

A Review on Environmental Threats and Challenges of Kolleru Lake

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ABSTRACT

Kolleru Lake is the largest fresh water lake ecosystems in India having rich resources of wild life and fish's wealth and also supporting agriculture in the country. The Ramsar Convention (IUCN, 1971) was the first to identify the lake in coastal Andhra Pradesh as a wetland. It is located between two major deltas, Godavari on the east and Krishna on the west. It is situated mostly in West Godavari and partly in Krishna districts. Lake receives about 65000 to 1, 10, 000 cusecs of water from catchments. A number of streams open into it. They include Tammileru, Budameru, Ramileru and Gunderu. The only outlet is Upputeru which connects the lake to Bay of Bengal. Outflow varies from 6,500 to 14,600 cusecs. Lake has been designated as Ramsar site in November 2002. The shallow waters of the lake, the vast marshy lands, and innumerable mud flats with grassy edges provide an excellent and varied habitat for various species of birds and rich flora. But today economic and industrial development, unjust practices of aquaculture and pollution have become causes of great concern to the ecological status of the lake. Management plan is aimed at preserving the ecosystem to provide an ideal habitat for birds as well as the stakeholders living in and around the Kolleru lake area. Government of A.P is trying to restore the Lake's wetland ecosystem as per terms of Ramsar convention. This review provides challenges and threats of largest fresh water Lake of India and present ecological status of Kolleru Lake, laws and actions of Government takeover.

Keywords: Azeez committee, Ecological status, Kolleru Lake, Management strategies, Operation Kolleru, Policy approaches, Sukumar report.

I. INTRODUCTION

The lake receives water from the catchment area extending over an area of 3,405 sq. km of upland and 1360 Sq. km of delta totaling 4,765 sq. km. The lake supports more than 50,000 water fowls, including a variety of resident and migratory birds. They visit the lake from October to March every year. It provides habitat for 61 species of fishes, 12 species of prawns. Seshavataram & Dutt (1978) noticed up to 18 species of aquatic macrophytes in the lake. Brajmaji rao (2015) identified 17 aquatic flora and 15 common flora in 17 field stations of Kolleru lake.

Last two decades, owing to heavy silting, the lake has been converting into a wetland and in large parts into landmasses. This natural process has been hastened by anthropogenic interventions i.e. partly due to the legal status extended to aquaculture and agricultural activity within and around lake.

Threats and challenges of Kolleru Lake

Satellite images taken by the Indian Remote Sensing Satellite IRS-ID (2010) found that approximately 42% of the 245 km² was occupied by aquaculture, while agriculture had encroached 8.5%. The area consisted of 1050 fish ponds under aquaculture within the lake and 38 dried up fish ponds, which together covered an area of 103 km². Based on IRS ID,LISS 2004 data, it was estimated that between 1967 and now, the total loss of lake area (due to aquaculture) was a staggering 109 km² which represented 55.3% of the 1967 Lake area. The agricultural encroachments were mostly rice fields. The rest of the lake was diminished by water diversions or was infested with weeds like elephant grass and water hyacinth. (Nageswara Rao et al., 2010). In another

significant study (Jayanthi et al., 2006), it was noticed that the lake has undergone phenomenal changes due to aquaculture. The study noted that if human induced degradation is allowed to continue, the lake will very soon disappear. As a result, the ecological conservation of the area has become more a humane than an aesthetic need. A lack of regulation of the seaward flow of Kolleru out flow during monsoon is progressively increasing the high flood line, causing major flood problems in the surrounding cities of Eluru and Guduwada, besides submerging second crop paddy lands and fish tanks. Aquaculture, anthropogenic activities have pressure and badly affected water quality, there by affecting the ecosystem of the lake. Variations observed in physicochemical parameters of Vijaya Lakshmi and Brahmaji rao (2017) study indicate that, exploitation of the Kolleru area has evidently resulted in depletion of many of the ecological goods and services.

Policy approaches

In 1982, the A. P. Government constituted Kolleru Lake Development Committee (KLDC) which had proposed a Rs. 300 Crore master plan for Kolleru. The plan suggests that the lake level be maintained at +5 msl and irrigation and drainage regulators be constructed across the Upputeru channel from the lake to the sea. It also calls for formation of a Kolleru Lake Development Authority to check encroachments, regulate and monitor pollution, clear the lake of weeds and use it as compost and raw material to produce biogas. Despite such admirable proposals, the lake continued to exhibit signs of ecological degradation and it would seem extremely important to conserve the lake and introduce appropriate management systems that would sustain biodiversity of the lake and conservation of the lake ecosystem without inhibiting the genuine developmental needs of the area.

Despite of judgment of the High court of A.P in 2001, upholding the notification of the Kolleru wild life sanctuary, the orders of high court were not implemented. In 2004, following a petition before the Central Empowered Committee (CEC), the government appointed a Committee under the aegis of the Supreme Court of India to oversee implementation of the orders of the Supreme Court.

In January 2006, the CEC undertook a field visit in response to the petition. Following a series of hearings before the CEC and the Supreme Court in response to petitions filed by the aquaculture operators, the Supreme Court delivered a judgment in the matter that the notification of the sanctuary was upheld, that no fish tanks could subsist in the lake and the lake had to be restored to its natural state.

The State Government of A.P carried out the demolished of all illegal structures in the wild life sanctuary by June 15, 2006. The work was carried out by the district Administration of W.G & Krishna districts as "Operation Kolleru". "Operation Kolleru" was launched for dismantling fish ponds encroaching into the Government lands in the notified Kolleru Wild Life Sanctuary. At the outset, the Hon'ble C.M, A.P deserves to be complemented profusely, for not going ahead with the proposal to reduce the boundary of Kolleru Sanctuary from +5 to +3 contours.

Showing remarkable resilience, the lake seemed to have bounced back in short time. As soon as the structure of the lake was mostly restored by June 2006, a group of Pelicans, along with thousands of Asian Open bill storks and painted storks.

By 2006, over 3,500 grey pelicans had arrived at Atapaka in the sanctuary and were trying desperately to nest, but could not succeed due to lack of nesting substrate (sufficient trees were not available). Finally, about 350 Grey Pelicans have settled in Atapaka.

"Operation Kolleru" had significant impact on socio economic development and ecological status of lake. Demolishen of fish ponds at the time of Operation Kolleru, were again repaired and operating freshly. The recent Satellite images also prove that the demolished fish ponds were again carrying aquacultural practices. At present, the lake is subjected to a lot of socio -economic stresses like human settlement, expansion of agriculture in the lake bed, utilization of unrestricted nitrogenous fertilizers and pesticides in the lake bed. Further, the lake is polluted due to discharge of untreated effluents from industries located around the lake in addition to sewage and human wastes. The problems of silting, changes in salinity, increase in nutrient loads, proliferation of weeds as a sign of eutrophication, unjustified aquaculture practices, reduction in fish yields, changes in composition and distribution of the lake's biota, over exploitation of bio resources are all apparent.

Despite these setbacks, there has been no concerted effort until now to studying Kolleru Lake at the ecosystem level. The recent developments in remote sensing with satellite carrying earth observational sensor system disclose how the ecosystem of the lake has been destroyed. The local public requested the Government to reduce the boundary of the lake from +5 contours to +3 contours. So that resulted area 13946.99 hectares including

government 8413.65 hectares and 5533.34 hectares of private land area could be made available for use to agriculture and fishing by local people.

Government of A.P acknowledged the need to carry out a detailed study on the ecology of the lake to restore the lake's ecological character in view of its present degraded state. The Government of India's concern (vide Supreme Court directives) was equally clear on this matter.

Realizing the ecological significance and socio economical pressure of local people, the ministry of Environment and Forest, Government of India appointed AZEEZ committee to solve the problems of Kolleru Wild Life sanctuary. The committee started working in 2010 on the downsizing the Kolleru Lake Wild life sanctuary from +5 contour to +3 contour, and submitted to Ministry of Environment and Forests, Government of India, in 2011 and pointed out the " reducing the area +5 contour to +3 contour feet of Kolleru lake does not serve all the problems of local. But it will affect the ecological environment of the lake and would worsen the water storage capacity of the lake; it will lead to destruction of valuable lake for short signed benefits. Resizing the lake from +5 contours to +3 contours would also results flooding of bed and belt villages of the area due to conversion of lake bed into fish ponds. Azeez committee also recommended the urgent need to conduct resurvey of the existing boundaries.

Ecological features gradually destroyed the livelihood of about thousands of fishermen. More than one lakh dependants shall be deprived, besides loosing the bird habitats of the sanctuary. Lively hood programmed proposals for rehabilitation purposes are not properly implemented.

Aquaculture farmers and local people forced the A. P. Govt to pass a resolution for reduction of Lake. A.P. Assembly unanimously passed the resolution in 2015 to downsizing the Kolleru Lake Wild life sanctuary from +5 contours to +3 contours due to pressure of local people and political representatives.

Before making any further changes on Kolleru Lake, Government needs to balance between the livelihood of local people and conservation of ecological environment of the lake. There is enormous pressure from the locals to explore livelihood opportunities and there is enormous potential too.

Again in 2015 Central Government appointed another committee to discuss with the public concern about the regularization of encroachment of fish ponds, ecological conditions of the lake, livelihood of people were redirected to the Prof Sukumar committee.

Prof Raman Sukumar committee, which has been asked by the Ministry of Environment and Forest to give a report on the A.P. State Govt's request to resize the Kolleru from +5 contour to +3 contour. Working group constituted by National Bird for Wild Life (NBWL) headed by Wild life institute of India.

Committee members visited the various locations of Kolleru Lake 2015, December, including Pelicans paradise, Atapaka, enquired and gathered information about diversion of water from drains that empty into Kolleru Lake. Committee visited the sanctuary, surrounding bed and belt villages and interacted with the local people and state government and received several representations from the local people for the reduction of lake from +5 contours to +3 contour. Several environmentalists also represented not to oblige any request for the reduction of lake.

Sukumar's report January 2017 comments include " no compromise with the ecological balance of the lake by reduction of Sanctuary +5 to +3 contour as per A.P. State Assembly resolution". The committee also recommended the removal from Kolleru nearly 13,673 acres of private lands. It has been noticed that uncontrolled illegal aquaculture farms have come up and showed impact on livelihood of local farmers due to influx of entrepreneurs from private sector.

Conservationists working for the protection of Kolleru Lake are ready to file public interest Ligation (PIL) in the appropriate court taking Prof. Sukumar's recommendations.-G. Venkata Ramana Rao. Hindu March- 2017.

II. SUGGESTIONS

1. Water quality maintained because quality of water determine the biodiversity richness.
2. Water should be treated before entering into lake from aquaculture ponds and control the extension of Aquaculture.
3. Proper management practices should be implemented by the Government and Kolleru Board.
4. Promote and provide livelihood practices like duck rearing, ecotourism...

5. Control the back flow of water from Bay of Bengal to Kolleru Lake by the construction of regulator. Otherwise soon, the fresh water lake may slowly change into brackish water lake. Already in many bed and belt villages during summer time Kolleru people dehabitate their places and migrate to neighboring towns and villages. Intrusion of salt water into Kolleru areas and even in bore wells the quality of water changed into saline water, which is not potable for human consumption.
6. Government of A.P has to be initiate schemes and laws to restore the lake to its pre development state.

III. CONCLUSION

Sound scientific knowledge conserving ecosystem functioning and service appropriation is essential to the management of any ecosystem and Kolleru Lake, in A.P; one of the Asia's largest fresh water bodies and a Ramsar site is no exception. By 2018, it was estimated that over 72% of the sanctuary was encroached upon for unsustainable aquaculture.

We hope that these committees and projects, appointed by State and Central governments outcomes could be used to provide decision makers with scientific information on the ecological and social issues of various management solutions, helping to establish a management scheme which allows for sustainable fishery production without degrading the ecosystem of the lake.

If the present opportunity provided to restore Kolleru Lake of International and National importance, to its prestine glory is missed or lost, not only the chance to do a good thing, but Kolleru Lake itself, one of Asia's most ancient and largest fresh water lakes, is lost forever and at what cost for generations to come.

IV. REFERENCES

- [1]. Amaraneni SR (2004) Poly cyclic hydrocarbons in sediments of Kolleru wetland in India. *Bulletin of Environmental Contamination and Toxicology* 70:964–971; DOI: 10.1007/s00128-003-0076-3
- [2]. Amaraneni SR, S Singh and PK Joshi (2004) Mapping the spatial distribution of air and water pollutants in Kolleru Lake, India using geographical information system (GIS). *Management of Environmental quality* 15(6):584-607; DOI 10.1106/14777830410560683 Anjaneyalu.Y , M.K.Durga Prasad.(2003), *Lake Kolleru; Environmental Status (Past and Present)*. B.S.Publications.
- [3]. Ashok Kumar (2007) Kolleru lake, can it be redeemed. *Proceedings of National Seminar on Conservation of Eastern Ghats, 2007*, Pp 348-355, EPTRI, Hyderabad
- [4]. Azeez P.A, S Ashok Kumar, B C Choudhury, VNVK Sastry, Sanjay Upadhyay, K Mruthyunjaya Reddy and K Kameshwara Rao- Submitted to The Ministry of Environment and Forests Government of India April 2011
- [5]. Bharatha Lakshmi. B¹, Dr.B.T Rao², Dr. K. Rama Rao³, Dr. Poli Naidu⁴, 2015. Diversity, Disribution and status of birds of Kolleru Lake-A Ramsar site in Andhra Pradesh, J. IJRSET, Vol 4, Issue 7, 5759-5779.
- [6]. Brahmaji Rao .P, Vijayalakshmi B.B R.G. (2017) Floral Diversity of Common Flora in Kolleru Lake A.P IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) e-ISSN: 2319-2402,p- ISSN: 2319-2399. Volume 11, Issue 6 Ver. III (June. 2017), PP 01-11.
- [7]. Das Sharma. S, Sujatha. D, Govil. P. K. 2006. Chemical and isotopic study of water and Sediments from Kolleru Lake, A.P, India, Goldschmidt conference Abstracts. Doi: 10.1016/j.gea.2006.06.272.
- [8]. Islam MZ and Rahmani AR (2004) Important Bird Areas in India: Priority sites for conservation. *Indian Bird Conservation Network, Bombay Natural History Society and & BirdLife International (UK)*. Pp xviii + 1133
- [9]. Jayanthi M, Rekha P.N, Kavitha N, Ravichandran P, 2006. *Aquaculture Reserch*, 37: 1617- 1626.
- [10]. Mangapathi Rao, K. 1987. Master Plan for Kolleru lake development - An integrated ecological approach. Office of the Kolleru lake development authority, Kaikaluru, Government of Andhra Pradesh.
- [11]. Nagabhatla N, C Pattnaik, S S Sellamutthu, S N Prasad, R. Wickramasuriya and M Finlayson (2009) Investigation of aquaculture dynamics at a Ramsar site, using earth observation systems in conjunction with a socio-economic assessment. *Lakes & Reservoirs: Research and Management* 2009 14: 325–336
- [12]. Nagabhatla N, Sellamutthu SS (2008) Political Ecology of Wetland Management: the post aquaculture demolition case of Lake Kolleru in India. *Rev. Geogr. Acadêmica* 2(1):10-19
- [13]. Nageswara Rao K, G Murali Krishna and B Hema Malini (2004) Kolleru Lake is vanishing - a revelation through digital processing of IRS-1 D LISS-III sensor data. *Current Science* 86(9): 1312-1316
- [14]. Nageswara Rao K, K Ch V Naga Kumar, P Subraelu, G Demudu, B Visweswara Reddy and B Hema
- [15]. Malini (2010) Kolleru lake revisited: the post 'Operation Kolleru' scenario. *Current Science* 98(10): 1281-1291
- [16]. Pattanaik C, SN Prasad, N Nagabhatla and SS Sellamuthu (2010), A case study of Kolleru Wetland (Ramsar site), India using remote sensing and GIS. *The IUP Journal of Earth Sciences* 4(2): 70-77
- [17]. Radhakrishna Y (1989) .Research on Kolleru lake: Status Report *Proceedings of Indo-US workshop on wetlands, Mangroves and Biosphere Reserves*, New Delhi, 1989, pp 52-59.
- [18]. Ranga Reddy. Y. and M.K. Durga Prasad,.1982. *Lake Kolleru – A limnological Perspective*. S
- [19]. Souvenir of Ist All India Conference of limnology sponsored by UGC and Nagarjuna U University, held on 3-5 March, 1982
- [20]. Ramana Murty MV and K Mruthyunjaya Reddy (2010) Flood hazard zonation around the Kolleru lake, Andhra Pradesh, India – A remote sensing and GIS based approach. In *Proceedings of the 3rd International Conference on Hydrology and watershed management with a focal theme on climate changes – water, food and environmental security*, 3-6 February 2010, Centre for Water resources, Jawaharlal Technological University, Hyderabad. Pp1010-1021
- [21]. Rama Rao RV (1981) Techno economic evaluation studies of aquaculture at Kolleru Lake. Department of Geoenineering and resource development, Andhra University, Visakhapatnam
- [22]. Reddy P R (2014) Fresh water ecosystem and biodiversity-A case study of Kolleru lake, India; A review, *J Ind. Geophys. Union*(2014)v 18, no 2, pp 277- 288
- [23]. Seshavataram. V.B.S.M. Dutt and P.Venu.1982. .An ecological study of the vegetation of Kolleru lake. *Bulletin Botanical survey of India*. 24(11-4): 70-75pp.
- [24]. Seshagiri Rao BV(1988) Kolleru lake in India under threat of ecological degradation, *Asian Wetland News* 1(2): 13-16.

- [24]. Seshavaram V and P Venu (1981) Ecology of Kolleru lake. *International Journal of Ecology and Environmental Sciences* 7: 35-44.
- [25]. Sukumar .R. (2017) Minutes of 40th Meeting of the Standing Committee of National Board for Wildlife held on 3rd January 2017- Agenda Item No. 2: Action Taken Report (ATR) 35.4.5.1 Proposal for boundary alteration of Kolleru Wild Life Sanctuary, Andhra Pradesh
- [26]. Venkateswaralu V,(1993) Kolleru lake Ecosystem: A comprehensive study; Lake Kolleru, Environmental Status, pp 159-167, Retd Professor, Department of Botany, Osmania University, Hyderabad.
- [27]. Vijayalakshmi B.B R.G* , Brahmaji Rao .P**(2017) Evaluation of Physico- chemical parameters to determine the Water Quality Criteria in Kolleru Lake A.P, India, *Int. Journal of Engineering Research and Application* www.ijera.com ISSN : 2248-9622, Vol. 7, Issue 9, (Part -1) September 2017, pp.01-06
- [28]. Wetland International (2008) Integrated management plan for Kolleru Wildlife Sanctuary, Final Report prepared for the Forest Department. Government of Andhra Pradesh
- [29]. Wildlife Management Division, Eluru (undated) Brief note on Koleru Wildlife Sanctuary, p22 WW India (2002–2003) Kolleru lake Andhra Pradesh., <http://www.wfindia.org/programs/freshwet/koleru.jsp?prm=100>.
- [30]. WWF India (1987) Wetlands, status and management in India; an overview. Environmental Service Group, Delhi

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