

**PEOPLE’S WILLINGNESS TO PAY FOR ECOSYSTEM SERVICES: A
CASE OF COASTAL WETLAND SYSTEM IN KERALA**

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ABSTRACT

Anthropogenic activities impact the diversity of organisms found in ecosystems above ground and below ground, and thus influence the provision of ecosystem services. The present paper tries to address the problem of sustainable use of resources in coastal wetlands of Kerala with an example of tourist spot known as Veli, a well-known tourist spot in Thiruvananthapuram city. Studies reveal drastic depletion in fauna and fish species in recent decades. In this context, the present work tries to identify the various eco system services associated with coastal wetlands particularly Veli Wetland System. The study also aims to illuminate the economic value of recreational services provided by the Veli Lake and also the threat from waste disposal to the lake. To identify various ecosystem services offered by Veli wetland, discussion with the stake holders, local communities and other beneficiaries have been done. To illuminate the economic value of recreational services from the Lake, primary data have been collected from 120 tourists of Veli through a structured questionnaire. Tourist’s willingness to pay has been used to find out the economic value of recreation benefits from the Lake. To find out the threat of waste disposal into the Lake, case study method has been used and data have been collected from 60 households including fishermen. The lake system is rapidly getting degraded due to reclamation, input of city drainage, siltation and weed infestation. Consequently, the study suggests to impose a user fee from tourists and households for the optimum management of the ecosystem services.

Keywords: Economic valuation, Ecosystem services, Tourism, Willingness to pay, Recreational benefit

“It is impossible to devise effective environmental policy unless it is based on sound scientific information.”

Kofi Annan, 2000 (the former United Nations General Secretary)

INTRODUCTION

Mankind largely depends on the goods and services provided by the biosphere and its ecosystems. Human well-being and progress towards sustainable development are vitally dependent upon improving the management of Earth's ecosystems to ensure their conservation and sustainable use (Ecosystem and Human Well Being, 2009). It is observed that anthropogenic activities impact the diversity of organisms found in ecosystems above ground and below ground, and thus influence the provision of ecosystem services. The human shocks like, rapid urbanisation, industrialisation and development of tourism activities poses severe threat to the conservation of ecosystem (Zamora, 1984; Tiner, 1984; Pullan, 1988; WCMC, 1992; CES,1995; IUCN, 1998; Khaleel, 2005; Barbier,2007; Sony, 2016).

Ecosystem conservation is therefore a serious challenge to the prospects of economic growth across the globe. It has got worldwide attention from the past three decades (Acreman, 1994; Acreman & Hollis, 1996; Barbier, 2007; Harikumar, 2016).The fundamental constraint for ecosystem diversity conservation is the lack of knowledge about its high diversity and hotspot assessments in the tropics (Barbosa and Callisto, 2000).

The varied climatic and topographic conditions of Kerala, the southernmost state of India, has resulted in a wide range of ecosystems and habitats such as grasslands, wetlands, coastal and marine ecosystems. The “Gods own Country” is particularly rich in its biodiversity and attracted many foreign and domestic tourists every year with its beautiful greenery. Infact, the unscientific tourism development, urbanisation and industrialisation poses potential threats in three main areas such as depletion of natural resources, pollution and degradation of eco system itself (Harikumar, 2016). Veli wetland system is such a beautiful tourist spot situated in the south of Thiruvananthapuram District in Kerala State is a finite example for the degraded ecosystem due to industrialisation, urbanisation and tourism activity. The present paper tries to address the problem of sustainable use of resources with an example of a tourist spot known as Veli Lake.

Veli Lake is a part of Akkulam – Veli wetland system, located between Lat 80 25' to 80 35' N; Long 760 50' to 760 58'. This wetland system is connected to the Lakshadweep Sea through a seasonal tidal inlet at Veli. There is no major rivers that flow into this wetland system, except the Parvathy Puthenar which is a very small stream. It covers an area of about 75 ha and lies almost perpendicular to the shoreline. Depth varies from 0.5 to 3.75 m. The wetland is divided into two by a submerged bund constructed at the time of construction of Akkulam bridge. The bund divides the wetland into Veli lake (western part) and Akkulam lake (eastern part). The Veli wetland has been a lively habitat for brackish water fish and migratory birds. Studies reveal drastic depletion in fauna and fish species in recent decades. The lake system is rapidly getting degraded due to reclamation, input of city drainage, siltation and weed infestation. Consequently,

there has been increasing research interest in exploring the present environmental health of Veli wetland system and its sources of pollutants. The present paper focuses on the depletion of water resources and other local resources in Veli and tries to illuminate the economic value of the recreational benefit of the Veli Lake.

OBJECTIVES

The broad objective of the study is to assess the economic value of recreational benefits from the Veli Lake in Thiruvananthapuram District in the South Kerala. The specific objectives are

1. To trace out the various ecosystem services provided by the coastal wetlands in Kerala with special reference to Veli Lake.
2. To assess the economic value of recreational benefit from Veli Lake
3. To find out the threat of disposal of solid waste in to the Lake

RESEARCH QUESTIONS

The major research questions in this study are

1. What are the ecosystem services provided by the coastal wetlands especially Veli Lake in Kerala?
2. What is the economic value of recreational benefit of Veli Lake?
3. In what way does the threat from solid waste disposal affect the ecosystem services of Veli Lake?

METHODOLOGY

The study depends on the primary and secondary sources of data. The method of investigation adopted in the present study ranges from primary survey, review of literature, discussion with the stakeholders, case studies and economic valuation of ecosystem services.

To understand the direct, indirect and non use values of coastal wetland goods and services, review of literature, discussion with stakeholders, local communities and other beneficiaries have been used. Prioritisation of use and non use values particular to Veli coastal wetland system have been identified through available literature and discussion.

Table 1: Methodological Framework

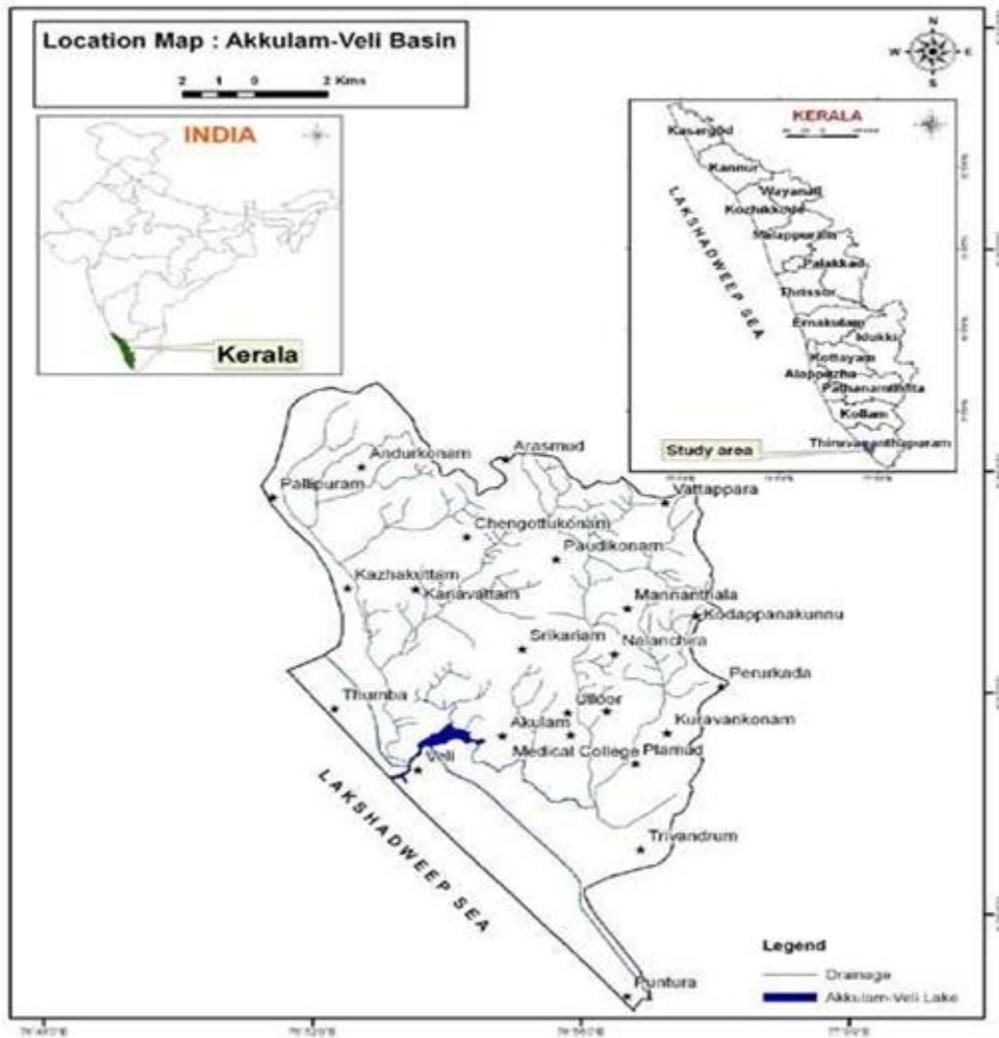
Sl No.	Objectives	Categories	Method of Valuation	Sources of data
1	To identify various ecosystem services provided by the coastal wetlands in Kerala	Provisioning, Supporting, Cultural and Regulating Services	Interview Method	Review of Literature & Discussion with the stake holders, local communities and other beneficiaries
2	To illuminate the economic value of recreational services of Veli Lake	Cultural Services like recreational benefit from tourism	Willingness to pay Method	Tourist Survey
3	To find out the threat of solid waste disposal into the Lake	Solid waste disposal affect all the ecosystem services and the well being of human kind	Case study method	From tourists, households and fishermen within the distance of 5 Km from the Lake

To illuminate the value of recreational services, ‘Willingness to pay’ method has been used. With a well structured questionnaire, data have been collected from the domestic tourists visiting the lake by selecting a week day, a weekend day and a holiday. Based on it, the prediction of number of tourists who visits in the area has been done. Thus 120 tourists have been selected for data collection.

To find out the threat of solid waste disposal into the Lake, a negative externality of tourism, case study method has been used and data have been collected from the households and fishermen through a well-structured questionnaire. It is helpful to identify the changes in the demand for recreational services in the absence of solid waste disposal to the lake. The major challenges and suggestions for sustainable use of environmental resources have been listed from the data collected.

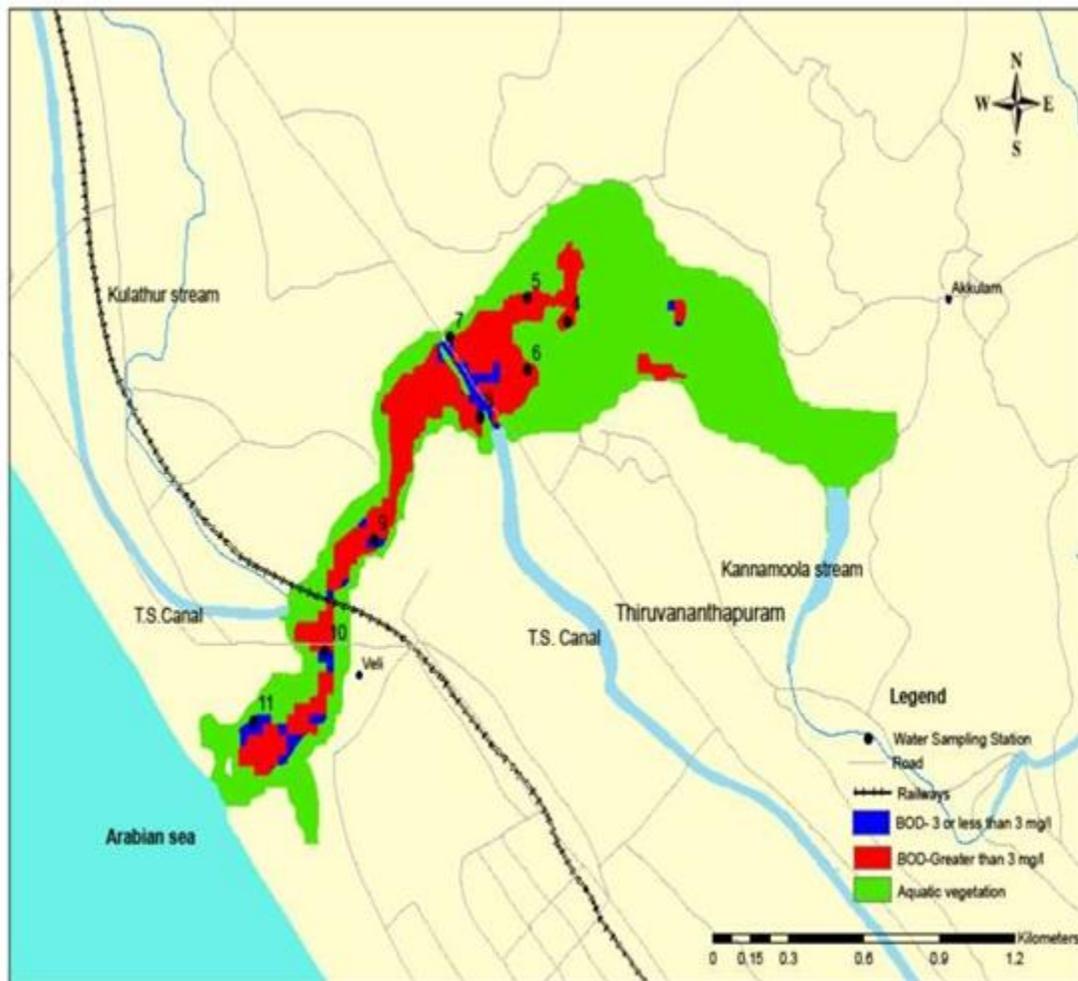
Study Area:- Veli Lake is located 5 km north east of Thiruvananthapuram district. It covers an area about 12 hectors with a length of 1.25 km and a width of around 100 m. For most part of the year, the Veli Lake remains separated from the sea by a sandbar of approximately 150 m in length and 20-40 m in width. The Lake mouth remains open usually for 10 to 14 days, depending upon the influx of land drainage to the Lake. Veli Lake is a major tourist spot in the capital city and it attracts both foreign and domestic tourists largely.

Figure 1: Location Map of Akkulam – Veli Basin



Source:- Sheela.et.al., (2010)

Figure 2: Veli Lake



Source:- Sheela.et.al., (2010)

RESULTS AND DISCUSSION

From various literature, it is found that the major ecosystem services provided by the coastal wetlands in Kerala are fish, grass, wood and tourism earnings. These all are coming under the category of direct uses. The indirect uses of coastal wetland systems are mainly biodiversity conservation, carbon sequestration, groundwater recharge, flood control, prevention of natural disasters like tsunami and cyclone, livestock bathing etc. Moreover, coastal wetlands in Kerala have a rich variety of plants and animals. These wetlands are homes not only to different species of birds but also to diverse fishes, shell fishes, clams etc.(Harikumar,2016; Hema,2015; Sreeja, 2009) Coastal communities are largely depend on fishing activities. Some of coastal

communities are engaged with kaipad cultivation which is a mode of rice cultivation practicing in fields of riverside (C. Sulakshana Rao and R. Balasubramanian, 2017). Discussion with the local communities revealed that people who resides near to Veli Lake are largely benefited from the tourism development in the area. It is found that Veli Lake is a lively habitat for brackish water fish and birds. But people are reluctant to catch Lake fish due to water contamination.

A survey has been conducted among 120 domestic tourists who had visited Veli Lake in the month of January 2018 for the assessment economic value of recreational benefit from the Lake. The entry fee to the recreational area, Veli Tourist Village' is Rs.5 per head. The timing of entry is from 8 AM to 6.30 PM and it is open in all days. There are several events for the recreation of tourists other than enjoying the aesthetic beauty of the site. Normal boat services and Speed boat services are offered at different price ranging from Rs.100 per head to Rs.1000 per four people. Different events for entertainment are offered like horse riding, birds watch, Game Park, adventurous park, floating bridge, floating restaurant, children's park etc. The area is very large to accommodate around more than 2000 people at a time as it is near to sea shore.

Figure 3: Floating Bridge in Veli



Source:- <https://www.keralatourism.org/destination/veli-tourist-village>

Figure 4: Boating in Veli Lake



Source:- <https://www.keralatourism.org/destination/veli-tourist-village>

Results from sample survey

Table 2: Family size of the Respondent

Number of family members	Frequency	Percent
0 - 3	38	31.7
4 to 7	75	62.5
Above 7	7	5.8
Total	120	100

Source:- Sample survey, 2018

Table 3: Educational Qualification of Tourists

Qualification	Frequency	Percent	Cumulative Percent
SSLC and Below	54	45.0	45.0
Pre degree	23	19.2	64.2
Degree	39	32.5	96.7
P.G	4	3.3	100.0
Total	120	100.0	

Source:- Sample survey, 2018

Table 4: Monthly Income of the Respondent

Income (Rs.)	Frequency	Percent
Upto 10000	60	50
10001 - 20000	37	31
Above 20000	23	19
Total	120	100

Source: - Sample survey, 2018

The study reveals that the visitors to the recreational site is large during the evening and it is more than 1000 in the weekends. The huge number of visitors to the site itself is a reason for the plastic waste in the area. It is found that all respondents are totally dissatisfied with the waste disposal to the lake. They are opined that the plastic waste to lake is huge due to tourism. The waste disposal management in the recreational site is rated by all respondents as very poor. In the questionnaire, the tourists were asked to reveal their willingness to pay in order to preserve the Lake clean. They were asked how much they can contribute towards the entry fee if the government is going to implement a programme to preserve the lake. Out of 120 tourists, 54 tourists are not willing to pay for the preservation of the Lake. 30 percent of total respondents expressed that the government programme is not at all an important one for them. Another 15 percent revealed that they are not willing to pay as they have a limited budget. However, 31 percent of respondents, want to contribute because they are really mean to be a part of this good cause to preserve the lake. Another 24 per cent of tourists who wish to pay because they believe that it is their responsibility to protect the Lake for future generation. It is found that the average willingness to pay in this regard is Rs.5. The maximum willingness to pay in this regards is

Rs.50 and minimum is Rs.1. Flow of tourists to the site is varying from week days to weekends and even morning to evening. Therefore, for the sake of estimation of recreational value of the site, it is assumed the average number of visitors to the site is 500. It is calculated that the average willingness to pay of tourist is Rs. 5. The study reveals that based on the average willingness to pay and average number of visitor per day, the government can generate additional Rs. 9, 12,500 per year if they increase the ticket charge from Rs.5 to Rs.10. and which can be used for the proper maintenance and preservation of Lake.

Apart from tourist, data have been collected from 60 households residing within the 5 k m radius of Veli Lake and discussion with some of the fishermen nearby have been conducted to understand the threat of solid waste disposal into the lake. It reveals that poor water quality due to waste disposal is a serious threat to tourism activity in the Lake. It is viewed that households hardly use lake water and they are provided with enough safe drinking water from the Aruvikkara River by the Corporation. The survey among 60 households reveals that 45 percent of the respondents are not willing to pay or contribute for any kind of initiative to improve the water quality in the Lake. The other 55 percent are ready to pay for the initiative and their average willingness to pay is Rs.1.35 in the form of extra payment made for the public water supply bill. It is observed that 55 per cent of respondents are willing to increase the bill of drinking water in support of government initiative to implement a programme to improve the water quality in the lake as a part of sustainable use of resources in the area. The willingness to pay in this regard is ranging from Rs.1 to Rs.20. Therefore, the study reveals that the government can collect additional 1.35 rupees along with the water supply bill from the households in the area. This additional income can be used for the improvement in the water quality of Lake.

To know the responses of households regarding the present condition and solid waste disposal to the lake, a case of 53 year old Auto driver is given below.

1. Thomas, a 53 year old Driver who is a native of Veli told that the households are provided with safe drinking water from Aruvikkara River by the Thiruvananthapuram Corporation and they are not dependent on Veli Lake for water or any other resources. He opined that people stopped to take water from the Lake from more than 20 years back. According to him, sewage waste is there and people who live in the surrounding area of Lake are affected by huge mosquito problems due to the dumping of waste to the lake.

The discussion with the fishermen community revealed the intensity of water contamination and its adverse effect on the provisioning services of ecosystem in the region. The fishermen stopped fishing due to water contamination from years back. It is observed that the market value of lake fish has come down considerably from the last two decades and now nobody wants to eat Lake

fish. The supply of sea fish is high in this area and therefore people choose sea fish as an alternative to lake fish.

2. Shoshamma, a fisherwomen, who sells fish in the local market of Veli for the last 27 years told that she used to sell sea fish in the market. She said that there is not much fish in the lake for fishing and nobody wants to eat lake fish at all due to water contamination.

This shows that people are aware of the intensity of the problem and became more health conscious. They switched their consumption to sea fish as it is abundant in the area. Moreover, the available literature shows that the water quality of Veli Lake has been deteriorated from 2009. The poor water quality (i.e., low dissolved oxygen, undesirable levels of nutrients and increased levels of ammonia and Hydrogen Sulphide) was prevalent throughout the period of 2009 to 2017 (Nandhini N.J, 2018).

CONCLUSION AND POLICY IMPLICATION

The study reveals that due to adverse human action, the ecosystem services in Veli is in great danger. The Lake has got polluted in three ways. i.e., huge industrial waste from nearby industries, sewage waste and disposal of plastic waste from tourism activities. The water in the lake has been contaminated by anthropogenic activities and the problem of water pollution is not addressed with its due importance. Considerable fall in the use of fish and other resources from the lake have been observed. From the survey it is found that more than half of tourists and households who surveyed are willing to pay for the preservation of the lake if the government take initiative to implement a programme for it. On the other hand people are not much concerned about the sustainability issue of Veli Lake. They are provided with urban amenities and engaged in non agricultural activities. They are not much bothered about the preservation of Veli wetland system as they are not directly depended on the ecosystem services provided by the Lake for their livelihood. It is observed that the alternative services like drinking water from other river and sea fish are very much present in the study area. Therefore the need of protection of Veli Lake is considered to be an insignificant matter of concern for the people.

It is viewed that the outcome of the study obviously help to fix an appropriate user fee from tourists which can be used for the maintenance of lake from waste disposal. Moreover, it is helpful in assessing the value of recreational benefit and thereby help to manage the resources in an optimal manner at the local level. Another major threat from solid waste has been addressed by effecting the ban on plastic bottles and plastic carry bags or by imposing a fine on the use of such items in the recreational site. The study reveals that it is high time to implement a ban on plastic in the recreational site for the preservation of the ecosystem concerned.

REFERENCES

- Acreman, M.C. *"The Role of Artificial Flooding in Integrated Development in Africa."* In Integrated River Basic Development, edited by C. Kirby and W.R. White, Newyork: Wiley, 1994
- Acreman, M.C. and G.E. Hollis. *"Water Management and Wetlands in Sub – Saharan Africa."* IUCN. Switzerland: Gland, 1996.
- Baral, Sony, Bijendra Basnyat, Rajendra Khanal and Kalyan Gauli. "A Total Economic Valuation of Wetland Ecosystem Services: An Evidence from Jagadishpur Ramsar Site, Nepal." *The Scientific World Journal*. vol. 2016: Article ID 2605609. 9 pages. (2016): <https://doi.org/10.1155/2016/2605609>.
- Barbier, E. B. "Valuing Environmental Functions: Tropical Wetlands." *Land Economics*.70-2. (1994):153-73.
- Barbier, E. B. , M. C. Acreman and D Knowler. *"Economic Valuation of Wetlands: A Guide for Policy Makers and Planners"*. Ramsar Convention Bureau. Switzerland: Gland, 1997.
- Barbosa, F. A. R., M. Callisto and N. Galdean. The diversity of benthic macroinvertebrates as an indicator of water quality and ecosystem health: a case study for Brazil. *Journal of Aquatic Ecosystem Health & Restoration*. (2000)
- Brander, Luke, M., Raymond J.G.M. Florax and Jan E. Vermaat. " The Empirics of Wetland Valuation : A Comprehensive Summary and a Meta –Analysis of the Literature". *Environment and Resource Economics*. (2006): 223-250. <http://doi.org/10.1007/S10640-005-3104-4>
- Champ P.A., K.J. Boyle and T.C. Brown. *"A Primer on Nonmarket Valuation"*. The Netherlands: Kluwer Academic Publishers, 2003
- Commission of the European Communities UNSPECIFIED. *"Wise use and conservation of wetlands"*. Communication from the Commission to the Council and the European Parliament. COM (95) 189 final. Brussels. 29 May 1995.
- Harikumar, P. S. "Wetlands of Kerala: Degradation, Restoration and Future Management- A Case Study of Kavvayi Wetland- A Coastal Wetland in the North Kerala", *Conference Proceedings on Conservation and Sustainable Management of Ecologically Sensitive Regions in Western Ghat*. Karnataka. India(2016)

- IUCN. “ Economic Values of Protected Areas: Guidelines for Protected Area Managers”. *International Union for Conservation of Nature*. Gland. Switzerland.(1998).
- Khaleel, K.M. “Study of the Quantitative Structure of True Mangroves Present in the Mangal Forests of Tellicherry, Pappinissery and Kunhimangalam of Kannur District”. *The Indian Forester*.(2005): 131: 81-89.
- Millennium Ecosystem Assessment. *‘Ecosystems and Human Well-being: Wetlands and Water Synthesis’*. Washington DC: World Resources Institute, 2005
- Ministry of Environment and Forest. India: Government of India, 2012
- Nandhini, N.J. “Ecosystem and Economic Valuation”, Conference Proceedings. New Delhi, TERI University (2018)
- Pullan, R.A. *“A Survey of Past and Present Wetlands of the Western Algrove.”* UK: University of Liverpool,1988
- R. Costanza, et.al. “The value of the world's ecosystem services and natural capital,” *Nature*, vol. 387, no. 6630.(1997): 253–260
- Tiner, R.W. *“ Wetlands of the United States: Current Status and Trends”*. Washington D.C: U.S. Fish and Wildlife Services,1984
- Vijayan, A., E.Job. “Recreational value of Vellayanilake in South India: a travel cost approach”. *Int. J. Sci, Res.* 4-11 (2015): 156–158.
- World Conservation Monitoring Centre. *“Global Biodiversity: Station of the Earth’s Living Resources”*. London: Chapman & Hall, 1992.
- Zamora, P.M. *“Philippine Mangroves: Assessment Status, Environmental Problems, Conservation and Management Strategies.”* In Asian Symposium on Mangrove Environment: Research and Management, edited by E. Soepadmo, A.N Rao, D.J MacIntosh, 25-29. Malaysia, 1980