

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

1. Date this sheet was completed/updated:

10th September, 2002

FOR OFFICE USE ONLY.

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Designation date

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Site Reference Number

2. Country: PAKISTAN

3. Name of wetland: DEH AKRO-II DESERT
WETLAND COMPLEX

4. Geographical coordinates: 68° – 20' E and 26° - 50' N

5. Elevation: (average and/or max. & min.) 50 m (above sea level) 6. Area: (in hectares) 20,500 ha.

7. Overview: This Wildlife Sanctuary is located in Nawabshah administrative District of the Sindh Province at the distance of about 330 Km in the North-east of Karachi city. It supports diverse fauna and flora, mainly desert and wetland habitat. Many rare and endangered Wildlife species not only inhabit but also breed in this area. (refer column 17 & 18).

8. Wetland Types: (please circle the applicable codes for wetland types; in the present document, the "Ramsar Classification System for Wetland Type" is found on page 9)

marine-coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

inland: L • M • N • P • R • Sp • Ss • Tp

Ts • U • Va • Vt • W • Xf • Xp • Y • Zg • Zk(b)

human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

Please now rank these wetland types by listing them from the most to the least dominant:

‘Q, O’

9. Ramsar Criteria: (please circle the applicable Criteria; the *Criteria for Identifying Wetlands of International Importance* are reprinted beginning on page 11 of this document.)

1, 2, 3, 4, 5, 6, 7, 8

Please specify the most significant criterion applicable to the site: 1.

10. Map of site included? Please tick *yes* -or- *no*

Yes.

11. Name and address of the compiler of this form:

Hussain Bux Bhaagat, Sindh Wildlife Department, M.D. Wafai Road, Karachi. Pakistan. Phone and Fax : +9221 9260304

Please provide additional information on each of the following categories by attaching extra pages (please limit extra pages to no more than 10):

12. Justification of the criteria selected under point 9, on previous page. (Please refer to the *Criteria for Identifying Wetlands of International Importance* appended to this document)

Criterion 1.

Deh Akro-II Wildlife Sanctuary is considered internationally important, because it represents the example of a natural inland wetland eco-system comprising of 36 lakes and unique desert habitat which supports large variety of fauna and flora species.

Criterion 2.

This wetland complex supports many globally threatened species.

Vulnerable species: Marbled Teal (*Marmaronetta angustirostris*),
Marsh Crocodile (*Crocodylus palustris*).

Threatened species: White-eyed pochard (*Anthya nyroca*),
Darter (*Anhinga melanogaster pennant*),
Black Ibis (*Pseudibis papillosa*),

(List attached.) Ref. IUCN Red data book 2000.

Criterion 3:

The wetland supports diverse fauna and flora, mainly desert and wetland habitat. This unique desert wetland ecosystem supports more than 18 species of mammals, 16 species of reptiles including threatened Marsh Crocodile, 14 species of fishes and 101 species of birds. (Lists of species are attached.)

Criterion 4.

The resident and migratory populations of all the species are dependent of this wetland system for survival in different time of their life (Lists of species are attached.)

Criterion 5.

This wetland complex regularly supports more than 20 thousand waterfowls and other birds of different species. (Please refer to the attached Reference: Sindh Wildlife Waterfowl Counts 1992-2000.)

Criterion 6.

This wetland complex supports 6% of the relevant bio-geographic population of Marbled teal. (*Marmaronetta angustirostris*). More than 300 birds were count regularly each year and some also breeding in the complex. Ref. Sindh Wildlife waterfowl counts 1992 to 2000.

Criterion 8.

This wetland complex supports a significant proportion of species such as Dambro/Rohu (*Labeo rohita*), Thaila (*Catla catla*), Morakha (*Cirrhinus mrigala*), Singhara (*Mystus seenghala*), Malli/Jerki (*Wallago attu*), Gandan (*Natopterus notopterus*) and Dimmon (*Ompok bimaculatus*) which are food source of Marsh Crocodile and local resident communities. All the fishes are totally dependent on these wetlands as spawning ground, for their food source and as nursery.

13. General location: (include the nearest large town and its administrative region).

Deh Akro-II is situated in the south-west of Sindh Province and at the distance of 320 Km in the north-east of Karachi City. Nearest large town is Jam Datar at the distance of 30 Km in south-west and Nawabshah at 60 Km in south-west.

14. Physical features: (e.g., geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; catchment area; downstream area; climate)

Deh Akro-II is typical stable sand desert covered with sand dunes. Mean elevation of the area is about 50 m above sea level. The sand dunes rise to an elevation of 5 to 10 m and lie in an east-west orientation. There are typical flat-bottomed valleys between the dunes, which contain perennial lakes. These lakes are recharged either by seepage from Nara and Jamrau canals or rainwater. The desert surface is stabilized by vegetation and there are well developed dune farms, formed by active windblown sand. Agricultural lands lie in the same topographical regime and this part of the area can be clearly differentiated from surrounding desert environment.

Geology:-

Two types of soil classes exist in the area, sandy soils in the desert and clay mixed sandy soil in the low-lying areas. Soils in the desert area are sandy, silty, moderately calcareous and alluvial deposits are date back to the time when Indus river flowed through this area. Salinity and water logging are common problem in the area.

Origin:

Natural sand dunes and wetlands.

Hydrology (water sources and quality):

The wetlands of Deh Akro basically formed by the Seepage of the Irrigation Canal- i.e. Jamrau Canal. Beside these seepage the rain water is also fed these wetlands. due to shortfall of rain last 6 years and the canal water diversification to the agriculture area is the reason of shrinkage the wetlands in the Deh Akro II. The lakes are not isolated from the main water body i.e. the irrigation canal. The main surface water source are surface water lakes, which are formed due to surfacing of ground water or seepage from Nara and Jamrau canals in its south-east. These lakes cover an area of about 5000 ha and are formed in an interdunal valleys one after the other. Their sizes, shapes, water quality and depth is different and largest one is about 750 ha, while smallest one is about 40 ha. Out of 36 lakes, 5 are sweet water and rest of the 31 lakes are brackish. Other surface water source is irrigation water system in the area, local communities, who are settled there, do cultivate their ancestral lands through irrigation canal system of Jamrau canal, which emerges from Nara main canal from Jamrau head in the south-east of the sanctuary.

Soil type:-

Two types of soil texture exists in the area. Sandy soil in the desert and sand mixed clay loam 3 -5 m in depth laid over sandy soils in the Nara and Jamrau canal command area. Soils in the desert area are sandy, silty, and moderately calcareous with a ph of 8 to 8.4 and are excessively drained. The desert area is under lain by the estimated 30 m of dune sands and river alluvium. The alluvial deposits date back to the time when Hakro river (Eastern Nara) flowed through this area during Sama and Soomra period in Sindh. The Nara canal now follows its abandoned course.

Water depth:-

Water depth of the Akro-II lakes varies from lake to lake. The maximum depth is about 15 m and minimum depth is 2-3 m. While ground water table depends upon the location and elevation of the extracting source. Generally fresh water aquifer depth is from 15-20 m.

Water permanence and fluctuation:-

Wetlands of Akro-II Wildlife Sanctuary are perennial lakes and water remains in these lakes round the year with seasonal fluctuations. Water level of the wetlands fluctuates round the year. When there are good rains in the area, water level of the lakes rises upto 30-40 m and ground water table rises to 5-8 m. But when there are scarce rains, water level of the lakes decreases upto 50% and ground water table goes down upto 20 - 30 m.

Tidal variation:-

There is always tidal variation depending upon the availability of the water in the canal system and catchment area.

Catchment area:-

Catchment area in the south-west of the Akro-II is almost agriculture fields, while in its north-east is Nara desert. Salinity and water logging is the common problem in the catchment area.

Climate:-

Summers in the area are very hot, where as winters are dry, mild and short. There is no meteorological station with in this area and meteorological data of nearest station i.e Padidan shows that, hottest months are May to July with mean temperature of 48-52⁰C. January is the coldest month with a low temperature of 11⁰C. The mean rainfall ranges from 88mm to 135 mm. Most of the total rainfall is received during the monsoon (mid July to end of August). Winter rains receives during the months of December to March, are of low intensity.

Drought prevails in the area since last 5-6 years. Only few rain showers were received during monsoon in 2001. Due to long spell of drought, area has received severe water shortage. Ground water table has gone down from 5-8 m to 20-30 m and water level in the lakes has decreased up to 50%. Four of the lakes of Akro-II wetland complex have completely dried (Akro, Sahanwari, Pakhe-wari, and Akanwari), while many other lakes have shrunk to 40 - 50%. Water quality have also deteriorated in most of the lakes.

15. Hydrological values: (groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.)

This area is devoid of any perennial surface fresh water resources. The main surface water source are surface water lakes, which are formed due to surfacing of ground water or seepage from Nara and Jamrau canals in its south and east. These lakes cover an area of about 5000 ha and are formed in an inter dunal valleys one after the other. Their sizes, shapes, water quality and depth is different and largest one is about 750 ha, while smallest one is about 40 ha. Out of 36 lakes, 5 are sweet water and rest of the 31 lakes are brackish. Other surface water source is irrigation water system in the area. Local communities, who are settled there, do cultivate their ancestral lands through irrigation canal system of Jamrau canal, which emerges from Nara main canal from Jamrau head in the south-east of the sanctuary.

Groundwater:

Due to geological reasons, groundwater in the area is generally brackish. In the Nara and Jamrau canal command area, fresh water pockets are found which are recharged by the canal losses and irrigation water supplies to the agriculture fields. Rain water, although scarce, also serves as a source of ground water recharge. In the desert, a fresh water layer and perched fresh water aquifer are the only source of water supply. Water is extracted through hand pumps while in agriculture fields few diesel engine operated tube wells are installed for irrigation purposes. Water table in the area varies from 15 –20 meters depending upon the location and elevation of the settlement. Water quality in most of the hand pumps is sweet, depending upon the recharge cycle through rainfall or irrigation canal system. Ground water is recharged either through rain water or through Nara and Jamrau canal seepages, But due to long dry spell in the region, ground water has goes down from 5 – 8 m to 20 – 30 m. Water shortage in the canal system has also reduced the seepage recharge system, therefore groundwater quality has generally turned in to brackish.

Flood control:-

There is no flood in the area since last three decades, hence there is no flood control system. However, flood control in the Nara and Jamrau canal is ensured through strengthening their protection bunds.

Sediment trapping:

Nara and Jamrau canal and their tributaries are de-silted annually by government while local water courses and channels are de-silted by locals manually for ensuring maximum water supply to their agriculture fields.

Embankment stabilization:

Embankment stabilization of Nara and Jamrau canals and their tributaries is ensured through water barriers by giving wooden pillars bushes structures along the canal sides at the distance of 500 m these barriers also control the canal side erosion.

16. Ecological features: (main habitats and vegetation types)

Deh Akro-II is true representative example of unique desert and natural wetland habitat types. Four major habitats of the area are:-

Desert habitat:

Sand dunes are main characteristic features of this habitat. Well developed herbs/shrubs including *Calligonum polygoides*, *Aerva javanica* and trees *Tamarix aphylla*, *Prosopis cineraria*, *Salvadora oleoides* and *Capparis decidua* manifest the permanent landscape over the dunes and *interdunelgaps* in this area. *Farsetia bamiltonii*, *Limeum indicum*, *Tribulus longipetalus*, *Synolon dactylon* and *stipagrostis plumose* are common herbs. Due to long dry spells in the area, herbaceous communities and ephemeral species have not been emerging every year. Such species respond quickly to rainfall and emerge with the first shower, grow instantly, produce seeds and complete their lifecycle in a span of 7 to 8 weeks these seeds remain dormant through out the dry period. Some of the plant species are, *Prosopis cineraria*, *Prosopis juliflora*, *Acacia jacquementii*, *Acacia nilotica*, *Aerva javanica*, *Salvadora oleoides*, *Capparis decidua*, *Cassia italica*, *Calligonum polygonoides*, *Aristida funiculata*, *Enpharibia prostrata*, *Saccharum spontaneum*, *Saccharum benealensis*, *Tamarix aphylla*, *Zizyphus mauritiana*, *Zizyphus nummularia*, *Alhagi maurorum*, *Indigofera nochstetterii*, *phyla nodiflora*, *Typha domingensis*, *Typha elephantica*, *Achyranthes aspera*, *Calotropis procera* *Tamarix indica*,

Wetland Habitat:

Deh Akro-II is a complex of 36 lakes in this area having different sizes shapes and depth. Basically these wetlands are formed by the seepages from Jamrau canal and Nara canal. Flowing along the south – east boundary line of the Akro-II wildlife sanctuary. Reed vegetation and *Tamarix* spp can be observed at the margins of these lakes. These lakes support a good population of waterfowls, marsh crocodile, otters and fish stock. About 1% of global population of the Marbled Teal breed in these lakes in May to June. Water level of these lakes gradually decreases and increases due to the fluctuation in the water level of Jamrau and Nara canals. Low rainfall have an significant impact on these wetlands. Some of the wetland floral species are, *Farsetia bamiltannii*, *Limeton indicum*, *Tributus lorgipetalus*, *Cynodon dactylon* and *Stipagrostis plumosa*.

Agriculture lands:

This habitat comprises of patches of irrigated agriculture fields lying adjacent (south-east) of the desert habitat. This habitat houses good population of black & grey partridges, reptiles and small mammals. Some of the common birds also perch in these fields. Use of pesticides and clearing of lands for agriculture practices are threats to the wildlife in this area. Some of the Agricultural habitat species are, *Achyranthes aspera* Linn, *Alhagi maurorum* Medic, *Amaranthus Viridis* Linn, *Aristida adscensionis* Hk.f, *Brachiaria eruciformis* (J.E. Smith)Griseb, *Celosia argentea* Linn, *Cenchrus ciliaris* Linn.

Marshy habitat:

This habitat is concentrated along the length of the Nara canal and Jamrau canal and is formed as a result of seepage from these canals. Most common reed vegetation species are *Saccharum* spp, *Pluchea lenceolata*, *Prosopis cineraria* and *Limeum indicum*. This habitat also supports Hog deer, crocodiles, Indian Monitor, jungle cats and large variety of birds. Clearing and burning of vegetation in the marshy area are main threats to this habitat. Some of the Marshy habitat have, *Aehuropus lagopoides*, *Alhagi maurorum* Medie, *Bacopa*, *Mouuieri* (Linn.) Pennell, *Boerhavia procumbense* (*Bank ex. Roxb*, *Capparis decidua* (Forssk.), *Edgew*, *Cenchrus ciliaris* Linn.

17. Noteworthy flora: (indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc.)

Well developed herbs/shrubs including, *Calligonium*, *Aerva javanica* and trees like, *Tamarix apbylla*, *Prosopis cineraria*, *Salvadora oleocides*, *Acacia nilotica*, *Capparis decidua*, manifest the permanent land scape over the dunes and interdunal gaps in this area. *Farsetia bamiltannii*, *Limeton indicum*, *Tributus lorgipetalus*, *Cynodon dactylon* and *Stipagrostis plumosa* are common herbs. Perennial grasses, *Saccharum spp* and *Typpha spp* are also commonly - present in the wetland habitat.

Deh Akro-II Wildlife Sanctuary is located in the tropical thorn forest sand dune type of vegetation zone of Pakistan (Roberts 1991) . In this project area four major vegetation habitats were identified, the vegetation habitat types have been discussed in details in section 16 (Ecological features). However major floral species includes, *Prosopis cineraria*, *Prosopis juliflora*, *Acacia jacquemontii*, *Acacia nilotica*, *Aerva javanica*, *Salvadora oleoides*, *Capparis decidua*, *Cassia italica*, *Calligonium polygonoides*, *Aristibla funiculata*, *Enpharibia prostrata*, *Saccharum spontaneum*, *Saccharum benealensis*, *Tamarix aphylla*, *Zizyphus mauritiana*, *Zizyphus nummularia*, *Alhagi maurorum*, *Indigofera nochstetterii*, *phyla nodiflora*, *Typha domingensis*, *Typha elephantica*, *Achyranthes aspera*, *Calotropis procera* *Tamarix indica*, etc.

18. Noteworthy fauna: (indicating, e.g., which species are unique, rare, endangered, abundant or biogeographically important; include count data, etc.).

- Rare:** Desert cat (*Felis libyca*), Fishing cat (*Felis viverrina*), Darter or Snake bird (*anhinga melanogaster pennant*) Garganey (*Anas querquedula*), Glossy Ibis (*Plegadis falcinellus*), Spoon Bill (*Platalea leucorodia*), Black Ibis (*Pseudibis papillosa*),
- Endangered:** Hog deer (*Axis porcinus*), Marsh Crocodile (*Crocodylus palustris*), Houbara Bustard (*Chlanydotis undulata*), Marbled teal (*Marmaronetta, angustirostris*), White-Eyed pochard (*Anthya nyroca*).
- Abundant:** Grey Partridge (*Francolinus pondicerianus*), Black Partridge (*Francolinus francolinus*) Mallard, (*Anas platyrhynchos*) Moor hen, (*Gallinula chloropus*) Black winged stilt, (*Himantopus himantopus*), Shovler (*Anas clypeata*) Little egret (*Egretta garzetta*), Intermediate Egret *Egretta intermedia* (Wagler) Indian Pond Heron, *Ardeola grayii* (Sykes), Redshank *Tringa totanus Linnaeus*), Grey Plover *Pluvialis squatarola* (Linnaeus), Indian Roller *Coracias benghalensis* (Linnaeus), Dabchick *Tacbybaptus ruficollis* (Pallas), Glossy Ibis *Plegadis falcinellus* (Linnaeus), Common Pochard *Aythya ferina* (Linnaeus), Common Teal *Anas crecca linnaeus*, Spoon Bill *Platalea leucorodia* (L).

19. Social and cultural values: (e.g., fisheries production, forestry, religious importance, archaeological site, etc.)

Deh Akro-II support many indigenous fish species, but commercialization is strictly banned under the Wildlife Act. However, local people use to net fish for their food. There is no protected forest in the sanctuary but protected area irrigated plantation on a low scale was practiced by the local farmers. 100%

population of the local is Muslim and every village has a mosque for prayers. No other religious saint or shrine is found in this area.

No archaeological or cultural sites, protected under the Antiquities Act, exist in this area, only local grave yards are found along the village sides. No local shrine or religious saint is found in the area and only locally made mosques are found for prayers in the villages, people believe that crocodiles are sacred creature of Almighty Allah (God), and these wetlands are formed in between the desert dunes without direct water supply, for the existence and survival of these crocodiles.

20. Land tenure/ownership of: (a) site (b) surrounding area

Deh Akro-II land (Total 20500 ha) is State owned land and no one has ownership rights in this area. However, about 6 Blocks (38 ha) is surveyed land (Permanently leased out) and about 140 ha is granted to local peoples for agriculture purposes under land grant policy of Government of Sindh. In the surroundings of this PA, 60% land is privately owned and 40% is still state owned.

21. Current land use: (a) site (b) surroundings/catchment

Lands taken under land grants policy are used for agricultural purposes. No other use is in practice.

While catchment area on south-east is also under agriculture practices and on north-east is Nara desert track.

Surroundings: same.

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects: (a) at the site (b) around the site

(Site) Water scarcity due to long dry spell, left Bank Outfall Drain (LBOD) of National Drainage Programme (NDP) of Government of Pakistan, Government land grant policy of Government of Sindh, grazing, fuel wood collection, hunting and fishing, agriculture pesticides uses in agriculture fields.

Surrounding:

Construction of New Jamrau canal in the south – east of the sanctuary, draining out the Jamrau seepage water into Nawabshah main drain, oil exploration activities in the Nara desert in its north-east boundary line (Gamsat Block concession area allocated to OMV (Pvt) limited) and indiscriminate use of pesticides in the surrounding agricultural fields.

23. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

Deh Akro-II is declared Wildlife Sanctuary (Category IV of IUCN) in 1988. A team of experienced Wildlife officials is permanently posted in this area for the protection and conservation of fauna and flora. Annual surveys of waterfowls and crocodiles are regularly conducted by Sindh Wildlife Department. No

management Plan exists. Fishing is officially banned in Wildlife Sanctuary to ensure the food stock and availability for the local crocodile population.

Keeping in view its biodiversity richness, area is on priority list of Sindh Wildlife Department for future conservation strategies. For conserving its rare and endangered biological and ecological resources, its development project is in the pipe line with NEAP (National Environment Action Plan), Government of Pakistan.

24. Conservation measures proposed but not yet implemented: (e.g., management plan in preparation; officially proposed as a protected area, etc.)

A development project of the Protected Area is submitted to Federal Government under National Environment Action Plan (NEAP), which covers all conservation and management actions including preparation of Management Plan. Already declared Protected Area.

25. Current scientific research and facilities: (e.g., details of current projects; existence of field station, etc.)

Currently no such development project is approved or under implementation. A district Wildlife office is established in district headquarter Nawabshah city (60 Km in south-west. Only one room Wildlife check post is constructed in the centre of the sanctuary, which is used by local Wildlife staff for stay and surveillance.

26. Current conservation education: (e.g., visitors centre, hides, info booklet, facilities for school visits, etc.)

Sindh Wildlife Department has started educating the local communities for conserving the natural resources of this area. Regular meetings with the local communities are being held to educate them and encourage them in protecting the natural resources. There is no visitors centre, hides, info booklets or any facilities for school visits, only day trips are arranged for visitors naturalists and Wildlife lovers by local communities, District Administration and Wildlife Department.

27. Current recreation and tourism: (state if wetland is used for recreation/tourism; indicate type and frequency/intensity)

Area is rich in biodiversity and there is great potential for tourism activities, research and bird watching. PTDC (Pakistan Tourism development corporation) and STDC (Sindh Tourism Development Corporation) do not have established their net work for managing and enhancing tourism activities in this area. Sindh Wildlife Department also do not have such infra structure in this area.

28. Jurisdiction: (territorial, e.g. state/region, and functional, e.g. Dept of Agriculture/Dept. of Environment, etc.)

Sindh Wildlife Department, Government of Sindh.
District Government Nawabshah.

29. Management authority: (name and address of local body directly responsible for managing the wetland)

Sindh Wildlife Department, Government of Sindh, M. D. Wafai Road, Saddar Karachi
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30. Bibliographical references: (scientific/technical only)

1. Pakistan Wetland Action Plan (August 2000).
2. Directory of Asian Wetlands (Pakistan).
3. Environmental Study of Nara Desert (Halcro Pakistan).
4. Mammals & Birds of Pakistan - By T.J. Robert. (1991).
5. Waterfowl Survey in Pakistan – Sindh (1987-1989) By Fred J. Koning & others.
6. IUCN red data book 2000.
7. Sindh Wildlife waterfowl counts 1992-2000.

Please return to: **Ramsar Convention Bureau, Rue Mauverney 28, CH-1196 Gland, Switzerland**

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TABLE – 1. VEGETATION SPECIES OF – DEH AKRO-II

S.NO	SEIENTIFIC NAME
DESERT HABITAT:	
1	<i>Acacia jacquemontii</i> Benth
2	<i>Aerva javanica</i> (Burm.f.)Juss ex J. A.Q. Shultes
3	<i>Apluda mutica</i> Linn.
4	<i>Aristida adseensionis</i> Hk. F.
5	<i>Aristida funiculata</i> T. & P.
6	<i>Aristida mutabilis</i> Trin. & Rupr.
7	<i>Bocrbavia procumbense</i> Bank ex Roxb
8	<i>Calligonium polygonoides</i> Linn.
9	<i>Capparis decidua</i> (Foresk.) Edgew.
10	<i>Cassia italica</i> (Mill.) Lam ex f.w. Anderssp.
11	<i>Cenchrus ciliaris</i> Linn.
12	<i>Citrulus colacynthis</i> (Linn) schrad.
13	<i>Cleome brachycarpa</i> Vahl.
14	<i>Cleome scaposa</i> D.C.
15	<i>Cocculus birsutus</i> (Linn.) Diels.
16	<i>Convolviulus prostratus</i> Forssk.
17	<i>Corcborus depressus</i> (Linn.) Stocks.
18	<i>Crotalaria hurbia</i> Ham ex Bentham
19	<i>Cynodon dactylon</i> (Linn.) Pers
20	<i>Cyperus arenarius</i> Retz.
21	<i>Euphorbia prostrata</i> Ait..
22	<i>Farsetia hamiltonii</i> Royle.
23	<i>Heliotropium</i> Desf.
24	<i>Heliotropium strigosum</i> Wild.
25	<i>Indigofera bochstetterii</i> Baker.
26	<i>Indigofera semitrijuga</i> Fork.
27	<i>Leptadenia pyrotechnical</i> (Forssk.) Decne.
28	<i>Limeum indicum</i> Stocks ex T. And.
29	<i>Mollugo cerviana</i> (Linn.)
30	<i>Neurada procumbens</i> Linn.
31	<i>Pameum turgidum</i> Forsk.
32	<i>Polygala crioptera</i> D.C
33	<i>Pluebia lanccolata</i> Oliv & Hiern.
34	<i>Prosopis cineraria</i> (Linn. Druce.)
35	<i>Rbynchosia minima</i>
36	<i>Saccharum spontaneum</i> Linn.
37	<i>Salsola baryosoma</i> (Roem & Schult.) Dandy.
38	<i>Salvadora oleoides</i> Decne.
39	<i>Setaria punila</i> (Poir.) Roem. & Schult.
40	<i>Stipagrostis plumosa</i> (Linn.) Karst.

41	<i>Tephrosia tenctoria</i> Pers.
42	<i>Tephrosia uniflora</i> Pers.
43	<i>Tephrosia uniflora</i> Pers.
44	<i>Tribulus longipetalus</i> Viv.
45	<i>Zizyphus nummularia</i> (Burm.f.)Wt. & Arn.
46	<i>Zygophyllum simplex</i> Linn.
MARSHY HABITAT:	
47	<i>Aehuropus lagopoides</i> (Linn.) Trin.
48	<i>Alhagi maurorum</i> Medic.
49	<i>Bacopa mouuieri</i> (Linn.) Pennell.
50	<i>Boerhavia procumbense</i> (Bank ex. Roxb.
51	<i>Capparis decidua</i> (Forssk.) Edgew.
52	<i>Cenchrus ciliaris</i> Linn.
53	<i>Desmostachya bipinhnata</i> (L.) Stapf.
54	<i>Fimbristylis acuminata</i> Vahl.
55	<i>Fimbristylis dicholtoma</i> Clarke.
56	<i>Eragrostis minor</i> Host.
57	<i>Euphorbia prostrata</i> Ait.
58	<i>Heliotropium crispum</i> Desf.
59	<i>Heliotropium europeum</i> Linn.
60	<i>Heliotropium strigosum</i> Wild.
61	<i>Indigofera hochstetterii</i> Baker.
62	<i>Limeum indicum</i> Stocks ex T. And.
63	<i>Mothugo cerviana</i> (Linn.) Ser.
64	<i>Phyla modiflora</i> (L.)
65	<i>Portulaea oleracea</i> Linn.
66	<i>Pluchia lanceolata</i> Oliv & Iiern.
67	<i>Polygala erioptera</i> DC.
68	<i>Prosopis cineraria</i> (Linn.) Druce.
69	<i>Saccharum bengalensis</i> Retz.
70	<i>Saccharum spontaneum</i> Linn.
71	<i>Suaeda fruticosa</i> Linn.
72	<i>Suaeda nudiflora</i> (Wild.) Moq.
73	<i>Satsola baryosoma</i> (Roem & Schult.(Dand)
74	<i>Sesuvium sesuviodes</i> (Fenzl) Verde.
75	<i>Stipagrostis plumosa</i> (Linn.) Munro ex T.A.
76	<i>Tamarix dioica</i> Roxb.
77	<i>Triamthema triaquetra</i> Rottle. And Wild.
78	<i>Tribulus longipetalus</i> Viv.
79	<i>Typha domingensis</i> Pers.
80	<i>Typha elephantina</i> Roxb.
81	<i>Zaleya pentamudra</i> (linn.) Jaffrey
82	<i>Zygophyllum simplex</i> Linn.
WETLAND HABITAT:	
83	<i>Alhagi maurorum</i> Medic.
84	<i>Alernanthera sessili</i> (Linn) R. Br.
85	<i>Alysicarpus scariosus</i> Grah. Ex Thwaites
86	(<i>Navshi</i>) Gusev.
87	<i>Amarathus cirdis</i> Linn.
88	<i>Bacopa monnicri</i> Linn.
89	<i>Bergha aestivosa</i> Wight & Arn,
90	<i>Brachiaria cruciformis</i> (J.E Smith)Griseb.
91	<i>Calotropis procera</i> (Wight & Arn.)

92	<i>Codoorusaestuans</i> Linn.
93	<i>Covchorus trilocularis</i> Linn.
94	<i>Cuenmis melo</i> var. <i>Agrestis</i> Naud.
95	<i>Cyperus difformis</i> Linn.
96	<i>Cyperus irta</i> Clarke
97	<i>Cyperus rotundus</i> Linn.
98	<i>Demostabya bipinnata</i> (L.) Stapf
99	<i>Dichanthium annulatum</i> (Forssk.) Stapf.
100	<i>Digera muricata</i> (Linn.) Mart.
101	<i>Echinochloa colomum</i> (L.) Link
102	<i>Echinochloa crusgalli</i> (L.) P. Beauv.
103	<i>Edipta prostrata</i> (Linn) Mant.
104	<i>Eleusine indica</i> (Linn.) Gaertn.
105	<i>Equisetuna arvense</i> (Linn)
106	<i>Eragrostis minor</i> Host.
107	<i>Euphorbli prostrata</i> Ait.
108	<i>Embrstylis acuminata</i> Vahl.
109	<i>Eimbrastylis dichotonta</i> Clarke
110	<i>Hydrilla corticallata</i> (L.T)Royale.
111	<i>Impomoca aquatica</i> Forssk.
112	<i>Iponoca eriocarpa</i> R.Br.
113	<i>Rajagopal.</i>
114	<i>Nymphtea pubescens</i> Wilid.
115	<i>Oxystebua esculemtum</i> (L.F) R. Br.
116	<i>Persicora barbata</i> (Linn). Hara.
117	<i>Perstatria glabra</i> (Willd. M. Gomes.
118	<i>Phragmites korka</i> (Retz Trin.)
119	<i>Phyllonbus reticulatus</i> Poir
120	<i>Physalis perucuana</i> Linn.
121	<i>Phyla nodiflora</i> (L.)
122	<i>Populus cuphratica</i> Olivier.
123	<i>Portulaca oleraced</i> Linn.
124	<i>Rhynchotha minima</i> (L). DC.
125	<i>Saccharum bengalensis</i> Retz.
126	<i>Sacharwn spontaneum</i> Linn.
127	<i>Seshouna bispinosa</i> (Jacq.) W.F Wight..
128	<i>Solwuna nigram</i> Linn.
129	<i>Solonoa surattense</i> Burm.f.
130	<i>Tamarix dioica</i> Roxb.
131	<i>Tamarix madica</i> Wild.
132	<i>Typha domingensis</i> Pers.
133	<i>Typha dephontima</i> Roxb.
134	<i>Vanthnom nedieum</i> J.Koenig.

AGRICULTURE HABITAT:

135	<i>Achyranthes aspera</i> Linn.
136	<i>Albagi maurorum</i> Medic.
137	<i>Amaranthus Virdis</i> Linn.
138	<i>Aristida adscensionis</i> Hk.f.
139	<i>Brachiaria eruciformis</i> (J.E. Smith)Griseb.
140	<i>Celosia argentea</i> Linn.
141	<i>Cenchrus ciliaris</i> Linn.
142	<i>Cleome viscosa</i> Linn.
143	<i>Convolvulus arvensis</i> Linn.
144	<i>Convolvulus prostratus</i> Forssk.
145	<i>Corcborus aestuans</i> Linn.

146	<i>Corchorus trilocularis</i> Linn.
147	<i>Cressa cretica</i> Linn.
148	<i>Cucumis melo</i> Var. <i>Agrestis</i> Naud.
149	<i>Cyamopsis tetragonoloba</i> (Linn.)
150	<i>Cynodon dactylon</i> (L.)
151	<i>Cyperus rotundus</i> Linn.
152	<i>Datetyloctenium aegypticum</i> (L.) P. Beauv.
153	<i>Desmostachya bipinnata</i> (L.) Stapf.
154	<i>Digera muricata</i> (L.)
155	<i>Echinochloa colonum</i> (L.) Link
156	<i>Echinochloa crusgalli</i> (L.) P. Beauv.
157	<i>Eclipta prostrata</i> (L.) Linn.
158	<i>Euphorbia birta</i> Linn.
159	<i>Euphorbia prostrata</i> Ait.
160	<i>Ipomoea aquatica</i> Forssk.
161	<i>Lauaea procumbens</i> (Roxb.) Ramayya & Raj
162	<i>Mukia maderaspatana</i> (L.)
163	<i>Oxalis coruiculata</i> Linn.
164	<i>Phyla modiflora</i> (L) Greene.
165	<i>Physalis peruviana</i> Linn.
166	<i>Portulaca oleracea</i> Linn.
167	<i>Sesbania bispinosa</i> (Jacq. W.F. Wight.
168	<i>Trianthema portulacastrum</i> Linn.
169	<i>Tribulus terrestris</i> Linn.
170	<i>Xanthium indicum</i> J.Koenig.

TABLE - 2. LIST OF MAMMALS OF DEH AKRO-II.

S.NO	LOCAL NAME	SCIENTIFIC NAME
1	Long-eared Hedge Hog	<i>Hemiechinus auritus</i>
2	Yellow throated Shrew	<i>Suncus Stoliezkanus</i>
3	Desert Fox	<i>Vulpus vulpus pusilla</i>
4	Jackal	<i>Canis aureus</i>
5	Smooth Coated Otter	<i>Lutra perspicillata</i>
6	Small Mongoose	<i>Herpestes auropunctatus</i>
7	Desert Cat	<i>Felis libyca</i>
8	Jungle Cat	<i>Felis chaus</i>
9	Indian Wild Boar	<i>Sus scrofa</i>
10	Hog Deer	<i>Axis porcinus</i>
11	Indian Hare	<i>Lepus nigrocollis</i>
12	Indian Crested Porcupine	<i>Hystrix indica</i>
13	Five Stripped Palm Squirrel	<i>Funambulus pennanti</i>
14	House Mouse	<i>Mus musculus</i>
15	Short-Tailed Mole Rat	<i>Nesokia indica</i>
16	Bluchistan Gebril	<i>Gerbillus nanus</i>
17	Indian Gebril	<i>Tetra indica</i>
18	Indian Desert Jud	<i>Meriones hurrianae</i>

TABLE – 3. LIST OF REPTILES OF DEH AKRO-II.

S.NO	LOCAL NAME	SCIENTIFIC NAME
CROCODILES		
1	Mugger Crocodile	<i>Crocodylus palustris</i>
SNAKES		
2	Brahminy Blind Snake	<i>Typhlops braminus</i>
3	Indian Sand Boa	<i>Eryx johni</i>
4	Saw scaled Viper	<i>Echis carinatus</i>
LIZARDS		
5	Brilliant Agama	<i>Trapelus (Agama Agilis isolepis)</i>
6	Afghh Ground Agama	<i>Trapelus Agama megalonyx</i>
7	Indian spiny-tailed Lizard	<i>Uromastix hardwicki</i>
8	Indian Fringed Toed sand Lizard	<i>Acanthodactylus contoris contoris</i>
9	Long-tailed Desert Lacerta	<i>Eremias guttulata watsonana</i>
10	Sindh Sand Gecko	<i>Crossobamon orientalis</i>
11	Banded Dwarf Gecko	<i>Tropicolotes helenae</i>
12	Indian Sand Swimmer	<i>Ophiomorus tridactylus</i>
13	Indian Monitor	<i>Varanus bengalensis</i>
14	Indian Desert Monitor	<i>Varanus griseus Koniecznyi</i>
TURTLES		
15	Brown River Turtle	<i>Kachuga Smithii</i>
16	Spotted pond Turtle	<i>Geoclemys hamiltonii</i>

TABLE – 4. LIST OF BIRDS OF DEH AKRO-II

S. N O	LOCAL NAME	SCIENTIFIC NAME
1	Grey Partridge	<i>Francolinus pondicerianus (Gmelin)</i>
2	Black Partridge	<i>Francolinus francolinus</i>
3	Houbara bustard	<i>Chlamydotis undulata</i>
4	Green shank	<i>Tringa nebularia</i>
5	Grey Heron or Common Heron	<i>Ardea cinerea</i>
6	River Tern	<i>Sterna auranitia J.e Gray</i>
7	Montagu's Harrier	<i>Circus pygargus</i>
8	Egyptian Nightjar	<i>Caprimulgus aegyptius lichtenstein</i>
9	Little Stint	<i>Calidris minuta (Leisler)</i>
10	Moorhen, Waterhen	<i>Gallinula chloropus (L)</i>
11	Darter or Snake, Bird	<i>Anhinga melanogaster pennant</i>
12	Marsh Harrier	<i>Circus aeruginosus</i>
13	Black or Eurasian Coot	<i>Fulica atra (L)</i>
14	Garganey	<i>Anas querquedula</i>
15	Pied Wagtail	<i>Motacilla alba</i>
16	Black winged Kite	<i>Elanus caeruleus (desfontaines)</i>
17	Black winged stilt	<i>Himantopus himantopus (J)</i>
18	Ruff	<i>Philomachus pugnax (L)</i>
19	Little Tern	<i>Sterna albifrons pallas</i>
20	Gadwall	<i>Anas strepera linnaeus</i>
21	Tufted Duck	<i>Aythya fuligula</i>
22	Marbled Teal	<i>Marmaronetta angustirostris</i>
23	Shoveler	<i>Anas clypeata</i>
24	Curlew Sandpiper	<i>Calidris ferruginea</i>
25	Blue Rock Pigeon	<i>Columba livia gmelin</i>
26	Common Crow Pheasant (Coucal)	<i>Centropus sinensis (Stephens)</i>
27	Great Grey Shrike	<i>Lanius excubitor</i>
28	Rufous-backed Shrike	<i>Lanius schach linnaeus</i>
29	Eurasian Kestrel	<i>Falco tinnunculus</i>
30	Common Myna	<i>Acridotherus tristis (L)</i>
31	Common Babbler	<i>Turdoides caudatus (Dumont)</i>
32	Bank Mayna	<i>Acridotherus ginginianus (Latbam)</i>
33	Black Drongo/King Crow	<i>Discrurus macrocercus vielliot</i>
34	White Cheeked Bulbul	<i>Pycnonotus leucogenys (J.E.Gray)</i>
35	Indian Robin	<i>Saxicoloides fulicata (Linnaeus)</i>
36	Stoneo chat or Collared Bush Chat	<i>Sexicola torquatta (Linnaeus)</i>
37	Crested Lark	<i>Galerida cristata</i>
38	Hoopoe	<i>Upupa epops linnaeus</i>
39	Pied Kingfisher	<i>Ceryle rudis (Linnaeus)</i>

40	White-breasted Kingfisher	<i>Halcyon smyrnensis (Linnaeus)</i>
41	Little Green Bee-eater	<i>Merops orientalis latham</i>
42	Blue-cheeked Bee-eater	<i>Merops superciliosus linnaeus</i>
43	Little Egret	<i>Egretta garzetta (Linnaeus)</i>
44	Intermediate Egret	<i>Egretta intermedia (Wagler)</i>
45	Indian Pond Heron	<i>Ardeola grayii (Sykes)</i>
46	Redshank	<i>Tringa totanus (Linnaeus)</i>
47	Grey Plover	<i>Pluvialis squatarola (Linnaeus)</i>
48	Indian Roller	<i>Coracias benghalensis (Linnaeus)</i>
49	Dabchick	<i>Tachybaptus ruficollis (Pallas)</i>
50	Glossy Ibis	<i>Plegadis falcinellus (Linnaeus)</i>
51	Common Pochard	<i>Aythya ferina (Linnaeus)</i>
52	Common Teal	<i>Anas crecca Linnaeus</i>
53	Common Sandpiper	<i>Actitis hypoleucos (Linnaeus)</i>
54	Sand Martin	<i>Riparia paludicola (Vieillot)</i>
55	Roseringed Parakeet	<i>Psittacula crameri (Scopoli)</i>
56	Indian Tree Pie	<i>Dendrocitta vagabunda (Latbam)</i>
57	Spoon Bill	<i>Platalea leucorodia (L)</i>
58	Purple Sunbird	<i>Nectarinia asiatica (Latham)</i>
59	Spotted fly catcher	<i>Muscicapa striata</i>
60	White tailed plover	<i>Chettusia leucura</i>
61	Black crown finched lark	<i>Eremoterix nigriceps (Gould)</i>
62	Ring Dove	<i>Streptopelia decaocto (Frivaldszky)</i>
63	Great Cormorant	<i>Phalarocorax carbo (Linnaeus)</i>
64	Little Cormorant	<i>Phalacrocorax niger (Viellot)</i>
65	Little Orstriated Heron	<i>Butorides striatus (L.)</i>
66	Grater Flemingo	<i>Phonicopterus ruber</i>
67	Osprey	<i>Pandion Haliatos (L.)</i>
68	Black Francolin	<i>Francolinus francolinus (L.)</i>
69	Purple Gallinule	<i>Porphyrio porphyrio (L.)</i>
70	Houbara Bustard	<i>Chalamydotis undulata jacquini</i>
71	Pied Avocet	<i>Recuriostra avosetta (L.)</i>
72	Kentish Plover	<i>Charadrius alexandrinus (L.)</i>
73	Red watted Lapwing	<i>Hoplopterus indicus</i>
74	Dunlin	<i>Calidris alpina (L.)</i>
75	Common or Fantail snipe	<i>Gallinago gallinago (M.)</i>
76	Balck tailed Godwit	<i>Limosa limosa (L.)</i>
77	Marsh Sandpiper	<i>Tringa stagnatilis (Becbstein)</i>
78	Chestnut-Bellied Sandgrouse	<i>Pterocles exustus temmimck</i>
79	Red collared or Turtle Dove	<i>Streptopelia tranquebarica</i>
80	Spotted Little Owl	<i>Athene brama (Temminck)</i>
81	Common Swift	<i>Apus apus (L.)</i>
82	Common small Blue kingfisher	<i>Alcedo atthis (L.)</i>
83	Blue tailed Beeeater	<i>Merops philippines (L)</i>

84	Eurpian or Kashmir Roller	<i>Coracias garrulus (L.)</i>
85	Greater short Toed Lark	<i>Calendrella brachydactyla (Leisler)</i>
86	Indian Pipit	<i>Anthus similis jerdon</i>
87	Grey wagtail	<i>Motacilla alba</i>
88	Red vented Bulbul	<i>Pyenonotus cafer (L.)</i>
89	Pied stone chat or pied Bush Chat	<i>Saxicola caprata (Linnaeus)</i>
90	Graceful Stripe Backed Prinia	<i>Prinia gracilis (M.b.c. lichtenstein)</i>
91	Common Tailor Bird	<i>Ortbotomus sutorius (Pennant)</i>
92	Indian Great Reed Warbler	<i>Acroccpbalus stentoreus (Hemprich & Ebreberg)</i>
93	Plain Leaf Warbler	<i>Thylloscopus neglectus bume</i>
94	Jungle Babbler	<i>Turdoides striatus (Gmelin)</i>
95	House Crow	<i>Corvus splendens vieillot</i>
96	Brahminy Starling or Myna	<i>Sturnus pagodarum (S.G.Gmelin)</i>
97	Rosy pastor	<i>Sturnus roseus (L.)</i>
98	House Sparrow	<i>Passer domesticus (L.)</i>
99	Sindh Sparrow	<i>Passer pyrronotus blyth</i>
100	Indian Bava	<i>Ploceus philippinus (L.)</i>
101	Indian silver Bill	<i>Lonchura malabarica (L.)</i>

TABLE – 5. LIST OF FISHES OF DEH AKRO-II.

S.NO	COMMON NAME	SCIENTIFIC NAME
1	Dambro/Rohu	<i>(Labeo rohita)</i>
2	Dambro/Rahu	<i>(Labeo nigripinnis)</i>
3	Dahi	<i>(Labeo calbasu)</i>
4	Makhni	<i>(Ambassis nam)</i>
5	Sole/Saul	<i>(Channa marulius)</i>
6	Dayya/Tilapix	<i>(Tilapia mossombica)</i>
7	Thaila	<i>(Catla catla)</i>
8	Morakha	<i>(Cirrhinus mrigala)</i>
9	Palli	<i>(Gaduria chopra)</i>
10	Singhara	<i>(Mystus seenghala)</i>
11	Malli/Jerki	<i>(Wallago attu)</i>
12	Gandan	<i>(Notopterus notopterus)</i>
13	Dimmon	<i>(Ompok bimaculatus)</i>
14	Nahi/Shakur/Golu	<i>(Glossogobius giuris)</i>