Sarovar

NEWSLETTER

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WETLANDS INTERNATIONAL

About WISA

Wetlands International – South Asia Society (Regd.) (WISA) is a non government organization with mission to sustain and restore wetlands, their resources and biodiversity. WISA's office at New Delhi, India was established in 1996 as a part of global network of offices of Wetlands International (WI) with a mandate to promote wetland conservation and wise use in South Asia region. WI is a global non-profit organization which works on wetland conservation and restoration through 19 regional offices in over 100 countries supported by a headquarters based in the Netherlands. WI is also one of the five International Organization Partners of the Convention on Wetlands (Ramsar Convention). In 2005, WISA was registered as a legal entity under the Societies Registration Act of Government of India.

The strategic directions and policies of WISA are set by a General Body which comprises eminent experts and conservation planners. The General Body also elects office bearers, namely the President, Vice President and Treasurer. The overall management of the society is vested in a Governing Body comprising the office bearers, the Chief Executive Officer of Wetlands International – Head Quarters and elected member of General body. The Director is appointed by the Governing Body for operations of the WISA Office and implementation of its various work programmes.

Currently, Dr. Ashok K. Kundra (former Secretary to the ministries of Mines and Special Secretary, Environment and Forests, Government of India) is the President of the Society. Dr. Siddharth Kaul (Advisor, Ministry of Environment and Forests, Government of India) is the Vice-President. Mr. Sudhir K. Pande (Former Director General, Forests and Special Secretary, Government of India) is the Treasurer. Ms. Jane Madgwick (Chief Executive Officer, Wetlands International) represents the WI- headquarters on the Governing Body. Mr. Ritesh Kumar (Conservation Programme Manager) holds the current duty charge of the Office of Director.

The work of WI network ranges from research and community based field projects to advocacy with governments, corporations, international policy fora and conventions. The organizational priorities and broad thematic work areas are guided by a Global Strategic Intent and South Asia Regional Targets. Since its inception, WISA has maintained a focus on promoting conservation and sustainable management of wetlands based on inventorization, assessment and evaluation of hydrological, ecological and socio-economic processes of wetlands through participatory approaches. The organization provides scientific and technical support to national / state governments, wetland authorities, NGOs and the private sector for wetland management planning and implementation. The projects implemented by WISA have ranged from formulation of management action plans; environmental flows assessments; establishing inventory , assessment and monitoring systems; restoration ; undertaking research on wetland ecosystem services and biodiversity; ecotourism development; capacity building ; and communication and awareness on wetlands.

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"SAROVAR"© is the newsletter of the Wetlands International – South Asia Society (Regd.)

From the President's Desk

It gives me a great pleasure in presenting the inaugural issue of our newsletter 'Sarovar'.

This publication aims at providing a platform to wetland managers and field practitioners for discussing issues related to wetland management in South Asia. We also intend to keep you informed of our projects and ongoing initiatives through this publication.

The focus of this issue is on wetlands of India. An important development of 2011 was publication of a national atlas of wetlands which provides information on their nationwide extent based on analysis of satellite imageries. Late 2010, the Ministry of Environment and Forests introduced the Wetlands (Conservation and Management Rules which intends to put in place, for the first time in the country, a regulatory regime for these ecosystems. In parallel, revision of the water policy has also been initiated which is a key opportunity to link wetland conservation and water management. We present an analysis of implications of these changes in the context of securing conservation and wise use of wetlands in the country, specifically focusing on specific opportunities that are emerging on account of these changes. We have also included a special feature on the regulatory framework for wetlands.

The wetlands in the South Asia region are located within a complex development landscape marked with high economic growth, burgeoning population, exacerbating rich-poor divide, increasing food and water insecurity and more lately an unprecedented increase in number of natural disasters. Limited awareness on contribution wetlands make to societal well-being in these contexts has led to severe pressure on these ecosystems leading to degradation, loss in biodiversity and critical ecosystem services. Climate change and associated drivers and pressures are only likely to make the situation more unpredictable and vulnerable accentuating the burden particularly on poor and high dependence on wetlands for sustenance having little capacity to adapt and adjust in changing environments. It is pertinent that wetland management recognizes challenges and trade-offs emerging from policies and development decisions primarily aimed at water and food security, and relatively recently climate change adaptation. We need to communicate cross sectorally the ways wetlands are able to contribute to these larger societal goals supported with the relevant information and knowledge base.

In 2011, Wetlands International – South Asia revised and realigned its strategy to be able to meet these challenges. These are outlined in the introductory sections of the newsletter.

The year 2012 is going to be very eventful for wetland conservation. With India hosting the 11th Conference of Parties meeting of the Convention of Biological Diversity, there is a unique opportunity to further strengthen biodiversity conservation, in particular for our inland and coastal wetlands. With the launching of The Economics of Ecosystem Services and Biodiversity (TEEB) – India, new evidences are expected to emerge on how wetlands contribute to the well-being of the society and how wetland conservation could be incentivized particularly at the level of communities. Also, with India and Bangladesh undertaking reviews of their national water policy, we would look forward to the extent to which they integrate wetland- water regimes interlinkages. The outcomes of the Conference of Parties meeting of Ramsar Convention is also expected to set some new priorities, particularly through resolutions related to agriculture and energy sector.

I wish you happy reading and would look forward to your comments and suggestions for improving this newsletter. We also welcome contributions on seminal issues related to wetlands in South Asia region for publication in the next issue.

Dr. Ashok K Kundra
New Delhi, June 2012

WISA Strategic Intent: 2011–2020

The technical programmes of Wetlands International network are guided by a Global Strategic Intent which outlines the priorities and the outcomes sought by the organization in the form of targets. The strategy development process set out an evaluation of the current intent at the end of five year period, i.e. 2010 to assess the overall performance and identify the changes in external environment that needed to be factored in setting out the priorities for the coming five years, i.e. 2011-15. The review carried out outlined the need to realign our intent to focus on the lack of priority accorded to wetlands in water and food security policies, and general weakness of the linkages between scientific evidence base and policy making. Changes in external environment related to the role of wetlands in climate change adaptation and mitigation, and issues within water and land management sector were considered highly relevant to be internalized within the organizational strategy.

WISA hosted the Asian Regional Strategy consultation in New Delhi held on 17-18 November 2010 which was attended by 18 participants including existing partners of Wetlands International, donor agencies, government and non-government organizations, and representatives of WI offices in Asia. The consultation highlighted the need to position wetland conservation in the context of water, food security and climate change sectoral investment, and build on the partnerships with government, non-government and business sectors to enable policy change.

Based on the regional consultations in Asia, Africa and Latin America, a new WI Strategic Intent 2011-2020 was drafted and approved by the Board of Members in their meeting held at Edinburgh, Scotland in February 2011. The new intent is based on the following overarching goal statement:

Wetlands are wisely used for the role they play in:

- Improving human well-being and local livelihoods;
- Conserving biodiversity;
- Sustaining the water cycle, and;
- Reducing climate change and its impacts;

Building on the goal statement, 12 collective targets have been identified as a priority under the themes on local livelihoods, biodiversity, water, climate and greening the economy. The long term goals sought under these themes are as follows:

Local Livelihoods Improve human well-being and local livelihoods through wise use of wetlands.

Water Conserve and restore wetlands as critical elements of natural water infrastructure

Climate Change Conserve and restore wetlands to increase resilience to climate change

Biodiversity Halt and reverse the loss and degradation of wetlands and their biodiversity

Greening the economy Promote the positive contribution that wetlands can play in delivering ecosystem services

WISA has identified the following 6 regional targets to guide its work under the strategic intent:

- In 3 major basins, implementation of water resources management plans safeguard and restore the role wetlands play in regulation of hydrological regimes and supporting biodiversity
- Ecologically sustainable drinking water and sanitation programmes implemented in country programmes of 1 WASH initiative
- National government in atleast 1 South Asian country increase recognition and investment into wetland conservation and wise use as a means for climate change adaptation
- In the catchments of 3 significant wetland systems, community resilience to natural hazards is enhanced through better environmental management
- Improved status of wetland biodiversity in 5 sites in South Asia
- In at least 3 cases, the design and delivery of major developmental schemes which threaten significant wetlands or water resources are adjusted to avoid or reduce impacts on biodiversity and livelihoods

Mobilizing the best available expertise and knowledge, raising awareness on critical issues, enabling society to take action, and influencing policies and practices would form the broad strategies for achieving the collective targets.

Implementation of the strategy would be the main objective of the WISA office which will ensure that necessary human and financial resources are made available. Apart from the technical and administration staff within the office, WISA will also strive to create an external pool of experts which would provide the necessary strategic advice and guidance to strategy implementation. WISA will also work to enhance the current mix of donors, in particular, secure the attention of donors from developmental sector to implement new ideas and approaches which have greater relevance to this sector. An adequate balance would be made between field demonstration, creating and communicating knowledge, policy and advocacy as well as continued investment into state of the art technologies in the field of wetland management. The current network of partner NGOs and CBOs would be further developed to implement field projects. Additionally, WISA would also seek collaborations and partnerships with various agencies to achieve its cross cutting targets, in particular within Water, Sanitation and Hygiene and Disaster Risk Reduction sectors.

Implementation of the Strategic Intent would also include an Organizational Development Plan with investment in human resources, systems and processes and capacities.

A panoramic view of Lake Chilika

Conserving Wetlands in India
Prospects and Challenges

A view of Loktak Lake from central islands

Ritesh Kumar (WISA) presents a review of trends emerging from various wetland inventories, analysis of the sectoral policy environments related to wetlands, and opportunities for furthering their conservation and wise use through better implementation of the Ramsar Convention guidance and concepts.

The state of our wetlands

India is bestowed with a rich and diverse wetland regime ranging from high altitude lakes in upper reaches of Himalayas, to extensive floodplains linked with 14 major river systems of the country and coastal wetlands in the form of mangroves and coral reefs. These are reservoirs of range of biodiversity and source of ecosystem services which sustain life and livelihoods of dependent communities.

Efforts to assess the status of Indian wetlands have been carried since the seventies. Application of remote sensing techniques have enhanced the capabilities to map wetlands at national scale. The most recent assessment on wetland extent has been made by Space Application Center (SAC) using the imageries of 2006 -07 to prepare a National Wetland Atlas at 1: 50,000 scale. The total area of wetlands in India has been estimated to be 15.26 m ha, approximately covering 5% of national geographic area. Of this, inland wetlands account for 10.56 m ha or 69% of the total area. There are other independent and wetland type specific assessments available as well. Forest Survey of India also covers mangroves in the State of Forests Report (SFR) published every two years. The State of Forest Report of 2011 indicates (based on 2009 imageries analysed at 1: 50,000 scale) that our coastline supports 4,639 km^2 of mangroves. SAC has also undertaken the most recent assessment of coral reefs (based on imageries of 2004 -2006) indicating the total reef area to be 3,062.97 km^2 (which include 521.5 km^2 as lagoons and 157.6 km^2 as coralline shelf interspersed within the reefs).

Discerning the trends in wetland status is challenged due to lack of assessments over a definite timeline using consistent methodologies. However, the two remote sensing based assessments carried by SAC using imageries of 1992-93 and 2007 have comparable resolutions for 85 districts and 6 inland wetland types. The areas were found to be declining in the range of 19 – 68% in 46 districts. Salim Ali Center of Ornithology and Natural History (SACON) based on analysis of the wetland extent data for 1992/93 and 2001 observed nearly 38% decline in 28 of 71 districts.

Recent SFRs indicate some positive change in area under mangroves on the Indian coastline. The SFR of 2009 (using 2007 imageries) indicated an increase in area under mangroves by 58 km^2 primarily attributed to restoration and protection measures undertaken in the states of Gujarat, Orissa, Tamil Nadu and West Bengal. Further, the report of 2011 (using data of 2009) indicates an increase in area by 23.34 km^2 due to an increase cover in Gujarat. However, of the total mangrove area, only 66% is classified to be moderately to very dense. As far as coral reefs are concerned, only Lakshadweep hosts reefs in near pristine conditions, the rest being vulnerable and in degrading conditions. There is very limited information available at a national scale to discern a trend in wetland dependant species or ecosystem services.

The sketchy information available so far underlines the fact that wetland continue to be under stress, being encroached and converted for alternate use, and as a wasteland.

The national policy environment for wetlands

India does not have a separate wetland policy. The key policy directions in the context of wetland management are contained in the National Environment Policy (2006) which supports adoption of integrated approaches, specifically river basin management and site specific prudent use strategies as guiding actions. The coastal wetlands, particularly mangroves and coral reefs were accorded distinct protection under the Coastal Zone Notification (1986), subsequently revised to Coastal Regulation Zone Notification (2011). The Ministry of Environment and Forests introduced the Wetland (Conservation and Management) Rules in 2010, which is the first major national framework for regulating detrimental activities in wetlands and their catchments. The coverage of the rules includes Ramsar sites, high altitude wetlands (sites with area greater than 5 ha and located at elevations greater than 2,500 m), sites or complexes below 2,500 m with an area of 500 ha and above, those designated as World Heritage sites, and those specifically included under the provisions of the rules. The management aspects of wetlands is facilitated through three major programmes of the Ministry, notably the National Wetland Conservation Programme; National Programme on Mangroves and Coral Reefs; and National Lakes Conservation Programme. The Ministry provides 100% central assistance to sites identified under these programmes, and currently has 115 wetlands of national priority (under the National Wetland Conservation Programme), 61 lakes (under National Lake Conservation Programme) and 38 mangroves and coral reef sites (under National Mangroves and Coral Reef Conservation Programme).

As a positive trend, the investments as well as site coverage under the above mentioned programmes of the Ministry have been on an increase. There are more sites being brought under integrated management plans, efforts are being made for building capacity of wetland managers, and increasing awareness amongst stakeholders on values and functions of wetlands. The restoration of Chilika Lake has been globally recognized with Ramsar Award for Wetland Conservation. Similarly, positive outcomes have been observed through the restoration efforts undertaken in Nainital, Uttarakhand and lakes in Thane district, Maharashtra.

However, the challenging bit is ensuring mainstreaming in other national policies, notably the national water policy and climate change policy, which have great significance for conservation and management of wetlands. A good pointer to this is recent wetland assessment which indicates that 75% of the inland wetlands are linked to river systems.

Wetlands are adapted to their hydrological regimes. Water regimes set the template which structure wetland biodiversity and ecosystem services, and thereby policies and practices related to water management have great significance for wetlands. This is validated by several cases. Increased upstream abstraction of water and reduced availability downstream has been one of the major factors for domination of high salinity tolerant mangroves species (such as *Avicennia marina*) and drastic reduction in species sensitive to salinity in the coasts of Tamil Nadu and Andhra Pradesh. Similarly, reduction in freshwater flows to the Gangetic Delta and increasing salinity and sedimentation is attributed to a major factor behind decline in density of *Heritiera fomes* (locally called Sundari) within Sunderbans. Within Loktak Lake in Manipur, regulation of outflow regimes through construction of Ithai barrage has led to a rapid degradation of the habitat of globally rare and endangered deer species, *Rucervus eldi eldi,* which uses the Keibul Lamjao National Park located within the wetland as habitat. Availability of water is constraining maintenance of waterbird habitats in Keoladeo Ghana National Park in Rajasthan. Fragmentation of Mahanadi Delta floodplains through construction of embankment and water control structures is one of the major drivers of loss of wetlands in the central deltaic region.

Creating linkages of wetlands with national water policy has been a significant challenge. The water policy of 2002 accorded allocation priorities and identified ecology as fourth, after meeting the demands of drinking water,

Water availability is a core issue for conserving Bharatpur

irrigation and hydropower. There was no mention of the term 'wetland' even once in the policy. The draft policy placed for public consultations in January 2012 accords a higher significance to environmental concerns in general, as compared to the previous policy document, but treats wetlands from a very narrow perspective. Not only is the use of term 'wetland' done once and inconsistently, it merely considers these ecosystems from the point of view of allocation, and thereby missing on the possibilities of including their ecosystem services for meeting various objectives of water management.

The National Action Plan on Climate Change also does not have much to offer for the role of wetlands in climate change adaptation. Wetlands are included as a minor subcomponent of the National Water Mission, with no reference to the role they could play in climate adaptation or mitigation strategies. The actions identified are merely limited to impact assessment of developmental projects, survey and assessments, awareness generation and enforcement of regulatory regime and do not have any semblance of being considered at risk due to mal-adaptation or being used as an infrastructure for adaptation.

The fact that wetlands are not identified as a land use category makes their conservation and protection all the more difficult. The recent cases of acquiring wetlands for thermal power plant at Somepeta, Andhra Pradesh and Nirma cement plant at Bhavnagar, Gujarat are one of numerous examples wherein this flaw is being used as an opportunity for converting wetlands. Whereas the Central Government was quick to react in both these cases and secure restoration of wetland areas, there are scores of instances wherein wetland conversion has been veiled as productive uses of wastelands.

Ramsar Convention – The Wise Use Concept

Wetlands are unique in the sense that they are the only ecosystems to have a dedicated convention. The year 2011 marked 40 years of Convention on Wetlands. The "wise use concept" which is the central pillar of the Convention is the longest-established example among intergovernmental processes of the implementation of what have become more recently to be known as ecosystem approaches for the conservation and sustainable development of natural resources. The negotiations that led to establishment of Convention were initially directed at establishing a mechanism for conservation of waterfowl through creation of an international network of wetland refuges, but over a period of time Ramsar has been an increasingly important forum for highlighting the role of wetlands in human well-being, food and water security and climate change adaptation. Amongst other benefits, the Convention offers a suite of guidance to support integrated management of wetlands, ranging from management

planning, community participation, awareness raising, ecotourism development, environmental flows assessment, economic valuation and several others.

India ratified the Convention in 1981 with designation of two sites initially (Chilika Lake and Keoladeo National Park) and has since designated 23 more sites as Wetlands of international importance or Ramsar Sites. The sites designations have created several positive advantages, including establishment of baselines through the Ramsar Information Sheets, need for a holistic management plan in place, increased awareness on values and function within communities and stakeholders etc. In several circumstances, site designation has been used to ward off developmental pressures. In East Kolkata Wetlands, Ramsar Site status was used as basis for the preventing construction of a World Trade Center within the area. The East Kolkata Wetland (Conservation and Management) Act, 2005 was notified to prevent any change in Ramsar site boundary and a separate authority established to enforce the act. In Kolleru Lake, Ramsar site designation was used as one of the core arguments for demolition of fish culture tanks from within the wetland area. Environment NGOs in particular have attempted to use the site designation as a means to seek judicial interference for preventing degradation or conversion of wetlands.

However, despite nearly three decades of ratification, the depth of application of scientific guidelines for site management available through the Convention remains very marginal. The wider benefits of the Convention instruments are yet to be realized. Most importantly, of the three sites identified under Montreux Record of the Convention (which is a list of sites undergoing negative changes in ecological character and thereby requiring priority action by the contracting party), two continue to be in the Record. Notably, the root causes of their inclusion and continuation in the Record is related to availability of water to secure ecosystem functioning and biodiversity.

More recently, the increasing focus on wetland- water interlinkages within the Convention of Biological Diversity (CBD) holds a lot of positive significance for wetland conservation. Of the 20 targets agreed under the CBD Strategic Plan for Biodiversity 2011-2020, there are more than 5 targets which provide a significant opportunity for making tangible progress towards conserving wetlands and their biodiversity. Target 11 (seeking conservation of at least 17% of terrestrial inland water areas and 10 % of coastal and marine areas), target 14 (conservation of ecosystems proving essential services including services related to water), and target 6 (all fish and invertebrate stocks and aquatic plants) make direct references to wetlands while several others (eg. Target 8 related to pollution, Target 9 related to invasive alien species) refer to management of direct and indirect drivers of their degradation. However, achieving these targets

East Kolkata Wetlands were identified as a wise use case by Ramsar Convention

would require adoption of integrated approaches to water management building on the linkages between hydrology, biodiversity, ecosystem processes and sustainable development.

Bridging the science – policy divide

Wetlands today are placed at the unique interface of food and water security and more recently climate change led developmental planning. While the need to integrate wetlands in sectoral policies was never more pertinent as is now, the challenge of ensuring the right science and knowledge base to support this process is enormous. The domain of wetland sciences have been traditionally dominated by biophysical and limnological sciences with little involvement of landscape ecologists, hydrologists and humanities. With wetlands being impacted by the choices of economic and social development, we need higher investment into the science and practice of 'ecosystem services' – connecting the structural elements of wetlands, to their functioning and ultimately linkages with well-being of the communities and stakeholders to be able to generate policy relevant information. Future assessments would require not only determining the trends in wetlands extent, but also implications of these change for societal well-being and ecological security.

Developing the capacity to manage wetlands connecting sectors and stakeholders requires specialized training. Unfortunately, such avenues are very limited and mostly available off-shore with challenges in application within national contexts. There is a pressing need for an advanced wetland management training center with appropriate courses and training opportunities to address this need. The design of such a center is currently being worked on by the Ministry of Environment and Forests with Government of Orissa. Needless to state, such investments need to be multiplied manifolds with increased access to young scientists and entrepreneurs.

India has come a long way in managing wetlands and made some very critically important achievements in the form of a national inventory, legislation and dedicated programmes and national wide efforts. However, much needs to be done in securing cross sectoral policy linkages and mainstreaming wetlands in water, food security and climate adaptation policies. There is much gain to be achieved through deeper implementation and better use of Ramsar Convention principles and instruments, and creating synergies with commitments related to CBD.

Painted Stork in Nalabana Island at Chilika

Regulatory Framework for Conservation of Wetlands in India

Fisher in Wular Lake, Kashmir

Dr. Siddharth Kaul (Ministry of Environment and Forests, Government of India) presents an outline and salient features of the regulatory framework for conservation of wetlands in India.

Wetlands, which are vital parts of the hydrological cycle, are highly productive, support exceptionally large biological diversity and provide a wide range of ecosystem services, such as food and fibre; waste assimilation; water purification; flood mitigation; erosion control; ground water recharge; micro climate regulation; enhance aesthetics of the landscape; support many significant recreational, social and cultural activities, besides being a part of the cultural heritage. However, they are seriously threatened by reclamation through drainage and landfill, conversion, pollution (discharge of domestic and industrial effluents, disposal of solid wastes), hydrological alterations (water withdrawal and inflow changes), and over-exploitation of their natural resources resulting in loss of biodiversity and disruption in goods and services provided by wetlands. Unless concerted efforts are made by the central government, state government, NGO's, local communities and all other stake holders to conserve these wetlands, we would be doing a great injustice to our future generations by depriving them of the multiple benefits which a healthy wetland can provide.

India is a signatory to the Ramsar Convention on Wetlands for conserving their biodiversity and wise use, extending its scope to a wide variety of habitats, including rivers and lakes, coastal lagoons, mangroves, peatlands, coral reefs, and numerous man-made wetlands, (such as ponds, farm ponds, irrigated agricultural lands, sacred grooves, salt pans reservoirs, gravel pits, sewage farms, and canals) and has identified a number of sites for conservation and management under its conservation programme where financial and technical assistance is provided to the State Governments/ Union Territory Administration. The National Environment Policy recognized the numerous ecological services provided by wetlands and emphasized on the need for setting up of a legally enforceable regulatory framework for wetlands and developing their national inventory.

In exercise of the powers conferred by the Environment (Protection) Act, 1986, the Central Government came up with the wetlands conservation and management rules published on 4th December, 2010.

High altitude wetlands as Tso Moriri (Kashmir) would be protected under wetlands rules

In general "Wetland" means an area of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six meters. The term wetland includes all inland waters such as lakes, reservoirs, marshes, swamps, tanks, backwaters, lagoons, creeks, estuaries, man-made wetlands covered by the definition of the Ramsar Convention. They also include the zone of influence on wetlands i.e, the riparian floodplain areas along the rivers to the extent they are flooded naturally; a perimeter of 200 metres from the highest water line observed in the last ten years. *For the purpose of these Regulations, wetland does not include main river channels; paddy fields; those coastal wetlands which are covered under the notification on Coastal Regulation Zone under the Environment (Protection) Act, 1986.*

Wetlands are to be identified on the basis of criteria set up by the Ramsar Convention which include representativeness, biodiversity, number of water birds, supporting good diversity of indigenous fishes, source of recreation, eco-tourism, aesthetic, educational and cultural value; and socio-economy/livelihood of the people dependent on wetlands.

These Regulations shall be applicable to all the wetlands identified and notified in accordance with the procedure detailed in. There are certain prohibited and permissible activities within this framework as per following details.

Prohibited activities

The rules prohibit the following activities:

- Conversion of wetlands to non-wetland use with appropriate benchmarks in time for land use;
- Reclamation of wetlands;
- Setting up of new industries and expansion of existing industries;
- Manufacture or handling or storage or disposal of hazardous substances as specified in the notifications of the Government of India in the Ministry of Environment and Forests No. S.O. 594(E) dated 28th July 1989, S.O. 966 (E) dated 27th November, 1989 and GSR 1037 (E) dated 5th December, 1989; and or issued from time to time;
- Solid waste dumping; the existing practices, if any, shall be phased out within a reasonable time period not exceeding one year from the date of notification of the wetland under these Regulations;
- Discharge of untreated wastes and effluents from industries, cities or towns and other human settlements; the existing practices, if any, shall be phased out within a reasonable time period not exceeding two years from the date of notification of the wetland under these Regulations;

Coastal wetlands as mangroves are protected under Coastal Regulation Zone notification (2011)

- Any construction of permanent nature except for boat jetties within 50 metres from the mean high flood level observed in the last ten years in the standing water bodies;
- Any other activity to be specified in writing by the regulatory authorities constituted in accordance with these Regulations, which may have adverse impact on the ecosystem of the wetland.

Regulation of permissible activities

The following activities proposed to be undertaken within the notified wetlands shall require prior approval from the concerned regulatory authority:

- Withdrawal of water, impoundment, diversion, interruption of sources carried within the natural carrying capacity of the wetland ecosystem and essential for the sustenance of local communities;
- Harvesting of living and non-living resources; and grazing to the level that the basic nature and character of the biotic community is not adversely affected;
- Treated effluent discharges from industries, cities or towns, human settlements and agricultural fields falling within the limits prescribed by the Central Pollution Control Board or the State Pollution Control Committee, as the case may be.
- Plying of motorized boat, if it is not detrimental to the nature and character of the biotic community;
- Dredging only if the wetland is impacted by siltation;
- Construction of boat jetties;
- Activities which interfere with the normal run-off and related ecological processes upto 200 m as per the definition of wetland;
- Facilities required for temporary use such as pontoon bridges and approach roads;
- Fisheries within the carrying capacity of the wetland;
- Any other activity to be identified by the Regulatory Authorities constituted in accordance with these Regulations, which may have adverse impact on the wetlands.

Notwithstanding the provisions in regulation 4 (1) & (2) above, the power to convert a wetland under category 'A' to non-wetland use shall vest with the Central Government. No wetland shall be converted to non-wetland use unless it is in public interest and detailed reasons justifying the decision are recorded. Provided further any change in category of land use shall be in accordance with the Town and Country Planning Acts, or any other Act regulating such water bodies in the State/UT.

Categories of Wetlands for Regulation

Based on the relative significance of the functions performed by the wetlands for overall well being of the people and for determining the extent and level of

regulation, wetlands were initially categorised as given below:

Category 'A' to be regulated by the Central Wetlands Regulatory Authority and shall be categorised based upon all or any one of the following criteria:

- Wetland listed under the Ramsar Convention;
- Wetland recognized as or lying within a World Heritage Site or a National Heritage Site;
- High altitude wetland at two thousand and five hundred metres or more above the mean sea level having an extent of five ha or more;
- Transboundary wetland (partially falling in the territory of another country) or state within the country;
- Wetland which is a major source of drinking water for 'Class A' cities.

Category 'B' to be regulated by the State Wetlands Regulatory Authority and were categorised based upon all or any of the following criteria:

- Wetland recognized as, or lying within, a State Heritage Site;
- High altitude wetland at two thousand and five hundred metres or more above mean sea level having an extent of less than five ha;
- Wetland which is a major source of drinking water for a 'Class B' town.

Category 'C' to be regulated by the District Magistrate and were categorised based upon all or any of the following criteria:

- Wetlands other than those covered under category 'A' and 'B';
- Wetland which is a major source of drinking water for local communities involving at least one hundred households; and
- Wetland which is socially and/or culturally important to the local communities.

In case of any conflict on the issue of categorization, an additional criteria on ecological significance of the wetland is expected to be considered with the final decision vested with the Central Government. However there were some legal implications as such only authorities at central level were agreed by the ministry of law and justice.

Regulatory authorities

Central Wetlands Regulatory Authority (CWRA)

CWRA was constituted by the Central Government under the Chairmanship of the Secretary, Ministry of Environment and Forests, Government of India. The other members of the committee include representative each from Ministry of Agriculture, Water Resources, Tourism, Social Justice and CPCB; Joint Secretary or Adviser, dealing with wetlands in the MoEF - member ex-officio; experts in ornithology, limnology, ecology, and hydrology; and Director/Additional Director/Joint Director dealing with the Wetland in the Ministry of Environment and Forests-Member Secretary.

As explained above, other categories at state and district level were not approved and as such are not being described here.

Functions of the regulatory authority

The authority will appraise proposals for identification of new wetlands and to enforce the provisions contained under these rules along with other laws; enforce grant clearances or identify the areas for the grant of clearance for regulated activities in the wetlands under jurisdictions issue whatever directions, from time to time necessary for the conservation, preservation and wise use of wetlands to the State Governments and to review the list of wetlands and the details of prohibited and regulated activities under the rules and the mode and methodology for execution.

The Authority is to consider all the representations which the Central Government may receive under sub-rule(6) and submit its recommendation within a period of sixty days for final notification the Central Government shall on receipt of the recommendations of the Authority under sub-rule(7) issue a final notification notifying therein the area of the wetland, its category or classification to be regulated under these rules and display the said notification in public places in English and vernacular languages.

The Authority may, *suo moto* or on application made to it, review any decision under these rules or issue direction for inclusion of wetland under these rules.

Proponents for initiation of the proposals

There is a provision for identification of wetlands under various categories which is to be initiated by the Central Government/State Government/District Authorities, as the case may be. The following categories of proponents may also initiate proposal for identification of a particular wetland:

- A Central/State or Local Public Organization
- A recognized University/Research Institution
- A recognized Community Based Organization
- A registered Industrial Association
- NGO having office in a district in which the wetland is located

Process for identification and notification of wetlands

State governments are supposed to identify nodal agencies along with nodal officers to look in to regulatory framework implementation at the ground level and to Constitute appropriate committees for such purposes. The States Government are also supposed to prepare, within a period of one year 'Brief Document' identifying and classifying the wetlands within their respective territories with details like broad geographic delineation of the wetland. Its zone of influence along with a map (to scale); The size of the wetland account of pre-existing rights and privileges, consistent or not consistent with the ecological health of the wetland.

Nodal agency in collaboration with all relevant departments is expected to conduct a comprehensive survey of the wetland within a period of thirty days. A report is to be submitted within next ninety days from the date of such reference to Authority. The Central Government on the receipt of the recommendation of the nodal agencies is to notify the area of for public information inviting objections and suggestions from the general public likely to be affected. Any representation is to be made to the Central Government within a period of sixty days;

Overlapping Legal Provisions

- The wetlands lying within the protected areas of National Parks and Wildlife Sanctuaries to be regulated under the provisions of Wildlife (Protection) Act, 1972.
- The wetlands lying within the notified forest areas to be regulated by the provisions of the Indian Forest Act, 1927, Forest (Conservation) Act, 1980; and Environment (Protection) Act, 1986.
- While the gaps, if any, under the provisions of the Indian Forest Act, 1927; Wildlife (Protection) Act, 1972; and Forest (Conservation) Act, 1980 to be plugged by invoking provisions of the Environment (Protection) Act, 1986.
- The wetlands situated outside the protected or notified forest areas to be regulated by the relevant provisions of the Environment (Protection) Act, 1986.

Appeals against the decisions of the regulatory authorities

Any person aggrieved by the decision of the Authority may prefer an appeal to the National Green Tribunal constituted under the National Green Tribunal Act, 2010(19 of 2010) with in a period of sixty days from the date of such decision.

Till date, many clarifications have been sought from various state governments on different clauses of the notification. In order to discuss these issues thread bare, a two day workshop was organized in Bharatpur on World Wetland Day last year so that state governments are able to execute these laws at ground level and are clear about activities to be allowed or disallowed.

Representatives from states were asked to participate and give their inputs on any shortfalls in the recently issued management rules.

Key recommendations received included water allocation to be a part of state water policy, reinventorisation of revenue records so that wetlands are not shown as wastelands and sharing of information among different states for better execution.

Still doubts about implementation are being discussed with state governments directly. Through SAC Ahmedabad, the MoEF has inventorised wetlands in the scale of 1:50000 so that wetlands up to five hectare are also covered. State wise atlases have also been prepared. The MoEF continues to discuss modalities of implementation with state governments.

Apart from above regulations, India needs to have strong institutional mechanism, capacity to implement various conservation activities, involvement of communities in decision making , economic valuation of wetlands, effective synergy and linkages to yield desirable results.

This notification, exclusively for wetlands, is first of its kind in the country and is going to be a powerful tool to conserve wetlands if executed in a proper manner.

Building Livelihood Resilience in Changing Climate

Report of Asia Regional Conference, 3–5 March 2011, Kuala Lumpur, Malaysia

Mr. Malik Amin Aslam (Former Minister of State-Environment, Government of Pakistan), Dr. Ashok Kundra (President, WISA) and Mr. S.M. Munjural Khan (Deputy Secretary, Ministry of Environment & Forests, Government of Bangladesh) discuss science- policy divide

Asia, home to over 60% of human population presents a strikingly contrasting picture of economic growth and human development. The United Nations Millennium Development Goals report of 2010 highlights that the proportion of undernourished people in the region has swelled to levels last seen during the nineties. While already burdened with challenges of food and water security, Asia has also seen an unprecedented increase in the number of natural disasters which threaten to wipe out the development gains made so far. Their cumulative impact has been disproportionately higher on the poor and vulnerable sections of society. Climate change and associated drivers and pressures are only likely to make the situation more unpredictable and vulnerable accentuating the burden on poor who often have little capacity to adapt and adjust in changing environments.

Increasing incidence of disasters and consequent stresses on livelihoods and efforts for poverty reduction has led to renewed interest in understanding and conceptualizing livelihood vulnerabilities and devising strategies and actions for creating resilient livelihoods. Several emerging paradigms from ecosystem management, livelihoods and disaster risk reduction sectors can be mapped in this direction. It is also evident that theories, approaches, policy frameworks and actions within these sectors differ on perceptions of livelihood resilience. Individually, none of these present a full-fledged pathway for achieving resilient livelihoods. While an impressive body of knowledge base, best practices and lessons learnt exist within individual sectors, there are still repeated calls for promoting and communicating an integrated livelihood resilience vision, approach, policy and practice.

In this backdrop, WISA in partnership with Cordaid and Ekgaon Technologies organized an Asia Regional Conference on **'Building Livelihood Resilience in Changing Climate'** with an aim *to provide an interdisciplinary platform to researchers, practitioners, and policy makers working within the domains of environmental management, development and disaster risk reduction for developing a shared*

vision of livelihood resilience in changing climate. Financial support for the conference was provided by International Development Research Center (IDRC), New Delhi, India and CDKN (Climate and Development Knowledge Network), United Kingdom. The conference was held from 3-5 March 2011 in Hotel AnCasa, Kuala Lumpur, Malaysia.

The conference was set up in the following sessions:

- Exploring livelihood resilience *focused on approaches, frameworks and lessons from field implementation related to environmental management, development, disaster risk reduction*
- Pathways to livelihood resilience *focused on the role governance; information, communication and technology; markets and technical expertise play in building livelihood resilience*
- Livelihood resilience – the policy challenge *aimed at exploring the challenges and solutions in creating policy design for supporting livelihood resilience*
- Livelihood resilience – Institutional frameworks *aimed at analysing institutional arrangements with various domains and building a design framework in the context of livelihood resilience*

Overall 54 participants from 14 Asian countries attended the conference. These included non-government agencies (68%), research and academia (15%), policy makers (10%) and media (7%). A live webcast was organized. The three day conference included 7 keynote presentations, 23 case studies (14 oral and 9 poster presentations), 4 panel discussions and 6 sessions of group discussions. The case studies were selected from over 200 submissions.

Discussions on approaches and frameworks within ecosystem management, sustainable livelihoods and disaster risk reduction highlighted a distinct commonality of aims, i.e achieving livelihood resilience. However, there were differences in ways system boundaries as well as drivers for action were defined and identified. The case studies from India, Bangladesh, Vietnam, Indonesia and China indicated that the local level adaptation to climate change was a continued process as it has imposed new dimensions to existing vulnerabilities due to poverty, sectoral planning, and degrading natural resources.

Discussion on pathways for livelihood resilience cut across the themes of governance; information, communication and technology; markets and capacities. Inadequate interface between various governance

mechanisms was identified as a major challenge that needs to be addressed in the context of livelihood resilience. The feedback mechanisms between the local scale (wherein management takes place) and national/ provincial scales (which generally set the policy direction) are currently underdeveloped, creating information asymmetries at various levels, and thereby inefficiencies in policy making.

The role of markets in creating resilient livelihoods was recognized, with a call for making these institutions more socially and environmentally responsible. There was also a call for creating adequate safeguards so that the poor and vulnerable sections of the society having proportionately high dependence on the ecosystem services realize equitable and just outcomes from markets.

The session on policy making for livelihood resilience focused on bridging the science –policy divide. Key recommendations that emerged included creation of enabling mechanisms for joint identification and prioritization of policy needs from research; communicating research in language and form understood by policy makers; and creating entrepreneurial capabilities in research agencies to integrate research into policy making domain.

In summary, the conference concluded that despite there being no universal agreement on the understanding of 'resilience', the challenges in lexicon need not limit convergence and therefore the following attribution could help understanding livelihood resilience in changing climate in Asia:

- Recognizing change as a fundamental property
- Having adaptive capacity and transformability to new stability domains
- Retaining ability to support livelihoods including equitable allocation and benefit sharing of livelihood resources
- Recognizing urban rural continuum
- Sustaining ecosystem services as the guiding principle

Development of an integrated framework for livelihood resilience that could address the objectives within the individual domains as well as enable cross-sectoral communication was urged. The best way to do this was to invest into joint implementation optimizing synergies and provide evidence that the concepts can work together and add value. While several successful models of creating resilience through ecosystem management, development and disaster risk reduction approaches existed, a pressing need to upscale these to influence the policy environment was identified which could be achieved through conducting research on scalability potential of the interventions on policy relevant parameters; cross-sectoral linking and learning and creating knowledge networks which enable sharing of multiple knowledge systems.

Water management will play a crucial role in resilience building in Asia (In pic: Kulekhani, Nepal)

Managing wetlands for reducing disaster risk - Partners for Resilience

Mr. Sudhir Pande (Treasurer, WISA) reviewing risk reduction plan developed in a coastal village near Konark, Orissa

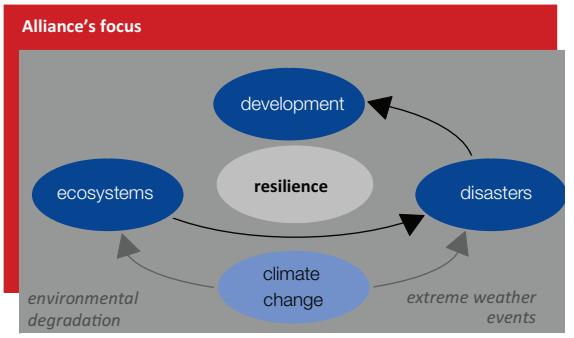
Globally, the number of disasters, man-made and natural, has been increasing almost exponentially over the last 20 years. The intensity and the unpredictability of hazards (leading to disasters if combined with vulnerability) has been negatively related to climate change and the degradation of ecosystems. Through loss of lives, assets and production, hazards and disasters have a negative impact on livelihoods and economic growth. It is well-established that poor people are disproportionately affected. Disasters wipe away gains in poverty reduction that took much time, energy and resources to achieve and threaten the achievement of the Millennium Development Goals (MDGs).

Conventional approaches to disaster risk management have focused on physical approaches, largely based on addressing the impacts of events. Though of late, there has been an increased emphasis on disaster risk reduction, the impacts have been limited as the interlinkages with systemic risks have been very poorly understood and addressed. To address this gap, and to demonstrate alternate approaches to risk reduction, five Netherlands-based humanitarian, development and environmental organisations have joined forces to reduce the impact of natural hazards on vulnerable communities. The coalition is named 'Partners for Resilience' and includes International Red Cross, Red Cross Climate Center, Care, Cordaid and Wetlands International.

This Partners for Resilience is an innovative program on Ecosystem based Climate-proof Disaster Risk Reduction, which will be implemented through three intervention strategies: strengthening community resilience, strengthening of civil society and policy dialogue at all levels. The program aims to reduce the impact of natural hazards on the lives & livelihoods of local communities in nine countries: Ethiopia, Uganda, Kenya, Mali, Indonesia, India, the Philippines, Nicaragua and Guatemala. Wetlands International leads programme implementation in Mali and India. Financial support to this programme is provided by the Dutch Ministry of Foreign Affairs.

The programme is built along the following three strategic areas:

1. **Sustainable economic development and poverty reduction.** Communities are at the front line of disasters



and the impacts of climate change. Increased resilience and sustainable livelihoods can avoid a disaster from happening or help to reduce its adverse effects. Our work at the local level include activities such as designing and implementing together with communities livelihood security, water, environmental degradation and poverty reduction programmes; linking organisations with specialist knowledge /resources to communities and providing resources to communities.

2. **Strengthening of civil society and community empowerment.** To enhance communities' resilience, the policy context and cooperation between governmental and non-governmental actors must be strengthened. Our work for this strategy includes conducting risk analyses together with communities; developing risk reduction plans and early warning tools; supporting communities, community-based organisations and civil society organisations to effectively use their knowledge and experience and express their needs to local authorities.

3. **Policy dialogue and advocacy for stronger DRR/ CCA policies and increased resources at all levels.** Advocacy is needed to create a more solid policy context for disaster risk reduction / climate change adaptation at all levels.

A key element in our approach is a more intensified cooperation with knowledge centres and private sector parties working on the same themes and in the same areas as we do. Globally, the Red Cross Climate Centre will lead the alliance in using existing cooperation with, among others, knowledge centres like the IPCC, the UN system and the World Bank. At the national level in the beneficiary countries, existing cooperation with the line ministries, meteorological offices, the governmental climate change focal point and other relevant governmental institutions and civil society organisations will be intensified and new relations, for instance with private actors, will be explored. Locally in the field, the alliance members will engage with local governments, regional universities and relevant civil society organisations.

Programme implementation in India will focus on two states – Bihar and Orissa, prioritized due to their low development status, high disaster risk, and high significance of ecosystems in supporting community livelihoods. Within the two states, the programme will focus on Gandak – Kosi floodplains and Mahanadi Delta. Both of these areas have extensive wetland regimes, degradation of which has enhanced vulnerability of communities.

The partnership aims to integrate wetland restoration and managing water resources in an integrated manner as key components of disaster risk reduction strategies. At state levels, the programme will work with the State Disaster Management Authorities, wetland authorities, departments of environment, water resources, planning and other concerned to ensure cross-sectoral integration in approaches to risk reduction. At national level, the programme would seek higher emphasis on ecosystem management within risk reduction and climate change adaptation policies and action plans. In physical terms, the programme will reach 10,000 households in 350 villages through networks of Wetlands International-South Asia and Cordaid.

Groynes at the mouth of Sunamuhin River in Puri eroding the mouth opposite

Wetlands of Mahanadi Delta – need for integrated river basin and coastal zone management

River Mahanadi at Naraj

WISA recently concluded a one and a half-year project on scoping the role of Mahanadi Delta wetlands in securing water and food security and climate change adaptation. This article presents a summary of the study and builds a case for integrating conservation and wise use of delta wetlands into river basin and coastal zone management.

The Mahanadi Delta, located within the northeastern region of Orissa at the confluence of Mahanadi River with the Bay of Bengal Orissa is a quaternary delta with high ecological and socioeconomic importance. The delta begins its formation at Naraj wherein the Mahanadi River branches into three main tributaries Kuakhai, Kathjodi and Birupa. Chilika lagoon and Bhitarkanika mangrove forests form the south-western and north-eastern corner of the delta. The entire deltaic region is characterized by the presence of varied landforms as distributary channels, natural levees, channel bars and islands, floodplains, backwater swamps, lakes, offshore bars and spits and embayments. Spread over 9,000 square kilometres, the delta forms 5% of the geographical area of the state but is inhabited by over 30% of state's population.

High ecological significance of the delta is reflected by the presence of several highly critical conservation areas including Chilika, the largest brackish water lagoon; Bhittarkanika, a mangrove forest with high species diversity; and Garimatha, habitat of Olive Ridley turtles and the largest rookery in the world. Located at the terminus of the migratory Palaearctic pathway, a total of 211 bird species have been identified at Chilika, of which 97 are intercontinental migrants. Additionally, the lake also supports a very healthy population of Irrawady Dolphins. The presence of rich biodiversity within these conservation areas also forms the basis of provisioning of a range of ecosystem services which support well being of a large population inhabiting the delta. Chilika Lake is an important fisheries resource of the Orissa state and accounts for 5-6% of the total production. The lake presently supports 46 economically important species of fish, prawns and crabs harvested by 0.2 million fishermen to support livelihoods.

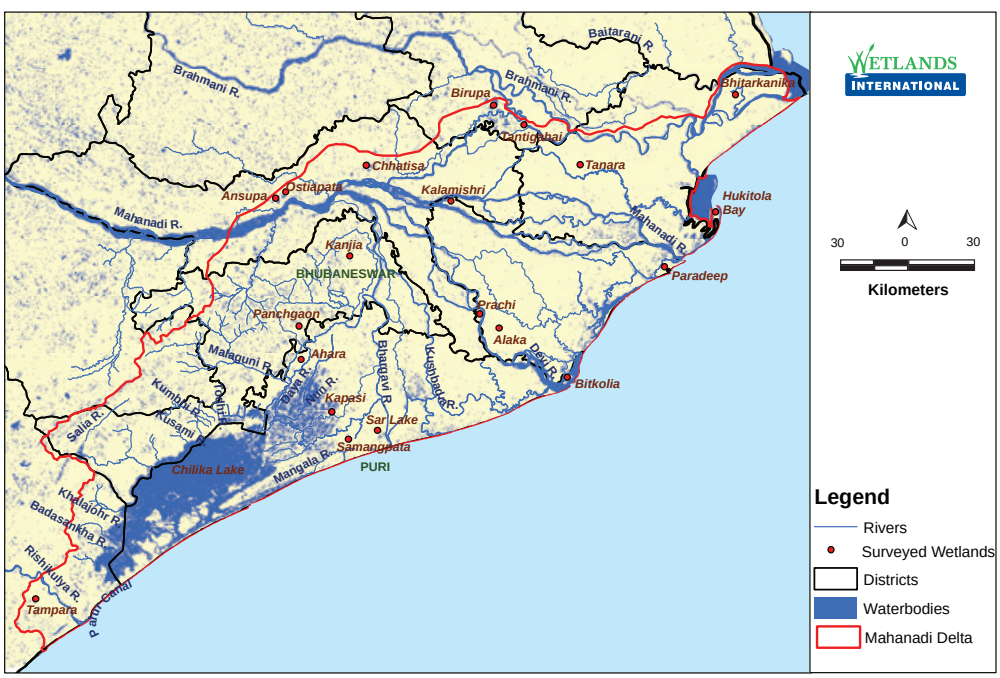
Mangroves of Bhittarkanika are known to play an important role in acting as a buffer against storms and floods which frequent these coastal areas. Regulation of hydrological regimes by these coastal ecosystems forms the basis for maintenance of high biodiversity values within the delta. The scenic beauty of these ecosystems also forms the basis of sizeable national – international nature tourism.

The Mahanadi Delta is also a region frequented by floods and cyclones. The Mahanadi River carries runoff from a huge catchment (~ 132,000 sq km) creating recurrent inundation within the deltaic region. Similarly depressions of varying intensity are a common weather phenomenon of the region. The super cyclone of 1999 led to more than 10,000 deaths and affected .85 million people and 0.6 million ha agricultural lands. Despite being a region of high extremities, the delta is densely populated and is home to 30% of the state's population with a population density nearly 8 times the state average. Agriculture supported by rich fertile soils and abundant freshwater forms the predominant livelihood option for 68% of its population. However, the overall agricultural productivity is low due to poor drainage conditions in the floodplains. As per socio economic benchmark survey of the delta, 43.19% of the culturable command area is affected by poor drainage, leading to lower crop productivity, damage to crops and aggravated damages of floods. Small land holdings and limited opportunities for occupation diversification has led to high poverty in the region.

Developmental planning within the Mahanadi Delta has been focused on a commodity centric perspective aimed at enhancing revenue realization rather than harmonizing with the inherent ecological setup of the deltaic region. Traditionally, the agrarian communities living within the delta evolved farming system which adequately distributed crop failure risks emerging through recurrent floods and droughts. The cropping cycles were distributed across the year so that even if one crop would get affected by floods or droughts, the other two would provide sufficient production to compensate for the loss.

Besides evolving rice strains that were timed to virtually dodge the ravages of floods or droughts, cultivators also adopted other risk distributing strategies as cultivating in different classes of soil marked by varying composition, fertility and located at various elevations. Most importantly, the strategy recognized floods and resulting inundation patterns to be beneficial to the crops due to their capacity for natural fertilization of agriculture lands.

Developmental planning within the region has been inherently contradictory to the symbiotic relationship between hydrological regimes and livelihoods,and focused on structural approaches to support agriculture by harnessing hydrological regimes. The delta was subject to intensive hydrological regulation primarily during the 18th century colonial rule.the dynamic fluvial environment of the delta was constrained by embankments and other hydraulic structures to provide a regulated water supply to irrigated fields and thereby ascertain revenue. In 1957, the Hirakud dam project was constructed on the Mahanadi River for hydropower generation and as a major sediment trap for an intercepted catchment area of 83,500 km^2. Weirs were constructed at the head of the Mahanadi delta to capture the downstream hydropower water release to irrigate 1.36 million hectares. Subsequently, the Bhargabi and



Mahanadi Delta in dry season (Radrasat, 2nd September 2008)

Daya distributaries were embanked to Chilika as a flood preventive measure in irrigated areas (Das and Jena 2008). The Mahanadi delta command area presently has 1038.10 kms capital embankment and 403.19 km of other agriculture embankments. Later development in the delta emphasized on the extension of these activities without reviewing their long-term implications and taking into consideration views of the communities. Further, increasing population in the delta led to contamination of water resources due to lack of sanitation facilities. The communities particularly women and dalits have been seriously affected by unsustainable developmental activities leading to poverty.

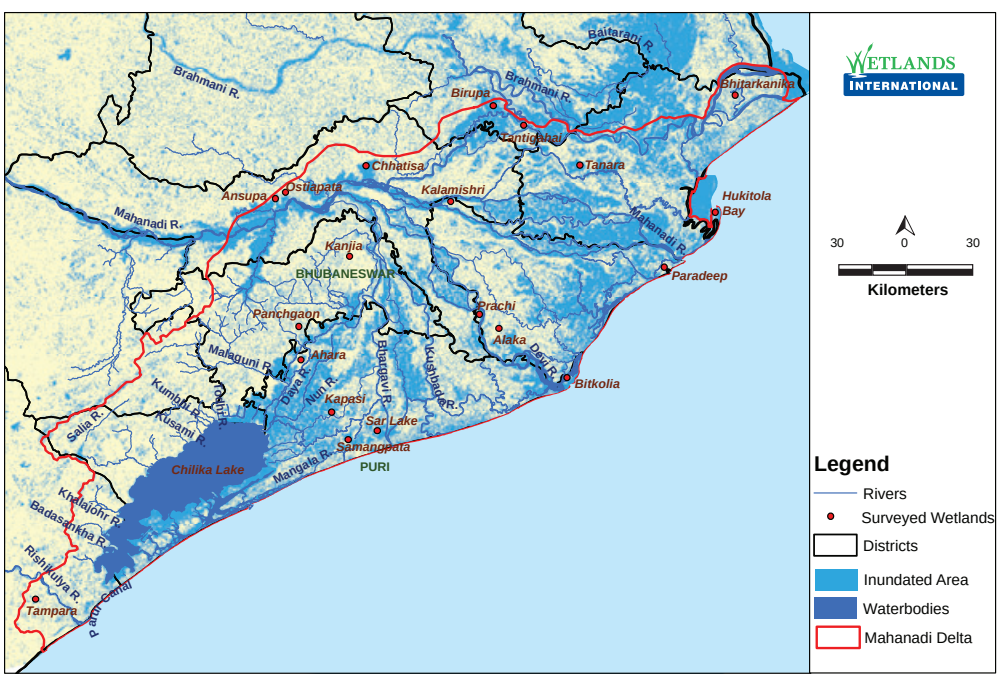
As an outcome of the water resource management which has failed to understand the role of fluvial regimes in deltas, the communities have been rendered flood vulnerable rather than flood dependant. With the flow connectivity severly impeded by embankments, the delta faces sever waterlogging which leads to lower agricultural productivity as well as diseases attributed to stagnant waters. Assessment based on remote sensing imageries indicate that the extent of wetlands has declined considerably due to loss of connectivity with the river regimes and changing land use pattern in the delta, especially in the central deltaic region. During the period 1975 – 2010, nearly 30% of wetland area has been lost.

The delta was subjected to two consecutive high flood events in September 2011. The 9 September floods were attributed to heavy rains in the upper catchments during 24-28 August which led to steady increase of water level in Hirakud Dam to 628 feet, close to its maximum storage level of 630 feet. On September 7, the dam storage level was at 625.60 feet when 10 of its 64 sluice and 34 craste gates were open. Within a span of 48 hours, the river received five times more water, and nearly double to what the reservoir could hold, forcing opening of 55 sluice and 4 craste gates. The flooding event of 22 September was attributed to heavy rainfall in the delta itself. Two thirds of the state's 30 districts were inundated affecting nearly 2.2 million

These events bring to fore the risk of focusing only on structural approaches for flood management. The Hirakud Reservoir Rule curve – a relationship between water storage and releases in a reservoir which determines allocation for water uses for various purposes as irrigation and hydropower as well as downstream releases is being revisited. Embankments are being strengthened, and relief and rehabilitation measures being undertaken within the affected communities. The role of wetlands in flood control is still not on the discussion table.

Sustainability of livelihoods within the delta is closely linked to conservation of extensive wetland regimes, which not only buffer extreme events, but support rich and productive resource base. However, maintenance of the wetland regime is closely linked to water management within the delta, especially connectivity with the river system and coastal processes.

WISA is working with CDA and Integrated Coastal Zone Management Project of World Bank for seeking integration of wetland in Coastal Zone Management.



Mahanadi Delta in flooding season (Radrasat, 2nd September 2008)

Mission:

To sustain and restore wetlands their resources and biodiversity

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