The Disappearing Tank Culture of Rajasthan

Rakesh Vyas

Key words: tank culture, communities, waterfowl, socio-economic impact, breeding.

Introduction

Tank-culture in India is as old as the history of its civilization. The ancient Sanskrit literature is full of references about the importance and utility of tanks. The wisdom contained in the Vedic literature in the form of Sanskrit verses is as relevant today as it was 5000 years ago. The Rigveda, the oldest of all Vedas contains verses on the importance of tanks as a run-off water harvesting system. The Atharvaveda contains a number of verses propagating the construction of tanks and urges Kings to create such facilities for the general populace, wherever possible. Around 200 A.D., a great philosopher, astronomer and scientist, Varahmihir, wrote a whole treatise on the construction and maintenance of tanks (Brihatsagar, circa 200 A.D.). Kalidasa, a contemporary poet of Varahmihir was a naturalist and has dwelt deeply on the proliferation and beauty of the tanks in his works 'Meghdootam' and 'Abhigyan-Shankutalam'. There are hundreds of ancient tanks in India and one was recently discovered at Sringapverapura near Allahabad, which is well over 2000 years old. The lakes of Pakhal, Ramappa, Lakhavaram and Sanigaram in the districts of Warangal and Karimnagar in South India were constructed in 12th and 13th centuries. The British chroniclers in 1856 found extremely rich and flourishing tank-culture in south and east India. The southern part of central provinces and the parts of Rajputana (now Rajasthan) situated east of Aravali mountain ranges have natural and man-made tanks. This method of harvesting run-off water was extremely successful in low to moderate rainfall areas.

The purpose of the present study was to investigate the present status of tanks in south-east Rajasthan and the fate of communities dependent on them. In India, various communities have ecological niche diversification (Malhotra and Gadgil) which is also evident among the wetland dependent communities known as Bhoi, Kahar, Keer and Mallah. They are respectively fisherfolk, Trapa and Lotus cultivators, vegetable growers and boat people.

South-east Rajasthan is known to have a rich avifauna due to its strategic location between arid desert on the west and the Deccan plateau on the east. Various migratory waterfowl use it as a stop-over on their southward movement, whereas a number of resident and migratory waterfowl are found in the study area. As nothing much has been documented on the waterfowl of Kota, it was chosen to study the impact of vanishing wetlands and degraded watersheds on the diversity and breeding of resident birds.

Material and Methods

This study was conducted on the natural and man-made tanks of Kota and adjoining villages during 1989-1993. Kota city is situated on the banks of the Chambal river in south-east Rajasthan on 25°10'N latitude and 75°52'E longitude. In all 22 tanks were surveyed. The village tanks fall within a distance of 25 kms from Kota. Very little documented information is available on the wetlands. However, official data on certain irrigation tanks were collected from the departmental sources. Thus, personal observations were made to evaluate the present area and status of the tanks. Interviews with the villagers and senior citizens of the city yielded relevant information on the past
history of the tanks. Information on tanks built and maintained by the royalty of Kota is collected from the city archives. Interviews with the community elders and leaders were conducted on a regular basis. Currently, only two wetland dependent communities have remained in the area namely Bhoi (fishing) and Kahar (cultivation). The other two, viz. Keer (vegetable growers) and Mallah (boat people) have migrated due to multiple dams on the Chambal river.

The tanks were visited at regular intervals. Records were maintained for about 600 visits. The waterfowl were observed with a Minolta 8 x 40 binocular and a Konus telescope. The breeding site records of ducks and herons were separately maintained. The past breeding records have been collected through personal communications with interested birdwatchers.

Results

Tanks — Past and present: Kota receives moderate precipitation (average 786.46 mm, 1956-82) every year. The fine textured clay loam soil up to a depth of 200 cms. is non-calcareous and has slow to moderate permeability (Verma B. 1986). The run-off water from the stony upland, south-west of Kota drains into the Chambal river and its tributaries as well as fills natural depressions, providing scope for creating small to fairly large tanks by constructing earthen or masonry bunds on one or more sides. The erstwhile rulers of Kota were highly inclined towards creating this facility for the masses and also used these tanks as recreational and resting sites for themselves and royal visitors. Abheda, Jawahar sagar, Kishor sagar, Ranpur, Lakhawa and Ummedganj tanks are 200 to 500 years old. Palaces or their ruins may still be seen on the banks of these tanks.

In all 22 tanks were studied. The results are summarised in Table 1. The results indicate that 3 tanks have become defunct due to the building of concrete structures and dwelling sites erected in the tank beds and their catchment. This has led to repeated flooding of the residential colonies during monsoon in Dakanya talab, Ganeshpal and Chhatrapara tank area. Five tanks including the historical Kishor sagar, Soorsagar and Ummedganj tanks are now a part of the canal system arising out of the kota barrage and drain into the right main canal (RMC). They can no longer be termed as tanks because presence or absence of water in the reservoir and the canal depends upon the irrigation schedule rather than on the needs of traditional beneficiaries of the tanks.

Out of the remaining 14 tanks, 5 are within Kota city and remaining 9 are multiple-usage village tanks. The available records of Lakhawa and Ranpur tanks suggest that the storage area has invariably shrunk by 50% to 80% due to wetland degrading factors, viz. 1. Deposition of silt, 2. Seasonality, 3. Eutrophication, 4. Leakage/seepage, 5. Poaching/hunting, 6. Non-sustainable economic activity. The status in Table 1 is based on these factors:

- a. Very poor: indicates involvement of 5 to 6 factors.
- b. Poor: indicates involvement of 3 to 4 factors.
- c. Moderate: indicates involvement of 1 to 2 factors.
- d. Good: indicates absence of degrading factors.

According to the present status, 8 out of 22 tanks studied are defunct, excluding one tank which has been filled by ash-slurry generated by Kota Thermal Power Station. Five tanks are in a very poor condition due to degradation factors stated above. Six have been placed under the poor category and two in the moderate category. No tank could be termed Good because degrading factors were totally absent from none.

Wetland Dependent Communities

Traditionally four communities are utilizing the wetlands for their livelihood. Bhoi are the traditional fishermen, who catch fish for their own consumption and trade. Certain families among them have diversified into Trapa cultivation. This has happened due to a dwindling fish catch and religious beliefs. The Kahar community is engaged in Trapa and Lotus cultivation in tanks and waterholes. Keers grow vegetables on the sandy tank and river beds. Their chief crops are cucurbits, mainly water melon. Mallah are boat people, who earned their living by ferrying people across rivers on riverine water ways.

Since the construction of four mega dams on the Chambal river upstream and Kota between 1950 and 1970, the Mallah community lost its source of income. They have migrated to downstream locations on the Chambal river, where people still need boats to cross the river. No active boat family could be traced in the study area. The river bed is no more sandy, the tanks are filled with silt, thus forcing the Keer community also to leave Kota. The community still practises its age old vocation near Parban river and other tributaries east of Kota.

The Bhoi community has approximately 300 households in Kota city. A majority of them still practise their traditional vocation. The community members have formed a co-operative society, which takes a long term fishing lease on local tanks and canals. However, this society has a very loose working structure. Since its members work in family parties rather than as a
cohesive group, the whole operation is still traditional, unscientific and non-remunerative. Fish catch collected legally or illegally reaches the market through a powerful lobby of middle men. Gradually, the local society is losing ground and financially sound traders of eastern Uttar Pradesh and Bihar have procured the fishing rights on all the major dams, lakes and tanks in the state. The living standard of the community is below poverty line which is further compounded by illiteracy, resulting in social evils like gambling and alcoholism.

Kahar community is relatively small with only 60 households residing in Soorsagar area of Kota at present and 115 in adjoining areas. According to community elders, more than 200 families have gone out of Kota. Although economically, they are as backward as their other wetland dependent brethren, socially they are better organized. Six to 7 members of this community are employed in governmental agencies. Kahar community also has a co-operative society, which procures sub-leases from fishermen's society to cultivate Trapa and exploit Lotus flowers, stems and fruits. There seems to be no provision for providing them direct leases for Trapa cultivation. They have to work on small plots of roughly half to one hectare, thus making the work more cumbersome and less paying. Water hyacinth has gradually choked the wetlands, causing crop loss in Kala talab, Moiyo ka talab and Kishorsagar. The average per hectare yield amounts to Rs. 40,000 ($1200) annually.

Waterfowl

The list of observed waterfowl in the study area is given in Table 2. A total of 96 species from 20 families is found in the study area. Out of these, 55 waterfowl species are migratory and remaining 41 are resident. Their movements are dictated by the local water conditions. The impact of receding wetlands on the breeding of the resident waterfowl was evaluated by comparing the old records and information collected from knowledgeable people. The findings suggest that 38 resident species used to breed in and around Kota (Bharat Singh, Shantanu Kumar, Soni R. G. pers. com.). During the study period, 20 species were seen breeding and juveniles of 13 species were regularly seen in the post breeding period (Table 2). This fall in numbers is mainly evident among the tree nesting birds like Comb duck Sarkidiornis melanotos; Whistling teal Dendrocygna javanica; Cotton teal Nettapus coramandianus; Indian cormorant Phalacrocorax fuscicolis; Darter Anhinga melanogaster; Grey heron Ardea cinerea; Great egret Egretta alba; Storks and Ibises. Among the ground nesting species, Yellow Wattled Lapwing Vanellus malabaricus; River Lapwing Vanellus duvaucelli; Stone Curlew Burhinus oedicnemus were not seen nesting. The breeding attempts of Great stone plover Esacus magnirostris failed twice at the Alniya and Abheda tanks due to submergence of the island in the last week of June and early July in 1992 and 1993.

Cormorants, Egrets, Herons mostly nest on Acacia sp., Prosopis, Azadirachta indica, Dalbergia sissoo, Tamarindus indica and Ficus religiosa. In 1991 and 1992, breeding failure was also noted among reed nesting birds, in a stretch of 6 kms. on RMC. Typha was exploited on a large scale between February and May causing loss of nests of Sarus crane Grus antigone, Purple swamphen Porphyrio porphyrio, White breasted waterhen Amaurornis phoenicurus and Indian moorhen Gallinula chloropus.

Discussion

Tanks and Dependent Communities: The results of the present study reveal that only 9% of the tanks come under the moderate category while 51% could be categorised as poor or very poor and 40% have become defunct due to various reasons (Table 1). This state of affairs could be attributed to the lopsided development, utter neglect in planning, eutrophication, municipal and industrial waste disposal in the tanks and degraded catchment areas. The waterbodies choked with Hyacinth, Typha and algae have low percentage of dissolved oxygen causing significant reduction in aquatic fauna. It was found that Hyacinth competes with other vegetation of economic importance and particularly marginalises Trapa. The weedicide effective against Hyacinth is also lethal to Trapa. The poisoning of fauna due to pesticide wash was particularly evident at Ranpur tank in 1991, when hundreds of fish perished within a day. The indiscriminate use of carbamate insecticide like Sevin on stem borer in Trapa was also observed. The cultivators are not aware of the toxic effects of residual pesticides on man and its lethal effect on fishes. They use wasteful quantities of pesticide (3.5 kg/ha). Experts do not favour the use of chemical pesticides in the waterbodies. The industrial wastes cause eutrophication. The extent of damage depends on its constituent chemicals. An extreme example of the problem of industrial waste disposal is Jawaharsagar, which is completely filled up with the ash slurry of Kota Thermal Power Station, rendering it useless as a tank or wetland habitat for waterfowl. Part of Ummedganj tank has been completely drained. Ranpur and Anantpura tanks are regularly drained every year in
January to create space for crops. The residual impacts of such practices are loose soil, pesticide and fertilizer contamination which remain in the tanks in the following monsoon season. Tanks which have agricultural fields in their catchment suffer similar effects. The degraded catchment areas are an environmental disaster for the region. Depleted vegetation cover, over-grazing and tree felling have left the top soil barren resulting in erosion, deposition of soil in tank beds. Without soil binding, water retaining root systems, there is no water retention in the lakes and streams. Acute water shortage is the result inspite of normal precipitation.

Following measures are recommended to overcome the problems and to restore the traditional tank-culture in the study area.

**Short term:**
1. Removal of silt.
2. Proper maintenance of bunds to reduce leakage/seepage.
3. Restrengthening of bunds with tree/bush cover.
4. Remove excessive weeds choking the tanks.
5. Reduce wasteful pesticide/fertilizer use through awareness campaigns.

**Long term:**
1. Treat all organic waste, sewerage before release into the waterbodies.
2. Do not permit the disposal of industrial waste in multipurpose tanks.
3. Apply watershed development techniques to improve the catchment area of the tanks.
4. Promote afforestation practices to bind the soil and retain water.
5. Application of soil conservation techniques.

**Predicted benefits to Dependent Communities** - Restored perennial tanks will immensely improve the economy and life style of the dependent communities. Unscientific fishing practices are adopted by the Bhoi community because of poverty rather than lack of knowledge. Economic deprivation does not allow the community members to adopt superior technology and sustainably exploit the available resources. The practice of starting the fish catch early in the season which has an adverse impact on the total output needs to be eliminated. The undesirable and commercially nonlucrative fish varieties like *Mastacambelus armatus*, *Mystus* sp., *channa* sp. are prevalent in the tanks. Perennial tanks and seepage marshes near Kotri tank, Soorsagar, Raipura tank and Ummedganj tank will be ideally suitable for rearing commercially remunerative fishes like *Labeo*, *Catla*. Illegal practices such as the use of small gauge nets and interception of fish fry from the streams feeding the tanks also has an adverse impact on the output of fish.

This situation in the study area could be corrected by imparting scientific training in sustainable pisciculture with NGO support. At the same time governmental support in the form of extension education, formation of workable co-operative societies, soft loans to upgrade the technology, community welfare programmes, if provided, would immensely benefit the Bhoi community.

The practice of leasing the shallow tanks and waterholes for *Trapa* and Lotus cultivation should be restarted. Presently it is a short term vocation for the community resulting in inefficient utilization of available man power. The plants are looked after between July-September and fruits are harvested in the months of October and November. In the seasonal tanks, fresh root stock is planted each year increasing the work load, whereas a few remaining perennial waterbodies retain their own root stock which is looked after by the cultivators between March and June. If restored, the perennial tanks will allow the Kahar community to harvest *Trapa* twice a year, thus improving the economy of the people. An awareness programme among the Kahar community to reduce the use of pesticides and promote the use of biological pest control methods must be conducted so that they can sustainably utilize the wetland resources. The community welfare programmes like literacy, health, training and proper marketing of the produce will go a long way in bringing about economic and social upliftment of Kahar community.

**Waterfowls:** The tank restoration activities, which are expected to help the resident waterfowls, will provide a. perennial availability of habitat, b. trees/bushes to breed close to the tanks, c. foraging and roosting sites, d. ensure absence of toxic waste in the tanks. A visual example of such attributes is the Abheda tank. It was a seasonal waterbody until 1991, when the bund was repaired to stop the leakage. The following year, Spotbill duck *Anas poecilorhyncha*, Little grebe *Tachybaptus ruficollis*, Pheasant tailed jacana *Hydrophasianus chirurgus*, Whitebreasted waterhen *Amaurornis phoenicurus* started breeding in the tank.

On the basis of this study, I strongly recommend the restoration of tank-culture in south-east Rajasthan and Kota, especially to bring back the past glory of the wetlands and to improve the lifestyle of the dependent communities and waterfowl.

**Acknowledgement**

I am thankful to the members of Bhoi and Kahar
community, who patiently participated and helped with the interviews. I am indebted to Dr. V. G. Gokhale for his valuable suggestions.

References


Verma B. et. al. (1986), Twenty five years of Research on Soil and Water Conservation in Ravine lands of Rajasthan, Central Soil and Water conservation Research and Training Institute, Kota, p. 47-56, 99, 158-159.


Table 1: Tanks of Kota and adjoining villages and their problems

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Tank Nearby City/village</th>
<th>Natural Masonary Earthen Seasonality</th>
<th>Approx. Area</th>
<th>Present Status</th>
<th>Economic Activity</th>
<th>Dependent Problems Communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kishorsagar Kota MHP</td>
<td>25 Hect.</td>
<td></td>
<td>Part of reservoir poor</td>
<td>Trapa Fishing</td>
<td>Kahar 1, 2, 5</td>
</tr>
<tr>
<td>2</td>
<td>Kotari Tank Kota NP</td>
<td></td>
<td>Part of canal defunct</td>
<td>Fishing Lease</td>
<td>Bhoi 1, 2, 5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Kansa Soorsagar Kota NP</td>
<td></td>
<td>Part of canal defunct</td>
<td>Fishing Lease</td>
<td>Bhoi 1, 2, 3, 5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Kala Talab Kota NS</td>
<td>5 Hect. V. poor</td>
<td>Trapa Fishing</td>
<td>Kahar 1, 2, 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dakanya Talab Kota N</td>
<td></td>
<td>Defunct</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Chhatrapura Tank Kota M+</td>
<td></td>
<td>Defunct</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Ganesh Pal Kota M H P</td>
<td>8 Hect. Moderate</td>
<td>Trapa, Lotus Sagar Defunct</td>
<td>Bhoi 5, 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Abheda Tank Kota NP</td>
<td></td>
<td>Ash filled Defunct</td>
<td>Typha</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Tank Name</td>
<td>Municipality</td>
<td>Type</td>
<td>Area (Hect.)</td>
<td>Condition</td>
<td>Fishing Type</td>
</tr>
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<tr>
<td>10</td>
<td>Nanta Tank</td>
<td>Kota</td>
<td>E^0 S</td>
<td>5</td>
<td>Poor</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Moiyo ka Talab</td>
<td>Kota</td>
<td>E^+ S</td>
<td>2</td>
<td>V. poor</td>
<td>Trapa</td>
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<tr>
<td>12</td>
<td>Raipura Talab</td>
<td>Raipura</td>
<td>M^+ P</td>
<td>—</td>
<td>Partly</td>
<td>Partly</td>
</tr>
<tr>
<td>13</td>
<td>Ummedganj Tank</td>
<td>Ummedganj</td>
<td>M^0 H S</td>
<td>—</td>
<td>Partly</td>
<td>Partly</td>
</tr>
<tr>
<td>14</td>
<td>Nayagaon Tank</td>
<td>Nayagaon</td>
<td>M^+ S</td>
<td>10</td>
<td>V. poor</td>
<td>—</td>
</tr>
<tr>
<td>15</td>
<td>Borabas Tank</td>
<td>Borabas</td>
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<td>10</td>
<td>V. poor</td>
<td>—</td>
</tr>
<tr>
<td>16</td>
<td>Lakhawa Tank</td>
<td>Lakhawa</td>
<td>M^0 H S</td>
<td>80</td>
<td>Poor</td>
<td>10 Hect. (av)</td>
</tr>
<tr>
<td>17</td>
<td>Ranpur Tank</td>
<td>Ranpur</td>
<td>M^0 H S</td>
<td>130</td>
<td>Poor</td>
<td>40 Hect. (av)</td>
</tr>
<tr>
<td>18</td>
<td>Raontha Tank</td>
<td>Raontha</td>
<td>M^+ P</td>
<td>20</td>
<td>Moderate</td>
<td>—</td>
</tr>
<tr>
<td>19</td>
<td>Anantpura Tank</td>
<td>Anantpura</td>
<td>M^+ S</td>
<td>20</td>
<td>V. poor</td>
<td>—</td>
</tr>
<tr>
<td>20</td>
<td>Morpa Tank</td>
<td>Morpa</td>
<td>E^+ S</td>
<td>5</td>
<td>V. poor</td>
<td>—</td>
</tr>
<tr>
<td>21</td>
<td>Karadia Tank</td>
<td>Karadia</td>
<td>E^0 S</td>
<td>8</td>
<td>V. poor</td>
<td>—</td>
</tr>
<tr>
<td>22</td>
<td>Simalya Tank</td>
<td>Simalya</td>
<td>E^0 P</td>
<td>10</td>
<td>Poor</td>
<td>—</td>
</tr>
</tbody>
</table>

N - Natural, M - Masonary, E - Earthen, O - Two/more side bund, + - One side bund, H - Historical, S - Seasonal, P - Perennial

Problems:

1. Choking with Water Hyacinth/Typha reed/Algal bloom.
2. Human/Municipal waste disposal.
3. Industrial waste disposal.
4. Tank drained for cultivation/habitation.
5. Poor maintenance.
6. Degraded catchment.
7. Cultivation on margins (Pesticide/fertilizer wash off).
## Table 2: Waterfowl of Kota

<table>
<thead>
<tr>
<th>Family</th>
<th>Waterfowls</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Podicipedidae</strong></td>
<td><strong>Tachybaptus ruficollis</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Podiceps cristatus</strong></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td><strong>Pelecanus onocrotalus</strong></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td><strong>P. crispus</strong></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td><strong>Phalacrocorax fuscicollis</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>P. niger</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>P. carbo</strong></td>
<td>M</td>
</tr>
<tr>
<td><strong>Ardeidae</strong></td>
<td><strong>Anhinga melanogaster</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Phoenicopterus ruber</strong></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td><strong>Ardea cinerea</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>A. purpurea</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Egretta alba</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>E. intermedia</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>E. garzetta</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Bubulcus ibis</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Nycticorax nycticorax</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Butorides striatus</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Ardeaola grayii</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Botaurus stellaris</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Ixobrychus cinnamomeus</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Mycteria leucocephala</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Anastomus oscitans</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Ciconia nigra</strong></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td><strong>C. episcopus</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>C. ciconia</strong></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td><strong>Ephippiorhynchus asiaticus</strong></td>
<td>M</td>
</tr>
<tr>
<td><strong>Threskiornithidae</strong></td>
<td><strong>Threskiornis melanocephalus</strong></td>
<td>E</td>
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<td></td>
<td><strong>Pseudibis papillosa</strong></td>
<td>R</td>
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<tr>
<td></td>
<td><strong>Plegadis falcinellus</strong></td>
<td>M</td>
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<tr>
<td></td>
<td><strong>Platalea leucorodia</strong></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td><strong>Dendrocygna javanica</strong></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><strong>Anser anser</strong></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td><strong>A. indicus</strong></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td><strong>Tadorna ferruginea</strong></td>
<td>M</td>
</tr>
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<td></td>
<td><strong>Sarkidiornis melanotos</strong></td>
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<td><strong>Nettapus coromandelianus</strong></td>
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<td></td>
<td><strong>Anas penelope</strong></td>
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<td></td>
<td><strong>A. crecca</strong></td>
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<td><strong>A. querquedula</strong></td>
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<td><strong>A. platyrhynchos</strong></td>
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<td><strong>A. poecilorhyncha</strong></td>
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<td><strong>A. strepera</strong></td>
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<td><strong>A. clypeata</strong></td>
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<td></td>
<td><strong>Netta rufina</strong></td>
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<td></td>
<td><strong>Aythya ferina</strong></td>
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<tr>
<td><strong>Anatidae</strong></td>
<td><strong>A. nyroca</strong></td>
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<tr>
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<td><strong>A. fuligula</strong></td>
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</table>

1. Little Grebe
2. Great Crested Grebe
3. Great White Pelican
4. Dalmation Pelican
5. Indian Cormorant
6. Javanese Cormorant
7. Great Cormorant
8. Indian Darter
9. Greater Flamingo
10. Grey Heron
11. Purple Heron
12. Great Egret
13. Intermediate Egret
14. Little Egret
15. Cattle Egret
16. Blackcrowned Night Heron
17. Green backed Heron
18. Indian Pond Heron
19. Eurasian Bittern
20. Cinnamon Bittern
21. Painted Stork
22. Asian Open Bill Stork
23. Black Stork
24. Wooly Necked Stork
25. White Stork
26. Black Necked Stork
27. Oriental Ibis
28. Black Ibis
29. Glossy Ibis
30. White Spoonbill
31. Indian Whistling Duck
32. Greylag Goose
33. Bar Headed Goose
34. Ruddy Shelduck
35. Comb Duck
36. Cotton Teal
37. European Wigeon
38. Green Winged Teal
39. Garganey
40. Mallard
41. Spotbill Duck
42. Northern Pintail
43. Gadwall
44. Northern Shoveller
45. Redcrested Pochard
46. Common Pochard
47. Ferruginous Duck
48. Tufted Duck
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Gruidae
49. Common Crane
50. Sarus Crane
51. Demoiselle Crane

Rallidae
52. Blue Breasted Banded Rail
53. White Breasted Waterhen
54. Moorhen
55. Purple Swamphen
56. Black Coot

Jacanidae
57. Pheasant Tailed Jacana
58. Bronze Winged Jacana

Rostratulidae
59. Painted Snipe
60. Black Winged Stilt
61. Pied Avocet

Burhinidae
62. Stone Curlew
63. Great Stone Plover
64. Little Pratincole
65. Northern Lapwing
66. River Lapwing
67. Yellow Wattled Lapwing
68. White Tailed Plover
69. Red Wattled Lapwing
70. Pacific Golden Plover
71. Ringed Plover
72. Little Ringed Plover
73. Kentish Plover
74. Lesser Sand Plover

Scolopacidae
75. Black Tailed Godwit
76. Bar Tailed Godwit
77. Western Curlew
78. Spotted Redshank
79. Common Redshank
80. Common Greenshank
81. Marsh Sandpiper
82. Green Sandpiper
83. Wood Sandpiper
84. Common Sandpiper
85. Common Snipe
86. Ruff
87. Little Stint
88. Temminck’s Stint
89. Dunlin
90. Great Black-Headed Gull
91. Indian Black-Headed Gull
92. Black Headed Gull
93. Whiskered Tern
94. Indian River Tern
95. Black Billed Tern
96. Indian Skimmer

Laridae
97. Great Black-Headed Gull
98. Indian Black-Headed Gull
99. Black Headed Gull
100. Whiskered Tern
101. Indian River Tern
102. Black Billed Tern

Rynchopidae
103. Indian Skimmer

Grus grus
G. antiquae
Anthropoides virgo
Rallus striatus
Amaurornis phoenicurus
Gallinula chloropus
Porphyrio porphyrio
Fulica atra
Hydrophasianus chirurgus
Metopidius indicus
Rostratula benghalensis
Himantopus himantopus
Recurvirostra avosetta
Burhinus oedicnemus
Esacus recurvirostra
Glareola lactea
Vanellus vanellus
V. duvaucelli
V. malabaricus
V. leucurus
V. indicus
Pluvialis fulva
Charadrius hiaticula
C. dubius
C. alexandrinus
C. mongolus
Limosa limosa
L. lapponica
Numenius arquata
Tringa erythropus
T. totanus
T. nebularia
T. stagnatilis
T. ochropus
T. glareola
Actitis hypoleucus
Gallinago gallinago
Philomachus pugnax
Calidris minuta
C. temminckii
C. alpina
Larus ichthyaetus
L. brunnicephalus
L. ridibundus
Chlidonias hybrida
Sterna aurantia
S. melanogaster
Rynchops albicollis

R - Resident, M - Migratory, B - Breeding, J - Juveniles seen.