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Conservation and Management Aspects of Avian Diversity in and around Traditional Water Bodies of Jodhpur (Rajasthan)

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Abstract: ***Both the study areas i.e. Kaylana lake nad Rao jodha desert rock park are very important areas for the birds as they provide the appropriate habitat for them. They welcome hundreds of migrants every year.This paper stresses the strategic significance of traditional people in maintenance, conservation and management of the entire avian diversity. There is an indivisible relation between peoples ethnic cultures and birds conservation. Role played by the royal patronage in conservation of birds is eye catching. Traditional people lice in most hostile environment and protect avian diversity. Their contribution to the conservation of biodiversity is significant. But several problems were encountered which needs to be resolved. Various management aspects are to be considered for the proper avian site to become.***

Keywords: Conservation, management, traditional, protects, patronage

1. Introduction

Birds are one of the best known and most highly valued groups of species. These have been demonstrated to serve as good indicators of biodiversity and environmental changes. Birds thus can help in making strategic conservation planning decisions for the wider environment. Continental and local declines in bird population have led to concern for the future of migratory and resident bird species. According to the Worldwatch Institute, many bird populations are currently declining worldwide, with 1,200 species facing extinction in the next century [1]. The reason for declines are complex like habitat loss, habitat fragmentation and modification, loss of wintering habitat, successive predation etc. Indian Bird Conservation Network (IBCN) is a network working for the conservation of birds in India. Daniels (1994) proposed a landscape approach to conserve avian diversity of Western Ghats, India. Bdeachandran (1995) studied avian diversity in Coastal wetlands of India and conservation needs. Islam and Rahmani (2004) identified important bird areas for conservation of birds in India. Islam (2006) suggested conserving waterbirds and wintering areas through important bird areas in India. Acharya and Vijayan (2010) collected information on threatened and endemic birds of Sikkim using PC method. Arresting deteriorating aves population require developing effective conservation and management decision making tools.

Spirit of avian conservation and appreciation has been deeply rooted in Indian culture and ethos. Many ancient folklores, paintings, sculptures provide illustrative account on how earlier people enjoyed watching, eating, taming and even worshipping birds. The Hindu mythology contains several revealing descriptions of bird's role in social, religious and cultural phenomenon, so much so that swan is considered as the carrier of goddess of education- The Saraswati, and the owl is considered as the carrier of the goddess of wealth- The Lakshmi, white Jatayu – the vulture played the key role in Ramayana. According to another Sanskrit script the crow look by one eye: this observation is quite appropriate from scientific view, and whenever they see food item they call other crows to join the feast, a social justification of seeing needs of other fellows with one eye- with equality!

However, despite a glorious past due to gradual decline in the quality and content of most of the wildlife habitats the future of India's wildlife habitat, the future of India's wildlife, vis-à-vis birds, is far from secure. Environment degradation more notably the decline and degradation of avian habitat is perhaps the most damaging factor for jeopardizing the sustainability of our avian heritage. Various anthropogenic effects and indiscriminate use of pesticides and insecticides are adversely affecting the avifauna of the country. While population of Great Indian bustard and Vulture's has crashed alarmingly and that too with in a very short period of time, population of common birds like house sparrow, parakeets, baya weaver, etc., are also declining.

Jodhpur, the second largest city of the state Rajasthan, India. It is the gateway to the Thar, as it is literally on the edge of the Thar Desert. There are two important areas from the conservation point of view of birds i.e. Kaylana lake and Rao jodha desert rock park as they inhabit wide range of birds diversity. Kaylana lake is located 8 km west of Jodhpur (Raj.). It is an artificial lake made in 1872 by Pratap Singh. It receives its water from Hati Nahar, which is further connected to the Indira Gandhi Canal. The drinking water needs of Jodhpur and nearby villages is fulfilled by this lake. Its surface area is 84 km^2 (32 sq in) with an average depth of approximately 35 to 40 feet (11 to 12 m). It's coordinate $26^0 17^{'}$ N $72^0 58^{'}$ E. It is hot and semi-arid during dry season. Rao jodha desert rock park was created in 2006 to try and restore the natural ecology of large, rocky wasteland next to Mehrangarh Fort in Jodhpur. It spreads over 72 hectares. Itscoordinate 26.30^0N 73.01^0E.Temperature varies from 49^0 in summer to 1^0 in winters. Average rainfall is 302 mm/yr. The soil is sandy, with a natural vegetation of trees and shrubs comprising of *Prosopis cineraria, Capparis deciduas, Caligonum polygonides, Acacia senegal, Zizipus nummularia, S.persica, Euphorbia caducifolia, Calotropis procera, Dactyloctenium aegyptium.* The fauna of this area

mainly include Mangoose, Jackal, Nilgai, Desert hair, Cobra, Cat, Dog, etc.

During study period various aspects of conservation and management of avian diversity was observed. The Kayalna lake and Rao jodha desert rock park are popular tourist site. Surrounding areas such as Balsamand lake, Mehrangarh fort, Old city wall and area, Jaswant thada and many more are also attractive site for tourists. So the study area has a good scope of tourism by virtue of its location, good floral and faunal diversity. It is important to conserve and manage these areas so as attract more avian diversity and the tourists. The Rao jodha desert park (back in 1930's) was covered by the *Prosopis juliflora* ("a mad one") but due to immensless effort of Mr. Pradeep Krishen the area is no more dominated by *Prosopis juliflora* and the native plants which were ousted, they have been reintroduced in the area. So this person have reintroduced the habitat of billions of birds which are dependent on these plants they may be resident of may be migratory.

2. Materials and method

Specific methods were applied randomly in the study area regarding the conservation and management aspects of avian diversity. We gained valuable information during the random field survey using various methods like:

1) **Field survey**: Random field survey and visual observation in Kaylana and Rao jodha desert rock park in Jodhpur (Raj.).
2) **Interview**: The field survey conducted by making simple questionnaire format to obtain the information through people's traditional knowledge.
3) **Literature Survey**: Offline and online literature has been used using books and Journals.
4) **Bird's observation**: avian fauna was watched by ocular methods and their nests and feathers. Vehicle-based method and Road side counts also have been used.
5) **Questionnaires Format**: With simple questionasked people how they utilised these resources to conserve the avian diversity.
6) **Photography**: Photographs of their activities in the study area has been also taken. Identification of Faunal, as well as floral diversity, also was observed.

3. Result and Discussion

In the present study an attempt has been made to find out the conservation and management aspects of avian diversity in the study areas. Results in this study include information related to the knowledge that the people have and their view towards the conservation of birds. The local people of Jodhpur mainly in the old city area are very knowledgeable about this environment around Rao jodha desert park, Mehrangarh fort and traditional water bodies are no exception to this situation. In spite of lack of scientific literature on people's science and biodiversity repositories, a fairly good knowledge on flora and fauna exists in form of oral tradition and desert ethos in the study area. During the tenure of this study the problems were encountered and the management aspects were listed.

The local people have developed knowledge and theme about forecast system and perception related to rains and better agriculture crops based on animal behaviour and changed in morphological characters in plants/trees is remarkable technique and can never be gleaned from the meteorological science [2]. In this study information on behaviour of birds were recorded as narrated by the people in the study area as follows:

While interviewing and interacting with local people a large number of information based on birds behaviour was recorded. Some of the interesting beliefs of local are:

1) It is said for Cuckoo, *Cuculus micropterus* fly in the early hours of the day between 5 AM to 6 PM from North to South direction emitting loud vocalization the region receive rains the very third day (Parihar and Rajpurohit, 2010).
2) The Crow, *Corvus splendens* if start laying eggs, it will not rain for 60-70 days in that area and also in that direction where the eggs have been laid.
3) The gliding behaviour in the sky of Pariah kite, *Milvus migrans* and eagle *Circaetus gallicus* is collaborated with early rains in the area.
4) When house sparrow, *Passer domesticus* bath in dry soil it indicates that it will rain.
5) Location of Red wattled lapwing, *Vanellus indicus* nests is a good measure to forecast the extent of rains. If nests are found on the banks of a water body or in the bed of the tank, it will not rain. if it is away from the bank on the high elevation, the rains will be good.
6) If the cattle egrets, *Bubulus ibis* leave their resting place and fly away it is going to be poor rain year.
7) If Peacocks, *Pavo cristatus* vocalize after 3 AM showers of rain follow in the early morning.
8) The location and height of nests from the ground of Kalchiri, *Saxicoloides fulicata* in their nesting trees are good indicators of rains. If nests are located on the higher canopy it will rain heavily. If it is on the lower branches the rain will be poorer in the area.
9) If Crow, *Crovus splendens* vocalize in the night it is going to be a drought year.
10) Grey shrike Lanius excubitor presence in good numbers suggests that there will be an attack of 'Katra' *Stauropus fagi* which is a serious pest of crops in the region. However, birds act as very good biological control by consuming *S.fagi*.

Traditional songs

Traditional songs always have a message for conservation and management of avian diversity, which is transferred by them from one generation to another generation. Here listed some of them folk songs.

1) '*Kurja mat mar re balum, kurja mat mar'.*
   '*Kurja'* mean Demoiselle crane scientific name *Grus virgo*. The message is that don't kill them.
2) '*Mor bole re, hivde ri ler mai'.*
   'Mor' mean Peacock *(Pavo cristatus).* Meassage voice of peacock is so sweet touching heart so conserve it, it is very important for an ecosystem.
3) *'Aacho re buglo, aachi re poncho, acho mhore dhiyal bai ro chudo'.*
   It's about the beauty of white heron or great egret (*Ardea alba)* and gives a message to the conservation of it.

4) *'Udja bai re chidkli'.*
   It's about house sparrow (*Passer domesticus)* and its conservation.

(III) Local phrases- There are various local phrases of indigenous people in the Thar Desert that mention the presence of animals in contrast to their good or bad omen. These are like that-

1) *"Davi dere, Jeemni gometre"* – This quote states 'Daavi'- the presence of bird Grey Shrike (*Lanius excubitor*) at the left side is good for going home (dere=home) and 'Jeemni' – presence of bird at the right is best for travel (Gometre= outside the home). Bird Grey Shrike (*Lanius excubitor*) is locally called as "Malali" or "Shakun chiddi" is the very hallowed bird for them. They use its presence as a good omen or bad omen for work and travel. Due to this behaviour, they conserve avian biodiversity [3].
2) *"Davo Teetar, Davo Raja, Davo Mor kre kilol, Davi Lonki Mukh dikhaye, to Lanka Ko Raj Vibhasan pave"* – It means when there is presence of Grey Shrike (*Francolin pondicerianus*) locally called Teetar, presence of king (Raja) and presence of peacock (*Pavo cristesus*) locally called as Mor while singing (Kilol) at left (Davo) side than according to them it is very good sign for success of any work like these all incidents happened in past during Ramayna so Vibhishan became king of Lanka. This type of phrases or common quotes transfer traditional knowledge to the nest generation and plays a significant role in the conservation of biodiversity.

4. Role of royal patronage of Jodhpur in Black Kite Conservation

Mehrangarh fort is one of the largest forts in India. It was built in around 1459 by Rao Jodha, the fort is situated 410 feet above the city and is enclosed by imposing thick walls. Rao jodha desert park lies below the fort adjoining it. An important ritual associated with Devi worship in Mehrangarh is the daily feeding of Black kites that is performed in the afternoon at 3:30 PM on the ramparts of the fort. In the Mehrangarh fort lays the Salim court, it is a large U-shaped courtyard behind the fort area surrounded by a large stone wall from where the kites are fed. A man named as Abdul Latif Kureshi walks daily from his mutton shop at Ghanta Ghar to the ramparts of Salim court not withstanding weather and other variables to feed these kites. As soon as he start moving from his house and covers the area of the large stone walls he can easily see the owners of the eager eyes waiting for him. The punctuality of the kites was very interesting behaviour observed during this study. As soon as he reach Salim court he sees the kites orbiting the fort, he scoops up a few fleshy pieces of meat and flings a fistful in the air. A clutch of kites comes swooping down in a rush looking like small fighter jets and grabs the pieces mid-air. They time their downward flight to every swing of Abdul's arm, beating each other to the goodies in the air. Once the food is all gone, it takes the kites only few minutes to disappear completely.

Figure 1: Abdul Latif Kureshi feeding at Salim court

Kites have always played a prominent role in Mehrangarh's history. The practice of feeding the birds dates back to the year 1459. There are two different stories behind these kites as narrated by local peoples. It is said that Rao jodha's family worshipped Chamunda devi temple as their family deity. It is said that goddess appeared to one of the priest and asked for the sacrifice as she was happy with their devotion. It is said that according to the demand of the Goddess the priest sacrificed his own son Mehran. Now kites happened to Chamunda devi's favourite bird and in addition to the poor Mehran's sacrifice Rao Jodha decided to feed the birds every day so that goddess would remain happy and not ask for any other sacrifice. The bird commands a special place in hearts of the royal family and the royal family believe that the city will stay ble.ssed if the kites will each day. It is also said that they will rule till the kites revolves around the fort.
Some people says there was a hill known as 'Bkahurcheeria' or 'the mountain of birds' on which stayed the man named as Cheeria nath ji also known as the lord of birds. The Rao jodha asked him to leave his home as he wanted to build this fort. Cheeria nath ji left his home angrily cursing their kingdom to never have enough water and fertile land. Frightened king apologised to him and asked him to return back and build a cave for him and instructed the courtiers to feed the kites and live around the fort. That's when Abdul's family made an entry as they were the only butchers in the area. His ancestors were asked to make this daily trek to the Salim court. It's been 600 years since then, and his family still holds this tradition.

During the study period there was several problem identified in the study which is to be resolved by the local people, the concerning authority and by the environment lover. Some of them are:

1) Lack of knowledge and awareness in general public about the importance of conservation of the study area.
2) Inadequate effort and lack of planning for conservation in and around Kaylana lake.
3) Lack of monitoring and research work.
4) Inadequate technical data about birds.
5) Lack of bird watching guide in Kaylana lake.
6) Lack of site support group for conserving the study area.
7) Inadequate information to staff persons about the birds and the habitat.
8) Lack of proper protection of historical buildings and other ruins within the limits of the study area as they are the nesting sites for many birds.

9) Lack of awareness about Eco-tourism concept and insufficient interpretation centre opportunity.
10) Insufficient resources to advertise the Kaylana lake the site as the bird watching one amongst the tourists and visitors.
11) Soil erosion is very fast leading to the habitat destruction.
12) Inadequate moisture content in the study area that speeds up the rate of habitat degradation.
13) Lack of amenities for staff personnel involved in management ofKaylana lake to stay in the area.
14) Invasive weeds like Prosopis juliflora, Lantana camara and L.wightiana are taking heavy toll from native species especially from palatable grass in area around Kaylana lake.

Recommendations to manage study areas as important avifaunal site:

Area monitoring is a primary step to manage the area. Study area should be managed to conserve important bird populations. Area monitoring must be soundly designed, systematic, regular and sustained according to the trigger species of bird inhabiting it. As far as possible, area monitoring should also involve the local community for collecting data. Birds due to their mobility use a variety of environmental resources, especially habitats. However, currently these habitats are only in patches over most of the tropical world. The landscape approach starts with the realization that patches of habitats as interacting elements in the large matrix of the landscape. Landscaping is a better approach to preserve maximum species diversity and valuable species. Birds contribute most significantly to the diversity of the terrestrial vertebrates. Birds also have a special role in conservation as they not help in identify areas most worth saving, but also have the capacity to make conservation an "affair of the heart". Landscape has been defined as "kilometres-wide area where a cluster of interacting ecosystems is repeated in similar form (Daniels, 1994). Landscape ecology is also termed as 'patch work ecology'. It deals with patches of different sizes, shapes and origin (Forman and Godron, 1986; Noss, 1983). The landscaping process should begin with a consideration of the survival requirements of birds. The requirements can generally be divided into four groups: food, water, cover and nesting site. To improve our study area so as to attract the greatest variety of birds we should supply the following needs in sufficient good amount.Plants of the area provide food in the form of buds, fruits, seeds, nectar and insects. Different types of food became important to birds at different times of the year. During the breeding season different songbirds needs insects to raise their young ones. Flower buds become more important to birds in late winter, when many fruit and seed supplies are diminished. Therefore planting of variety of trees is required to attract diversity of birds. Water is important for birds as they feed on the water living creatures, for drinking and for bathing. To rectify this all the activities which are polluting the water bodies should be banned such as Ganesh visarjan, spiritual activities, feeding fishes, etc. Drinking water and birdbath should be cleaned frequently during period of high use and scrubbed periodically to keep down the algal. In addition to food and water, birds require cover and shelter year-round. Cover provides protection from severe weather as it is a safe heaven where birds can preen feathers and rest. Plants provide cover in different ways to the bird. Dense vegetation is especially valuable to birds during the winter, when they provide protection from strong winds and cold night-time temperatures. Low shrubs and ground cover provides refuge and safety for ground – feeding species such as sparrows and thrushes. The availability of cover year round should be considered in landscaping for birds. An additional way to provide cover for birds is to construct brush piles. Brush piles are refuges made by tree and shrub clippings and can be placed at the edge of woods, next to existing shrubs or near bird feeder. Nesting is one of the important bird activities in bird's life. Every bird species has its own nesting site. Some birds make their nest on ground. Some birds use the old buildings as nesting sites. Some birds prefer the tall and dense tree for nesting. Some birds like to make their nest on thorny plants. So keeping in mind the variation the variation of nesting sites of birds, proper tree plantation should be made in the area to attract variety of bird species.

5. Conclusion

In this study emphasis was laid on conservation steps taken by the local peoples towards the birds, the problems identified during research period was listed and the management aspects were written out. The study revealed the idea about the people's perception towards the conservation of birds and their awareness towards the birds. The study area Rao Jodha park is very much concerned towards the biodiversity conservation but the Kaylana lake is to be looked after and various steps should be taken for its conservation. If the proper measures would not be taken it will lose the important habitats of the birds. Many migratory birds also migrate to these habitats so proper management of the area must be taken.

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