

Lake Conservation as Citizens' Initiative in India

Report (2010 – 11)

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Man Sagar Lake over view.

Introduction:

A new fillip was received to the Man Sagar lake conservation initiatives in the city of Jaipur, India, following support received from the Rufford Small Grants Foundation (July 2010 onwards for one year). The programmes got strengthened and also diversified, one new project taken up first time: Check list of Common Birds of Man Sagar Lake.

Background:

The Man Sagar lake was established by Raja Man Singh of Amber (Jaipur had not been set up then), who was a contemporary of the Mughal Emperor, Akbar in India (late 16th century). The objective was to dam the waste flowing rain water and maintain it for irrigation and recreation. The massive dam constructed then stands till this date and is the main venue of the annual Birding Fair, fifteen held so far (2011). Raja Man's successor, Maharaja Sawai Jai Singh (early 18th century) created a palace over an island amidst this lake, called Jal Mahal, which added scenic charm to this water body.

The lake was subjected to misuse for past few decades and city's sewerage flowed in to it. It presented a case of neglect by the civic authorities and the Government of Rajasthan.



1st session at the 14th Fair.

In the mid nineties when Manoj Vardhan visited the British Bird Watching Fair (Rutland, Leics), it was devised that the lake could receive peoples' attention if a bird fair would be held at the impressive dam (700 m long and 20 m wide), offering a command view of the water, hills around and city of Jaipur towards the south. Thus started the Birding Fair. The 16th Fair is due in February 2012. The objective is to develop this lake as another Keoladeo National Park (Bharatpur, India).



A session at Sewerage Treatment Plant.

The aim is to involve citizens in to the Fair and through them convey the message to the decision makers in the Government so that the lake gets improved. As a result, the Government invited private companies to develop land by the side of the lake to develop tourism infrastructure on a public-private-partnership mode. Jal Mahal Resorts Pvt Ltd, a new company set up by Jaipur based jewelers, took up the project. However, it was intrigued to commence work in face of intensely polluted water and foul smell all around. Therefore, lake conservation became priority though the lake restoration was not its contracted job. The company relied on experience and field-knowledge of Harsh Vardhan to initiate some measures to minimize the threats faced by the lake. However, it could not complete the suggested tasks owing to its priorities and lack of support from the Government. Yet its efforts brought certain positive results to improve the lake condition.

Several islands were created through the intervention of Harsh Vardhan during 2000 – 2001 when the lake was being de-silted by the Jaipur Development Authority (JDA). We planted *Acacia nilotica* (*desi babool*) trees over the islands so that on maturity they become habitat for heronries, on the pattern of KN Park. The invasive species, *Prosopis juliflora* was eradicated from entire lake bed (while it remained dry in 2000 – 2001) and from its adjoining edges. Not a single tree/shrub of this plant has been allowed to grow over the islands.



An in-field session at the lake dam.

Aquatic vegetation, basically the seeds, was lost in the bed of the lake when de-silting was initiated. It came as a major setback as it caused loss of feed for birds. Therefore, truck-loads of aquatic vegetation was fetched from Bharatpur (KN Park area) and introduced in the lake bed to attract birds and also get polluted water cleaned, a job, supervised by Harsh Vardhan and taken care of by JMRPL.

The lake was administered by the Irrigation Department. It was handed over to Jaipur Development Authority (JDA) for past seven years, which is not tackling its conservation related issues as are being suggested by Harsh Vardhan and colleagues on behalf of the citizens of Jaipur. This Government organisation has the requisite capability and capacity; therefore, it is being appealed again and again to take the needed lead.

The Fair Approach:

The present lake conservation initiative by way of the Birding Fair involves series of programmes; all aimed at involving citizens and create a fully conscious and committed base to defend the lake conservation:



It is how they learn bird-watching and lake conservation at the Fair.

- (i) As students number a lot at the Fair, they are being treated as catalysts of conservation-change. One student-visitor attends the Fair and informs about 8 – 10 persons at home and in neighbourhood because he is given a friendly-dose of bird-watching and bit of conservation. Nearly 3000 students attend one Fair. A Fair thus involves nearly 30000 people in to its objective-network. Fourteen Fairs held so far are expected to have informed as many as 1320000 people about the lake related issues. Repeat visits deducted, it can be about quarter million lake-friends have been generated through the process.
- (ii) Expert bird watchers are available at Keoladeo National Park, Bharatpur. About 15 of them are invited to join the annual Birding Fair to teach bird watching techniques to students, teachers and others. Each one is stationed at a Bird-Butt and provided a table and a chair with a pair of binoculars. Students form a queue to be guided by him. Thus at a time 15 students can spot birds and learn bit more about lake conservation. Doing so for a few thousand throughout the two-day sessions is quite possible. The bird

watchers stay overnight at the Fair and are provided remuneration, cash incentive, a pair of khaki apparels and a certificate of participating.

- (iii) In-field sessions are held at the Fair to answers questions of participants and offer them inputs about lake conservation.
- (iv) Various Stands are organised at the Fair which are taken over by conservation experts and organisations so that they can convey their messages to participants.
- (v) Participants are taken over nature trails at the lake to experience various facets of water quality and habitat alterations.
- (vi) Separate sessions are held for teachers to address their queries on lake related issues.
- (vii) Tea-snacks and lunch are served to all volunteers.
- (viii) Banners and hoardings are put up to highlight the issue being tackled through the Fair; each Fair is dedicated to a conservation-problem, a threatened species or habitat.
- (ix) The Press is invited to come and see how the event progresses and they are welcome to write own views which they indeed do. The support of the Press is of great advantage as the word spreads far and wide and quickly.
- (x) As services of any paid staff are not available, all these programmes are carried out through volunteers. Some times overseas volunteers also join like James Whitney, Tom Barrett and Victoria Johnson came from UK for the 2010 Fair.



A Spot bill female with chicks, birds start breeding at the lake.



Black Drongo at its nest at the lake.

Outcome:

It is like a dream getting materialized as one will like to look at where the start was made, and where it is placed today: Man Sagar getting conserved.

One could not stand by the lake even for some minutes because of intense foul-smell (SO, SO₂ etc) that emanated from its water, and all around its about 1.5 sq. km area, couple of years ago. Residents living nearby and business enterprises along the Amber Road can now feel the transformation that has occurred here.

The process has been challenging for dealing with aquatic regime, it was an uncommon task and required an entirely different discipline. Thanks to the cooperation which flowed from all directions, both the goal is nearing completion, happily for city of Jaipur. Here are some facts.

Desilting of the entire bed of Man Sagar was executed so as to create certain depth of water. There was excessive silt-load, which was forcing the lake remain dry for most period of a year.

No more now. The Jaipur Development Authority executed it. The private company executed the following:

A sedimentation tank was devised in a manner that it should:

(i) retain silt, brought in to the lake bed through storm water and sewage (total 29,500 cum/day: Nagtalai Nalla bringing 5,000 cum/day, Brahmpuri Nalla bringing 24,000 cum/day and Amber Road's drains further contributing 500 cum/day)

(ii) check inflow of plastic and other solid waste of the city in to lake, and

(iii) receive such quantity of storm water as was requisite to enter the lake.

This was clubbed with construction of a new Nalla (storm water and sewage flow channel) measuring 1,384 meter. It bypassed the city's sewage-flow thereby saving the lake from the recurring menace of sewage (both the main Nallas earlier flowed in to the lake).

Constructed Wetlands (CW) were next device. They have been created at three different locations as per availability of specific land for the purpose. First one is down stream of the 27 mld sewage treatment plant and 7.5 mld tertiary treatment plant, both located by the side of Amber Road, about three km backyard of the lake. Second and third are south of the project site.

CWs' objective is to further treat the already treated sewage water of the city and then release it in to Man Sagar. The capacity of the three CWs is 7.8 mld and they all cover about 4.5 ha area. It is an innovative approach to treat polluted water which has to flow under the roots of some selected species of long and short shrubs. Three pipe-lines carry this treated water in to the lake. It is happening for past several months, formal start was made in mid 2009.

The resultant positive gain, for all to experience, is that the BOD level at Man Sagar now a days ranges from 30 – 50, at times even 15 – 20, which until two years ago was more than 150.

Jal Mahal, the idyllic monument amidst placid water of Man Sagar, now receives visitors: it has a terrace garden with stylized marble-carving, domes and kiosks restored with gold-painted ceilings of olden character and hues -- a systematic, methodical, well planned and immaculately executed progression in stone, masonry, art, craft, design etc to try and recreate the original grandeur of this heritage monument of immense repute. A miniature painting gallery has been added in its lower level.

All is not well at the lake. Certain issues remain yet to be sorted out towards managing this lake at the eco-system-based approach like removal of plastic waste, still being thrown in to the lake (by visitors, vendors etc), dredging of the solid waste from the sedimentation basin area, removal of invasive vegetation from lake shores, role of vegetation as means to improve water quality as also serve as feed for certain bird species, maintaining high degree of water quality, fish (Mangur species) removal, reintroduction of appropriate fish species, routing visitors/tourists along the lake side roads, managing vendors along the main Amber Road etc. Multiplicity of agencies can be replaced by a unitary decision making mechanism.

During winter Man Sagar hosts thousands of birds, mostly migratory species. By way of habitat modification and feed supplementation, more birds will start wintering here. Resident species like Indian Moorhen and Spotbill Ducks have reported breeding in numbers across the well-vegetated water spread here.

Nature offers limitless to all. Hence this endeavour to let Nature continue to give more and the best. Man Sagar is emerging as one of the best visitor-attractive and nature-friendly zones in the country.



Black-crowned Night Heron
breeds at the lake



Black-winged Stilts, Spoonbill,
Great Cormorants and Grey Herons
at the modified habitat of the lake.

Common Birds:

Following year long observations made, Harsh Vardhan prepared a check list of the Common Birds of Man Sagar. The Rufford-support enabled to publish a booklet with using colour photos of all such birds to be observed in and around this lake without much effort put in.

1. Great Cormorant *Phalacrocorax carbo*

Total black with yellow throat, the largest among cormorants. Fish eating, dives in water to catch it, comes out with fish within large beak. Often in a group at lakes, rivers. Resident. 80 cm.

2. Little Cormorant *Phalacrocorax niger*

Total black but smaller (than above), short beak having no yellow patch, head is domed. Fish eating, dives to catch it, often in a group at lakes, rivers. Resident. 51 cm.

3. Indian Cormorant *Phalacrocorax fuscicollis*

Total black with purple tinge over lower back, often looks like Little Cormorant, but has long slender beak. Fish eating, dives to catch it, often in a group at lakes, rivers. Also called Indian Shag. Resident. 27 cm.

4. Little Grebe *Tachybaptus rificollis*

Smallest of swimming-diving, tail-less bird, short pointed beak, heavy rear portion, always moving forward, often diving in water to feed submerged organisms. Single or couple, also together in smaller number at lakes. Resident. 27 cm.

5. Great Egret *Casmerodius alba*

Total white. Outstanding due to its tall appearance at lake-edge and river banks, often found knee-deep in water, long yellow beak, thick long legs and downward sloping body with long generally curved neck. Fish eating. Solitary, often in company of other Egrets, Pond Herons and waders. Resident. 90 cm.

6. Intermediate Egret *Mesophoryx intermedia*

Total white. Often, in size, confused with Great Egret, yellow beak, dark thin legs, neck not very long and often slanted. Fish eating. Often in company of other Egrets and waders at edge of lakes, river or knee-deep in water. Resident. 80 cm.

7. Little Egret *Egretta garzetta*

Total white, smaller than Intermediate Egret, black thick legs with yellow feet, black rather thin beak. Fish eating. Often in company of other Egrets and waders at edge of lakes, river. Resident. 63 cm.

8. Cattle Egret *Bubulcus ibis*

Total white, small and short, thick neck, yellow short beak, found at water-edges, often in agriculture fields following cattle, to catch insects, grasshoppers etc. Resident. 51 cm.

9. Grey Heron *Ardea cinerea*

Outstanding due to tall appearance at water-edge or knee-deep in water at lake, river. Grey colour significant all over body, with black-white mixed linings, long neck generally curved, tall yellow beak. Solitary, in company of Egrets, Herons. Fish eating. Resident. 96 cm.

10. Indian Pond Heron *Ardeola grayii*

Always within aquatic vegetation or at edge of lake, river, dull brownish round-shaped body, long-rounded neck, often erect, yellow beak with black point, yellow thin legs. Fish-eating. Often in company of waders, egrets. Resident. 46 cm.

11. Black-crowned Night Heron *Nycticorax nycticorax*

Seldom observed during day. Comes out of woody growth at sun set to occupy edge of lakes, prefers to settle within aquatic vegetation, nocturnal. Fish eating. Recognised by its black cap, black back, and black thick beak, slaty body, red eyes and yellow legs. Resident. 58 cm.

12. Greater Flamingo *Phoenicopterus ruber*

Graceful, pinkish-white, very tall, red legs, heavy body, long neck always curved, pink beak, black towards tip, often stands on single leg, vigorously feeding by keeping entire beak submerged in water. Selective feeder of algae, mollusc etc. Prefers shallow water, generally brackish, often polluted. Resident. 130 cm.

13. Painted Stork *Mycteria leucocephala*

Long pink beak, red head, long white neck, black wing patches on either side of well-built body, red-black tail marks, red long legs. In knee-deep water in lakes, river or over trees where it nests amidst or near water. Fish-frog-eating. Resident. 93 cm.

14. Eurasian Spoonbill *Platalea leucorodia*

Spoon-like long grey bill, all white well-built body, black legs. At edges of lake, river, muddy areas. Feeds on mollusc, vegetation, fish-frogs. Resident. 82 cm.

15. Ruddy Shelduck *Tadorna ferruginea*

Copper colour well-built body, black thin beak, reddish legs, grazes at aquatic fields near water, swims around edges, in small numbers. Breeds in Himalayas. Omnivorous, feeds on tubers, shoots, insects at lakes. Migratory. 66 cm.

16. Northern Pintail *Anas acuta*

Long pointed tail is slightly upwards, black linings over grey body, longer neck, dark-brown round head and slender beak. Only tail visible while feeding with body inside water. Feeds on vegetation, seeds, insects, larvae at lakes. Migratory. 56-74 cm.

17. Common Teal *Anas crecca*

Tiny water-bird, chestnut head, green band behind eyes, white stripe over ears, yellow patch over tail parts. Swims in numbers all day, walks up vegetation to feed on vegetation, tubers, seeds at lakes. Migratory. 38 cm.

18. Spot-billed Duck *Anas poecilorhyncha*

Yellow tipped beak, dark over head and dark eye-brows, spotted breast, it is well-built duck. Feeds on aquatic vegetation, sedges, water snails at lakes. Resident. 61 cm.

19. Gadwall *Anas strepera*

Grey body, white belly, black hind portion, dark-grey beak. Swims in company of other ducks. Feeds on aquatic vegetation, worms, mollusks at lakes. Migratory. 51 cm.

20. Eurasian Wigeon *Anas Penelope*

Yellow forehead and yellow crown, chestnut head and pinkish breast. Swims amidst other ducks in lakes, river, feeds on aquatic vegetation, insects, larvae. Migratory. 49 cm.

21. Garganey *Anas querquedula*

Long, white stripe behind eyes, brown breast, grey flanks. Swims amidst other ducks, often inserting head in to water to feed aquatic vegetation, mollusc, insect, larvae at lake. Migratory. 41 cm.

22. Northern Shoveler *Anas clypeata*

Shovel-like beak with bluish forewing, dark green head and white breast with chestnut flanks. Swims in group with other ducks. Stays longer period at lakes, prefers polluted ponds too. Feeds on crustacean, water insect, larvae, vegetation at lakes. Migratory. 51 cm.

23. Common Pochard *Aythya ferina*

Dark chestnut large head, silver back, grey band over black bill, black breast. Dives in to water to feed on aquatic vegetation, rhizome, bud, seed, worm. Migratory. 48 cm.

24. Black-shouldered Kite *Elanus caeruleus*

Black shoulders over small grey body having white belly, yellow claws and blackish hooked beak, small bird of prey, a hawk, perched over electric wire or over a tree-branch. Hovers stationery in sky and swoops down over prey. Prefers arid, open areas. Feeds on locusts, grasshopper, cricket, insect, lizard. Resident. 33 cm.

25. Black Kite *Milvus migrans*

Forked tail, large dark body, small hooked beak. Commonest of raptors, found in and around towns, occupying dead tree-branch. Omnivorous, feeds on garbage, insects, mice, lizard, frog, kitchen-waste, an efficient scavenger. Resident. 61 cm.

26. Shikra *Accipiter badius*

Pale blue-grey upper parts, fine brown and orange bars on under parts, unbarred white thighs and lightly barred tail feathers. Handsome bird of prey, prefers open areas including agriculture fields. Feeds on rats, striped squirrel, lizards, smaller birds, locusts. Resident. 35 cm.

27. Osprey *Pandion haliaetus*

Prominent white head over dark body, black stripe behind eyes, white under body and under-wing parts, pale claws. Settles over a dead tree branch or on ground, soars high and dives to bag fish from surface of lake, river, feeds on fish only. Migratory. 56 cm.

28. Eurasian Marsh Harrier *Circus aeruginosus*

Pale head and brown upper wing parts, broad wings, body is well built. Sits over dead tree branch or on top of a green tree, often over a mound. Has to be around a lake, river, teeming with ducks. While flying, captures fish, small ducks, frogs. Migratory. 56 cm.

29. Grey Francolin *Francolinus pondicerianus*

Solitary, usually a party of half a dozen, walking, running across uncovered ground, around low bushes, calling intermittently is common. Buff, grey brown colour, cross bars above and below body, has a dark necklace. Feeds on seed, plant, berry, insect, termite. Resident. 33 cm.

30. Indian Peafowl *Pavo cristatus*

National bird of India. Spectacular green neck and breast, dark green plumage with bluish oval-like designs over elongated feathers, form a coat over entire body. In garden, large houses, around bushes, spends night in big trees. Feeds on seed, grain, lentil, berry, snake, centipede. Resident. 110 cm.

31. White-breasted Waterhen *Amaurionis phoenicurus*

Small long-legged hen, around water-edge, runs through aquatic vegetation, fore head, face and breast are white, has dark upperparts, rear under parts are rufous, and no tail. Feeds on shoots of marsh plants, insects, larvae, molluscs. Resident. 32 cm.

32. Common Moorhen *Gallinula chloropus*

Red over the beak up to forehead, dark head and body, bluish chest and under parts, and white lines over lower body and behind. Omnivorous, feeds on shoots of water plants, mollusks, frogs. Resident. 32 cm.

33. Common Coot *Fulca atra*

White beak up to forehead, entire body is black. Swims alone or in numbers over lake. Common at most water bodies. Feeds on water plant shots, worms, insects. Migratory. 42 cm.

34. Pheasant-tailed Jacana *Hydrophasianus chirugus*

Long thin tail, long pale legs, yellow vertical patch over either side of neck with dark lining below beak, light brown upperparts and white under parts. Found alone or pair amidst thick floating vegetation. Indicator of quality of aquatic vegetation and health of water body. Feeds on water plant shoots, seeds, roots, insects. Resident. 31 cm.

35. Pied Avocet *Recurvirostra avosetta*

Black and white body. Long thin black beak curved upward, black cap and black neck, black stripes over body and over tail, tall slaty legs. Around edges of lake, coast and also polluted/brackish water. Feeds on tiny molluscs, crustaceans, insects. Migratory. 46 cm.

36. Black-winged Stilt *Himantopus bimanatopus*

Long and thin pink legs, cylindrical long beak, white head-breast and under parts, black upperparts. always at edge of lake and polluted water bodies, wades to pick up micro-organisms from even foul-smelling sites. Feeds on worms, mollusks, aquatic insects. Resident. 25 cm.

37. Red-wattled Lapwing *vanellus indicus*

Red bill, black head and breast, brown upper part, white under part, black tail and long thin yellow legs. Around edge of water and in scrub areas, single or a few, calling noisily. Feeds on ants, beetles, caterpillars, insects. Resident. 33 cm.

38. Little-ringed Plover *Charadrius dubius*

Small fast moving, black necklace, white throat and under part, black lining behind eyes, light brown upper part and thin yellow legs. Feeds on aquatic insects, larvae, beetles at wet surface near lake, river, shore. Migratory. 17 cm.

39. Black-tailed Godwit *Limosa limosa*

Long cylindrical thin beak, often reddish, straight brownish neck having, long thin blackish legs, entire body has white wing bars, tale has black band. Feeds on mulluscs, worms, seeds of marsh plants at edges of lake, mudflats. Migratory. 46 cm.

40. Ruff *Philomachus pugnax*

Orange thin legs, short straight beak, whitish under part, and black-white markings over upperparts, also over head. Feeds on mollusks, crustaceans, insects, worms at edges of lake, shore. Migratory. 25 cm.

41. Common Redshank *Tringa tetanus*

Orange thin legs, red base of long beak, dark upper part, head and neck, all having whitish dots. Feeds on mulluscs, worms, crustaceans, aquatic insects, larvae at edges of lake, shore, frequently at polluted water. Migratory. 28 cm.

42. Common Sandpiper *Actitis hypoleucos*

Constantly bobbing, has somewhat horizontal stance, dark patches over upper part and sides of wings, white under part and rear part, light-dark spots over chest. Feeds on tiny mollusks, crustaceans, insects at edges of lakes, shore, often at polluted water. Migratory. 28 cm.

43. Little Stint *Calidris minuta*

Smallest wader, single or isolated individual at edge of lake, shore. Dark thin legs, black and little whitish markings over entire body, white eyebrow and white behind eyes, white under part and white-darkish neck. Bending body towards ground, feeds on tiny mollusks, crustaceans, insects, worms. Migratory. 13 cm.

44. River Tern *Sterna aurantia*

Orange yellow beak, black head, red short legs, grayish upperparts and under parts, forked tail, flying over water surface at lakes and rivers, bending neck perpendicularly to dive over water surface to pick up tiny fish, aquatic insects, crustaceans. Resident. 42 cm.

45. Eurasian Collared Dove *Streptopelia decaocto*

Half body is black, red tiny legs, grayish neck, breast and under parts with sandy brown upperparts, black patches over lower back and long tail. Common in open areas and at houses, over trees and around lawn. Feeds on food-grains, seeds. A family friend. Resident. 32 cm.

46. Laughing Dove *Streptopelia senegalensis*

Black spots over upper breast, brownish head, neck and under parts with brownish-bluish upperparts and long tail having black stripes over lower back. Feeds on cereals, grains, weed-seeds. A family friend. Resident. 27 cm.

47. Rock Pigeon *Columbia livia*

Grey all over, greenish-reddish spots over neck, black bands over tail and black patch over tail-end, red tiny legs. Most common around houses, at trees. A family friend. Resident. 33 cm.

48. Rose-ringed Parakeet *Psittacula krameri*

Pink collar over all green body, long tail having bluish tapering tip. Red curved beak with black chin. Feeds on vegetables, fruits, seeds. A family-friend. Resident. 42 cm.

49. Pied Cuckoo *Clamator jacobinus*

Crest over black head and all-black body including long slender tail, and throat, under parts are white. In well wooded areas around the town. Feeds on caterpillars, beetles, ants, mulluscs, flying termites. Migratory. Found in late summer and monsoon season. 31 cm.

50. Asian Koel *Eudynamis scolopacea*

Black with grey shades over wings, red eyes, reddish tiny legs. Female is spotted with brown on upperparts and bars over under parts. Feeds on fruits, berries, caterpillars, eggs of small birds. Resident. 43 cm.

51. Greater Coucal *Centropus sinensis*

Black beak, chestnut wings, black head and under parts, black long tail, red eyes and dark legs. Around bushes and over tree branches. Feeds on mice, house geckos, lizards, spiders, snakes, destroyer of birds' eggs. Resident. 48 cm.

52. Spotted Owlet *Athene brama*

Small, brown-white spotting and tiny bars all around body, dark collar separated by white, white legs, oval eye-disc with white circles, tiny pink nose in between. Seated amidst tree-branches, or in a bark-hole, in parks. Feeds at night on mice, beetles, small birds. Resident. 21 cm.

53. House Swift *Apus affinis*

Black plumage, white rump, broad small wings, small square tail, generally observing flying in flocks around town and its neglected buildings. While flying, feeds on flying bugs, beetles, winged ants, airborne spiders. Resident. 15 cm.

54. Indian Roller *Coracias benghalensis*

Many-coloured, prominently blue over head, wings, tail and under parts, thick beak, brown underbelly with grayish bars over throat and chest, pale tiny feet. Feeds on insects, locusts, crickets, ants. Migratory. 31 cm.

55. White-throated Kingfisher *Halcyon smyrnensis*

Long thick reddish beak, dark brown head, so also under parts, white over throat, up to breast, upperparts and long tail is blue, black patches on either sides of upper wings, reddish tiny feet. Always at a tree branch near lake, or in garden, often near houses, feeds on fish, frogs, lizards, grasshoppers. Resident. 28 cm.

56. Green Bee-eater *Merops orientalis*

Black slender beak, slightly downward, making a black line through and behind eyes, blue cheeks and throat, black collar, golden head, green long tail with some feathers stretching out. Found sitting over wire or tree branch in open areas, often within town. Feeds on bees, wasps, moths, dragonflies, always while flying. Resident. 21 cm.

57. Coppersmith Barbet *Megalaima haemacephala*

Crimson forehead, tiny thick black beak, yellow around eyes, yellow throat, below which crimson curved spot, green upperparts, streaked under parts, small green tail, red legs. Hides higher in tree cover. Feeds on fruits of banyan, peepal, gular trees. Resident. 17 cm.

58. Common Hoopoe *Upupa epops*

Thin downward curved beak, brown body in contrast with black-white feathers, pale feet and fan-like brown crown over head (spreads when in mood). At home lawn, garden, open areas and agriculture fields. Feeds on insects, crickets, grasshoppers. Resident. 31 cm.

59. Indian Grey Hornbill *Ocyrceros birostris*

Black raised cap over head, long thick pale-black beak, sandy-slaty upperparts and long tail having black strip, black feet, covered with pale feathers. At tree branches around houses, garden, feeds on fruits, flower petals, lizards, mice. Resident.

60. Black-rumped Flameback *Dinopium bengalense*

Sharply pointed beak, golden back, crimson head, black eye-stripe and throat, black neck, black spotting on wings, black scales over under parts and long black rump. Observed clinging vertically over tree-trunk, the beak hammering its bark causing loud noise, changing stance frequently, feeds on insects, larvae, ants. Resident. 29 cm.

61. Yellow-crowned Woodpecker *Dendrocopos maharattensis*

Sharply pointed beak, light red head, light dark patches below eyes, white throat, black-white dashes over upperparts, white spotted under parts, red patch over lower belly, white bars over tail. Observed clinging vertically over tree-trunk, the beak hammering its bark causing loud noise, changing stance frequently, feeds on insects, larvae, ants. In gardens and at trees around houses. Resident. 18 cm.

62. Eurasian Golden Oriole *Oriolus oriolus*

Completely golden body with prominent black wings and upper part of tail, black feet, reddish beak. Observed during summer, hides in tree branches often camouflaged, catches attention due to whistling calls. Feeds on wild figs, berries, insects, caterpillars. Resident. Found in summer. 25 cm.

63. Ashy-crowned Sparrow Lark *Eremopteris grisea*

Grey head and upperparts, black over eyes, below shoulder and under parts, tiny thick pale beak, and thin pale legs. Generally found at dry vegetated areas, hopping, in good number, feeds on grass, weeds, seeds, insects, ants. Resident. 13 cm.

64. Dusky Crag-martin *Hirundo concolor*

Entire body dark brown (appears black), tiny beak and forked tail. Generally observed flying in numbers around unused buildings and stony areas. Feeds on small flying insects, beetles. Resident. 13 cm.

65. Wire-tailed Swallow *Hirundo smithii*

Very long couple of wire-like tail feathers, entire body blackish-blue, under parts all-white, head being chestnut. Generally observed sitting over electric wires, tree branches, near water. Feeds on small flying insects. Resident. 14 cm.

66. Red-rumped Swallow *Hirundo daurica*

A combination of rufous, black and white. Neck sides and hind parts are rufous, black under-tail parts and tall forked tail. Found in open areas often around forest. Feeds on tiny flying beetles, bugs, winged ants, termites. Resident. 19 cm.

67. Black Drongo *Dicrurus macrocervus*

Altogether bluish-black bird with forked long well-feathered tail, black beak, whitish spots over belly. Found alone at electric wires, tree-branches in open areas, agriculture fields. Feeds on flying insects, locusts, beetles, bugs. Resident. 31 cm.

68. Common Woodshrike *Tephrodornis pondicerianus*

Dark grey upperparts, all white under parts, black beak and black lining behind eyes, white lining over eyes. Found at thorny tree-branches and around forest. Feeds on insects. Resident. 16 cm.

69. Southern Grey Shrike *Lanius meridionalis*

Black and white appearance. Black lining behind eyes, grey head and back, light grey or white under parts, thick black linings over wings and long black well-feathered tail. In open areas, at bushes, agriculture fields. Feeds on insects. Resident. 25 cm.

70. Long-tailed Shrike *Lanius schach*

Black lining behind eyes and black spot over forehead, grey head and upper parts of back, white under parts up to belly, rufous splashes over rear under parts and above upper part of tail which is black long and well-feathered slender. In open areas, bushes. Feeds on insects. Resident. 25 cm.

71. Brahminy Starling *Sturnus pagodarum*

Black cap up to lower neck, rufous body, black-white-marking feathers and likewise tail, having white below, long pale legs, yellow beak. In one, twos, all over and around houses also. Feeds on nectar of flowers, insects, fruits, berries, insects. Resident. 22 cm.

72. Asian Pied Starling *Sturnus centra*

Black and white body, yellow beak, tiny white in front of eyes and larger round shaped white patch behind eyes, grey-whitish rear under parts, and white lining over side feathers and over upper tail, yellow legs. Moist grassy areas, forest, in and around town. Feeds on fruits, cereal, grain, grasshoppers, insects. Resident. 23 cm.

73. Bank Myna *Acridotheres ginginianus*

Orange red beak and same colour oval spot behind eyes, black head and upper neck, bluish-grey body, black rear upperparts and black tail with orange below, orange legs. Feeds on fruits, grains, insects. All over including in town. Resident. 21 cm.

74. Common Myna *Acridotheres tristis*

Yellow beak, yellow oval patch behind eyes, light-brown head, upper neck, and over chest. Brownish upperparts, dark brown tail with black markings over end, light brown under parts, long pale legs. Feeds on waste and insects. All over including town. Feeds on fruits, grains, grub, tidbits from dumps, insects. Resident. 19 cm.

75. Rufous Treepie *Dendrocitta vagabunda*

Very long bluish tail with black broad strip, black head and chest, dark brown shoulders and back with bluish and black strips over lower feathers, light brown under parts, bluish beak, dark legs. Confines to tree-branches in forest, gardens and in outer residential localities. Can be friendly. Feeds on fruits, cereal, flower nectar, frogs, lizards. Resident. 50 cm.

76. House Crow *Carvus splendens*

Black head and beak, pale neck and under parts, black upperparts, long black legs. Hops around for feed from human waste and insects, inspecting attitude, perches over tree-branches, wire, ground around agriculture fields and friendly with people in town also. Feeds on all that can be eaten, flower nectar, destroy nests of Baya. Resident. 43 cm.

77. Red-vented Bulbul *Pycnonotus cafer*

Black head, minor crest, black-white scales over entire body, white rear belly, black tail with white tip at end, red vent below, black legs. Around houses, gardens and in forest. Feeds on fruits, flower nectar, insects. Resident. 20 cm.

78. Yellow-eyed Babbler *Chrysomma sinense*

Yellow iris with orange eye-ring, white triangular patch in front of eyes and white underbelly, light brown rear under parts, dark tan upperparts and similar long tail ending pointedly. Grassy areas, around bushes and reeds, not in town. Feeds on caterpillars, grasshoppers, spiders, flower nectar, insects. Resident. 18 cm.

79. Jungle Babbler *Turdoides striatus*

Yellow bill, light grey head and bit dark grey upperparts with blackish markings over feathers, not very long tail, has black marking towards end, grey under parts with vertical markings, yellow legs. Feeds on seeds, berries, grains, insects. Resident. 25 cm.

80. Large Grey Babbler *Turdoides malcolmi*

Light yellow beak with black tip, black around eyes, grey upperparts and dark long tail, rising above, light grey under parts, pale legs. Feeds on insects, ants, caterpillars, beetles.. Resident. 28 cm.

81. Common Babbler *Turdoides caudatus*

Pale beak, grey head with dark markings, white throat, chest and light pale under parts, light brown upperparts, light brown long tail. Feeds on seeds, berries, grains, insects. Resident. 22 cm.

82. Asian Paradise Flycatcher *Terpsiphone paradise*

Black head with backward crest, black up to shoulders and rest of body white (copper brown in female) with tall tail. Feeds on winged insects, dragonflies, flies, often near water. Resident. Observed during summer. 20 cm.

83. Ashy Prinia *Prinia socialis*

Thin dark beak, dark head and up to rear neck, less dark with orange-shades over upperparts, similar colour long drooping tail with black tip, light brown under parts, pale legs. Moist areas, around water, amidst reeds and tall grass. Feeds on ...Resident. 13 cm.

84. Plain Prinia *Prinia inornata*

Thin light dark beak, white line over eyes, light grey-pale upperparts, long thin tail, white under parts, light-pale legs. Tall grasses, reeds, open areas, outside town. Feeds on ...Resident. 13 cm.

85. Zitting Cisticola *Cisticola juncidis*

Looks like House Sparrow. Tiny grey beak, white lining over eyes, goes behind downwards, dark strips over entire upperparts with orange lining at lower spinal feathers, short tail with dark marking at end, white chin, breast and under parts, long pale legs. Grassland and open fields. Feeds on ...Resident. 10 cm.

86. Common Tailorbird *Orthotomus sutorius*

Rufous forehead and such shade over long, thin beak, slightly downwards, green upperparts with orange side patches at lower feathers, white under parts, light red legs, thin greenish-whitish tail generally kept raised. Feeds on ... Resident. 13 cm.

87. Lesser Whitethroat *Sylvia curruca*

Fast moving within moist shrubs and trees, feeding insects and heard more than observed. Tiny beak with black tip, dark around eyes, dark upperparts, white lower parts, small tail and dark legs. brown upperparts. Feeds on insects, nectar of thorny tree-flowers. Migratory. 13.5 cm.

88. Bluethroat *Luscinia svecia*

Tiny dark beak, white lining over eyes, rufous upper parts, dark blue bib-like patch from chin to upper breast, amidst which is a horizontal red spot with white lining above. Feeds on insects, beetles, ants. Migratory. 15 cm.

89. Black Redstart *Phoenicurus ochruros*

Combination of black and rufous. Black head with thin white line over eyes, behind thin black beak, rufous under parts and dark thin legs. Feeds on insects, beetles. Migratory. 15 cm.

90. Oriental Magpie Robin *Copsychus saularis*

Black and white combination with tall dark tail generally raised upwards. Black head, chest and upperparts with white lining over sides, white under parts, dark tall legs, tiny dark beak. Feeds on insects, ants, moths, caterpillars. Resident. 20 cm.

91. Indian Robin *Saxicolodes fulicata*

Dark under parts, light-dark upperparts, white patch over shoulders (in male), dark long tail raised upwards, reddish vent, dark long legs. To be traced by its whistle-like sing around garden, shrubs. Feeds on insects, larvae. Resident. 16 cm.

92. Pied Bushchat *Sexicola caprata*

Altogether black, head more than remaining body, white rear under parts, white thin lining over shoulders, thin dark beak and long dark legs. Feeds on insects, ants, beetles, caterpillars. Resident. 13 cm.

93. Paddyfield Pipit *Anthus rufulus*

Pale thin beak, white lining across eyes, pale-grey head, pale under parts, light grey upper parts with streaks over shoulders and rear back, tall thin tail, long pale legs. Hopping across sandy-grassy areas, feeds on insects, larvae, ants, bugs. Resident. 15 cm.

94. White-browed Wagtail *Motacilla maderaspatensis*

Altogether black and white. White brow prominent over black head and upperparts, shoulders have white lines, under parts white, long thin dark legs and dark pointed beak. Feeds on beetles, locusts, dragonflies. Resident. 21 cm.

95. Purple Sunbird *Nectarinia asiatica*

Altogether glossy-purple, thin beak curved downward, dark legs. Common visitor in own, flying around garden to suck flower's nectar, small insects. Resident. 10 cm.

96. Indian Silverbill *Lonchura malabarica*

Thick small beak, light rufous-grey shades over upperparts and white under parts, black lining over lower shoulder feathers, black tail with white patch over upper part, pale legs. Found in open dry areas also around forest. Feeds on... Resident. 10 cm.

97. House Sparrow *Passer domesticus*

Grey crown, black over eyes and throat, tiny thick dark beak, white over temple, light brown head, brown upperparts with dark lines, like on tail, white under parts, short pale legs. Feeds on grass, weed-seeds, cereal, kitchen waste. Resident. 15 cm.

98. Chestnut-shouldered Petronia *Petronia xanthocollis*

Yellow on throat (looks like Sparrow), tiny thick beak, pale head and upperparts, dark linings over back, white under parts, thin dark legs. Open dry areas. Feeds on grass, weed-seeds, cereal, kitchen waste. Resident. 14 cm.

99. Baya Weaver *Ploceus philippinus*

Tiny thick dark beak, yellow crown, black over eyes and throat, yellow under parts with white at lower parts, black markings over yellowish upperparts, small tail, pale feet. Feeds on grass-weed, seeds, cereal, grain, insects, beetles, caterpillars. Resident 15 cm.



Paradise Flycatcher reaches at the lake side forest to breed.



Peacocks are all around and displaying at the lake.

Migratory Species at Man Sagar:

About 180 species of birds have been recorded in and around Man Sagar lake. Of these, more than 50 species are migratory (which reach this lake from abroad or from very long distance: migratory are those which do not breed locally) as follows:

1. Great-created Grebe
2. Greater Flamingo
3. Lesser Flamingo
4. Great White Pelican
5. Dalmatian Pelican
6. Ruddy Selduck

7. Wigeon
8. Garganey
9. Pintail
11. Mallard
12. Gadwall
13. Shoveler
14. Common Teal
15. Red-crested Pochard
16. Common Pochard
17. White-eyed Pochard
18. Tufted Pochard
19. Bar-headed Geese
20. Brahminy Kite
21. Eurasian Sparrow Hawk
22. Marsh Harrier
23. Osprey
24. Eurasian Hobby
25. Common Coot
26. Pied Avocet
27. White-tailed Lapwing
28. Little-ringed Plover
29. Kentish Plover
30. Common Red Shank
31. Common Green Shank
32. Marsh Sandpiper
33. Wood Sandpiper
34. Common Sandpiper
35. Green Sandpiper
36. Little Stint
37. Temminck's Stint
38. Dunlin
39. Ruff
40. Black-tailed Godwit
41. Yellow-legged Gull
42. Brown-headed Gull
43. Whiskered Tern
44. Gull-billed Tern
45. Blue-tailed Bee-eater
46. Blue-cheeked Bee-eater
47. Red-breasted Flycatcher
48. Lesser White-throat
50. Black Redstart
51. Common Stone Chat
52. Orange-headed Thrush
53. Yellow Wagtail
54. Grey Wagtail
55. White Wagtail

Year-wise assessment of avifauna from 2006 to 2010:

Regular monitoring is being done at Man Sagar lake to assess levels of water and bird population for past many years, especially since 1997 when the 1st Birding Fair was started. It has brought forth interesting details:

(a) Forest Species:

Forest birds are observed in the northern wooded habitat throughout the year and they are mostly resident species, some of them breed there. The forest towards North and North-East of the lake is in prime health. Therefore, it offers positive signs of bird population and their breeding. However, forest towards North-West of the lake has declined in quantity as well as quality (due to increasing biotic pressure), and poses little potential for birds to survive there.

(b) Water Species (Migratory):

Water birds in the lake are noteworthy during the winter season as it is the period for migratory species to stay here. Their survival here (October to March) depends on :

- (i) depth of water
- (ii) quality of water
- (iii) aquatic feed available for them
- (iv) safety etc.

During peak of winter (December to February) the migratory birds number about 2000 to 3500. The number was more during 2007 (Common Teals outnumbered other migratory species). It was largely because of abundance of aquatic vegetation available here (which was reintroduced).

The number was about 2500 (maximum) during 2008 peak of winter. Water was available in most other lakes and wetlands (around 100 – 180 km area from Man Sagar), therefore, birds' population got spread out, depending on feed availability. Therefore, Man Sagar's share was somewhat less.

With lake water getting improved in quality and water depth (4 to 6 feet) being maintained round the year, number of migratory species is expected to increase though feed will account for it. Migratory birds are rather selective feeder. Most ducks require aquatic vegetation: rooted, submerged and floating.

(c) Water Species (Resident):

There has been decline in number of such species which are :

1. Egrets
2. Herons
3. Cormorants etc.

All above species are strictly fish-eating. They require smaller-size fish. Due to lack of such fish, these birds are not recorded in numbers and all of them are in double digits. Until five years ago, they were in a few hundred numbers, mainly because fish of their choice was available.

The African Fish (Mangur) being in abundance in Man Sagar, it is to be held responsible for decline of such resident water bird species. This is a huge size fish and it consumes smaller fish, thus leading resident water birds not to survive here. The contract for Mangur removal in this lake has been cancelled for past two years. Therefore, Mangur's population has further increased, which is neither better for aquatic health of the lake nor promises any good for the water birds. Mangur has been found eating water birds also – the danger from this fish is loud and clear.

(d) Water Species (Breeding):

With water quality improving, water depth maintained throughout the year, especially during summer period, and habitat diversity created, some resident water bird species are now found 'breeding' (2008 -11) in this lake. They are :

- (i) Cotton Pygmy Goose
- (ii) Spot billed Duck
- (iii) Common Moorhen.

The Lesser Whistling-duck is generally observed (100 +) but has not been reported breeding at this lake though there is potential to happen so.

(e) Wader Species:

These bird species confine themselves to water edges, they are great walkers (waders) and pick their feed from loose wet sand and shallow submerged areas. The diversity of such species at Man Sagar is wide. However, their total number is not large. It is because of lack of water edges and shallow areas. Yet Sandpipers, Ruffs, Black-tailed Godwits are observed in a few hundred (all migratory species) wherever water level remains shallow.

Migratory Path of birds:

The migration is mostly caused due to changes in climate and is North – South when winter starts. It is South – North after the winter is over. Migratory species are those which breed in other countries and spend winter in some other countries i.e. they do not breed in areas where they stay during winter. As feed on breeding ground gets covered by snow, birds, along with their young ones, start flying south to find feed in areas not yet covered by snow, finally reaching such places where there is no impact of snow and feed is in abundance at appropriate habitats. Birds reaching Man Sagar lake come from Northern Europe, Central Asia, Afghanistan, Northern China and across the Himalayas.

Biodiversity analysis:

Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Biological resources include genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity. In this Biotechnology plays useful role. It means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.

Ecosystem means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Genetic material means any material of plant, animal, microbial or other origin containing functional units of heredity. Genetic resources mean genetic material of actual or potential value. Habitat means the place or type of site where an organism or population naturally occurs.

"Protected area" means a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives.

Sustainable use means the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

All these components constitute Biodiversity and they are available around Man Sagar lake. Water, aquatic vegetation, forest nearby, wild species of birds, mammals, insects etc, and people of Jaipur sharing such natural resources, Man Sagar presents an authentic example of biodiversity being put to use. A balance amongst all of them is the key factor which was found missing until a few years ago due to excessive exploitation of this lake.

RSG Question-answers:

Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

The main difficulty is lack of more active role of the Government's agencies towards conservation of this lake. It is being tackled by holding direct meetings with the officers and through events as supported by the RSG. The success rate is low in a country like India.

Briefly describe the three most important outcomes of your project.

1. The Check-List of Birds of Man Sagar Lake was brought out first time in its 290-old history. It was a major accomplishment made possible through the RSG.
2. The school-teacher-interaction programmes inspired greater degree of conservation through this support, this age-group is the future decision-maker in the society, so promises well.
3. Signage's were possible to be placed to educate visitors. It however, needs much greater support as area of lake is vast.

Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

The lake being located by the northern side of the city of Jaipur, it is a place of recreation for people which earlier was denied because of foul-smell emanating at its shores (sewerage flow in storm water drains!). It has been minimised, BOD came down to about 15 – 20 (which earlier used to be 100). Foul smell has almost disappeared. Appreciation from the society is loud and clear. Yet more efforts are needed as the problem has not been tackled cent per cent.

Are there any plans to continue this work?

Yes. We are living 8-9 miles away from the lake but are present at the lake because of the firm commitment to conserve this heritage water body. The effort will be to attempt more and better, hopefully for brilliant results for all to share. Our stake becomes marked due to lake receiving a low priority by the Government.

How do you plan to share the results of your work with others?

The work gets covered by the daily Hindi newspapers, at times by the English dailies also. So it gets across the people. Signages have made them better aware. A publication on lake restoration can do a more meaningful purpose.

Timescale: Over what period was the RSG used? How does this compare to the anticipated or actual length of the project?

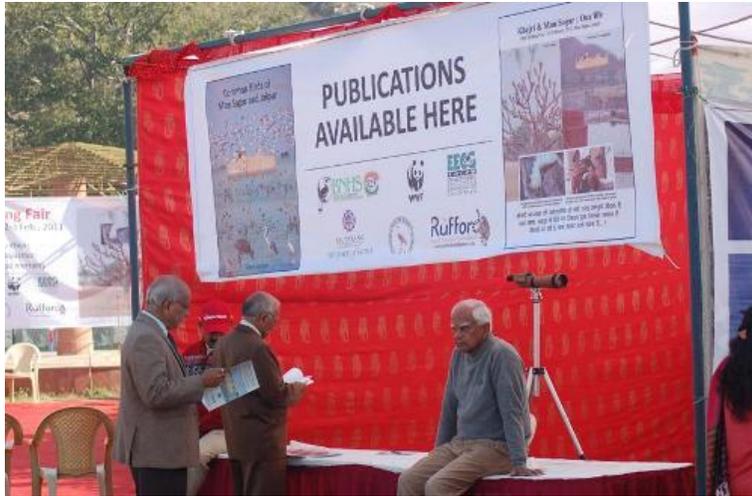
RSG amount was transferred in the bank account here on 22 July 2010 which meant the green signal. Main utilisation was from November 2010 to March 2011. The length of the project is longer as problems are multi-pronged, and stake-holders' jobs being burdensome. However, the first year's experience with generous decision by RSG has provided enormous confidence to step up work for next years.

Looking ahead, what do you feel are the important next steps?

1. Holding meetings with the key decision-makers in the Government to convince them about their main role and responsibility to improve this lake
2. More publications (in Hindi also) on lake-conservation to create greater awareness among key decision-makers, informing about the change that is being ushered in...
3. Habitat improvement at the lake and around the islands to offer better and diversified place for birds.

Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

Yes, the RSG logo was displayed at the backdrop of the 14th Birding Fair event and its photo sent to RSG office (Feb., 2011). Signage's also had RSG logo and its photos are being sent separately now (July 2011).



RSG signage at the Birding Fair.

Any other comments?

It has been great pleasure having interacted with RSG. RSG office bearers are extremely supportive, positive and decisive. Thank you very much for realising this project also. The RSG financial support is first such in my life for any conservation work and most appreciated.

Text and photos by Harsh Vardhan (www.birdfair.org).