Wetland Restoration and Management: A Case Study in Bundala Ramsar Site

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Abstract
Bundala wetland is a unique ecosystem, internationally recognized as a Ramsar site since 1990.Climate changes such as increasing temperature, extreme rainfall events, long droughts and sea water intrusion has highly impacted on wetland ecosystems. Further, disposal of agricultural waste water to lagoons has deteriorated the quality of the lagoon ecosystem. This study attempted to investigate the present situation of Bundala lagoon and to explore the stakeholders' perspectives on sustainable wetland management. Participatory rural appraisal tools and focus group discussions were used as the data collection methods. Resource map shows that there are three anchorage sites; three lagoons for inland fisheries, two turtle conservation sites and a salt factory which provide benefits to the inhabitants. Field observations and focus group discussions provide ample evidences for the degradation of ecosystem values. Brackish water lagoons have been completely changed into fresh water ponds, covered with prominent fresh water vegetation such as water lilies. Palu (*Manilkara heandra*) trees are one of the dominant woody plants existed in the wetland seems to be dying off due to unknown reasons. Many stakeholders believe that agricultural waste water which contains high concentration of chemicals and climate change may among the causes for such impacts though has not scientifically proved yet. At present the spreading of invasive plant species (Kalapu Andara – *Prosopis cineraria* and Pathok – *Opuntiadillenii*) has become the main threats to its unique biodiversity. Results of the pairwise ranking show that there is a reduction of direct use benefits. Benefits from the Saltern has been ranked as the first followed by agriculture and fishing. Findings of the historical profile clearly show this transformation. However, the results found that people still concern the conservation. They have identified that biodiversity, ecotourism and lagoon fish production as the priority areas for sustainable wetland management. This study concludes that unique ecological resource has seriously degraded and the needs of a sustainable management plan in order to ensure this distinctive highly diverse ecosystem to future generations.

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Introduction

Bundala wetland is a unique ecosystem consisting of natural forests, scrubs, sand dunes, grassland vegetation, a saltern and home steads with land extent of 3,886 ha and there are five brackish water lagoons which have the extent of 2250 ha. Bundala is a well-known bird sanctuary in Sri Lanka and is located in Hambantota district. It supports over 20,000 migrant water birds per season. This was declared as a Ramsar Site in 1990 being the first Ramsar site in Sri Lanka. Further considering its values, Bundala Wetland is declared as a Biosphere Reserve in 2005.It was declared as a sanctuary in 1969 and upgraded to a National Park in 1992. Its total park area is estimated as 6,216 ha (Wildlife Conservation Department, 1998). Apart from its distinctive ecological importance, there are archeological evidences of the pre-historic era were discovered within the wetland (Central Environmental Authority, 1993).

Many climatic factors including high temperature, extreme rainfall events, long droughts and sea water intrusion threaten wetland ecosystems. Intergovernmental Panel on Climate Change (IPCC) has predicted that change of water cycle will cause inundation of coastal wetlands with saline water and these wetlands will be destroyed.

Hambantota District which was neglected and underdeveloped in past has become a hotspot of development after 2004. The vast amount of funds was invested to execute different large scale projects. Irrigation and development projects were prominent among them as Hambantota is mainly an agricultural area where water is the scarcest resource. Hence, Lunugamwehera Irrigation and settlement project was implemented to irrigate paddy lands in both seasons and was able to solve the water issue. However, due to improper planning, all the agricultural drainage and waste water released to the Embilikala and Malala lagoons of the Bundala Wetland. As a result, the water quality of the lagoons was drastically changed and directly impact to the lagoon ecosystem (Abeywickrama, 2010). Later, with the request of lagoon fishermen, a canal was constructed to manage the water level of the lagoons but has failed to protect the nature of lagoon ecosystem. However, this construction was affected to the natural balance of the wetland causing to

degrade the whole system. Salinity level of the lagoons has been decreased. Aquatic weeds like Hambu Pan, Water Hyacinth (*Eichhornia crassipes*) Water Lilies (*Nymphaea pubescens*) spread over these lagoons and also decreases the amount of brackish water fish resource.

Sustainable wetland management has been identified as one of the best alternatives to restore or conserve the Bundala wet land. As a strategy of sustainable wetland management, it is important to get the stakeholder's perspectives and this study attempted to achieve that. . This study attempted to investigate the present situation of Bundala lagoon and to explore the stakeholders' perspectives on sustainable wetland management.

Methodology

Participatory Rural Appraisal (PRA) (Chambers, 1994) was used to get the stakeholders' opinions on sustainable wetland management alternatives. Two Focus group discussions (FGD) were conducted. The first discussion was carried out in Siriyagama which is located in the Bundala National Park (BNP). Different stakeholders including lagoon and marine fishing communities (10), officers of (BNP) (07), the members of village wetland committee (10), and paddy farmers (08) participated the study. The objective of the first focus group discussion was to examine the present status of the wetland. The PRA tools such as resource map, historical profile and pairwise ranking were used to collect the information. Resource map was developed by the group of the participants representing all categories of the stakeholders. Historical profile helped to investigate the inter-temporal changes of the wetland. Finally the pairwise ranking tool was carried out to explore the benefits gained and to choose the most efficient attributes for the sustainable management. Other focus group discussions were conducted with medium level (13) and the ground level officers (29) representing fisheries and wildlife conservation departments to cross check the findings of the first discussion. Investigators visited the wetland several times to observe the relevant sites and lagoons.

Results and discussion

Resource map of Bundala village describes the available resources and important places of the wetland. Though there are 5 lagoons located in the wetland, Bundala, Embilikala and Malala are the main sources of inland fishery. However, the accesses to these lagoons are restricted only for the members of the fishing cooperative society. *Pathirajaya* fishing port, *Gange Modara Madel Thotupola* and *Uraniya Madel Thotupola* are the places which facilitate marine fishing. There is a salt producing unit located in between the Bundala and Malala lagoons. Due to the rapid degradation of lagoon ecosystems, majority depend on the income by providing labour to the salt factory. Hence, people have identified that salt factory is one of the important asset in the wetland. People emphasized that there is a place called "Pathirajaya" which is identified as an ancient place where the pre-historic ancestors lived. Hence, Bundala village has been identified as one of the ancient villages in Sri Lanka. They believe that this area wants to be reserved as it has an historic value. There are two turtle conservation sites and two wild life department offices called Udamalala Beat Station and Uraniya Beat Station.

Historical profile demonstrates the changes in lagoon fishing, marine fishing and agriculture in Bundala wetland area. They were asked to identify the changes according to the three decades as 1980's, 1990s and after Tsunami catastrophe. Results depicts that there is an increase in the number of lagoon fishers but the unit fish catch has been decreased. Prawns were the prominent fish species but no more existed as the pH levels of the lagoons were changed. Hence the lagoon fishing activities are not prominent. Bundala area was famous for inland but not for marine fisheries. Results describe that there are 150 marine fishing families in the area at present. They have also experienced the change in fish varieties specially the mussels and lobsters. According to the fishers, ocean environment is different as they have noticed that there is a cold water layer in the sea surface and can see a lot of dead fish in those days. Also warmer climate is experienced as well as rainfall pattern and intensity has changed. They believe that these climate changes have impacts on both lagoon and small scale marine fishing industries. Biodiversity of the wetland has highly affected as the rapid spread of invasive plant species which hinder the growth of other forest trees.

Pairwise ranking tool was used to identify the benefits get from the wetland at present and to find out what aspects are they concern in order to attain sustainable wetland management. After its declaration as a National Parkin1993, people are restricted to occupy certain activities. Traditional lagoon fishing is allowed but many other activities in the park were restricted for public. Hence, at present, people earn income mainly from the saltern. In addition they engage in paddy farming, chena cultivation and tourism activities such as tourist guides, safari jeep drivers and laborers. Second pairwise ranking explores what main aspects they consider to

Table 1: Results of the pairwise ranking

	1	2	3	4	5	6	7	8	9	10	11	Total score	Rank
1.Fish production	X	1	3	1	5	1	1	8	1	1	1	7	3
2.Tourism		X	3	4	2	2	2	8	2	2	2	6	5
3.Salt production			X	3	3	3	3	3	3	3	3	10	1
4.Farming				X	4	4	4	4	4	4	4	8	2
5.Job opportunities					X	5	5	5	5	5	5	7	3
6.Medicines						X	7	8	6	10	11	1	10
7.Education purpose							X	7	7	10	7	4	7
8.Biodiversity								X	8	8	8	6	5
9.Fuel wood									X	10	11	0	11
10.Self-employments										X	10	4	7
11.Archeological importance											X	2	9

(Source: Focus Group Discussion Siriyagama, 26th of August 2016)

achieve sustainable management of the wetland. They have identified fish production; biodiversity and ecotourism are the important aspects need to be considered in the sustainable management plan. This result shows that they still concern the conservation of the wetland.

Conclusions

Bundala wetland faces a serious threat due to improper development activities and changes in the climate. Sustainable wetland management is timely important to conserve this unique ecosystem. Participatory rural appraisal has found out the community's views and perspectives in this regard. Though there is a decrease in the use values of the wetland, people still concern the value of the ecosystem services as selecting biodiversity, ecotourism and lagoon fish production are the aspects need to be addressed in the sustainable management plan of the Bundala wetland.

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