 1,670 hectares, and the total catchment area is approximately 317 sq. km. This beautiful lake within the picturesque landscape is surrounded by the Mahadev Mountains to the east, Kohi Suleiman to the south, and the hills of Hari Parbat, home to the ancient fort, to the west. As per the situation of early dams and protruding wetlands, the lake is divided into three parts: Lokut Dal (Little Dal), Bodh Dal (Big Dal) and Soderkhan. More than thousands of households are live in and around the Dal Lake areas and the inhabitants are the dependent directly or indirectly on it for their livelihoods (Shahab and Arshad, 2012) ^[7]. Amid the beautiful mountains, Dal Lake in the Himalayas that is mainly used for tourism along with fishing and agriculture practices. It is one of the most beautiful lakes in India and the second largest lake in Jammu and Kashmir. Dal Lake is unique, with hundreds of houseboats offering tourists the opportunity to stay on the lake in an atmosphere of peace and tranquillity. Mughal Gardens and the University of Kashmir campus are also adjacent to the lake shore. On the south-west side, a drainage channel drains the lake water into a tributary of the Jhelum River. A stone-lined channel runs parallel to this outlet, connecting the lake to the tributary. This channel is used to take boats into and out of the lake and protects the floating gardens from flooding during high tide.

Result and Discussion

Landscape is continually changing due to assortment of common and anthropogenic forms. Land use change during a period of time is the process of observing changes in land utilization at different point of view and as the term suggests, following changes within the form of land utilization. Dal Lake could be a lake of biological, economic and social significance to Srinagar city. The growth of the habitation in the Dal Lake areas and the expanding requirement for financial business and settlement driven to these changes. Also, the increment in tourism to the lake has moreover given city inhabitants space to create their businesses in and around the lake within the frame of lodgings and Fooding.

This study recommends that critical land use changes and these incorporate lake areas (bodies of water), wetlands, habitation (settlements), and plantations/orchards. The areas of wetlands and lakes decreased, whereas the area devoted to private employments, plantations orchards, and agribusiness expanded amid the lake areas.

The Dal Lake and encompassing wetlands have been changed over into developed a special land use pattern and floating gardens/water gardens compared to lake zones and wetlands, the zone utilized for private purposes proceeds to

increase. It was reported that the tourism potentiality recorded a tourism development rate of 15%, of which 80% were domestic visitors. The contribution of the tourism segment to wage development and work creation is broadly recognized in developing countries.

From ancient times to the present, the state's natural resources such as lakes, mountains, landscapes, forests and waterfalls have contributed significantly to the development of the country's tourism industry. Kashmir has great tourism potential and is a leader in development.

Kashmir looks like a heaven since of its beautiful excellence, wealthy vegetation and fauna, natural life asylums, snow-capped mountains and wetlands. Sightseers from distinctive parts of the world are pulled in to visit Kashmir to appreciate the excellent view and appreciate the recreational benefits. As a result, the tourism division contributes to the state's income, makes business openings, and accounts for 6.68% of the state's net household item (Economic Survey, 2017) [4]. Moreover, the lake is known for its quality in keeping up the biological adjust of its environment, with the nearness of distinctive sorts of greenery and fauna at diverse water levels and at distinctive times of the year.

Land Use

Dal Lake was situated at the east and northeast of the Srinagar, within the Srinagar area of Kashmir. The lake is surrounded by high mountain slopes on all sides except the south. The banks of this lake are home to various villages, orchids, and the famous Mughal gardens, offering spectacular views. The lake is encompassed by tall mountain inclines on all sides but the south. There has never been a time when people did not alter the environment, but the changes occurring now are greater and faster than within the past.

Roughly 42% of the workers taken part in activities at the lake. It has continuously been said that the waters of Dal Lake are precious stone clear and Kashmir's celebrated shawls owe much of their magnificence to having been washed within the delicate waters of this lake (Ray, 1970).

Land is always changing due to physical and anthropogenic forms. Until the early 16th century, Dal Lake remained untouched, but changes started after the visit of the Mughal heads. Mughal gardens were made and from the 18th century to his 19th century the city of Srinagar started to develop towards the lake, bringing with it far-reaching changes to the encompassing environment. Development of dams, streets, etc. caused certain changes in water stream designs, making huge ranges of stagnant water.

The lake's environment has changed due to the destitute sterile conditions of the houseboats. The wastewater was released straight forwardly into the lake, contaminating it. Water bodies were squandered as weeds developed excessively due to the influx of supplements from the watershed. This decreased water clarity and made the lake shallower.

Dal Lake is a lake of biological, economic and social significance to Srinagar city. The lake contributed approximately 16% of the state's revenue. This study focuses on five critical land use/cover layers that exist inside and around lake waters. The study area includes lake areas (bodies of water), wetlands, habitation (settlements), and plantations/orchards. Among these divisions, the zone of

wetlands and lakes destroyed. It was truly interesting that the lake, which was the centre of excellence of Srinagar and pulled in thousands of visitors each year, was being gradually devastated by the exceptionally individuals who profited from it.

This clearly shows that there is a pattern of land transformation, where lake water is converted to marshy lands which subsequently converted for agriculture, orchards and residential uses (Kak, 1989).

Pattern and Direction of Land Conversion

1. From plantations/orchards to agriculture.
2. From wetlands to plantations/orchards.
3. Agricultural wetlands.
4. Wetland to housing development.
5. Water bodies in agriculture.
6. Water bodies to marshy land.
7. Conversion of water bodies into residential areas.

According to various report, 8 hectares of land under plantations/orchards were converted to agriculture. Vast areas of wetlands in and around Dal Lake have been converted for agricultural activities. These changes were observed across most of the lake, with the most notable changes occurring in the northern part of Nehru Park (45 hectares), the western and central parts of Lokt Dar (310 hectares) where settlements are concentrated, and Mir Mohalla and Khon Khan in the Lokt Dar area (310 hectares). Approximately 16 hectares of wetland area was converted to housing development. This change has affected Chopan, Gaddi, Jafferi, Sheikh Mohalla, Bata Pora Khurd, Abi Kak Pora area (8 hectares) in Lokto Dal, Dal Gate Basin (5 hectares) and It was recorded around Goghar and Bujar Mohalla (3 ha). Conversion of wetlands to plantations/orchards was e observed in scattered areas of central Lokut Dal (8 ha) and Dal Gate basin (5 ha) which These are primarily used for apple production. Significant conversion of lake waters to agriculture was observed in northern Budhar Mohalla (42 ha), central and western Budh Dar (69 ha), and around Abi Kak Pora and Khon Khan (11 ha).

Flow of Tourist to Dal Lake

It has been observed that the share of Dal Lake in the total tourist flow in Kashmir Valley is around 60-65% foreign tourists and around 35-40% domestic tourists. The number of tourists at Dal Lake was 46,657 in 2000, which increased to 247,072 in 2005 and declined to 61,580 in 2008.

Houseboats of Dal Lake

Houseboats offer all the amenities of a luxury hotel, yet feature elegant cedar-clad bedrooms and offer the unique experience of living on the water. Houseboats have a long history and are an important feature of Kashmir tourism. During the reign of Akbar, houseboats were first used to accommodate tourists. Many tourists visit Dal Lake as staying in a houseboat is very appealing. Houseboats offer all the amenities of a luxury hotel, yet with elegant cedar-planked sleeping quarters, they offer the unique experience of living on the water. The state tourism department classifies houseboats into five categories - Deluxe, A, B, C and D - which roughly correspond to the level of comfort and service. Luxury houseboats come equipped with the plush furniture, high quality carpets and modern bathroom

facilities of a luxury hotel, while category "D" houseboats (the lowest category) are as simply furnished as budget hotels.

Houseboats provide attentive service according to the category as well as rent price. The rental fee of a houseboat includes all meals and free transfers from the houseboat to the nearest jetty (Ghat). Each houseboat has two to five bedrooms with bathrooms, dressing rooms, salon, dining room, pantry and upper deck. The most important economic factor affecting domestic and international tourist flow is the availability of well-maintained, comfortable and affordable accommodation. Kashmir Valley has a great selection of accommodation chains, including unique houseboat accommodation not found anywhere else in the world. Dal Lake accommodation capacity and daily rates for houseboats. The main economic factor influencing domestic and international tourist flow is the availability of well-maintained, comfortable and affordable accommodation options. Once a traveller reaches his destination, the first thing he needs to do is look for accommodation. Kashmir Valley offers a fantastic chain of accommodations with unique houseboat accommodations that are not available in other parts of the world.

As per the category of tourist accommodation, there are 881 houseboats, which amounts to over 2,281 rooms and 4,562 beds, distributed very unevenly across Dal Lake, Nagin Lake and the Jhelum River. There is a particular concentration of houseboats on Dal Lake, with 634 houseboats and 1,646 of 3,292 rooms available. There are 171 houseboats in Nagin Lake with 450 rooms and 900 beds. But there are only 76 houseboats with 155 rooms and 370 beds in Jhelum River.

It has been observed that the share of Dal Lake in the overall tourist flow of Kashmir valley is around 60-65% foreign tourists and around 35-40% domestic tourists. The number of tourists to Dal Lake was 46,657 in 2000, increased to 247,072 in 2005 and decreased to 61,580 in 2008.

Problems

The main problem of the decline of Dal Lake is the population pressure of the Dal residents. This problem can be solved by rehabilitation of the lake residents. Maintaining the services and facilities that the lake provides for this purpose could increase its popularity as a tourism product.

1. 18 tonnes of phosphorus and 25 tonnes of nitrogen nutrients are discharged into the lake from 15 drains.
2. Around 9000 tonnes of waste is dumped into the lake every year from over 1000 houseboats.
3. Lokt Dal and Bhod Dal, the two catchments of Dal Lake, generate 97,000 kg of wastewater.
4. High BOD values have been detected indicating eutrophication affecting aquatic life.
5. 50 million litres of sewage flow into the Dal Lake every day.
6. Moreover, around 80,000 tonnes of silt flows into the lake every year and it was found that the size of the lake has shrunk due to sedimentation.
7. Water quality shows that the water has changed from blue-green to hazel brown due to high turbidity. Water of the lake also becomes polluted over time and the polluted water causes many diseases in humans as well as harm to plants and animals.

8. Increase in tourism, which resulted in the construction of many hotels and houseboats, promoting commercialisation of the place.
9. The amount of waste started increasing and new sewerage pipes were also constructed. Untreated wastewater is then released into the lake, causing pollution.
10. Dal Lake is also known for having a permanent population of over 5,000 swimmers living in houseboats who dump their household waste into the lake.
11. It also has a large-scale floating horticulture industry, fishing and weeding for animal feed.
12. Lack of an efficiently functioning sewage treatment plant also affects the quality of sewage water, polluting the lake.
13. Natural Disasters like flood caused huge amounts of silt and sewage from the waters of the Jhelum River to flow into the Dal Lake, affecting the flora and fauna of the Dal Lake.
14. Unauthorized Settlements another important problem in the study area. More than 50,000 people live on houseboats and islands in Dal Lake.
15. Due to agricultural activities at the study site, water bodies of are being converted into floating gardens for cultivation and residential purposes, posing a threat to the ecosystem.
16. Unorganized Tourism Development is another threat of the study area. Around 42% of the workforce in Srinagar is involved in tourism activities on the lake, but nothing is organized. Pride of the Lake houseboats are still struggling to find a suitable plumbing solution.
17. Any commercial or private construction is not permitted within 200 metres of the Dal Lake or Dal grounds but unfortunately study site very few are concerned about adhering the rules and illegal constructions creating crucial problem at the Dal Lake areas.
18. The growth of invasive weeds has led to an explosion of pest plants. Around 4,000-5,000 tonnes of dead fish are dumped into the lake every year.

Possible Range of Solution

Houseboats in Dal Lake are a major tourist attraction in Srinagar city of Kashmir. The Srinagar city tourism development plan has consistently advocated for sustainable and systematic management of the tourism product, particularly Dal Lake. The number of tourists visiting Dal Lake continues to grow and the use of the lake as a tourism product is subject to seasonal fluctuations and overall landscape change.

Many factors have contributed to the destruction of the lake, including human settlements, agricultural activities, unstructured tourist development, illegal constructions, weeds, floods, sewage problems, houseboats, etc. Several initiatives have been taken and a dedicated agency for the protection of J&K Lakes (JKLWDA) has been set up. There is an inevitable need to take necessary steps for the improvement and development of Dal Lake. These include installing mini sewage systems on houseboats to avoid sanitation and water pollution issues, removing human settlements and agricultural activities from the lake site, determining the tourism capacity of the city and the lake, etc.

These include distillation and distillation. Sea water needs to be purified after a period of time.

Conclusion

This beautiful lake within the picturesque landscape is threatened by various anthropogenic pressures despite of the socio-cultural, ecological and economic importance. Its existence is now in danger mainly due to population growth, erosion, excessive domestic and foreign tourist flow and increasing agricultural activities by the local population. Furthermore, tourism interventions have mixed impacts, sometimes benefiting local communities and sometimes harming ecosystems. Lake Waterways Development Authority (LWDA) Srinagar, State Environmental Protection Agency and local bodies are continuously working to achieve the goal of cleaning and restoring the lake. The Lakes and Waterways Development Authority will immediately begin preparing a proposal to install additional aerators in the lake to boost oxygen levels in the stagnant areas. Installation of sewage treatment plants in nearby hotels is needed to solve the problem.

As a result, Dal Lake, one of the Himalayan lakes, has a fragile ecosystem. The existence of the lake is at risk due to increasing human intervention and intervention needs to be minimized to protect the lake and ensure its sustainability. Considering the recreational benefits and tourism value, It was very much important to the Policy makers to ensure about the sustainable use and conservation of natural resources of this socio-culturally and ecologically significant landscape of Dal Lake.

The lake has lost its natural beauty and if neglected, it may disappear within the next 50 years. Many factors have contributed to the destruction of the lake, including human settlements, agricultural activities, unstructured tourist development, illegal constructions, weeds, floods, sewage problems, houseboats, etc. Several initiatives have been taken and a dedicated agency for the protection of J&K Lakes (JKLWDA) has been set up. There is an inevitable need to take necessary steps for the improvement and development of Dal Lake. These include installing mini sewage systems on houseboats to avoid sanitation and water pollution issues, removing human settlements and agricultural activities from the lake site, determining the tourism capacity of the city and the lake, etc.

The study concludes that the Dal Lake environment is severely affected by population growth and increasing resource development. There are clear signs of decline in the lake landscape. The lake area is shrinking, water quality is deteriorating and resource development is increasing. The unfortunate thing about this process is that the changes are being made by local people and they are the main sufferers, as the environmental destruction of the lake directly affects the lives and well-being of the Dal Lake residents. The government needs to step in and act, and that is necessary for both the existence of the Dal Lake and the well-being of its residents.

This water body is not only a tourist attraction but also a vital lifeline for the city, directly or indirectly supporting the livelihoods of many people. Therefore, implementation of structural and non- structural management system is urgently needed to maintain both the ecological balance for the environmental as well as livelihood sustainability of the Dal Lake area.

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