

Jewel of Thar Desert: Case study of a hidden wetland

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Abstract

Wetlands are very critical for the conservation of aquatic ecosystems, while also serving as the breeding/ nesting/ resting grounds for water birds. Generally, wetlands support both resident and migratory birds, thus serving as connecting dots in the global flyways. The Rajasthan state of India has two Ramsar sites (Keoladeo National Park and Sambhar Lake) and many other water bodies/wetlands. However, most of these areas are segregated in the eastern, southeastern, southern, and northern parts. In the western part of Rajasthan, where lies the Great Indian or Thar desert, there are no such reported prominent wetlands drawing attention towards a substantial number of resident and migratory water birds. The author is an Indian Forest Service officer, who was posted in the Thar Desert region and during that time had identified a hidden wetland in the desert landscape. This study deliberates on the wetland location and its faunal diversity with prospects of developing the area as a proper wetland conservation zone. India is a signatory to the Central Asian Flyway of migratory species and serves as an important member in terms of having significant wetlands and reported migratory birds count. The need of preserving and bring the arid zone's hidden wetlands to the forefront can serve as an important tool to conserve water birds and comply with worldwide bird migration conservation efforts.

Key words : Annual Waterbird Count, Bikaner, Conservation, Desert, Rajasthan, Waterbirds, Wetland

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1. Introduction

The Rajasthan state of India falls under the arid and semi-arid biogeographical zone (Roger et al. 2000). The arid zone covers the west and northwestern part of Rajasthan, forming the Thar or Great Indian Desert. The desert region understandably witnesses water scarcity, being the limiting factor. The Indira Gandhi Nahar Project (IGNP) was initiated to provide drinking and agricultural water to the desert zone, covering 7 districts of Rajasthan, including the Bikaner district, which has nearly 5% of the canal. The IGNP is one of the biggest ambitious projects targeting to transform the desert into an agriculturally fertile and drought-proof zone (Shrivastava et al. 2013). Surface water resources were the main source of drinking water in Bikaner, before the IGNP canal. The district has only two prominent freshwater lakelets in Gajner and Kolayat tehsils. However, there are sufficient ponds and open tanks in Bikaner (Kashiwa 2013). Chauhan and Gopal (2016) have made a study on saline wetlands of arid zone in Rajasthan; their work has already mentioned Bikaner district's saline wetlands and those wetlands harboring important migratory birds and also providing ecosystem services. In recent times a land cover land use analysis of the district has shown a rise in total coverage of water bodies (Sen 2021). The significance of water bodies associated with the IGNP project

has also been highlighted in past by Sivaperuman and Baqri (2009) in their work on ascertaining the diversity of avifauna in and around the IGNP area. They have specially focused on inter sand dune wetlands and recorded a total 119 of water birds, thereby indicating the importance of such desert wetlands in conserving waterfowl populations.

The importance of a water body or wetland becomes evident as the migratory or resident water birds are reported in the area. Way back in 1993, Gopal and Krishnamurthy pointed out the need of classifying wetlands into saline and freshwater categories to understand their values in their study of wetlands in South Asia. The Asian Water bird Count (AWC, 2020) is a citizen volunteer programme under the aegis of the International Waterbird Census (IWC), for waterbird census across wetlands each year in January. In that programme, the Bikaner district had always had very little to offer in terms of large waterbird congregation, except the freshwater lakelets cited earlier. The author at the time of her posting in the Bikaner district from 2015 to 2017 identified an unbelievable hidden wetland water body at the catchment area of the IGNP canal, in the dead heart of the desert. The importance of the Thar desert in global winter bird migration is already established by the steady arrival of Demoiselle Crane every year in the Jodhpur district of Rajasthan (Gehlot et al., 2021). In the year 2000 to 2003, the Indian Ministry of Environment, Forests, and

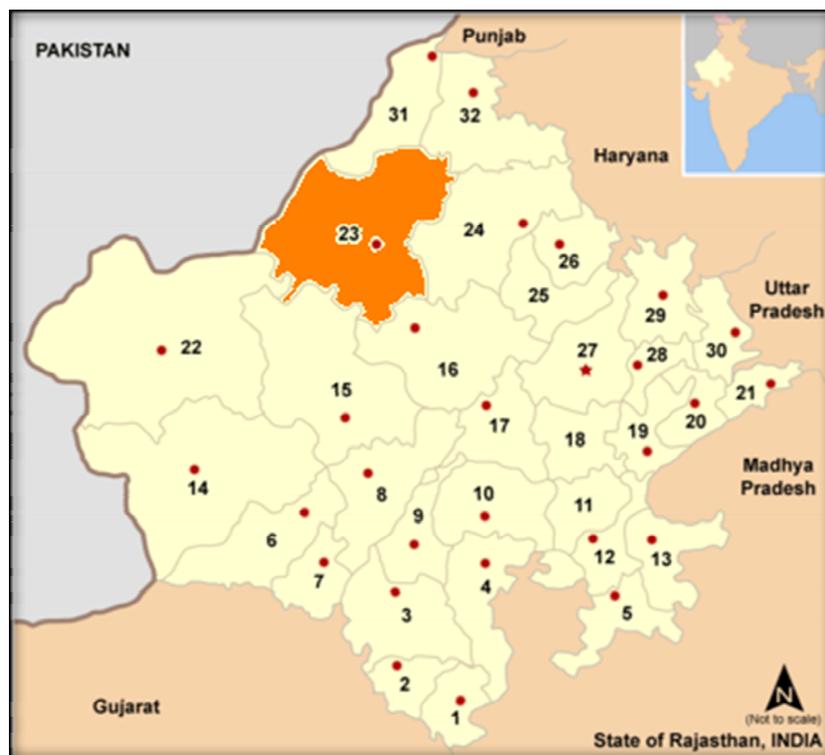


Fig 1. The location of Bikaner district in Rajasthan state of India



Fig 2. The location of the wetland area in Bikaner district, Rajasthan state of India

Climate Change conducted a study in the Thar desert with the purpose of an avifaunal survey in and around the IGNP canal area (Sivaperuman et al., 2005). In that survey, 271 species were reported in the Thar desert, out of which 23 species were reported first time, indicating the lack of inventorization and proper reporting of such desert zone avifauna.

It can safely be said that the Thar desert has always attracted scientific communities to decipher its various treasures. However, all these past studies were mostly with respect to counting and reporting of avifauna specially water birds. There had not been any previous study made to purposely identify any single potential water body in the Thar desert zone and evaluate its value as a wetland. This study has first time reported a single wetland area of the Thar desert, which is linked to the IGNP canal, including a listing of the area's wetlands characteristics and also a listing of the resident and migratory water birds found there. The study is intended towards pioneering the importance of conserving such sand dune wetlands hidden in the heart of the Thar desert and linked with IGNP, as they can potentially serve as the first Indian stopover for migratory birds flying along the Central Asian Flyway (CAF).

2. Materials & Methods

2.1 Study Area

Indira Gandhi Nahar Project (IGNP) II Bikaner division is one of the three territorial forest divisions of Bikaner district, Rajasthan, India (Figure 1). It was created on

October 1987 as IGNP Stage II Khand I, for plantation & sand dune stabilization of the Bikaner part of Thar Desert adjoining the IGNP canal, up to the international border. IGNP Stage II Bikaner division has a total area of 40764.580 ha. Geographically the wetland area is located 70 km away from Bikaner City, at the heart of the Thar Desert. The area falls on the right-hand side of the IGNP main canal (Figure 2).

2.2 Catchment area

The area focused upon is part of 2360.75 ha (9443 Bigha) "Gair Mumkin" land adjoining the IGNP main canal, owned by the Irrigation department. The total land is un-command & permanently declared a reserve zone for disaster management i.e. flood control. The escape area of this land has natural depressions with round-the-year water from the IGNP canal as well as monsoon rains. The escape area thus formed an artificial wetland area constituting 11 interconnected small jheels (Figure 3). The wetland has a depth of up to 5 m & over the years stable water table, therefore presenting a very good natural habitat for wild animals & birds.

There are patches of 15–20 years old plantations in the area done in the early days of the IGNP project by the Forest Department. Presently the plantations are considered as deemed forests with all practical purpose ownership & maintenance done by Forest Department (Kureel, 2009).

2.3 Ecological values

The area has important ecological value in terms of

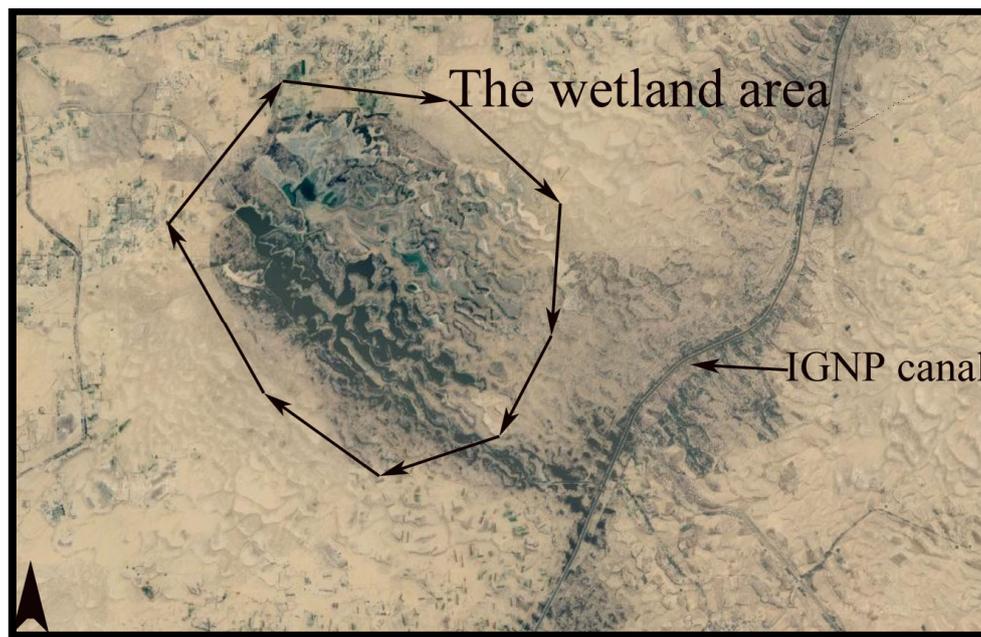


Fig 3. The wetland with the series of small lakelets



Fig 4. Few snapshots of the wetland area and surrounding vegetation

ecosystem services provided to the local communities. The area serves as the fishing zone for the nearby villagers, thereby supporting their livelihoods; also being used as a flood control zone for the IGNP canal. Other than supporting the avian populations, the catchment area is natural grassland supporting endemic grass and shrub species of the desert ecosystem and supporting the Chinkara or the Indian gazelle (*Gazella bennettii*).

2.4 Methods

The study was conducted keeping in mind the objective of finding the importance of the wetland both as a potential

stopover of winter migratory birds and also for its other ecosystem services. The direct counting method was followed in January 2017 for listing resident birds, migratory birds, and mammals. AWC conducted in Rajasthan does not cover this area; thereby the counting was done by field staff of the forest department. Generally, the AWC is conducted once a year in early or mid-January, the same method had been opted for this study as well. Detailed discussion was held with both the irrigation department and the local villages surrounding the wetland to understand their livelihood dependency on the wetland and also the scope of further development of the area as a potential ecotourism



Fig 5. Few snapshots of the waterbirds found in the wetland area

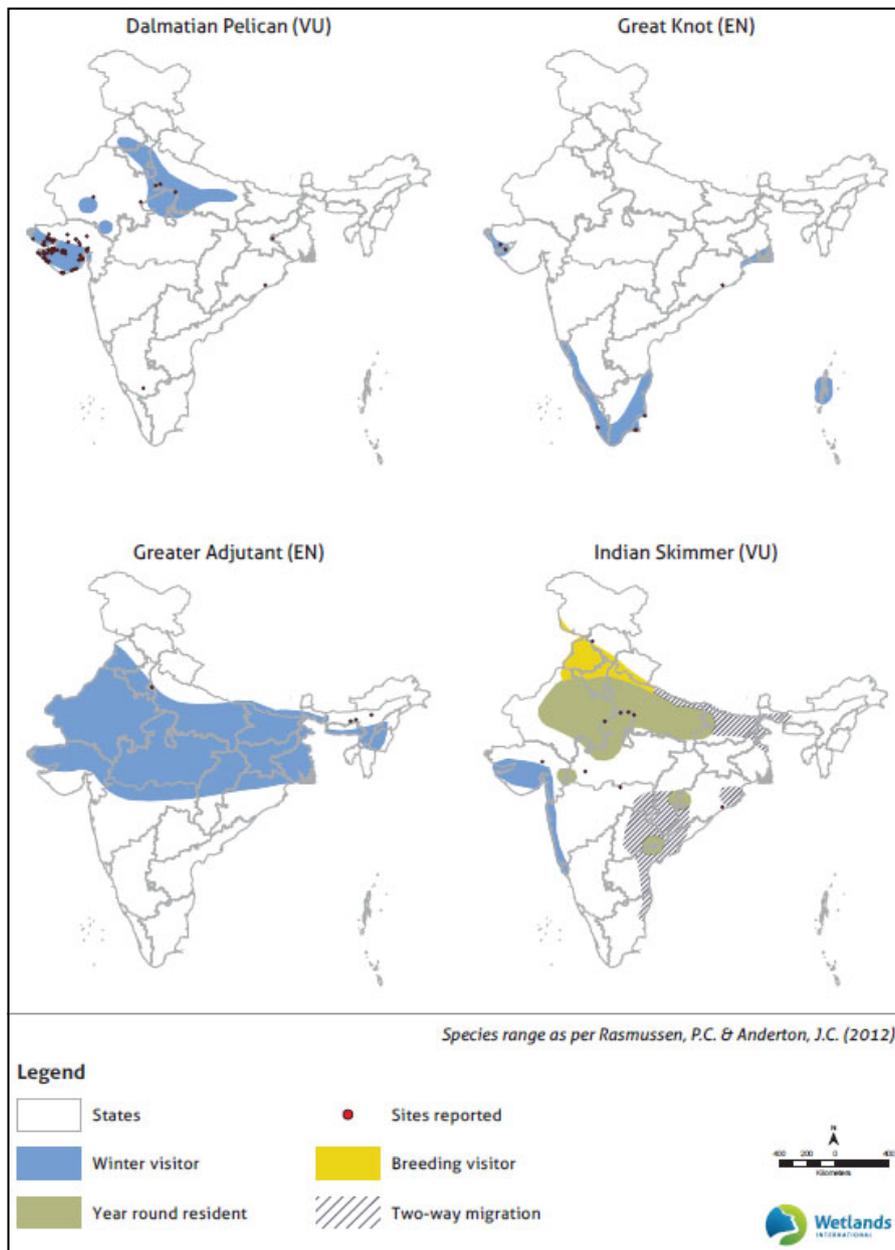


Fig 6. Range of Dalmatian Pelican, not covering western Rajasthan, as per the AWC data

site. This survey was then used for the SWOT analysis.

3. Results and observations

Amidst the barrenness of the Thar Desert, this place acts as a local oasis (Figure 4), providing habitat to several birds (resident & migratory), mammals & herpetofauna. The place is as yet unknown to the residents of Bikaner city as well, who can get a glimpse of greenery & be part of sustainable conservation on developing the project area. The area has been mentioned in IGNP Stage II Working Plan (2009–10 to 2018–2019) under Wildlife Overlapping Circle as one of the eight escape areas & depressions of IGNP Canal with a great variety of wildlife & vegetation. This is one of the four areas falling in Bikaner, the other four are in Jaisalmer. The main treatment prescriptions mentioned were as below:

1. Developing the area as Bird Sanctuary. Near water areas of escape and depression zone, planting shade and fruit trees, like *Ficus glomerata*, *Acacia nilotica*, *Ficus bengalensis*, *Syzygium cumini*, *Ficus relegiosa* species, etc, can be planted to serve as food & habitat for birds.
2. These areas should be developed as an Eco–Tourism zone as migrated birds regularly visit the area & made their habitat, along with permanent habitats of local birds. Thus the areas can be developed as bird watching areas.

The objective was manifold, encompassing the need for the conservation of the wetland habitat found amidst the desert ecosystem and development of the area as an Eco–tourism spot; protection of local wildlife & migratory avifauna through landscape conservation approach, and finally ensuring ecological and environmental stability through conservation of the wetland.

Being part of the Thar ecosystem & added benefit of wetland habitat, the area is rich in flora & fauna. Locally in present days, it’s named Roopnagar jheel. Naturally waterlogged area with a permanent water table aids in providing a good habitat for wild animals & avifauna. The landscape includes sandy patches, sand dunes, grassland, natural & planted forest area as well as lakes, thus encompassing a variety of habitats & minor ecosystems. There are two main categories of avifauna, one which is local to the whole Bikaner district & the other are migratory water birds found mainly from November to February. A list of present varieties is mentioned in table 1, by direct count of waterfowls only for a period of 7 days in January 2017.

The substantial number reported in such a short duration indicates the actual high bird count over the complete winter period from November to February (Figure 5). A list of general faunal diversity and vegetation checklists is as in Tables 2 and 3. It can be seen that the area is truly a natural wilderness with a substantial variety of presence of wildlife and natural vegetation.

Table 1. Migratory and resident waterfowl count in January 2017

Migratory &/or Water birds	Numbers by direct count (January 2017)
Coot	250
Cormorant	60
Grey Heron	57
Common Crane	87
Griffon Vulture	5
Gadwall	16
Darter	41
White-tailed Lapwing	26
Dalmatian Pelican	89
Osprey	7
Greater Spotted Eagle	9

Table 2. General faunal diversity of the wetland area

Mammals	Birds	Reptiles
Jungle cat	Little Cormorant	Varanus
Common mongoose	Indian darter	Uromastryx
Jackal	Grey heron	Hedgehog
Indian fox	Pond heron	Chamaeleon
Desert fox	Pariah kite	Cobra
Striped hyena	Indian peafowl	Saw scaled Viper
Blue bull	White-breasted water hen	Krait
Indian wild boar	White Tailed lapwing	
Indian porcupine	Wood sandpiper	
Hare	Blue rock pigeon	
Indian Gazelle	Red turtle dove	
	Sparrow	
	White ibis	
	King vulture	
	Koel	
	Large Indian parakeet	
	Rose-ringed parakeet	
	Common Kingfisher	
	White-breasted kingfisher	
	White wagtail	
	Large pied wagtail	
	Grey Francolin	
	Red Naped Ibis	

Table 3. Vegetation of the wetland area, natural and planted

Natural Trees	Planted Trees	Grass
<i>Calotropis procera</i>	<i>Eucalyptus spp</i>	<i>Cenchrus biflorus</i>
<i>Acacia jacquemontii</i>	<i>Acacia nilotica</i>	<i>Cenchrus ciliaris</i>
<i>Aerva pseudo tomentosa</i>	<i>Acacia tortilis</i>	<i>Conchrus setigerus</i>
<i>Zizyphus nummularia</i>	<i>Zizyphus glabrata</i>	<i>Farsetia hamiltonii</i>
<i>Tamarix aphylla</i>	<i>Acacia senegal</i>	<i>Paricum targidum</i>
<i>Salvadora persica</i>	<i>Prosopis cineraria</i>	<i>Lasiurus sindicus</i>
<i>Capparis deciduas</i>	<i>Tecomella undulate</i>	
<i>Prosopis cineraria</i>	<i>Albizia lebbek</i>	
<i>Leptodonia pyrotechtina</i>		
<i>Calligonum polygonoii</i>		
<i>Crotolaria burhia</i>		

4. Discussion

During this study, an extensive search of secondary literature was made. However, it was found that there are very limited avifaunal and wetland-related studies conducted in the Thar desert in the last 3 decades. Additionally, there has not been any single mention or report of this specific area in any research/ scientific publications. Thereby, this study reports first time the wetland potentials of the study area.

The ownership of the area is held by Irrigation Department

Table 4. SWOT analysis of the wetland area as a prospective protected area

Strength	Weakness	Opportunity	Threat
Natural waterlogged area with over the year permanent water table providing a good habitat for wild animals & avifauna. The landscape includes sandy patches, sand dunes, grassland, natural & planted forest area as well as lakes, thus encompassing a variety of habitats & minor ecosystems. So a simple enclosure & running maintenance will give rise to long-term habitat vis-a-vis wildlife conservation.	Total land ownership is with the irrigation department, which includes the bordering old plantations raised by Forest Dept. as well (considered to be deemed forest at present). Therefore the decision has to be taken on the issue of land acquisition, as mentioned earlier.	1. Locally established village communities can be involved in livelihood generation, capacity building & protection purposes	With increasing habitation pressure, permanent boundary maintenance & biotic interference may impose a problem in the far future.
Bikaner acts as a one-day stoppage for Jaipur-Jodhpur/ Jaisalmer travel route, both ways. Thus proper management & promotion can help in making this project flourishing alternative tourism for 1-day stoppers, who has a very limited option in Bikaner to explore & enjoy.	Complete fencing of the total area is a difficult task to achieve as there is no definite & clear boundary demarcation.	The area can be developed as an ecotourism area for the Bikaner district. Except for Johdheed Conservation Reserve, there are no other options available for people as a temporary getaway to nature (disputed Gajner area being royal property with no forest department's involvement); Thus generating a big public awareness, tourist influx, revenue generation & long term wildlife conservation in IGNU area which otherwise doesn't have any targeted conservation approach, though having good wildlife & avifauna	
No immediate biotic pressure on the grassland area as the villages surrounding are spread over a range of (on average) 10km radius.	There will be a majority influx of local tourists. As the area is close to the International border – foreigners are not permitted to visit, as the area is near the international border.	The area is near Bajju which is a predominated Vishnoi- supported zone with regular demand for targeted conservation efforts. Thus major support for running & maintenance will be ensured with public participation & cooperation.	
Being a natural depression, this area is one of the declared water reserves for the IGNU main canal, in case of a high water level emergency. Thus there will never be any future issue of transfer of land ownership.		The area is only at a distance of around 70 km from Bikaner city. Therefore 1-day ecotourism/ camping/ bird watching/ traditional night stay package will be a ready attraction for Bikaner tourists.	
No tributary canal system (minor, distributor) is passing through the area, so there will never be any issue of revenue allotment to farmers & villagers for agricultural purposes, which can cause probable dispute.			

as it is a permanently declared escape area for emergency mitigation. Thus either the Forest Department, through State Government, can acquire the possession and declare Protected Area status to the total land or the land would not be transferred to Forest Department, instead on basis of a bipartite agreement between Forest & Irrigation the tourism can be taken up by Forest Department, while the responsibility of regular maintenance of the channel & escape system remains vested with Irrigation department only.

The second way of conserving the area is more practical & viable because the escape area along with the adjoining Pannalal Barupal Lift needs permanent monitoring & control by the Irrigation department only, land acquirement by Forest Department will give rise to prolonged management issues & trouble may arise for water regulation. Similarly, as the area is already devoid of high anthropogenic pressure, ensuring protection through a notification is not an emergency demand: instead, it will give rise to future conflicts between the two departments. Therefore by a simple agreement between the two departments, the preservation of the pristine habitat as well as the scenic beauty will be ensured, coupled with benefit sharing with Irrigation Department & livelihood improvement for local communities.

Considering the working plan prescription of developing the area as a protected area with eco-tourism, a detailed strength, weakness, opportunity, and threat (SWOT) analysis was done as detailed in Table 4. It can be seen from the SWOT analysis that an area has huge potential to be developed as a protected wetland area.

The true importance of promoting this area as a proper wetland conservation site can be strengthened by another fact. The summary report of AWC for 2005–2015 released by Wetlands International (2020) showed the range of the Dalmatian Pelican (a migratory bird), and the range does not cover the western desert part of Rajasthan (Figure 6). However, there is the presence of the Dalmatia Pelican in the wetland area under discussion, which prominently justifies that this wetland is an actual winter-stopping ground for migratory birds which are not being reported and eventually not protected, thereby losing a huge conservation prospect. Another independent study made by Mahindra et. al. (2021) also reported the sighting of a Northern Lapwing during the water bird census 2020. This species has been recorded first time in the IGNP canal area of Bikaner, in India, it was only reported previously in the Eastern side of India and never from the arid Western side. The desert wetlands can thereby be considered an important retreat area for many migratory birds following

the Central Asian flyway.

Conclusion

The potential of any natural area to contribute to the conservation of habitat and species is subject to long-term planning, which also depends on the actual positive factors supporting the importance of the identified area. Thereby, this study has been targeted to identify the potential of conserving the referred area as an important wetland lying in CAF with associated ecosystem values. The study has established the said potential of the site in terms of already available important migratory bird species reported there and also in terms of its prospect of development as a protected area or ecotourism site. The path ahead is yet a long one, and based on the agreement between two government agencies, i.e. forest and irrigation department of Rajasthan, this area can serve as a showcasing of a targeted conservation approach and governments' commitment towards the same. There is also a need for repeat bird count and monitoring of the zone in the winter time of subsequent areas, to establish the importance of the potential wetland more firmly. In the arid zone of Rajasthan, such an initiative can bring fruitful outcomes in terms of desert ecosystem conservation with the added benefit of strengthening the central Asian flyway of global migratory birds.

References

- Asian Water bird Census (2020). Results of coordinated January counts for India 2006 – 2015. Wetlands International, India.
- Chauhan, M. and Gopal, B. (2016). Saline Wetlands of the Arid Zone of Western India. C.M. Finlayson et al. (eds.), *The Wetland Book*.
- Gehlot, H. S., Adhikari, T., and Kachhwaha, V. (2021). Eternal Attachment of Demoiselle Crane (*Anthropoides virgo*) to the Thar Desert of Rajasthan, India. *Applied Ecology and Environmental Sciences*, 9(1), 67–72.
- Gopal, B. and Krishnamurthy, K. (1993). Wetlands of south Asia. In *Wetlands of the world: Inventory, ecology and management Volume I* (pp. 345–414). Springer, Dordrecht
- Kachhawa, C. (2013). Pollution status of surface water resources in the arid region of Rajasthan (India). *International Journal of Modern Physics: Conference Series*. Vol. 22 (2013) 733–735.
- Kureel, M.K. (2009). Working plan of IGNP II division. Rajasthan Forest Department, India.

- Mahendra, S., Shubham, K., Kanak, P., & Rajaram, C. (2021). Sighting of Northern Lapwing (*Vanellus vanellus*)(Linnaeus, 1758) in Bikaner, Rajasthan, India. *Prithivya, An Official Newsletter of WCB Research Foundation and WCB Research Lab*. Vol 1(3) 10–12.
- Sen, M. (2021). Application of Bhuvan platform in deciphering Land Use Land Cover (LULC) changes of recent time in Bikaner part of Thar Desert, India. *International Research Journal of Earth Sciences*. 9(1): 1–7.
- Shrivastava, M., Sharma, I.K., and Sharma, D.D. (2013) Ground Water Scenario in Indira Gandhi Nahar Pariyojna (IGNP) in parts of Sri Ganganagar, Hanumangarh, Churu, Bikaner, Jaisalmer Jodhpur, and Barmer Districts, Rajasthan. *Memoir geological society of India*. No.82, 2013, pp.16–35.
- Sivaperuman, C., Dookia, S., Kankane, P. L., & Baqri, Q. H. (2005). Diversity, abundance, and dominance of avian species in the Thar desert of Rajasthan. *Changing Faunal Ecology in the Thar Desert*. *Scientific Publishers, India*, 367pp, 187–229.
- Sivaperuman, C. and Baqri, Q. H. (2009). Avifaunal diversity in the IGNP canal area, Rajasthan, India. In *Faunal ecology and conservation of the great Indian desert* (pp. 113–118). Springer, Berlin, Heidelberg.