

## National Wetlands Atlas, 2011: *Taking baby steps in the right direction*

Wetlands are amongst the most productive ecosystems of the world, and also one of the most threatened ecosystems, especially in our country. Wetlands are being 'reclaimed', poisoned, encroached upon all the time, by a number of land grabbing activities, including by the governments. ([Indian Railways plan to reclaim 650 acres of Howrah Wetlands](#)). Ramsar Wetlands, supposedly the most prestigious wetlands in India too face a similar fate (See: [India's Ramsar Wetlands in Peril, Dams, Rivers & People](#) Feb 2011 edition).

The value of wetlands and their plight has been in discussion in India for the last couple of years. End of 2010 saw Wetlands (Conservation and Management) Rules, 2010, being notified, the first legislation specifically for protecting wetlands in India. Though it leaves some major gaps (See [This cannot help protect the Wetlands, Sir](#) in DRP Dec-Jan 2011 issue), it is a step in the right direction. 2011 has seen one more such step, this time through the publication of **National Wetland Atlas** under the National Wetland Inventory and Assessment project, a joint undertaking of the MoEF and Space Application Centre, ISRO, Ahmedabad which has used pre monsoon and post monsoon remote sensing data and satellite images to present wetland maps of India in an Atlas format.

Looking at the rapid disappearance of Wetlands in our country, (it is estimated that India has lost 38% of its wetlands in just the last decade. In some districts, the loss of wetlands has been as high as 88%)<sup>1</sup> inventory and classification of wetlands comes out as one of the key components in Wetland protection. A number of efforts at Wetland inventories have taken place earlier. The first scientific mapping of wetlands of the country was carried out by Space Applications Centre (ISRO), during 1992-93 for MoEF. The mapping was done at 1:250,000 scale using IRS 1A LISS-III data of 1992-93 timeframe under the Nation-wide Wetland Mapping Project.

The project used wetland classification system based on Ramsar Convention definition of wetlands. This inventory put the wetland extent (inland as well as coastal) at about **8.26 m ha** (Garg et al, 1998). This estimate (24 categories) did not include rice/paddy

fields, rivers, canals and irrigation channels. Further updating of wetland maps of India was carried out by SAC in 2004-05, again at 1:250000 scale. In recent years, a conservation atlas has been brought out by Salim Ali Centre for Ornithology and Natural History (SACON), **covering 7 million ha**. SACON publication is especially important as it was the first work of its kind which actually used the data to highlight the rapid deterioration of wetlands.<sup>2</sup>

**The latest National Wetlands Atlas** categorises wetlands in India under nineteen classes which have been mapped using satellite remote sensing data from Indian Remote Sensing Satellite: IRS P6- LISS III sensor and presented in the format of an Atlas. For each wetland, following layers have been generated:

- Wetland extent including open water, aquatic vegetation, hydric soils,
- Water spread (pre and post monsoon),
- Aquatic vegetation spread, turbidity level of water
- small wetlands,
- base layers of major roads, railway, settlements.

Results are organised at 1: 50,000 scales at district, state and topographic map sheet (Survey of India reference) level using Geographic Information System (GIS). A noteworthy feature has been mapping of wetlands below 2.25 ha, which though small, are often crucial for water security and wildlife habitat. The 19-category classification used for the latest Atlas has been used in SAC's past study and has been accepted by wetland and remote sensing data experts.

**Results** Some of the interesting features and results of the Atlas are described here.

- **Rivers and streams categorised as wetlands** The report includes rivers and streams as wetlands and hence the area of wetlands in states rich with river and flood plain network is very high. For example, % of wetlands as rivers and streams is high in Mizoram (96%), Nagaland (89), Uttarakhand (77), Assam (83). This is a welcome step as neither SAC's earlier reports, nor SACON considered rivers as wetlands.
- **Gujarat has the highest wetlands area in the country** with 65% of its wetlands classified as intertidal mudflats, with barely 8% as rivers and 7% wetlands being reservoirs.

**Total 201 503 wetlands have been mapped at 1:50,000 scale. In addition, 555 557 smaller wetlands (< 2.25 ha) have also been identified. Total wetland area estimated is 15.26 M ha, which is 4.63 % of the geographic area of the country.**

**According to ISRO's report made for CWC in 2009, the waterlogged area of Major and Medium commands alone in Bihar stood at 627888. However, according to NWA, Bihar's man made waterlogged area is hardly 34878 ha, a difference of 593030 ha in just 2 years!**

<sup>1</sup> V.S. Vijayan (2004), *Inland Wetlands of India: Conservation Priorities*, SACON

<sup>2</sup> [http://www.wetlandsofindia.org/wetlandwiki/index.php/Andhra\\_Pradesh](http://www.wetlandsofindia.org/wetlandwiki/index.php/Andhra_Pradesh)

**Maximum wetland percentage in Maharashtra and Andhra Pradesh is attributed to reservoirs.**

Maharashtra: 36% wetlands under reservoirs and 30% under rivers/ streams, Andhra 28% under reservoirs and 27% under rivers/ streams. According to SAC Report 1998, Area of reservoirs in Maharashtra was 130119 ha which has increased nearly three folds in the past 13 years to 368135 ha.

- **Maximum number of Karnataka's wetlands is under smaller tanks and ponds.** (35% tanks /ponds, 33% reservoirs and 28% rivers/streams)

- **61% of Tamilnadu's wetlands are classified under lakes, ponds and tanks.**

- 62% of Manipur's wetlands are **lakes and ponds**, while 19% of Rajasthan's wetlands are **tanks and ponds**.

- Haryana has the highest % of **wetlands under 2.25 ha** at 24%, Tripura: 17, W Bengal: 12.52, Orissa 10%.

**AREAS OF CONCERN**

**Man-made waterlogged areas** Man-made water logged wetlands have been defined by NWA as: "Man-made activities like canals cause water-logging in adjacent areas due to seepage, especially when canals are unlined. Such areas can be identified on the images along canal network". According to the NWA, the total wetland area of the country under man-made wetlands is **135704 ha. This number appears to be an extreme under estimate**, considering that irrigation induced waterlogged areas in Punjab are more than **85000 ha<sup>3</sup>** and in Karnataka are **43472 ha<sup>4</sup>** totalling to **128472 ha from just the two states**. The Working Group constituted by the Ministry of Water Resources estimated in 1991 that an area of **2.46 million ha<sup>5</sup>** was suffering from the problem of water logging under irrigation commands.

**Rivers as wetlands** Maximum area under wetlands in the country come from rivers and streams. Rivers and streams cover 34.5% (5258385 ha) of overall wetland area of the country. However, rivers are not included as

**The NWA includes all reservoirs & barrages as wetlands. However, big reservoirs are methane-emitting dead ecosystems, which cannot support even indigenous fish species. All large dams are built at the expense of bio diverse rivers, floodplains and wetlands. Only a few reservoirs, that too only their fringe areas support some biodiversity. The ecosystem goods & services received from wetlands as against reservoirs have nearly nothing in common. How then, can reservoirs be included as wetlands?**

wetlands as per the Wetlands (Conservation and Management) rules 2010. This has been a major drawback of the Wetlands Rules.

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**State wise wetland area**

| Sr No | State/UT                   | Geographic area (sq. km) | Wetland area (ha) | % of National wetland area | % of state area |
|-------|----------------------------|--------------------------|-------------------|----------------------------|-----------------|
| 1     | Jammu & Kashmir            | 222111                   | 391501            | 2.57                       | 1.76            |
| 2     | Himachal Pradesh           | 55673                    | 98496             | 0.65                       | 1.77            |
| 3     | Punjab                     | 50362                    | 86283             | 0.57                       | 1.71            |
| 4     | Chandigarh *               | 114                      | 350               | 0.00                       | 3.07            |
| 5     | Uttarakhand                | 53566                    | 103882            | 0.68                       | 1.94            |
| 6     | Haryana                    | 49663                    | 42478             | 0.28                       | 0.86            |
| 7     | Delhi                      | 2966                     | 2771              | 0.02                       | 0.93            |
| 8     | Rajasthan                  | 342269                   | 782314            | 5.13                       | 2.29            |
| 9     | Uttar Pradesh              | 240928                   | 1242530           | 8.14                       | 5.16            |
| 10    | Bihar                      | 91689                    | 403209            | 2.64                       | 4.40            |
| 11    | Sikkim                     | 7096                     | 7477              | 0.05                       | 1.05            |
| 12    | Arunachal Pradesh          | 87658                    | 155728            | 1.02                       | 1.78            |
| 13    | Nagaland                   | 16521                    | 21544             | 0.14                       | 1.30            |
| 14    | Manipur                    | 22327                    | 63616             | 0.42                       | 2.85            |
| 15    | Mizoram                    | 21087                    | 13988             | 0.09                       | 0.66            |
| 16    | Tripura                    | 11040                    | 17542             | 0.11                       | 1.59            |
| 17    | Meghalaya                  | 22420                    | 29987             | 0.20                       | 1.34            |
| 18    | Assam                      | 78438                    | 764372            | 5.01                       | 9.74            |
| 19    | West Bengal                | 88805                    | 1107907           | 7.26                       | 12.48           |
| 20    | Jharkhand                  | 79714                    | 170051            | 1.11                       | 2.13            |
| 21    | Orissa                     | 153845                   | 690904            | 4.53                       | 4.49            |
| 22    | Chhattisgarh               | 135194                   | 337966            | 2.21                       | 2.50            |
| 23    | Madhya Pradesh             | 308414                   | 818166            | 5.36                       | 2.65            |
| 24    | Gujarat                    | 197841                   | 3474950           | 22.77                      | 17.56           |
| 25    | Daman & Diu*               | 112                      | 2068              | 0.01                       | 18.46           |
| 26    | Dadra & Nagar Haveli       | 487                      | 2070              | 0.01                       | 4.25            |
| 27    | Maharashtra                | 307748                   | 1014522           | 6.65                       | 3.30            |
| 28    | Andhra Pradesh             | 275045                   | 1447133           | 9.48                       | 5.26            |
| 29    | Karnataka                  | 191791                   | 643576            | 4.22                       | 3.36            |
| 30    | Goa                        | 3702                     | 21337             | 0.14                       | 5.76            |
| 31    | Lakshadweep*               | 828                      | 79586             | 0.52                       | 96.12           |
| 32    | Kerala                     | 38863                    | 160590            | 1.05                       | 4.13            |
| 33    | Tamil Nadu                 | 130409                   | 902534            | 5.91                       | 6.92            |
| 34    | Puducherry *               | 492                      | 6335              | 0.04                       | 12.88           |
| 35    | Andaman & Nicobar Islands* | 8249                     | 152809            | 1.00                       | 18.52           |
|       | <b>Total</b>               | <b>3297467</b>           | <b>15260572</b>   | <b>100</b>                 | <b>4.63</b>     |

<sup>3</sup> Shkya et al,2010, *New drainage technologies for salt-affected waterlogged areas of southwest Punjab, India*, CURRENT SCIENCE, VOL. 99, NO. 2

<sup>4</sup> Perspective Plan for Karnataka for 2005, Karnataka State Land Use Board, GoK, Bangalore, p. 261, Girish Kulkarni, 2007, *ECONOMICS OF IRRIGATION INDUCED LAND DEGRADATION AND ITS RECLAMATION IN UPPERKRISHNA PROJECT COMMAND AREA*, PhD Thesis, University of Agricultural Sciences, Dharwad

<sup>5</sup> mowr.gov.in/.../component%20of%20reclamation7872571015.pdf

| Sr no | wettcode    | Wetland Category                   | Number of Wetlands | Total Wetland Area (ha) | % of wetland area | Open water area   |                  |
|-------|-------------|------------------------------------|--------------------|-------------------------|-------------------|-------------------|------------------|
|       |             |                                    |                    |                         |                   | Post Monsoon area | Pre Monsoon area |
|       | <b>1100</b> | <b>Inland Wetland: Natural</b>     |                    |                         |                   |                   |                  |
| 1     | 1101        | Lake/Pond                          | 11740              | 729532                  | 4.78              | 454416            | 198054           |
| 2     | 1102        | Oxbow lake/ cut off meander        | 4673               | 104124                  | 0.68              | 57576             | 37818            |
| 3     | 1103        | High latitude Wetland              | 2707               | 124253                  | 0.81              | 116615            | 109277           |
| 4     | 1104        | Riverine wetland                   | 2834               | 91682                   | 0.60              | 48918             | 29739            |
| 5     | 1105        | Waterlogged                        | 11957              | 315091                  | 2.06              | 197003            | 112631           |
| 6     | 1106        | River/Stream                       | 11747              | 5258385                 | 34.46             | 3226238           | 2628182          |
| 7     | 1201        | Reservoir/Barrage                  | 14894              | 2481987                 | 16.26             | 2260574           | 1268237          |
| 8     | 1202        | Tank/Pond                          | 122370             | 1310443                 | 8.59              | 916020            | 349512           |
| 9     | 1203        | Waterlogged                        | 5488               | 135704                  | 0.89              | 85715             | 33822            |
| 10    | 1204        | Salt pan                           | 60                 | 13698                   | 0.09              | 5293              | 2599             |
|       |             | <b>Total - Inland</b>              | <b>188470</b>      | <b>10564899</b>         | <b>69.23</b>      | <b>7368368</b>    | <b>4769871</b>   |
|       | 2100        | <b>Coastal Wetlands - Natural</b>  |                    |                         |                   |                   |                  |
| 11    | 2101        | Lagoon                             | 178                | 246044                  | 1.61              | 208915            | 191301           |
| 12    | 2102        | Creek                              | 586                | 206698                  | 1.35              | 199743            | 189489           |
| 13    | 2103        | Sand/Beach                         | 1353               | 63033                   | 0.41              | -                 | -                |
| 14    | 2104        | Intertidal mud flat                | 2931               | 2413642                 | 15.82             | 516636            | 366953           |
| 15    | 2105        | Salt Marsh                         | 744                | 161144                  | 1.06              | 5369              | 2596             |
| 16    | 2106        | Mangrove                           | 3806               | 471407                  | 3.09              | -                 | -                |
| 17    | 2107        | Coral Reef                         | 606                | 142003                  | 0.93              | -                 | -                |
|       | 2200        | <b>Coastal Wetlands - Man-made</b> |                    |                         |                   |                   |                  |
| 18    | 2201        | Salt pan                           | 609                | 148913                  | 0.98              | 105253            | 94047            |
| 19    | 2202        | Aquaculture pond                   | 2220               | 287232                  | 1.88              | 196514            | 186963           |
|       |             | <b>Total - Coastal</b>             | <b>13033</b>       | <b>4140116</b>          | <b>27.13</b>      | <b>1232430</b>    | <b>1031349</b>   |
|       |             | <b>Sub-Total</b>                   | <b>201503</b>      | <b>14705015</b>         | <b>96.36</b>      | <b>8600798</b>    | <b>5801220</b>   |
|       |             | <b>Wetlands (&lt;2.25 ha)</b>      | <b>555557</b>      | <b>555557</b>           | <b>3.64</b>       | <b>--</b>         | <b>-</b>         |
|       |             | <b>Total</b>                       | <b>757060</b>      | <b>15260572</b>         | <b>100.00</b>     | <b>8600798</b>    | <b>5801220</b>   |

**Confusing nomenclature** Classification system of NWA is sometimes confusing. E.g., 'riverine wetlands' is an unclear term. Do they indicate floodplains or the water bodies within floodplains that cannot be distinguished directly as oxbows or meander cuts? Then what does the separate category of 'Natural Waterlogged areas' mean?

**No attempt at analysis or comparison**

The most surprising aspect is that the NWA report makes absolutely no effort to compare results obtained from past studies, including one from SACON, which was at the same 1:50000 scale. It was exactly the analysis and comparison that was done in the SACON study that highlighted the rapidly deteriorating state of wetlands in the country<sup>6</sup>.

NWA has not even tried to compare the results with data generated by their own organisation, twice in the past.

**Reservoir area** There are a number of discrepancies, which can throw light on interesting reasons. According to [SANDRPs analysis of CWC Register of Large Dams, 2002](#),<sup>7</sup> the area submerged by large dams in the country is 4.42 million ha. However, according to NWA, the area under 'reservoirs' is much less at 2.48 m ha. Thus there is a difference of 1.94 m ha between the

**reservoir area in 2002 and the one indicated by NWA.** As the NWA does not differentiate between dams and large dams, the difference between areas becomes even more glaring. However, NWA makes any serious analysis difficult as it does not clearly differentiate between its own definition of 'Reservoir'/ barrage and tank. Again, its surprising to note that while the report discusses water logging, salinisation, etc, it makes no attempt at calculating siltation of reservoirs, a threat to these supposed wetlands.

*In absence of comparative analysis with respect to previous surveys, the current Wetland Atlas is likely to end up, like its predecessors, as a mere template for the next Atlas.*

Detailed information on important wetlands includes some randomly selected wetlands, which has excluded some threatened Ramsar wetlands like Bharatpur.

According to experts like Prof. Madhav Gadgil, pdf files, which is an output of the NWA is of little help to planners and conservationists, and the SAC should put fully geo referenced data in the public domain, for use and integration by various layers.

**All in all, though the National Wetland Atlas is indeed a useful publication, its usefulness and applicability would have increased many folds if attention was paid to analysis of data as well. In absence of critical analysis, the current Wetland Atlas will also end up, like its predecessors, as a mere template for the next Atlas.**

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<sup>6</sup> <http://www.downtoearth.org.in/node/9258>  
<sup>7</sup> Dams, Rivers and People, May-June 2007