Pakistan National Wetlands Policy

Final Draft

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Ministry of Environment's
Pakistan Wetlands Programme

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Acronyms

ACS	Abbotabad Conservation Strategy
AJK	Azad Jammu and Kashmir
AKRSP	Aga Khan Rural Support Programme
BASDO	Belour Advisory and Social Development Organisation
BCS	Balochistan Conservation Strategy
CCS	Chitral Conservation Strategy
CCI&E	Chamber of Commerce and Industries
CICERO	Center for International Climate and Environmental Research Oslo
CIWC	Central Indus Wetland Complex
EPA	Environment Protection Agency
FAO	Food and Agriculture Organisation of the United Nations
FATA	Federally Administered Tribal Areas
GEF	Global Environment Facility
IDV	Integrated Development Visions
IEE	Initial Environment Examination
IRSA	Indus River System Authority
IUCN	International Union for the Conservation of Nature
IWMI	International Water Management Institute
KPT	Karachi Port Trust
LBOD	Left Bank Outfall Drain
LEAD	Leadership for Environment and Development
MAF	Million Acre Feet
MEA	Multilateral Environmental Agreements
NASSD	Northern Areas Strategy for Sustainable Development
NCS	National Conservation Strategy
NCCW	National Council for Conservation of Wildlife
NGO	Non-governmental organisation
NWFP	North West Frontier Province
NWMC	National Wetlands Management Committee
PEPA 1997	Pakistan Environment Protection Act
PEPA	Pakistan Environment Protection Agency
PIDA	Punjab Irrigation and Drainage Authority
PWP	Pakistan Wetlands Programme
RBOD	Right Bank Outfall Drain
SPCS	Sarhad Provincial Conservation Strategy
SDPI	Sustainable Development Policy Institute
SRWC	Salt Range Wetland Complex
SUSG	Sustainable Use Specialist Group of IUCN's Species Commission
UNFCCC	United Nations Framework Convention on Climate Change
WASA	Water and Sanitation Agency
WCMC	World Conservation Monitoring Centre
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

1. Pakistan has a number of environmental management and sustainable natural resource use policies that recognise the importance of water resources. However, there are clear policy gaps through which the conservation and sustainable use of wetlands may fall. Pakistan's wetlands continue to be degraded and are threatened by a variety of man-made and climate-induced changes. While Pakistan's forests, which occupy only 5 per cent of the land area, have a dedicated conservation and management policy, there is no such policy for wetlands, which occupy about 10 per cent of the land area. This policy document fills that gap and provides strategies for action at the national, sub-national and local levels.

2. Chapter 1 provides the justification for a separate policy for wetlands, and it defines wetlands and highlights their characteristic features and importance in terms of the benefits and services provided by wetlands. The degradation and loss of wetlands is caused by a number of threats, such as shortage of water, pollution, encroachment and land-use change, and over-exploitation of wetland resources. Nevertheless, the benefits and services offered by functioning wetlands provide a number of opportunities for enhancing and realising the value of wetlands.

3. Chapter 2 provides the overall vision and objectives for the National Wetlands Policy. The key principles that underpin the policy are outlined, and seven policy objectives are described that: (a) address the primary threats to Pakistan's wetlands; (b) provide a regulatory framework for conservation and sustainable use; (c) encourage co-ordination and collaboration between agencies and sectors at each level; (d) promote wetland research and education and data management; (e) build capacity for sustainable management of wetlands; (f) create awareness and understanding and changes attitudes towards wetlands; and (g) secure financing mechanisms for sustainable management of wetlands.

4. Chapter 3 describes the strategies for implementing the National Wetlands Policy. These strategies amplify the policy objectives and suggest courses of action for implementation. The institutional framework for putting the policy into action is outlined, and is further clarified in the policy framework presented in Annex 1. This framework also specifies indicators and targets for implementation. Financing mechanisms are also outlined in chapter 3.

5. Annex 2 provides an issues paper that describes the importance and threats to Pakistan's wetland resources. This paper is the basis for the objectives and strategies developed in the National Wetlands Policy. Annex 3 describes the consultative process with which this policy has been developed.

1. JUSTIFICATION FOR THE NATIONAL WETLANDS POLICY

1.1 *Definition of wetlands*

For this policy the definition of the Ramsar Convention is used:

"*…areas of marsh, fen,*[1] *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 metres."*

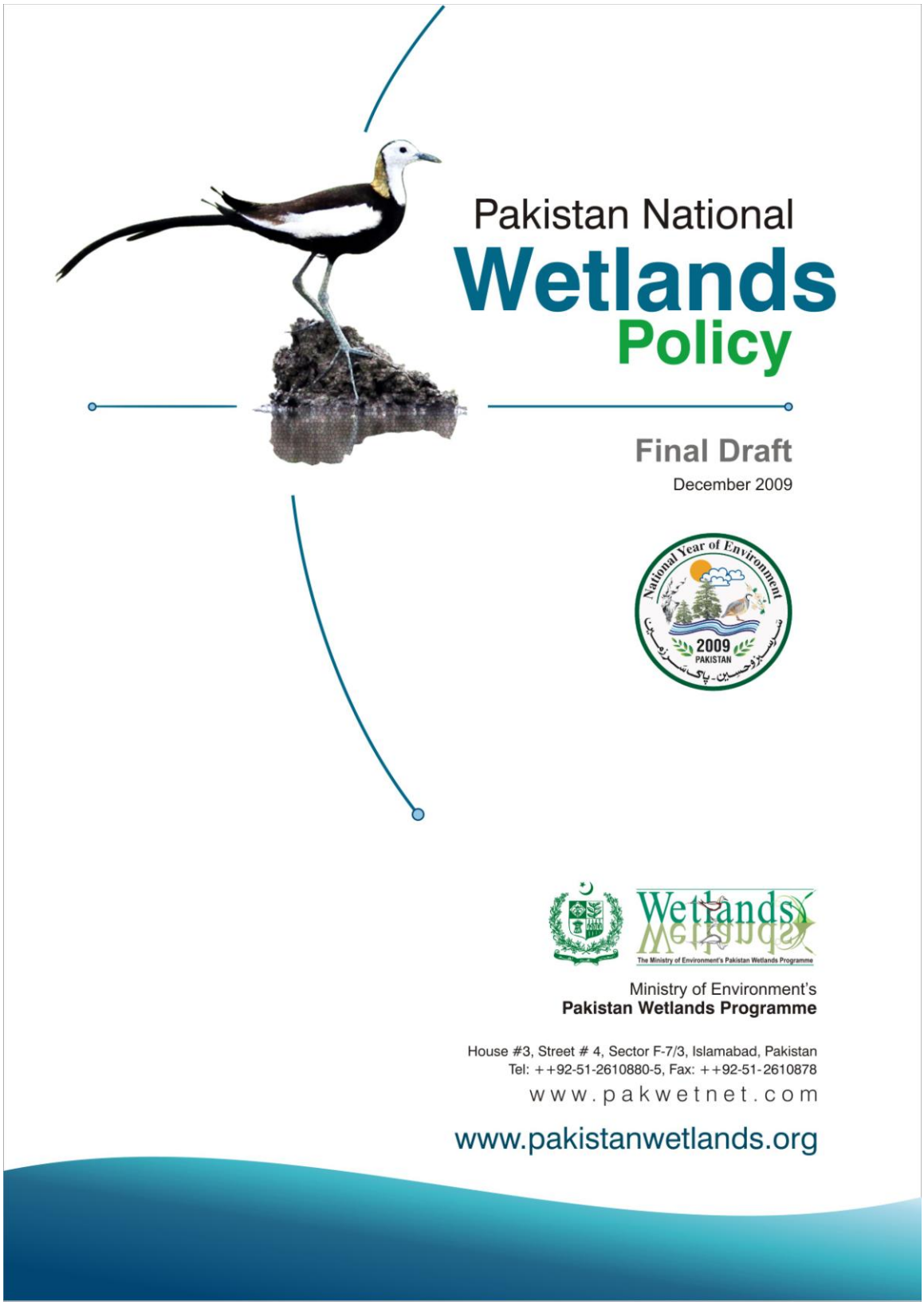
Future legislation will consider the adaptation of this definition to include glaciers and the areas of wetlands that fluctuate in size to include the 10-year high water levels.

1.2 *Importance of wetlands*

Pakistan's National Wetlands Policy recognises the importance of Pakistan's wetlands, which include valuable ecosystem services, such as:

- **Water regulation** – Pakistan's wetlands play an important role in regulating water availability and water quality for water resource conservation and storage, groundwater recharge and purification;

[1] Fen = Alkaline marsh.



- **Wetlands and climate** – wetlands play a significant role in local climate moderation and protection from extreme climatic events, but are threatened by

climate change leading to reduced water availability and increasing variability between flood events and drought;

- **Biodiversity importance** – Pakistan's wetlands are globally and nationally important for their diversity of ecosystems, habitats and species, from the high alpine lakes, small streams and major rivers to lowland lakes and reservoirs, and coastal wetlands such as mangroves, estuaries and beaches;

- **Human health and livelihoods** – Pakistan's wetlands and their natural resources contribute significantly to human wellbeing – the health, nutrition and livelihoods of communities adjacent to and using wetlands. Wetland loss and degradation will increase the vulnerability and poverty of wetland riparian communities.

1.3 *Features of wetland use*

The policy encompasses the following features of wetlands:

- **Multi-sectoral character** – wetlands are affected or used by many different sectors and stakeholders, requiring multidisciplinary, multi-institutional and co-ordinated approaches to wetland management and sustainable use;

- **Transboundary nature of wetlands** – wetlands often form or cut across political boundaries, between nations, provinces or districts, and water flows across these boundaries. This can give rise to different wetland management regimes, to the detriment of the whole wetland. Transboundary coordination is a critical concern for sustainable wetland management;

- **Gender –** the different roles that men and women play in using wetland resources must be recognised, especially those of women, in developing their contributions to sustainable wetland management practices.

1.4 *Threats to wetlands*

The policy addresses the following threats to the country's wetlands:

- **Loss and degradation of wetlands –** many of Pakistan's wetlands have been lost or degraded through water shortages and diversions, degradation of water quality as well as encroachment, land-use changes and overexploitation of wetland natural resources;

- **Demands for water, land and natural resources** – many of the threats to Pakistan's wetlands arise from the increasing demands for water, land and natural resources from an ever-growing population in rural, urban and metropolitan areas;

- **Lack of awareness** – in Pakistan, people at all levels – from wetland users, adjacent communities, private sector organisations, government officials at the sub-district, district, provincial and federal levels – are largely unaware of the importance, use and economic value of wetlands. Therefore, they do not realise the impacts of developments upon wetlands, and the value that is being lost as wetlands are degraded, drained and encroached;

- **Lack of co-ordination –** many organisations in Pakistan have different mandates and responsibilities for wetland management, leading to duplication and confusion, hence wetlands "falling through the gaps". The lack of co-ordination within and between these agencies contributes to ineffective protection and un-sustainable use of wetland resources;

- **Lack of capacity and resources –** shortfalls in technical capacity and understanding, and the lack of financial and trained human resources for wetland management, prevent good implementation, enforcement of policies, laws and regulations, and wise use of wetlands;

- **Policies, laws and regulations –** there is a multiplicity of policies, laws and regulations that relate to water and wetland resource use, but none which specifies or protects wetlands in particular. Many laws and policies have been actively detrimental to sustainable wetland management. There is a general inadequacy of implementation and enforcement, so that protection measures already in place are ineffectual.

1.5 *Opportunities for wetlands*

The policy encourages the many opportunities that exist for increasing the value of wetlands for human use without damaging or degrading the wetland natural resources:

- **Enhancing wetland productivity for water supply and food production –** improved management of wetlands, the prevention of pollution and careful stocking of wetlands, e.g., to increase fish production, provides opportunities for increasing the value of wetlands for water supply and food production**;**

- **Using wetlands for water treatment –** the creation of artificial wetlands for the treatment of wastewater can also provide habitat for wetland biodiversity;

- **Optimising multiple uses of man-made wetlands –** man-made wetlands include reservoirs for hydropower and flood management, irrigation barrages and canals that are usually designed for a single-sector purpose. Opportunities exist for greater multipurpose use of these man-made wetlands, without significantly reducing the effectiveness of the original purpose**;**

- **Using wetlands as an educational resource –** wetlands provide unique opportunities as natural laboratories for scientific studies and as teaching resources for all levels of education, from primary school to university.

- **Using wetlands for recreation and tourism –** Pakistan's wetlands offer a unique attraction for recreation and tourism, enhanced by the dramatic and often arid landscapes. Many wetlands are already used for this purpose, but are also threatened by the pressure that recreation and tourism bring. Opportunities exist for improved management of facilities to accommodate more visitors, but with less damage to the environment.

1.6 *The need for a National Wetlands Policy*

Starting with the adoption of the National Conservation Strategy (NCS) in 1992, Pakistan has developed a number of environmental and natural resource policies, and incorporated environmental concerns into ongoing and future five-year national plans that include:

- Medium Term Development Framework (MTDF)
- Biodiversity Action Plan (2000)
- National Environmental Action Plan (2001)
- National Environmental Policy (2005 – 2015)
- National Fisheries Policy (2006)
- National Water Policy (2006), approved by Federal Cabinet in 2009
- Clean Drinking Water for All
- National Sanitation Policy (2006)
- National Forest Policy (2008)
- National Energy Conservation Policy (2005).

6. These policies are fundamental to the overall National Vision 2030 prepared by the Pakistan Planning Commission in 2007. They contain elements supporting wetlands conservation and management, but are inadequate in their scope and have gaps in their coverage. They highlight the importance of water availability and water resources rather than wetlands. For example:

- The recently approved National Water Policy recognises the requirement of water for nature;

- The National Environmental Policy states: "Almost all freshwater resources are severely polluted due to discharge of untreated industrial and municipal wastes. Pollution of coastal waters due to discharges and oil spills, coupled with reduced freshwater flows, is resulting in declining fish yields";

- Vision 2030 states: "Natural resources will be severely depleted and stressed, especially water and land….Assuming that current water consumption patterns continue unabated, projections show that nearly half the world's projected populations will live in water-stressed river basins in 2030. Pakistan is fast approaching the water stress regime, with a storage capacity of only 9 per cent of average annual flows compared with a world average of 40 per cent." This is a critical outlook for a country with the fifth-largest population in the world, and

which is projected to reach between 230 million and 260 million by 2030 with more than half that total living in urban areas;

- Vision 2030 also states: "There are major threats to our freshwater [resources]. Worldwide, nearly 70 per cent of all available freshwater is used for agriculture, as against 90 per cent in Pakistan. This is mostly responsible for the deteriorating quality of freshwater through agrochemicals (fertiliser and pesticides). Industrial pollution, too, is unchecked and will get worse as economic activity accelerates further. Sustaining Pakistan's ecology and environment and biodiversity is now an important agenda of Pakistani society. Inability to do so now will result in extremely high costs in future. Cleaning up water sources, retrieving land and planting forests are three critical elements of the strategy."

7. Climate change is a big issue for both Pakistan and its wetlands. Models show that Pakistan will grow warmer by about 1o C by 2030 (CICERO, Report 2002-2), and could even rise up to 4-5 o C higher in the last three decades of this century. The Indus basin depends heavily on the western Karakorum and Himalayan glaciers that act as a reservoir, maintaining the rivers that feed the irrigation system of the country. Rising temperatures will increase the melting of glaciers over the next 50 years.

8. Precipitation during Pakistan's summer monsoon is likely to increase substantially between 20 to 30 per cent, but the rainfall will be poorly distributed temporally and spatially; much of the additional rainfall is likely to occur as high-intensity storm events. Climate change will have an adverse impact on wildlife and their habitats. Wetlands and their biodiversity will be under even greater threat. Policies encouraging adaptation to climate change for wetlands and wetland users are urgently required,

9. Despite its arid climate, Pakistan supports more than 780,000 ha of wetlands that cover 9.7 per cent of the total land area, with 225 nationally significant wetlands, of which 19 have been recognised as Ramsar sites of global significance. Even after the development of the NCS, Pakistan's wetlands have continued to be degraded under a broad spectrum of man-made threats that are mainly rooted in poverty, but which are exacerbated by the lack of knowledge and proper management. More than 60 per cent of Pakistan's inland wetlands have already been lost or degraded. (Pakistan Wetlands Programme, Project Brief, 2005)

10. In 1976, Pakistan joined the Ramsar Convention, which stresses the importance of developing a National Wetlands Policy as a key feature in the implementation of the concept of "Wise Use" of wetlands promoted by the Convention. A Wetlands Action Plan was prepared and approved in 2000, but it is now considered to be "wholly inadequate for comprehensive application"; thus, "in the absence of a pragmatic and living policy framework, the existing national and site level initiatives are likely to have little sustainable impact upon the conservation of globally important wetlands and their associated biodiversity in Pakistan". (Pakistan Wetlands Programme, 2008)

11. The policies listed earlier do not specifically address wetland issues and there is a growing concern that wetlands conservation may “fall through the gaps” of other environmental and conservation policies. There is already a National Forest Policy, even though forest cover amounts to only 5 per cent of the land area of Pakistan compared with 10 per cent covered by wetlands. The National Environment Policy highlights the need for developing a separate national wetlands policy.

12. **There is a clear need for a separate wetland policy that is focused on rehabilitation, restoration, sustainable management and wise use of wetlands. It must be closely co-ordinated with other environmental, water and natural resource use policies. There is also a legal obligation under the Ramsar Convention to formulate a National Wetlands Policy.**

2. NATIONAL WETLANDS POLICY

2.1 *Vision Statement*

The Vision Statement for the future of Pakistan's wetlands provides a goal for all wetland conservation and management work for the future:

"Pakistan manages its wetlands for effective performance of ecological functions and services; and for realising opportunities for sustainable livelihoods, recreation and culture, research and education."

2.2 *Policy principles*

A wide range of different principles underlie the design of the Pakistan National Wetlands policy; these can be summarised as:

- **Ecosystem approach** – endorsed by the Convention on Biological Diversity, the ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is based on the application of appropriate scientific methodologies that encompass the essential processes, functions and interactions among organisms and their environment. It recognises that humans, with their cultural diversity, are an integral component of ecosystems;

- **Equity** – the aim of sustainable management of wetlands is an equitable sharing of water and wetland resources at community, district and provincial levels;

- **Good governance –** the implementation of the national wetland policy is based upon good governance, transparency, informed decision-making and accountability;
- **Stewardship** – the policy aims to engender a sense of stewardship in wetland management so that the wetlands of Pakistan may be used and enjoyed by future generations;

- **Integration with other policies and development planning decisions** – the policy aims to ensure that wetland issues, risks and opportunities are incorporated into decision-making and planning of all major developments;

- **Transboundary co-ordination –** the policy aims to facilitate transboundary co-ordination in the management of wetlands and upstream/downstream impacts of developments upon wetlands;

- **No net biodiversity loss** – in the long term, the policy aims at halting further loss of wetland biodiversity and enhancing biodiversity values wherever possible. The policy will consider the concept of wetland biodiversity offsets, in

which loss of wetlands in one area is offset by gains and improved management in another area;

- **Knowledge-based –** wetland policies, plans and management are based upon on best available knowledge and understanding; the policy encourages easy access to such information for wetland users, managers and stakeholders;

- **Implementation** – the policy aims to act as a guide for the implementation of a range of initiatives to promote sustainable use of wetland resources, address the loss and degradation of wetlands, and reduce the poverty and vulnerability of wetland users;

- **Involving stakeholders –** implementing the policy is the responsibility of all wetland stakeholders – wetland users, including both men and women, riparian communities, wetland managers, local government officials, provincial and federal agencies, private sector companies, academia and research organisations, community-based organisations and non-governmental organisations (NGOs) – recognising their different roles and responsibilities;

- **Resourcing** – sustainable financing for implementing the policy will be raised through a variety of different sources, and will not rely solely upon government budgets and donor funds.

2.3 *Policy objectives*

The seven objectives detailed below have been specified for Pakistan's Wetland Policy to address the principal issues described in the Issues Paper in Annex 2. These objectives are

1. **Addressing primary threats to Pakistan's wetlands –** providing for direct action to tackle the principal threats to Pakistan's wetlands, covering water availability and quality issues, unplanned land use change, overuse and illegal use of natural resources and climate change induced degradation of wetlands.

2. **Creating and implementing a regulatory framework for the conservation and sustainable use of wetlands –** addressing the issue of conflicting and overlapping policies, laws and regulations, and envisaging the enactment of new legislation covering wetland conservation and sustainable use.

3. **Greater co-ordination and collaboration between agencies and sectors on wetland issues encouraged from local to international levels –** addressing the lack of co-ordination between different agencies and sectors at provincial and national levels, and encouraging greater collaboration at the international level.

4. **Promoting wetland research, education and data management** – recognising that further research is required to increase understanding of wetland resources and processes, and the valuation of wetland services. Wetland education is

needed to extend this knowledge base about wetlands to build the capacity for wetlands management for future generations. Improved data management is required for monitoring changes in wetlands, and for more effective site management.

5. **Building Pakistan's capacity for sustainable wetland management** – building the capacity for current and future management of wetlands at site level and among provincial and national agencies. Strengthened capacity will lead to improved decision-making about specific wetlands as well as improved implementation of wetland policies and sectoral development plans.

6. **Promoting improved understanding, perceptions and attitudes towards wetlands conservation and wise use** – creating a broad understanding and awareness of wetlands, their importance and threats at all levels – the general public, wetland stakeholders and users, including vulnerable communities that are dependent on wetland resources, and specific influential groups (e.g., industries that use or have an impact on wetlands, government officials, politicians and senior decision makers).

7. **Securing financing mechanisms for sustainable management of wetlands** – recognising that without adequate financing, all efforts envisaged by this policy will be undermined. A range of sources of financing, such as environmental funds, government budgets, corporate sector funding and donor funded projects, are identified.

3. IMPLEMENTING THE POLICY

3.1 Strategies for Action

For each objective, the policy framework outlines a number of strategies for action (see Annex 1). These are indicative and further actions in line with the objectives will be added as the policy matures. The strategies explain the meaning and intentions of the policy objectives and their implementation.

1.1 ***Addressing primary threats to Pakistan's wetlands.*** *Ensuring water availability for priority wetlands in Pakistan. Actions include recognition of water requirements for ecological functioning and encouraging the efficient use of water, especially in the water-intensive sectors such as agriculture, industry and domestic water supply.*

1.2 *Ensuring water quality in Pakistan's wetlands, especially rivers, lakes and coastal zones.* Actions include the control of water pollution through enforcement of National Environmental Quality Standards, application of water pollution control measures for specific wetlands, and minimizing the effects of agricultural run-off affecting specific wetlands.

1.3 *Managing land-use change to protect Pakistan's wetland resources*. Actions include classification and designation of protected wetland sites, the demarcation of priority wetlands and development of joint management plans, minimizing encroachment upon wetlands through enforcement of planning zones and regulations, and ensuring that the impacts of developments are adequately addressed through the environmental assessment processes.

1.4 *Encouraging sustainable use of Pakistan's wetland resources*. Actions include mapping of wetland resources and services and estimating the sustainable level of use at priority wetland sites, developing collaborative wetland management, carrying out market analyses for wetland products and services to provide livelihood opportunities for adjacent communities and, through risk assessments, identify non-wetland income-generating activities for adjacent communities to reduce pressure upon the wetland resources.

1.5 *Addressing issues of climate change and natural disasters affecting wetlands*. Actions include identification of the risks and impacts of climate change on Pakistan's wetlands, developing adaptation mechanisms for wetlands and communities dependent on wetlands threatened by climate change, and recognition and enhancement of the roles played by wetlands in natural disaster protection and mitigation.

2. Creating and implementing a regulatory framework for the conservation and sustainable use of wetlands

2.1 *Harmonising national wetland policy with other policies*. Actions include: encouraging the implementation of the National Wetlands Policy at provincial levels; harmonizing national wetland policy with other policies and establishing

indicators and baselines for monitoring the policy objectives and strategies and the links with other policies.

2.2 *Clarifying legal status for the protection and sustainable use of wetlands and developing new wetland legislation.* Actions include: the preparation of guidelines for wetland managers to interpret existing laws and regulations for the sustainable management of wetlands; identifying laws and regulations that are detrimental to wetlands and addressing these with amendments; developing a specific wetland law or a wetland component of a wider biodiversity law, harmonized with other natural resource and water-use legislation.

3. Greater coordination and collaboration between agencies and sectors on wetland issues achieved from local to international levels

3.1 *Ensuring greater coordination between institutions with wetland responsibilities.* Actions include: working with key agencies to define their roles and understanding of wetlands; reviewing, strengthening resources of the organization of National Council for Conservation of Wildlife (NCCW) to cover and support wider aspects of wetlands co-ordination and management throughout the country, including facilitation of inter-provincial collaboration for sharing expertise and experience to address common wetland issues; establishing and managing an effective National Wetlands Advisory Committee as a committee of the NCCW (the Ministerial Council); and establishing a national network of protected wetland areas.

3.2 *Developing site-level collaborative wetland management.* Actions include: encouraging and developing the capacity of local wetland communities and users as well as government agencies in collaborative management; supporting programmes to manage wetland habitats, including those outside the protected areas; and supporting incentive programmes on privately-owned and communally-used wetlands.

3.3 *Establishing co-ordination, collaboration and support mechanisms for wetlands at the provincial level.* Actions include: the establishment of provincial wetland committees; developing incentives and compensation mechanisms to secure priority wetlands for conservation objectives; and establishing mechanisms for supporting collaborative wetland management.

3.4 *Developing collaboration with other provinces on wetland issues.* Actions include sharing national and provincial expertise and experience to address common wetland issues.

3.5 *Developing international collaboration on wetland issues.* Actions include: participating actively in implementing and supporting international environmental treaties, especially the Ramsar Convention; facilitating South Asian and West Asian regional collaboration on the implementation of the Conventions; and establishing a regional network of academic institutions for building wetland management capacity.

4. Promoting wetland research, education and data management

4.1 *Encouraging wetland education at all levels from primary to tertiary education*. Actions include: the inclusion of wetland ecology and management in curricula at different levels; and encouraging field visits to local wetlands as a core educational activity.

4.2 *Improving the understanding of wetlands science – processes, use, threats and management*. Actions include: establishing national priorities in wetland research; promoting national and provincial research, and centres of wetland expertise; proposing research methods, processes and tools for data collection; and promoting the dissemination of wetland research findings.

4.3 *Developing and improving wetland maps and data management.* Actions include: the application of a standardised approach to wetland classification and inventory and the mapping of wetlands throughout the country; the extension of the national database on wetlands to include the location and status of wetlands and their resources; and reporting on a regular basis on the national status of wetlands, illustrated with trends in the status, threats and influences of climate change.

4.4 *Valuing the benefits and services of Pakistan's wetlands*. Actions include: establishing standardised protocols for descriptions of wetland functions and values; the application of these valuation tools to selected wetlands; and the promotion of the economic, social and beneficial functions of wetlands.

4.5 *Providing access to wetland information.* Actions include: a public access website; and ensuring that environmental impact assessments and other documents that assess the impacts of developments upon wetlands are made public.

5. Building Pakistan's capacity for sustainable wetland management

5.1 *Building the capacities for site-level wetland management.* Actions include: providing training in collaborative wetland management; and use of equipment for management and monitoring of wetlands at specific sites. It covers building the capacity of all involved in collaborative wetland management, including adjacent communities, wetland users as well as government agencies.

5.2 *Building the capacity for addressing wetland issues among provincial government agencies.* Actions include: developing the competencies of key provincial agencies responsible for water and wetlands resources; and ensuring that these agencies have adequate human resources, infrastructure and equipment to implement wetland policies and site management plans.

5.3 *Building the capacity for addressing wetland issues among federal government agencies.* Actions include: development of competencies as well as human and material resources for NCCW to undertake its work; and the development of competencies of the key sectoral agencies responsible for wetlands at the federal level.

6. Promoting improved understanding, perceptions and attitudes towards wetlands conservation and wise use

Creating awareness about wetlands among:

- *The public*
- *Wetland stakeholders and users*
- *Specific influential groups*
- *Government officials*
- *Senior decision makers.*

Actions include: the development of a broad communications strategy for public awareness and specific target audiences, which includes creating awareness among specific groups who may use their influence to promote sustainable wetland use; sensitizing environmental magistrates towards wetland issues and laws and regulations; planning and implementing communications campaigns aimed at wetland stakeholders and users of specific wetlands, the corporate sector, and government agencies at the federal and provincial levels; and providing briefings for political leaders and senior decision makers from key ministries concerned with wetlands as well as sectors that affect wetlands.

7. Securing financing mechanisms for sustainable wetlands management

7.1 Sourcing wetland finance from various environmental funds. Actions include: accessing environmental funds to provide funding for specific wetland management activities; and establishing environmental funds in those provinces where such funds are not yet functioning. Windows within such funds will be opened for community management of wetlands, which may be sustained longer and have direct benefits for dependent communities.

7.2 Ensuring specific wetland allocations in government budgets. Actions include the establishment of specific budgets for wetland conservation and management within national and provincial agencies.

7.3 Developing corporate sector finance for wetlands. Actions include: developing appropriate financial mechanisms for supporting wetland conservation and sustainable use, based upon concepts such as the polluter pays, payment for environmental services and biodiversity offsets; ensuring that funds allocated for implementing environmental management plans of major developments include an allocation for wetland management and rehabilitation; and developing partnerships with the corporate sector concerned for corporate social responsibility to finance wetland management activities.

7.4 Developing donor-funded projects: Actions include: sourcing financial support for wetland conservation and management projects from international and national sources; and sourcing appropriate funds for wetland climate change related projects.

3.2 Institutional framework

13. The Ministry of Environment is the key federal ministry responsible for wetlands, with NCCW as its delegated wetland co-ordinating agency with responsibility for the Ramsar Convention. The mandate for NCCW will be widened to cover aspects of wetlands beyond biodiversity issues for its effectiveness (e.g., co-

ordination with agencies responsible for management of water quantity and quality, fisheries and tourism).

14. A National Wetland Advisory Committee (NWAC) as a Committee of NCCW (the Ministerial Council) will be established, and linked with wetland management committees at the sub-national level for ensuring adequate co-ordination between the different agencies.

15. The policy recognises that many sectors and agencies are involved with wetlands. The principal institutions responsible for the different elements of the policy are shown in the Policy Framework in Annex 1. However, the conservation and sustainable use of wetlands throughout the country is impaired by the lack of capacity of these organisations as well as lack of co-ordination and collaboration between them. The goals of the National Wetlands Policy will only be achieved if institutional mandates and roles are resolved and clarified. The responsible organisations at the national and sub-national levels will be strengthened in order for them to carry out these roles.

The two policy objectives that relate to strengthening the institutional framework are:

- *Objective 3 – Ensuring co-ordination and collaboration between agencies and sectors on wetland issues, encouraged from local to international levels; and*
- *Objective 5 – Building Pakistan's capacity for sustainable wetland management*.

16. At the sub-national level, the provincial wildlife departments hold much of the responsibility for wetlands, although some crucial aspects come under the fisheries, irrigation and forestry departments. All these departments will be encouraged to take the wider view of wetlands, and to develop integrated wetland action plans incorporating wetland conservation and wise use priorities.

17. Many government departments and agencies at the federal and sub-national levels (e.g., the Water and Power Development Authority, irrigation and drainage agencies, the EPAs, and planning and development departments) have roles and responsibilities that may affect wetlands in different ways. The mandates and roles of these agencies in relation to wetlands will be clarified, and greater collaboration between such agencies will be encouraged.

18. The policy recognises the key roles of NGOs and academic institutions in public awareness and education, the development of wetland information and databases, and the rehabilitation and management of wetlands. The support that such organisations provide to community groups, wetland users and other stakeholders in the development of collaborative wetland management will be facilitated through the policy.

19. The corporate sector will be encouraged to help in implementing the national wetlands policy, through efforts to clean up polluting effluents that damage wetlands, sponsorship and corporate social responsibility initiatives, and working with neighbouring communities to support sustainable wetland management.

3.3 Monitoring

20. Monitoring plays an important role in the effective implementation of policies, and suggestions for targets and indicators are included in the Policy Framework (Annex 1). It is recognised that many of the policy strategies will take time to become effective. Some shorter-term targets are included (e.g., to 2015 or 2020) while longer-term indicators and targets are taken to 2030 and beyond.

21. The provision for a progress review of the National Wetlands Policy by NWAC every three years is built into the policy under Objective 2 – Regulatory framework for the conservation and sustainable use of wetlands created and implemented. Such a review depends upon the evidence of achievement of targets and indicators, and allows for regular adaptation and updating of the policy. This review will be supported by reports and maps on the status, trends and threats of wetlands in Pakistan, to be produced every three years (Strategy 4.3).

22. Indicators and targets for sub-national strategies and action plans will be developed, monitored and reported regularly.

3.4 Financing mechanisms

23. The implementation of the National Wetlands Policy must be supported financially if it is to be effective. Objective 7 – Financing mechanisms for sustainable wetlands management secured covers four different areas for financing sustainable wetland management. New forms of financing will be sought that do not rely solely upon government or donor sources of funds. They will be developed by the application of concepts such as “polluter pays principle” and “payment for environmental services”, “user pays” biodiversity offsets etc. Appropriate taxes and levies on tourists, for example, will be used to finance sustainable management of some wetland sites.

The four areas indicated in the policy framework include:

- **Environmental and natural resource funds**, such as the Forest Development Funds, Provincial Sustainable Development Funds, Community-managed funds etc;

- **Allocations for wetlands in government budgets** at both federal and sub-national levels. Wetlands allocations will be clearly specified, so that they can be totalled and monitored annually;

- **Corporate sector finance**, which covers a variety of mechanisms ranging from provisions for environmental management of development projects, through schemes such as “green loaning” from banks, awareness raising through “green cheque books”, and corporate social responsibility support for wetlands from national and international companies. Local philanthropists will be encouraged to support wetlands initiatives;

- **Donor funded projects**, including conventional donor projects and the newer climate change-related funds.

The responsibility for raising funds for wetlands lies not with any one agency, but with all the interested agencies, organisations and stakeholders according to the activities to be undertaken.

One of the indicators for successful implementation of the National Wetlands Policy will be the total funds that are generated from these different sources and organisations. Information on these indicators will be collected and totalled by NCCW as part of the triennial review process.

Annex 1: Policy Framework

Annex 2: Issues Paper

Annex 3: Development of the Pakistan National Wetlands Policy

The Pakistan National Wetlands Policy has been developed through the Pakistan Wetlands Programme (PWP), a Global Environment Facility (GEF) project which aims to protect the country's vital water and wetland resources. The Ministry of Environment is the PWP executing agency, which has in turn assigned the programme implementation to WWF-Pakistan under a Memorandum of Understanding. The PWP includes the development, adoption and implementation of a National Wetlands Conservation Strategy under its Output 3, of which sub-output 3.2 is the development of a National Wetlands Policy.[2] In 2007, IUCN Pakistan was asked to develop the National Wetlands Policy. The PWP is funded by the United Nations Development Programme Global Environmental Facility, the Embassy of the Kingdom of the Netherlands to Pakistan, Pakistan Poverty Alleviation Fund. The managing partners are the Ministry of Environment, Government of Pakistan and WWF Pakistan.

The process of developing this National Wetlands Policy comprised the following steps:

- Visits and consultations with stakeholders in each of the four wetland complex areas of the PWP, including communities, managers and local government officials, NGOs and other stakeholders. These visits were intended to be representative of wetlands throughout the country;
- A review of the institutional and administrative framework for wetlands;
- A review of legal and policy issues related to wetlands;
- An issues paper summarising the importance of wetlands in Pakistan, and providing a focus for the sustainable management issues and threats to wetlands for a series of consultative workshops;
- Six sub-national consultative workshops, held for stakeholders in each provincial and administrative area in the country, to refine the issues paper and prioritise the issues faced in sustainable management of wetlands and identify strategies for addressing these issues;
- A national-level working group, held to review and refine the draft National Wetlands Policy;
- A national-level workshop at which the draft National Wetlands Policy was presented.

The Issues Paper was used as a basis for the development of Pakistan's National Wetlands Policy and is attached as Annex 2 to the Policy Document. The development of

[2] The original Output 3.2 of the Pakistan Wetlands Programme focused on the development phase of the National Wetlands Conservation Strategy. That Output 3.2 was later revised on the advice of the Ramsar Secretariat and was replaced by the National Wetland Policy.

the National Wetlands Policy has been guided by the *Ramsar Handbook for the Wise Use of Wetlands No. 2 – National Wetlands Policies*.

4. Annex 1: Pakistan National Wetland Policy Framework

VISION			
Pakistan manages its wetlands for effective performance of ecological functions and services; and for realising opportunities for sustainable livelihoods, recreation and culture, research and education.			

Objective Areas / Strategies	**Mechanisms for Action**	**Institutional responsibility**	**Targets and Indicators**
1. Primary threats to Pakistan's wetlands addressed			Primary threats to Pakistan's wetlands managed and mitigated effectively by 2030
1.1. Ensuring water availability for priority wetlands[3] in Pakistan			Recognition of general principles of water requirements for environment by water resource management agencies by 2030
	1.1.1 Recognise and provide the water requirements for ecological functioning of priority wetlands, including the contributions they make towards conservation and management of water resources	Ministry of Environment working with federal (WAPDA, IRSA), provincial (irrigation and power department and irrigation and drainage authorities) water resource agencies and wetland management agencies and NGOs	• Environmental flow studies carried out for at least 2 priority wetlands per province[4] by 2012 • Progressive negotiations for appropriate water allocations to these wetlands by 2015 • Extension of similar approach and water allocations to an additional 5 to 10 priority wetlands per province/territory by 2030

[3] The term priority wetland is used throughout this table to indicate wetlands that are considered nationally or provincially significant. The priority wetlands associated with a particular action are not necessarily the same for all actions.

[4] In the interests of brevity in this table, the term province/territory is used to cover both provinces and all other administrative areas

Objective Areas / Strategies	Mechanisms for Action	Institutional responsibility	Targets and Indicators
	1.1.2. Encourage and demonstrate efficient use of water in agriculture, industry and domestic water supply in the catchment areas associated with priority wetland sites by minimizing wastage, reuse and recycling of water, choices of less water demanding crops.	Water resource use agencies – Provincial irrigation departments, irrigation and drainage authorities, water users including farmers, Water supply and sanitation departments, industries consuming significant quantities of water	• Efficient use of water in catchment areas feeding into these wetlands demonstrated. • Extension of water conservation measures to other areas
1.2. Ensuring improvement of water quality in Pakistan's wetlands, especially rivers, lakes and coastal zones			Water quality in 10% of the polluted water bodies restored by 2020 Water quality in 25% of the polluted water bodies restored by 2030
	1.2.1 Control water pollution through increasing effectiveness of strict enforcement of NEQS	PEPA, provincial EPAs, Departments of water and sanitation, agriculture, health, IPDs, WAPDA Industries	• Regular water quality monitoring (using chemical and biological indicators) shows progressive improvement in reducing water pollution in all provinces/territories,
	1.2.2 Establish programmes for addressing issues of water pollution affecting specific wetlands from: • Domestic waste waters • Industrial waste waters • Solid waste disposal and promoting waste water treatment including through constructed wetlands,	PEPA, Provincial EPAs working with municipalities, industries and waste water treatment agencies,	• Water pollution measures taken on at least 2 priority wetland sites per province/territory by 2020 • Water pollution measures taken on in an additional 5 priority wetland sites per province/territory throughout the country by 2030

	1.2.3 Establish programmes for minimizing the effects of agricultural run off on water quality in specific wetlands, e.g. high nutrient levels and agricultural chemicals	PEPA, Provincial EPAs, Provincial agriculture and irrigation departments, farmers surrounding selected wetlands	• Measures taken to reduce impacts of agricultural run off in at least 2 priority wetlands per province/territory by 2020 • Measures taken to reduce impacts of agricultural run off in an additional 5 priority wetland sites per province/territory by 2030
1.3. Managing land use change to protect Pakistan's wetland resources			Increase of 10% in area of protected or sustainably managed wetlands by 2020, and of 20% by 2030
	1.3.1 Establish provincial programmes for classification and designation of protected wetland sites, especially as managed resource-use protected areas	Provincial Wildlife departments, Forest Departments, Fisheries Departments, supported by MoE	• Each province/territory to have classified and designated its priority wetland sites by 2015
	1.3.2 Demarcate priority wetlands (up to highest water mark since 1992) and develop joint management plans with specified surrounding land uses involving all stakeholders	Provincial wildlife, fisheries and forest departments, Irrigation departments, farmers, fishermen and other wetland users, supported by MoE	• Joint management plans developed and operationalised on at least 2 priority wetland sites per province/territory by 2020, and on at least 5 sites per province/territory by 2030
	1.3.3 Minimise encroachment of wetlands – from agriculture, infrastructure, habitation and urban development through enforcement of urban and rural planning zones and regulations	Municipalities and urban planning agencies Provincial Wildlife, Forest departments, Fisheries Departments, supported by MoE	• Recognition of buffer zones around wetlands and shorelines by planning authorities by 2015 • Enforcement actions taken in priority wetland sites • No increase in encroachment in priority wetland areas
	1.3.4 Ensure that the impacts of	PEPA, Provincial EPAs	• Wetland guidelines for EIAs

	infrastructure and other developments are adequately addressed in the environmental assessment process through • guidelines for considering wetland impacts in IEEs and EIAs • adequate consultation with wetland responsible agencies, stakeholders and users • appropriate measures for mitigation of impacts on wetlands incorporated into management plans and implemented		produced by 2012 • Reviews of EIAs of developments potentially affecting wetlands show adequate consideration of wetland impacts after 2015
	1.3.5 Strengthen the capacities of lead agencies in reviewing EIAs for wetland issues ie Wildlife, Forest Departments	PEPA, Provincial EPAs, provincial wildlife, forest and fisheries departments	• Appropriate comments on the wetland components of EIAs provided by agencies responsible for wetlands
	1.3.6 Lead agencies monitor implementation of wetland mitigation measures in EMPs in addition to EPAs.	PEPA, Provincial EPAs, provincial wildlife, forest and fisheries departments	• Mitigation measures for addressing impacts of developments on wetlands being implemented in at least 75% of developments by 2020
1.4. Promoting sustainable use of Pakistan's wetland natural resources			No net loss of Pakistan's wetland biodiversity by 2030 compared to 2010 status[5]
	1.4.1 At priority wetland sites (as 1.3.1) identify and map the wetland resources and services available and the sustainable level of use	MoE, ZSD, NCCW, Provincial wildlife, forest and fisheries departments, Irrigation Departments/ PIDAs, WAPDA, NGOs (Lead to be taken by agency	• Wetland natural resources and services identified and mapped for at least 2 priority sites per province/territory by 2015, and in an additional 5 sites per province/territory by 2025

[5] Compared to the studies on status of wetlands in Pakistan undertaken by PWP

		that has principal responsibility for the priority wetland)	
	1.4.2 Develop and implement collaborative wetland management plans through: • Awareness raising, social mobilization/ organization and dialogue with wetland users and other stakeholders • Roles and responsibilities defined, sustainable use and benefit sharing • Ensuring access for traditional wetland users and addressing gender gaps • Enabling management rules and regulations covering use of wetland natural resources • Documentation of indigenous management practices and knowldege	MoE, ZSD, NCCW, provincial forest, wildlife/ fisheries departments, relevant NGOs/ RSPs and CBOs and tourism agencies . Irrigation Departments/ PIDAs, WAPDA.	• Collaborative wetland management plans developed and implemented in at least 2 priority sites by 2015, and in an additional 5 wetland sites per province/territory by 2020, and an additional 10 sites by 2030
	1.4.3 Carry out a market analysis for wetland products and services and develop/improve such products and services from particular sites to provide livelihood opportunities for wetland users, especially for women, and in poor and vulnerable communities	NCCW, Provincial wildlife, fisheries and forest Departments. Tourism agencies. Small scale business development agencies. Social welfare and women's development departments. NGOs/ RSPs	• Reviews of market opportunities for a wide range of wetland products carried out by 2015 • Development of improved sustainable wetland products and services for at least 2 priority wetland sites per province/territory by 2020
	1.4.4 Identify the risks and threats to the livelihoods of wetland user communities and develop non-wetland based income	NCCW, Provincial wildlife, fisheries and forest Departments. Tourism	• Review of risks and vulnerabilities of wetland user communities carried out in at

	generating activities for communities using wetlands to address issues of poverty and vulnerability	agencies. Small scale business development agencies. Social welfare and women development departments and NGOs/ RSPs	least 2 priority wetland sites per province/territory carried out by 2015 • Development of non-wetland livelihood opportunities for communities at these sites by 2020
1.5 Addressing issues of climate change and natural disasters affecting wetlands			Adaptation mechanisms for climate change impacts on wetlands in place by 2020
	1.5.1 Identify the risks and impacts of climate change on Pakistan's water and wetland resources	Ministry of Environment, Global Change Impact Studies Centre, National Agriculture Research Centre, Pakistan Met Department, Pakistan Council for Research on Water Resources, WAPDA, relevant NGOs	• Nationwide review of risks and impacts on wetland resources produced by 2011 • Prepare complete models at national level to access trends by 2015
	1.5.2 Develop and incorporate adaptation mechanisms for wetlands threatened by climate change, incorporated and implemented in wetland management plans	Ministry of Environment, Global Change Impact Studies Centre, National Agriculture Research Centre, Pakistan Met Department, Pakistan Council for Research on Water Resources, WAPDA, relevant NGOs	• Vulnerability and risk assessments to climate change of 5 priority wetland sites carried out, leading to identification of adaptation mechanisms and incorporation into management plans by 2015 • Extension of adaptation methodologies to at least 5 other sites by 2020
	1.5.3 Recognize the roles played by wetlands in protection and mitigation of natural disasters, and strengthen	Ministry of Environment, National Disaster Management Authority	• Review of the protective roles played by wetlands in extreme climatic events by 2012

	emergency response mechanisms for dealing with natural and man-made extreme events in and around wetlands	(NDMA, ERRA, Met Dept, IRSA, WAPDA, Federal Flood Commission), Agencies with disaster preparedness roles and responsibilities, international Agencies, NGOs	• Disaster preparedness agencies recognize the wetlands in their areas and how to use them in the event of a disaster by 2020
2. Regulatory framework for the conservation and sustainable use of wetlands developed and implemented			Policies, laws and regulations harmonized and new legislation covering wetland conservation and sustainable use in place by 2020
2.1 Harmonizing national wetland policy with other relevant sectoral policies			National wetland policy being implemented effectively and in harmony with other policies
	2.1.1 Implement the National Wetland Policy at all levels, through wetland related strategies and action plans	Federal, provincial and regional wildlife, fisheries and forestry, water and irrigation departments, EPAs	• Provincial Wetland strategies and action plans in place, funded and being implemented by 2015
	2.1.2 Harmonise national wetland policy with other policies being implemented throughout the country in particular including: ▪ Biodiversity Action Plan (2000) ▪ National Environmental Action Plan (2001) ▪ National Environmental Policy (2005 – 2015) ▪ National Fisheries Policy (2006) ▪ Draft National Water Policy (2006) ▪ Clean Drinking Water for All	Ministry of Environment, NCCW with other ministries and provincial departments and institutions associated with these policies	• Review of policies to identify areas of overlap, complementarity and conflict by 2012 • Development of mechanism for appropriate policy implementation focused upon opportunities for strengthening policies between 2012 and 2015

	▪ National Sanitation Policy 2007 ▪ National Forest Policy ▪ Energy Conservation Policy ▪ National Vision 2030 and Strategy for Forest Biodiversity Conservation ▪ Draft Wildlife Policy		
	2.1.3 Establish indicators for monitoring each strategic objective and its links with other policies, and implement a monitoring programme with a time line, and incentives to ensure that monitoring will be done.	Ministry of Environment (NCCW through its National Wetlands Advisory Committee)	• Progress review of implementing National Wetland Policy and associated policies every 3 years
	2.2.3 Develop a specific wetland law or component of wider biodiversity law, harmonised with other natural resource and water use legislation	Ministry of Environment	• Biodiversity law drafted and enacted with specific wetland conservation and sustainable use components by 2015
2.2 Streamlining the legal status for the protection and sustainable use of wetlands and developing new wetland legislation			Laws and regulations providing effective coverage for wetland conservation and sustainable use by 2015
	2.2.1 Prepare guidance for wetland managers to include interpretation of existing laws and regulations to show how they can be used for the conservation and sustainable management of wetlands	NCCW, PWP, IUCN, WWF	• Sustainable wetland management guidance, including interpretation of existing laws and regulations prepared by 2012 • Dissemination of guidance and training for wetland managers by 2015
	2.2.2 Identify laws and regulations that are actively detrimental to wetlands and take steps to address these with amendments	PWP, IUCN, NCCW, WWF	• Review with clear identification of laws and regulations damaging wetlands by 2012

			• Progressive amendments of these laws proposed to restrict potential damage to wetlands by 2015
	2.2.3 Develop a specific wetland law or component of wider biodiversity law, harmonised with other natural resource and water use legislation	Ministry of Environment	• Biodiversity law drafted and enacted with specific wetland conservation and sustainable use components by 2015
3. Coordination and collaboration between agencies and sectors on wetland issues encouraged from local to international levels			Arrangements in place for relevant agencies and sectors at all levels to work together for the conservation and sustainable use of wetlands in Pakistan
3.1 Ensuring greater coordination between institutions with wetland responsibilities			Reviews of coordination effectiveness between water and wetland agencies in 2020 and 2030 Wetland management plans amicably developed and implemented by relevant agencies
	3.1.1 Clarify the mandate, roles and responsibilities for wetlands of key agencies at federal and provincial levels. Identify focal departments within these agencies	Ministry of Environment, NCCW, WAPDA, Provincial water and irrigation departments, P & D departments, PEPA, Provincial EPAs, Provincial Wildlife, Fisheries, Forestry	• Wetland focal points identified in each agency with wetland responsibilities, with clearly defined mandate by 2012
	3.1.2 Review, reconstitute and strengthen the NCCW to cover the wider aspects of wetland coordination at federal and provincial levels	Ministry of Environment, NWAC, NCCW	• NCCW in place and strengthened by new mandate by 2012 • Review of coordination effectiveness by 2020
	3.1.3 Establish the National Wetlands	MoE/ NCCW	• NWAC and provincial wetland

	Advisory Committee (NWAC) and provincial wetland committees with a comprehensive mandate to foster co-operation for the conservation of wetland types and resources throughout the country	Provincial governments PWP	committees established by 2012 • Meetings of the National Wetlands Advisory Committee held at least once per year
	3.1.4 Establish a national network of protected wetland areas including those in national parks, wildlife sanctuaries and game reserves.	NCCW, Provincial wildlife, fisheries and forestry departments, Protected areas management units	• Network established • Annual meetings of national network of protected wetland area managers.
3.2 Developing site-level collaborative wetland management			Collaborative wetland management practiced in priority wetland sites and other wetlands throughout the country
	3.2.1 Develop the capacity of local communities and wetland users and stakeholders for collaborative management	NCCW, Provincial wildlife, forest and fisheries departments. PWP, NGOs. Local wetland users groups and communities,	• Active collaborative management mechanisms in place in at least 2 priority wetland sites per province/territory by 2015, and in 5 additional sites by 2025
	3.2.2 Support programmes to manage local wetland habitats throughout the country, including wetlands that are not designated as protected areas	Provincial wildlife, forest and fisheries departments. Local wetland users groups and communities, NGOs	• Collaborative wetland management taken up by user groups in other non-protected wetlands by 2025
	3.2.3 Support incentive programmes for wise use of wetland resources on privately-owned and communally-used wetlands	Ministry of Environment, NCCW, Provincial wildlife, fisheries and forestry departments	• Wise use supported on at least 2 privately-owned or communally used wetlands per province/territory by 2020
3.3. Developing coordination and collaboration on wetland issues at the provincial level			Provincial agencies working together to address wetland issues in each province
	3.3.1 Develop wetlands coordination mechanisms to operate at	Housed in appropriate provincial agency Wildlife /	• Wetland Coordination Units established in each

	provincial/territory level	WAPDA / EPA / P & D	province/territory by 2015
	3.3.2 Develop incentives and compensation mechanisms to secure priority wetlands for targeted conservation objectives across the country	Ministry of Environment, NCCW, Provincial wildlife, fisheries and forestry departments	• Incentives and compensation mechanisms developed for encouraging protection and wise-use of wetlands by 2020
	3.3.3 Develop enabling mechanisms for collaborative wetland management at provincial level	Ministry of Environment, Provincial wildlife, fisheries and forestry departments, NGOs	• Legal instruments in place for collaborative wetland management in place by 2015 • Advice and guidance on collaborative wetland management processes available by 2015
3.4 Developing inter-provincial collaboration on wetland issues			Transboundary wetland issues are not a cause for conflict between provinces
	3.4.1 Share national and provincial expertise and experience to address common wetland issues between two or more provinces	Provincial agencies with wetland responsibility, supported by NCCW	• At least 2 interprovincial / transboundary wetland issues addressed by 2020
3.5 Developing International collaboration on wetland issues			Pakistan wetland specialists and managers actively participating in international wetland activities and negotiations
	3.5.1 Support international environmental conservation initiatives and treaties, especially Ramsar Convention on Wetlands[6]	Ministry of Environment, NCCW	• Active involvement of Pakistan agencies in Ramsar Convention meetings, and other MEAs
	3.5.2 Facilitate regional (south and west Asia) collaboration on implementation	Ministry of Environment, NCCW, Indus River System	• Active participation by Pakistan agencies in regional

[6] Also the Convention on Biological Diversity, CITES, UNFCC and the Convention on Migratory Species, World Heritage Convention and the programmes of BirdLife International, IUCN, IWMI, Wetlands International and WWF. Regional forums are provided by SACEP, ICIMOD and SAARC.

	of conventions and sharing experiences and expertise to address transboundary issues	Authority,	wetland meetings
	3.5.3 Establish a network of academic institutions that can share and build wetland expertise both nationally and regionally	Academic institutions with wetland expertise and courses, supported by NCCW,	• Regular regional meetings of academic institutions with wetland interests
4. Wetland research, education and data management promoted			Regularly updated research and survey data on wetlands available and used in research, education and management of wetlands
4.1. Improving the understanding of wetlands science – processes, use, threats and management			Wetland research provides better understanding and solutions for conservation and sustainable use of wetlands in Pakistan by 2020
	4.1.1 Establish national priorities for wetland scientific research with regular review	Higher Education Commission, NCCW, drawing on information from academic institutions and provincial wildlife, fisheries and forestry departments and EPAs and wetland managers	• Three yearly reports identifying national wetland research priorities
	4.1.1 Establish national priorities for wetland scientific research with regular review	Higher Education Commission, Ministry of Environment, drawing on information from academic institutions and provincial wildlife, fisheries and forestry departments and EPAs and wetland managers, Irrigation departments, WAPDA,	• Three yearly evaluation reports, identifying national wetland research priorities

		energy & power department NWFP, PFI	
	4.1.2 Establish programmes to catalyse and promote priority national and provincial wetland research and centres of expertise	Higher Education Commission, NCCW, international research funding agencies	• Three yearly funding cycle for wetland research proposals
	4.1.3 Propose research methods, processes and tools for data collection on priority wetland components	NCCW with key academic institutions, international conservation organizations, NGOs	• Manuals for Pakistan wetland research and inventory produced by 2015 drawing upon international good practice
	4.1.4 Promote the sharing and dissemination of wetland research findings, through: • National and provincial wetland seminars • A society of wetland scientists • A Pakistan journal of wetlands management	Academic institutions with wetland expertise.	• Meetings and seminars on wetlands every year • Publication of journal of wetland management by 2015 • Appropriate wetland research information shared regularly with fisherfolk and local communities
4.2 Encouraging wetland education at all levels from primary to tertiary education			School children with a good appreciation of wetland issues and local wetland resources
	4.2.1 Include wetland ecology and management in the curricula at different education levels	Ministry of Education with Ministry of Environment, NCCW, NGOs	• Wetland ecology modules prepared by 2015 • Wetland ecology modules being taught in schools by 2020
	4.2.2 Encourage field visits to local wetlands as part of the core educational activities	Educational institutions	• Regular visits by educational institutions to local wetlands and wetland information centres where available
4.3 Developing and improving wetland maps and data			Pakistan's wetlands mapped and status reported regularly

management			
	4.3.1 Apply a standardised national approach to wetland classification, inventory and data integration	Ministry of Environment Relevant provincial departments, NGOs, academic institutions	• Application of the Pakistan wetland inventory started under PWP completed by 2015
	4.3.2 Develop GIS-based wetland maps wetlands throughout the country	PWP, NCCW, Relevant Provincial departments, NGOs, academic institutions	• Mapping of priority wetlands completed by 2015 • Mapping of all the wetlands completed by 2025
	4.3.3 Extend and manage the comprehensive national data base on the location and status of wetlands and their resources	PWP, NCCW	• National wetland data base permanently housed by 2015 and updated regularly
	4.3.4 Prepare a regular report on the national status and trends of wetlands, including climatic changes and other influences	Ministry of Environment, NCCW, Relevant Provincial departments	• Report on the status, trends and threats to Pakistan's wetlands produced every 3 years
4.4 Valuing Pakistan's wetland benefits and services			Continued recognition of the economic value of Pakistan's wetlands
	4.4.1 Establish standardised protocols for description of the functions and values of wetland ecosystems	PWP, NCCW, Relevant Provincial departments, NGOs, academic institutions	• Review recommending approaches and methods to be used for describing economic value of Pakistan wetlands produced by 2012
	4.4.2 Apply valuation tools to selected wetlands	PWP, NCCW, Relevant Provincial departments, NGOs, academic institutions	• Valuations of priority wetlands carried out between 2012 and 2020
	4.4.3 Promote the economic, social and beneficial functions and values that wetland ecosystems provide to society	PWP, NCCW, Provincial wildlife, fisheries and forestry departments, NGOs	• Economic valuations of wetlands used for wetland management, in EIAs and public awareness
4.5 Providing access to wetland			Wetland information freely and

information			publically available for use in wetland management, in EIAs and public awareness
	4.5.1 Establishing a public access website for wetland information, including wetland maps and database information	WWF-P, NCCW, PWP, Provincial wildlife, fisheries and forestry departments	• Extension and expansion of PWP website and its continued maintenance by NCCW
	4.5.2 Ensure that EIAs and other documents that assess the impacts of developments upon wetlands are made public	PEPA, Provincial EPAs	• Each province/territory to ensure full disclosure of IEE and EIA documents
5. Pakistan's capacity for sustainable wetland management built			People and organizations involved with and managing wetlands have competence to address wetland issues, and the materials and equipment for sustainable management by 2020
5.1 Building the capacities for site level wetland management			Capacities for wetland managers and users in 2 priority wetlands per province/territory strengthened by 2012, and in 5 additional wetlands per province/territory by 2020
	5.1.1 Providing training for collaborative wetland management for stakeholders at specific wetlands	PWP, Provincial wildlife, fisheries and forestry departments, NGOs, wetland managers	• On site and distance training courses provided to 2 priority wetland managers per province/territory by 2015, and to 5 additional wetland managers per province/territory by 2020
	5.1.2 Providing equipment for management and monitoring at specific wetland sites	PWP, Provincial wildlife, fisheries and forestry departments, NGOs	• Appropriate equipment for wetland management and monitoring provided for 2 priority wetlands per

			province/territory by 2015, and for 5 additional wetlands per province/territory by 2020
5.2 Building the capacity for addressing wetland issues amongst provincial government agencies			Provincial government agencies have appropriate capacity to deal with their responsibilities for water and wetlands
	5.2.1 Developing competencies of key agencies responsible for water and wetlands resources appropriate to their defined wetlands mandates and roles	PWP, Ministry of Environment, sectoral agencies, working with key provincial agencies	• Capacity needs assessment associated with definition of different agencies' mandates for wetlands carried out by 2012 • Appropriate awareness raising and training provided to these agencies between 2012 and 2015
	5.2.2 Ensure that agencies have adequate human resources, infrastructure and equipment to implement wetland policies and site management plans	Ministry of Environment, PWP, sectoral agencies, key provincial agencies	• Key agencies with responsibilities for wetlands are well resourced to carry out their mandates by 2015
5.3 Building the capacity for addressing wetland issues amongst federal government agencies			• Federal government agencies have the competencies and resources to coordinate, advise and monitor the management of Pakistan's wetland resources by 2030
	5.3.1 Develop the competencies and human and material resources for NCCW to undertake its coordination, advisory and monitoring roles	Ministry of Environment, NCCW	• Restructured NCCW strengthened to undertake its key responsibilities for wetlands, with trained human resources and equipment by 2015
	5.3.2 Develop the competencies of key	Ministry of Environment,	• Capacity needs assessment

	sectoral agencies responsible for wetlands to implement their mandates	NCCW, Federal sectoral agencies,	associated with definition of different sectoral agencies' mandates for wetlands carried out by 2012 • Appropriate awareness raising and training provided to these agencies between 2012 and 2015
6. Enhanced understanding, perceptions and attitudes towards wetlands promoted			Increased public awareness about the importance of wetlands throughout all sections of Pakistan society
6.1 Creating awareness about wetlands amongst: • The general public • Wetland stakeholders and users • Specific influential groups • Government officials • Senior decision makers			Reviews of communications strategies indicate increased levels of awareness and effectiveness of the campaigns by 2015 and 2025
	6.1.1 Develop and implement a broad communications strategy for general public awareness and specific target audiences in all provinces and territories	Ministry of Environment, NCCW, PWP, Provincial wildlife, fisheries and forestry departments, NGOs	• Communications strategy in place and implemented by 2012 • Regular reviews of strategy effectiveness in 2015 and 2025
	6.1.2 Create awareness amongst specific groups – e.g. Clerics, military, bankers, educational institutions, media etc. who may use their influence in their work to promote the sustainable use of wetlands	Ministry of Environment, NCCW, PWP, Provincial wildlife, fisheries and forestry departments, NGOs	• Influential groups use awareness of wetland issues in their work
	6.1.3 Sensitise environmental magistrates towards wetland issues and laws and regulations	Judiciary, Ministry of Environment, NCCW, PEPA, Provincial EPAs,	• Environmental magistrates apply appropriate laws and regulations to cases involving

		Provincial wildlife, fisheries and forestry departments, NGOs	damage to wetlands
	6.1.4 Develop and implement communications campaigns aimed at stakeholders and users of selected wetlands to improve management	Provincial wildlife, fisheries and forestry departments, NGOs	• Wetland users and communities are more aware of the wetland issues concerning their wetlands
	6.1.5 Develop and implement communications campaigns aimed at the corporate sector, especially for those affecting specific wetlands (e.g. through pollution or abstraction of water)	Ministry of Environment, NCCW, PWP, NGOs	• Businesses affecting specific wetlands are more aware of the impacts of their activities, and take steps to mitigate these impacts
	6.1.6 Develop communications and awareness campaigns focused on government agencies at federal and provincial levels with priority wetland roles and responsibilities, including the FFW, wildlife, environment, water and natural resource use agencies	Ministry of Environment, NCCW, PWP, Provincial wildlife, fisheries and forestry departments, Water and irrigation departments, NGOs, Media.	• Greater awareness amongst officials of federal and provincial government agencies about the importance of wetlands and their roles and responsibilities
	6.1.7 Provide clear, targeted information and policy briefings for senior decision makers from the key ministries concerned with wetlands and developments that may affect wetlands	Ministry of Environment, NCCW, National Standing Committee on Environment, Senate Standing Committee on Environment and Provincial Standing Committees	• Senior government officials and politicians are well informed about wetland issues before making decisions
7. Financing mechanisms for sustainable wetlands management secured			Long-term funding is available to implement the Pakistan Wetlands Policy from a variety of different sources
7.1. Sourcing wetland finance from various environmental funds			
	7.1.1 Access various environmental	MoE, Provincial	• Various environmental funds

	funds, where functional, to provide funding for specific wetland management activities, e.g. • Provincial/District Sustainable Development Funds, • Natural Resource Development Funds – o Forest Development Fund o Mountain Areas Conservation Fund, o Protected Areas Management Fund	environmental funds. ZSD, NCCW, provincial forest, wildlife/ fisheries departments, relevant NGOs/ RSPs and CBOs and tourism agencies	continue to allocate finance for wetland initiatives in line with Wetlands Policy
	7.1.2 Establish Wetlands Management Cell for Management of Wetlands Management Fund	Ministry of Environment,	• Wetlands Cell established by 2010
	7.1.3 Establish Wetlands Management Fund in provinces. Other relvant funds (where existing) streamlined to provide windows for wetland conservation	Ministry of Environment, provincial governments	• Wetlands Management Fund is established by 2012 • Window for wetland management created in other related funds.
7.2. Ensuring specific wetland allocations in government budgets			
	7.2.1 Establish appropriate budgets for wetland conservation and management within national and provincial government agencies	Ministry of Environment, NCCW, PEPA, Provincial wildlife, fisheries, forestry departments, Water and irrigation departments, Provincial EPAs	• Federal and provincial budgets have clearly identified budget lines associated with sustainable wetland management
7.3. Developing corporate sector finance for wetlands			Corporate sector recognizes its contributions to sustainable management of wetland
	7.3.1 Develop appropriate fiscal mechanisms for supporting wetland	Ministry of Environment, Corporate Sector	• Review of corporate sector financial mechanisms for

	conservation and sustainable use, based on concepts such as "polluter pays principle" and "payment for environmental services", "user pays" biodiversity offsets etc. e.g. Taxes and levies on tourists	representative institutions/ bodies	supporting wetlands by 2012 • Demonstrations of corporate support through development of at least one model wetland site in each province/territory by 2015.
	7.3.2 Ensure that funds allocated for implementing environmental management plans of major developments e.g. hydropower dams, transport and irrigation schemes, include an allocation for ongoing wetland management and rehabilitation	Ministry of Environment, PEPA, Provincial EPAs. Developers and environmental management consultants	• All environmental management plans have clear allocations of funds for affected wetlands and resource users. • Implementation of EMPs shows actual disbursement of funds for affected wetlands rehabilitation and compensation for wetland users
	7.3.3 Develop public-private partnerships for wetland rehabilitation and management. e.g. CSR initiatives, Green loaning from banks, Awareness through "green cheque book" schemes, donations	Corporate sector, Ministry of Environment, PEPA, Provincial EPAs, developers and environmental management consultants, wildlife departments	• Specific wetland focused initiatives developed by companies in Pakistan
7.4 Developing donor funded projects			
	7.4.1 Source financial support for Wetlands Management Fund from international and national sources of funding, including multilateral, bilateral and non-governmental sources	Ministry of Environment, Provincial wildlife, forest and fisheries departments, water and irrigation departments. NGOs, donor	• Each province/territory has at least one donor financed wetland project secured by 2015

		agencies	
	7.4.2 Source funds from climate change related activities, e.g. Carbon offsets, CDM and REDD for financing Wetlands Management Fund	Ministry of Environment, provincial wildlife, forest and fisheries departments, water and irrigation departments. NGOs, donor agencies	• Each province/territory has at least one wetlands and climate change related project being implemented by 2015

Annex 2: Issues Paper -

Towards a National Wetlands Policy for Pakistan

Executive summary of the issues

Despite its arid climate, Pakistan supports over 780,000 ha of wetlands covering 9.7% of the total land area, with 225 nationally significant wetlands, of which 19 have been recognised as Ramsar sites of global significance. It has a wide diversity of wetland types representing the passage of the Indus River from the glaciers and high alpine lakes, through riverine and freshwater lakes to the coastal wetlands of the Indus Delta. Every province and administrative area has important wetlands.

These wetlands provide often unrecognised benefits and services, such as provisioning - food and fibre production - regulating services such as water balance, groundwater recharge, flood mitigation and storm protection, cultural and social functions such as sacred and religious importance, and providing recreation and tourism opportunities, and supporting functions such as soil formation and sediment retention. If these ecosystem functions are lost through the degradation and encroachment of wetlands, Pakistan will lose important resources and be more vulnerable to natural disasters. Already Pakistan has lost or degraded over 60% of its inland wetlands.

The main threats to wetlands include shortages of water to maintain the wetlands, poor water quality from increasing pollution that threatens to degrade wetlands, encroachment and change in land use and over-exploitation of natural resources, such as fish and wildlife. Often the over-exploitation is driven by the lack of alternative livelihoods so that poor communities may have no option. Degradation from "the tragedy of the commons" applies to wetlands due to inadequacies of communal property management regimes.

The underlying causes of these direct threats are related to the perception that wetland natural resources are part of an open-access system. Management of the natural resources, if it exists at all, is usually ineffective and penalties for illegal or inappropriate resource-use are often not significant enough to be prohibitive. These inappropriate practices generally stem from policy shortcomings, legal gaps and inconsistencies, failure to enforce regulations, and institutional overlap of responsibilities for management of wetlands and lack of coordination. Consistently decision-makers and regulators do not adequately transfer appropriate environmental costs directly to users – both water users, so that water is wasted, and polluters, who continue to degrade wetlands.

A pervasive lack of awareness both amongst the general public and more importantly amongst key policy and decision makers at national and provincial levels undermines most efforts at wetland conservation and sustainable use. The direct threats and underlying causes of wetland loss and degradation are summarised in the table below and described more fully in the paper. A number of initiatives have been started for the conservation and sustainable use of wetlands in Pakistan, including the Pakistan Wetlands Programme, which is described because it illustrates the need for this work to be continued in the implementation of the proposed National Wetland Policy. The development of the policy is an integral feature of the Pakistan Wetland Progranne.

Direct threats to Pakistan's Wetlands

Loss of wetlands

Changes in water availability

- Climate change and glacier melt
- Flood and drought
- Watershed management issues - deforestation
- Demand for water for agriculture, domestic supply and industry
- Environmental flows
- Hydropower developments

Land use change

- Encroachment for agriculture
- Encroachment for building
- Urban developments – mega-cities
- Industrial development
- Irrigation and drainage schemes
- Hydropower schemes
- Transport sector – ports, roads and railways
- Climate change and sea level rise

Change in ecological character

Changes in water quality:

- Organic pollution
- Bacterial pollution
- Chemical pollution
- Oil pollution
- Agricultural chemicals
- Nutrients
- Salinity
- Thermal pollution

Ecological changes

- Spread of Invasive Alien Species
- Climate change induced ecological changes – temperature, rainfall, species shift

Over-exploitation of natural resources

- Over-use of vegetation for grazing, fuel, handicraft industries
- Hunting pressures on wetland mammals and waterfowl
- Fisheries – Over-fishing
    - Illegal fishing methods, dynamite and poison
    - Illegal nets and net materials
    - Non-observance of fishing close seasons and regulations
- Introduction of exotic species

- Non-sustainable tourism – water pollution, disturbance, development pressures

Underlying causes of wetland loss and degradation

Underlying causes

Socio-economic factors

- Lack of viable alternative livelihoods for wetland users, not to over-exploit
- Perception of common user rights to wetland resources
- Displacement of wetland users
- Economic value of land compared to value of natural wetlands
- Social and political unrest with regard to water resources
- Lack of awareness amongst general public
- Population pressures

Institutional factors

- Lack of awareness amongst decision makers and resource managers
- Conflicting and duplicated mandates for management of wetlands
- Lack of coordination between organisations responsible for wetlands
- Lack of institutional capacity for enforcement, technical management and advice
- Lack of financial resources

Legal Issues

- No legal recognition of wetlands.
- No laws that operate at the 'ecosystems level'.
- Too many different laws governing sectors, processes and activities (development, land use, etc.) that have a potential detrimental effect on wetlands.
- Existing legal mechanisms for protection, e.g. protected area laws, do not cover multiple sectors involved in wetlands conservation and protection
- No legal basis or financial incentives to encourage positive conservation measures

Planning issues

- EIA process is weak, lacking in enforcement and recommendations often disregarded
- EIAs rarely consider wetland issues
- EIAs conducted with inadequate consultation with wetland stakeholders
- No planning or building regulations (e.g. buffer zones) near wetlands and beaches, and these are disregarded where they exist

5. What and where are wetlands in Pakistan?

The Ramsar Convention defines wetlands as "areas 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 metres". It may also incorporate riparian and coastal zones adjacent to the wetlands, to conserve the integrity of the wetlands. Man-made wetlands including reservoirs, irrigation works and rice fields are also included. The definition covers all the wetland types found in Pakistan. Pakistan has not legally defined wetlands but for the purposes of developing the Pakistan Wetlands Policy, the Ramsar definition of wetlands is used. If Pakistan develops a specific regulatory framework for wetlands, the Ramsar definition should be expanded to include glaciers, man-made wetlands and the wider areas around wetlands that may be inundated every few years.

Five major wetland types are generally recognized:

- **marine** (coastal wetlands including coastal lagoons, rocky shores, coral reefs);
- **estuarine** (including deltas, tidal marshes, and mangrove swamps);
- **lacustrine** (wetlands associated with lakes);
- **riverine** (wetlands along rivers and streams); and
- **palustrine** (meaning "marshy" - marshes, swamps and bogs).

Pakistan is well endowed with a wide variety of these wetland types in all parts of the country with over 225 nationally significant wetlands covering an area of over 780,000 ha[7]. Wetland conservation and sustainable use is applicable in every province and administered area and should feature in environmental management measures at local, provincial and federal levels.

Figure 1 shows the distribution of wetlands in Pakistan, identifying the 19 Ramsar sites of globally important wetlands. Table 1 provides some brief details of these; only 10 of these 19 sites have protection status as wildlife sanctuaries or game reserves. Figure 2 shows the distribution of wetlands in the four major eco-regions represented in Pakistan – Montane and Alpine, Semi-Arid, Arid and Coastal. Despite the conservation status attached to a number of key wetlands, either as Ramsar sites or parts of other protected areas, there are many more that are unprotected and largely unmanaged.

The wetlands that are specifically found in Pakistan include the following:

- **Glaciers** – Pakistan has more area under glaciers than any other country – 13,680 sq km, or about 13% of the mountain area of the Upper Indus Basin. The largest is Siachen glacier, which is 75 km long in the eastern Karakorum.

- **Alpine lakes** – there are over 25 significant high altitude lakes in Pakistan, often fed by glaciers, lying at altitudes between 2,000 m and over 4,000 m. Most of

[7] The total area of the 19 Ramsar sites is 1,343,627 ha, but this includes the surrounding land areas.

these are in the Northern Areas, including Rush lake at 4,684 m, Satpara and Kachura Lakes in Skardu, Rama in Astore and Sheosar Lake on the Deosai Plateau, and in NWFP, including then highest – Ansoo Lake (5,027 m), Dudipatsar and Saiful Maluk in Kaghan, Kuramber and Shandur Lakes in Chitral and Lulusar Lake in the Naran valley and about three alpine lakes in AJK. Alpine lakes are characterised by cold, oligotrophic conditions with restricted but often unique flora and fauna.

- **Springs and streams –** occur throughout the country, wherever suitable groundwater conditions prevail, including along the coast. The streams collect the water from the watersheds and feed into the Indus River system.

- **Rivers** – Pakistan's principal river is the Indus, arising in the Himalayas, and flowing through the Northern Areas and out of the hills at Attock in NWFP. It has a total length of 2,897 km; five major tributaries from the east arising in India (Jhelum, Chenab, Beas, Ravi and Sutlej), come together to make the Panjnad before joining the Indus in southern Punjab. The flows of the latter two rivers are largely controlled by India. From the west, it is joined by the rivers that make up the Kabul river system. Broadly speaking, the rivers in the north, hilly areas are fast flowing, cold water rivers with typical flora and fauna. Once the Indus and its tributaries reach the plains, the river has a more productive, warm water ecosystem. The Indus flows through Sindh and discharges into the Arabian Sea in the Delta south east of Karachi. The rivers of Balochistan are much smaller and often seasonal. One of the key features of the lowland rivers is riverine forest, an important wetland type, which grows on the banks and in the floodplains of the Indus. These are threatened by water abstraction and loss of the floodplains.

- **Natural lowland lakes** – There are a number of natural lowland lakes in Punjab and Sindh, which can be classified into freshwater and brackish according to their salt content. In Punjab the major natural lakes in the Salt Range, include Kalar Kahar, Khabeki, Jahlar and Ucchali Lakes. Simli Lake near Islamabad is formed from the melting snow and natural springs of Murree Hills and is the largest drinking water source for Islamabad. In Sindh, Manchar Lake: is the largest freshwater lake in Pakistan and one of the largest in Asia, located west of the Indus River. The area of the lake fluctuates with the seasons from as little as 350 km² to 520 km². The lake is fed by numerous small streams in the Kirthar Mountains and empties into the Indus River. Keenjhar or Kalri Lake in Thatta District is another very large freshwater lake used for water supply.

- **Small dams and large reservoirs:** Man-made lakes formed by dams for hydropower and water supply are important wetland resources. They include the small water supply and irrigation lakes such as are found in Balochistan and FATA, and the larger lakes formed by dams such as Tarbela dam which has an area of 250 km^2. Mangla dam and reservoir lies on the Jhelum River between Punjab and AJK. In NWFP there are Warsak Dam, Simly and Sadpara. Other larger water supply reservoirs include Khanpur Lake, providing for Islamabad and

Rawalpindi; and Namal Lake in Mianwali, which extends over 5.5 km^2 and was formed in 1913 after the construction of Namal Dam. Rawal Lake is a man-made lake in Islamabad Capital Territory extending over 8.8 km^2 and is also a water source for the capital. In Thatta District, Sindh, Haleji Lake is now no longer used for water supply to Karachi, but is Asia's largest water fowl reserve. In Balochistan, Hanna Lake provides water supply for Quetta.

- **Barrage headponds:** There are six major barrages built on the Indus River, which provide irrigation water for agricultural areas along the river - Jinnah, Chashma, Taunsa, Guddu, Sukkur and Kotri Barrages. The first three are located in Punjab, Guddu Barrage lies on the border between Punjab and Sindh and the latter two lie in Sindh. Created during the 20^{th} century for distribution of irrigation waters, the barrage headponds are important for wetland biodiversity.

- **Irrigation and drainage canals:** Although often overlooked as wetlands, the irrigation and drainage canal networks throughout the country, particularly in NWFP, Punjab and Sindh, form wetlands. There are a number of link canals between the "five rivers". Where the canals are unlined, seepage may create adjacent waterlogged areas and swamps, which can be important for local aquatic resources. An example is the wetland area created by the Nara canal in Sindh, and the associated Chotiari reservoir. Effective drainage of irrigation water is critical to prevent water logging and soil salinisation, and Left and Right Bank Outfall Drains (LBOD and RBOD) in Sindh have associated wetland areas. The "kareze" system is a particular form of irrigation system which taps into ground water found especially in Balochistan.

- **Rice paddy:** irrigated agriculture that floods the fields at certain times of year, e.g. for rice paddy, creates seasonal wetlands that are important as food sources for fish and amphibians and also for migrating birds.

- **Urban wetlands:** water filled depressions caused by construction, lakes in parks and golf courses and waste water treatment lagoons and constructed wetlands are all forms of man-made urban wetlands, that serve recreational, and purification purposes, as well as being habitat for flora and fauna. All cities in Pakistan have urban wetlands, which are often overlooked, but important locally. Near the coast around Karachi, salt extraction creates saline ponds attracting certain bird species.

- **Peat lands:** some estimates of the area of peat land in Pakistan at around 20 km^2. Most of these are high altitude peat lands for example in Deosai, Ghizer district in the Northern Areas and Chitral. The peat lands of Shandur have achieved some recognition due to potential destruction by the crowds at the annual polo match.

- **Marshes:** There are extensive areas of both freshwater and saline marshes in Sindh, including the Deh-Akro-II Desert wetlands north of Karachi, and the Rann of Kutch, which are both Ramsar sites. Other smaller marshes are associated with

barrages and seepage from irrigation canals. When canals pass through desert areas, the wetlands created by seepage can be locally important.

- **Coastal wetlands:** Pakistan's coastal wetlands are a very important category and include:
    - **Mangroves –** The Indus Delta covers an area of some 600,000 ha, of which about 160,000 ha are forested with mangroves. Reduction of water flows, cutting and environmental degradation have led to extensive losses, although there have been significant efforts at rehabilitation in some parts. The Makran coastline in Balochistan also contains some valuable pockets of mangroves covering about 10,000 ha, notably at Miani Hor, Kalmat Khor, and Gwaddar Bay.

    - **Estuaries:** The biggest estuary is that of the Indus, which flows out through the Qalandri Creek in the Indus Delta, although with water abstraction upstream, the river may discharge water to the sea for only three months a year. Along the Balochistan coast, the only permanent rivers forming estuaries are the Hub and Hingol rivers, although there are a number of seasonal rivers flowing into the sea along the coast. Miani Hor and Kalmat Khor are deep inlets with mangroves and salt marshes.

    - **Beaches:** the dramatic coastline from Karachi to Pasni has extensive beaches interspersed with rocky outcrops and peninsulas. A number of these beaches are important turtle nesting beaches, e.g. Sansdpit and Hawksbay, and along the Makran coast at Hingol, Ormara, Jiwani and Pasni.

    - **Coral reefs:** the only active coral reefs found in Pakistan are on Astola Island, the largest offshore island which is also important for turtles nesting. Fossil coral reefs are found in southern Badin District.

Table 1 shows the distribution of these types of wetlands in the provinces and federally administered areas. Many of these wetlands are associated with the Indus River lying in its floodplain, especially those in Punjab and Sindh (Figure 3)

Figure 1: Map of Pakistan's wetlands

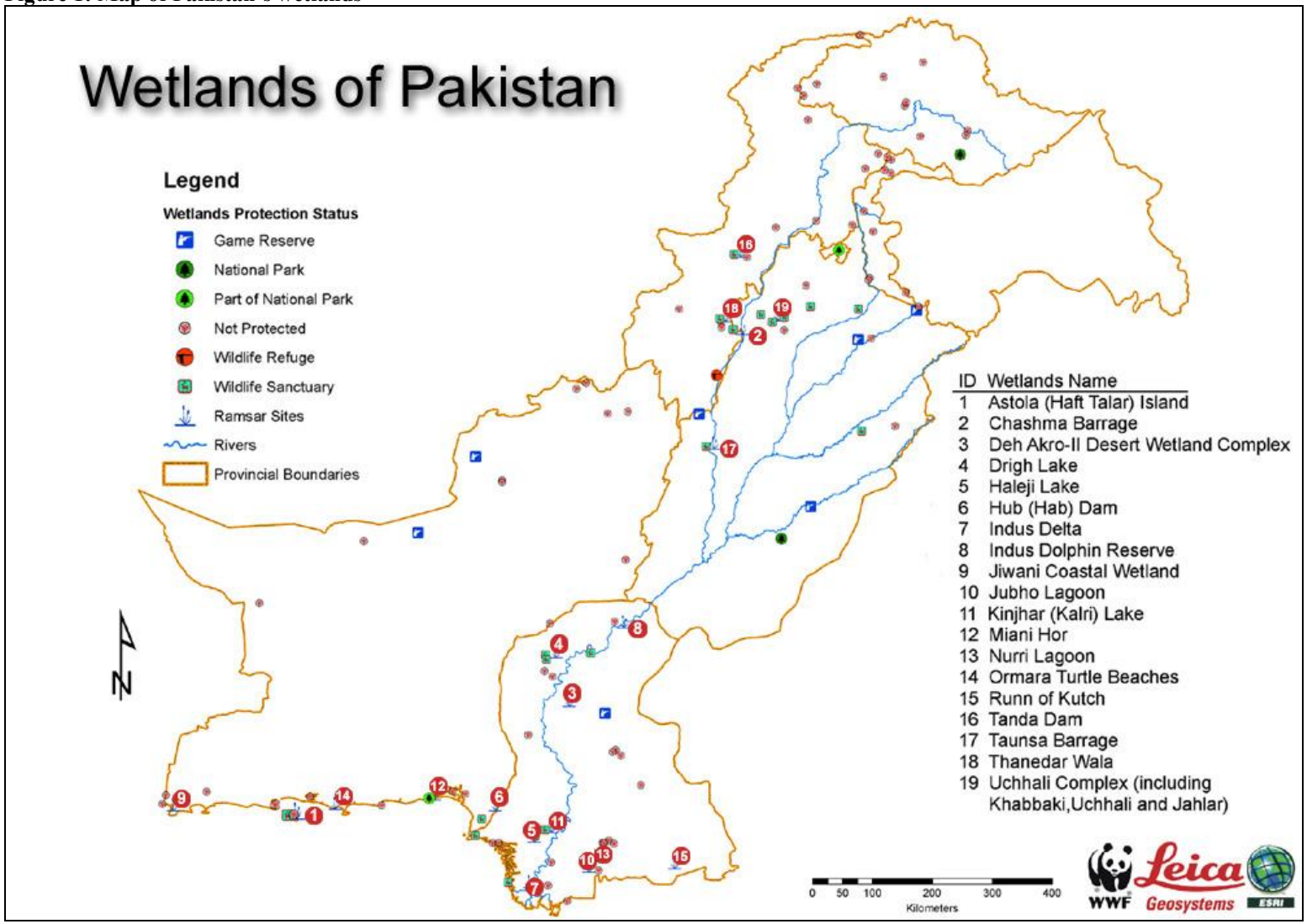


Table 1: Brief details of Pakistan's 19 Ramsar Sites

Ramsar site name	Size Ha	Province	Character	Protection status
Astola Island	5,000	Balochistan	Desert island, with high cliffs and Pakistan's only coral, turtles	None
Chashma Barrage	34,099	Punjab	Storage reservoir on Indus, important for migratory waterbirds	Wildlife sanctuary
Deh Akro-II Desert Wetland Complex	20,500	Sindh	Desert, 36 lakes, marsh, agriculture, rare fauna (marsh crocodile, hog deer) and indigenous fish	Wildlife sanctuary
Drigh Lake	164	Sindh	Small, brackish lake, extensive reed marshes surrounded by rice fields in Indus floodplain. Important breeding and wintering site for water birds.	Wildlife sanctuary
Haleji Lake	1,704	Sindh	Artificial lake with fluctuating water levels, fringed by brackish seepage lagoons and aquatic vegetation. Important breeding and staging point for migratory birds	Wildlife sanctuary
Hub Dam	27,000	Sindh, Balochistan	Large water storage reservoir on Hub River in arid coastal plains. Important staging and wintering point for migratory birds. Mahsheer provides excellent angling	None
Indus Delta	472,800	Sindh	5th largest delta in the world, fan shaped delta consists of creeks, estuaries, mud, sand salt flats, mangroves, marshes, sea bays, straits and rocky shores. Important for birds, fish and crustacean, dolphins and reptiles	Includes wildlife sanctuaries
Indus Dolphin Reserve	125,000	Sindh	170 km stretch of Indus River between Sukkur and Guddu barrages. Important for Indus Dolphin	None
Jiwani Coastal Wetland	4,600	Balochistan	Mangroves forests around Dasht River estuary along Gwaddar Bay, extending westwards to Iranian border and Ramsar sites. Important nesting ground for turtles	None
Jubho Lagoon	706	Sindh	Shallow brackish lagoon with associated mudflats and marshes, important with wintering birds and commercial fisheries. Privately owned by local inhabitants who use for agriculture and fishing	None
Kinjhar (Kalri) Lake	13,468	Sindh	Largest freshwater lake in Pakistan, extensive reedbeds. Major source of water for Karachi, important fishery and breeding, staging and wintering area for birds	Wildlife sanctuary
Miani Hor	55,000	Balochistan	Shallow sea bay and estuarine system, with low lying islands and mangroves	None
Nurri Lagoon	2,540	Sindh	Shallow brackish lagoon with barren mudflats. Important for migratory birds. Privately owned land. Fisheries	None
Ormara Turtle Beaches	2,400	Balochistan	Sandy beach about 10 km long. Supports breeding of three species of turtles.	None
Runn of Kutch	566,375	Sindh	Part of great Thar desert, permanent saline marshes, coastal brackish lagoons, tidal mudflats. Supports threatened species including bustards, cranes, hyena and flamingo	Wildlife sanctuary

Ramsar site name	Size Ha	Province	Character	Protection status
Tanda Dam	405	NWFP	Small water storage reservoir, supporting irrigated agriculture and fishery. Wintering area for birds	None
Taunsa Barrage	6,576	Punjab	Irrigation reservoir on the Indus. Riverine forest, Important wintering areas for waterfowl, and staging area for cranes and shorebirds. Commercial fishing, reed harvesting, recreation	Wildlife sanctuary
Thanedar Wala	4,047	NWFP	Stretch of Kurram River and floodplain. Braided river channels, seasonally flooded islands. Migratory birds. Hunting	Game reserve
Uchhali Complex	1,243	Punjab	Three brackish to saline lakes of fluctuating levels surrounded by agricultural fields in Salt Range.	Game reserve, Wildlife sanctuary
TOTAL	1,343,627			

Figure 2: Map of Pakistan showing wetlands in different eco-regions

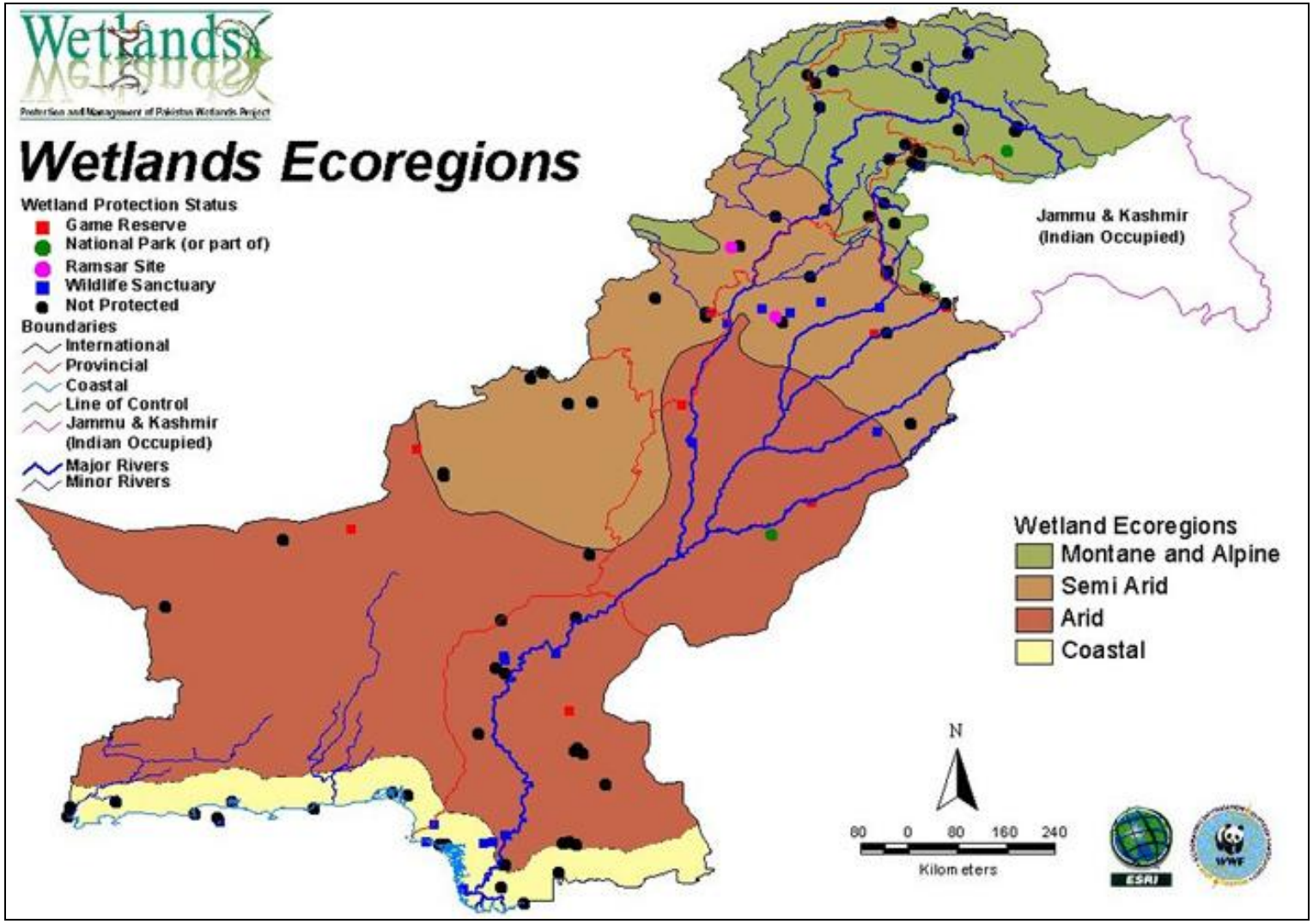


Figure 3: Map of Pakistan's river basin catchments

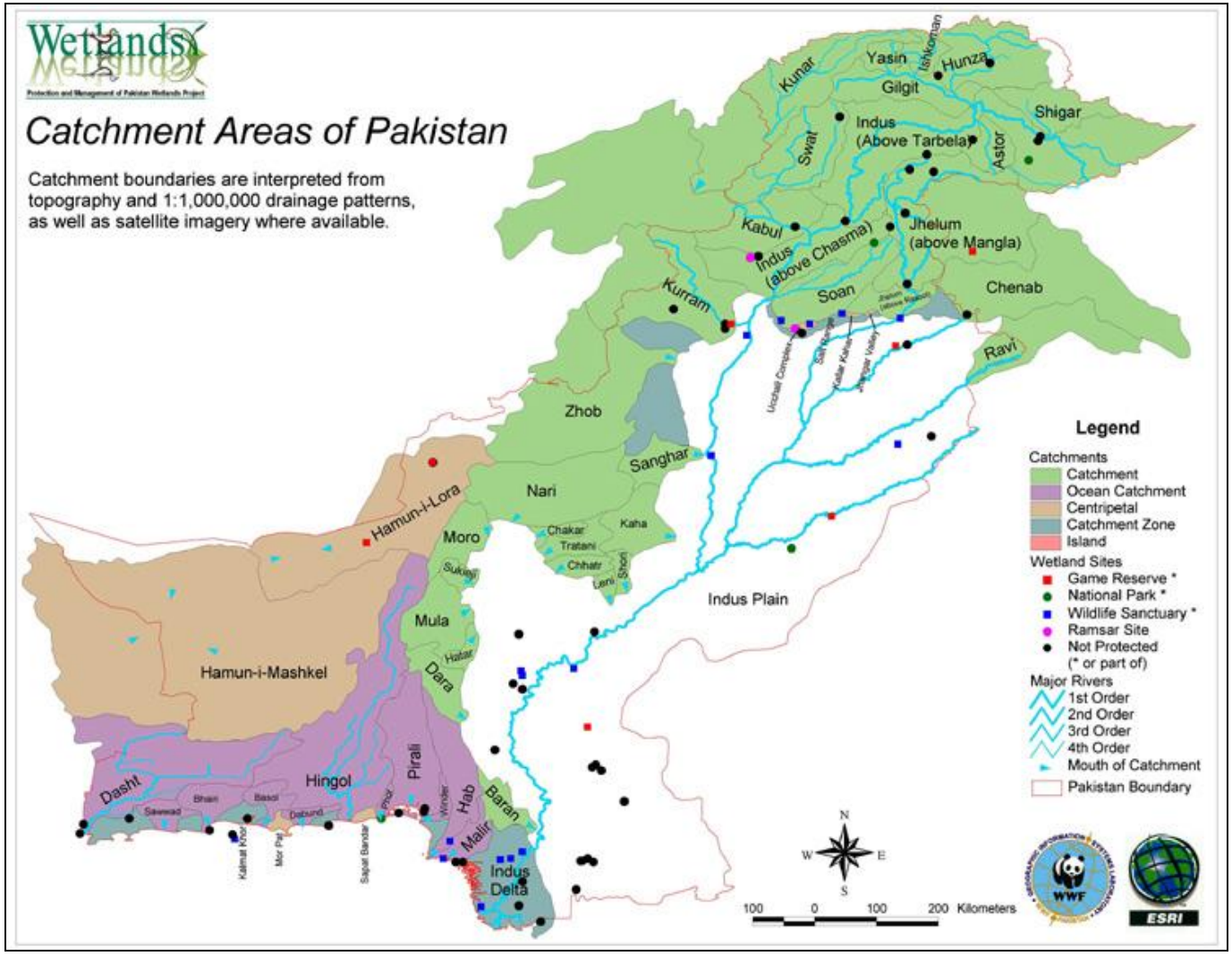


Table 2: Distribution of wetland types in Pakistan

	Type of wetland																		
Provincial representation	**Glaciers**	**Alpine lakes**	**Springs and streams**	**Rivers**		**Lowland natural lakes**		**Small dams**	**Large reservoirs**	**Barrage headponds**	**Canals irrigation & drainage works**	**Rice paddy**	**Urban wetlands**	**Peat swamps**	**Marshes**	**Coastal wetlands**			
				cold water	**warm water**	**freshwater**	**brackish**									**Mangroves**	**Estuaries**	**Beaches**	**Coral reefs**
Northern Areas	■	■	■	■				■			■	■		■					
AJK	■	■	■	■							■	■		■					
FATA			■		■			■				■							
Federal			■	■				■	■				■						
NWFP	■	■	■	■	■			■	■		■	■	■	■	■				
Punjab			■		■	■	■	■		■	■	■	■		■				
Balochistan			■		■	■	■	■			■	■				■	■	■	■
Sindh			■		■	■	■	■		■	■	■	■		■	■	■	■	

6. Why are wetlands important? Wetland functions

6.1 *Wetland biodiversity*

The biodiversity of Pakistan's wetlands is remarkable, reflecting the passage of the Indus River from the high mountains to the sea and the full diversity of wetland ecosystems. The Indus forms a critical migration route for water birds – ducks, geese, cranes and shorebirds – the Indus Flyway.

Pakistan's permanent and ephemeral wetlands are globally significant both in the intrinsic value of their indigenous biodiversity and for the subsistence use of the aquatic resources that contributes to rural livelihoods. Poverty-driven overuse of these resources is one of the most fundamental threats to biodiversity worldwide. The high global significance of Pakistan's wetlands is attributable to the diversity of species that they support. In all, eighteen threatened species of wetlands dependent mammals are found in the country including the endemic Punjab Urial (*Ovis vignei punjabiensis*) and Indus River Dolphin *(Plantanista minor*). Further, twenty threatened bird species are supported by Pakistan's wetlands and twelve reptiles and two endemic amphibians.

Pakistan's wetlands also support nearly 200 indigenous freshwater fish species (including fifteen endemics) and a total of 788 marine and estuarine fish species.[8] There are two exotic introductions (brown trout and rainbow trout) and 26 indigenous species of cold water fish in Pakistan. Trout introductions and aquaculture in the northern parts of Pakistan is commonplace. The snow trout, *Schizothorax plagiostomus* reaches enormous size on the Deosai Plateau, and could be suitable for cultivation. The indigenous cold water species include 7 endemics, such as *Schizothorax skarduensis* and *Triplophysa yasinensis.* Many of the northern cold water hill stream loaches of the genus *Nemacheilus* and *Triplophysa* are threatened.[9] There are two important migratory fish, the Mahseer, *Tor putitora* and the Shermai, *Clupisoma garua,* which are threatened by dams. One of the most famous warm water migratory fish is the Palla, *Tenualosa ilisha,* which used to be caught in large numbers in the Lower Indus up to and beyond Kotri. With the reduction in flows down the Indus, the fall in the catches of Palla has been dramatic.

6.2 *Wetland ecosystem services and benefits*

The Millennium Ecosystem Assessment identified a number of services and benefits associated with wetlands. This section highlights the services that are provided by various types of wetland, and their significance in the context of Pakistan. Not all are applicable for every type of wetland, but the range of services illustrates the importance of wetlands. The Millennium Ecosystem Assessment categorises the services into four types – Provisioning, Regulating, Cultural and Supporting. These are shown in Table 3.

[8] Pakistan Wetlands Project Brief (2003)

[9] Muhammad Yaqoob (2002), "Cold water fishes of Pakistan" in Petr, T and Swar, S.B. Cold water fishes in the trans-Himalayan countries, FAO Fisheries Technical Papers

6.2.1 Provisioning

- **Food production of fish, wild game, fruits, and grains -** One of the principal services provided by the wetlands of Pakistan is food production. The biodiversity and productivity of Pakistan's wetlands is very great in terms of fish, birds and mammals. In 2001, fishery statistics showed that out of nearly 600,000 tonnes of fish caught, 166,000 tonnes were from inland fisheries, and the rest (73%) were marine, of which nearly 300,000 tonnes were caught off the coast of Sindh and 125,000 tonnes off the coast of Balochistan[10]. The marine fishery is heavily dependent for its productivity upon the mangroves of Sindh and Balochistan, which are breeding and nursery grounds for many marine commercial species. Inland fisheries in the lakes and rivers are locally important, with a strong emphasis on promoting aquaculture.

  The wetlands of Pakistan lie on one of the principal bird migration routes, the Indus Flyway; many thousands of ducks and wildfowl use the wetland systems – alpine lakes, lowland lakes, barrages and rivers and marshes as staging points in their migrations. Without this wetland network many species would be unable to complete their annual migrations. Wildfowl and other resident bird species provide local food source for communities living around the wetlands.

  Rice is a key agricultural product for Pakistan; rice paddies are important seasonal wetlands that depend upon the health of the water and wetland network for their productivity. Pakistan has about 17 million ha of irrigated farmland – seasonal wetlands. Other wetland plants that are used for food include lotus, often seen in small tanks or ponds near the villages. Both men and women play important and often different roles in rice cultivation and harvesting as in fisheries and fish processing.

- **Fresh water storage and retention of water for domestic, industrial, and agricultural use –** In an arid country such as Pakistan, the efficient storage and retention of water for water supply, and for industrial and agricultural use is critical. Pakistan is moving into a situation of water deficit and without its wetland resources, the man-made storage reservoirs, and natural lakes and marshes, providing water storage would be very difficult. Water harvesting is becoming increasingly more important. The role that women play in water collection from wetlands for drinking, washing and laundry is critical to all rural livelihoods.

- **Fiber and fuel production of logs, fuelwood, peat, fodder –** the riverine forests and mangroves provide timber and fuelwood for local communities. In times past the mangroves provided the fuel source for river navigation up the Indus. The mangroves of Sindh and Balochistan provide fodder for camels and other livestock. There are about 16,000 camels and 3,200 cattle herded in the Indus Delta, dependent upon the fodder provided by the mangroves. The peat lands in

[10] Pakistan Government statistics

the north represent a fuel source that has yet to be exploited. The marshlands provide reeds for thatching and fencing. Men and women both have significant and varied roles in fisheries, fodder and fuelwood collection from Pakistan's wetlands, which need to be recognized in developing sustainable management of these resources.

6.2.2 Regulating services

- **Climate regulation – wetlands as a source and sink for greenhouse gases; influence local and regional temperature, precipitation, and other climatic processes:** wetlands have been identified as a major feature in climate regulation processes. As one of the major pools of sequestered carbon, the degradation and loss of wetlands would seriously increase greenhouse gas emission. Large water bodies and forested areas also have a cooling effect upon local climate reducing temperatures and increasing humidity and precipitation – an attribute that is important in the hot dry climate of Pakistan.

- **Water regulation (hydrological flows) groundwater recharge/discharge**: Glaciers are likely to be one of the casualties of climate change, and there is considerable concern about the rate of glacial shrinkage in Pakistan. Glaciers in the Karakorum and Himalayas provide more than 70 percent of the water in the Indus River. Glacial area has dropped by 35-50 percent since the 1930s and hundreds of small glaciers have already vanished. The Indus is critical to Pakistan's food and water security - more than three quarters of Pakistanis live in the Indus basin and its water irrigates 80 percent of the nation's cropland.

  The hydrological flows in the Indus are critical for the well being of Pakistan as a whole. The degradation of the Indus Delta ecosystem resulting from increased abstraction upstream illustrates the dependence on flows of the Indus. The 1991 Water Accord specified releases of a minimum of 10 MAF[11] of fresh water per year below Kotri Barrage required to maintain the Indus Delta ecosystem. This is rarely achieved – in the decade of 1994–2004, the average annual release has been 6.8 MAF, and down to less than 2 MAF in very dry years.

- **Water purification and waste treatment retention, recovery, and removal of excess nutrients and other pollutants:** most wetlands provide extremely useful functions in purifying water and removing nutrients and contaminants. The natural biological processes in rivers breakdown and carry away organic pollution from domestic and industrial wastes. Highly productive wetland ecosystems such as marshes and swamps may be most effective at pollution control, a fact that has been put to advantage in constructed wetlands. However, gross pollution from untreated wastes does not allow the natural systems to recover, resulting in severe degradation of many water courses and wetlands. Many of Pakistan's rivers and coastal wetlands are grossly polluted and contaminated from the wastes of major cities with resulting degradation, and loss of biodiversity and productivity.

[11] MAF = Million Acre Feet

- **Erosion regulation retention of soils and sediments:** Wetlands provide a service in erosion regulation – slowing down the flow of water through a catchment; wetlands can trap sediment and reduce erosion. Sediments can fill up reservoirs and dams, reducing the useful life of such dams. Watershed management to reduce erosion is critical where deforestation has exposed soils on hillsides to rainfall and run-off. Marshes and swamps are effective collectors of sediments. Riverine forests assist in stabilizing river banks and reducing bank erosion during floods.

- **Natural hazard regulation flood control, storm protection:** Increasingly the role of mangrove forests and coastal wetlands in providing storm and tsunami protection is being recognized, and active efforts to rehabilitate mangrove areas are being undertaken for this reason. Wetlands are also being used for flood control – floodplains and marshes provide an escape for floodwaters, holding them back and reducing the flood intensity. Urban wetlands reduce the impacts of flooding in cities, absorbing floodwaters and allowing groundwater infiltration.

- **Pollination habitat for pollinators:** the role of pollinators is often overlooked, and bees provide this important service. Wetland areas, for example mangroves, are an ideal situation for apiculture, with specialist mangrove honey attracting high prices. Other insects abound in wetland areas, and their loss may affect neighbouring agricultural areas.

6.2.3 Cultural

- **Spiritual and inspirational source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems:** Pakistan has its fair share of spiritual and religious wetland attributes, with shrines of Pirs and other religious leaders in some coastal and wetland areas. Kalakahar Lake in the Salt Range has shrines, and archaeological and historical features that attract visitors. Mythological stories are also attached to some wetlands, e.g. Saifiul Muluk and Shangri La. These attract pilgrims and visitors during festivals.

- **Recreational opportunities:** Lakes, beaches, rivers and streams are all important recreational sites, especially in an arid climate. The recreational values of wetlands have been recognized in establishing special tourism authorities, e.g. TCDP which is responsible for tourism management at Kalakahar Lake in the Salt Range, at Haleji and Kheenjar Lakes in Sindh, and along the Karachi coastline.

- **Educational opportunities for formal and informal education and training:** Several wetlands are being used for educational purposes, providing a local resource for creating awareness of the importance of wetlands amongst local schools and colleges. Examples are the Wetlands Information Centre at Sandspit, Karachi, established by WWF, and mangrove plantation exercises amongst school children. Kalakahar Lake in the Salt Range is a useful educational resource.

Practical environmental experience in wetlands is an educational tool appreciated by teachers and students alike.

6.2.4 Supporting

- **Soil formation, sediment retention and accumulation of organic matter:** the natural progression of lakes and marshes gradually filling up as sediment accumulates, drying and forming valuable land suitable for agriculture is well recognized, although encroachment of wetlands often preempts this process. Mangrove areas also allow the accumulation of estuarine and coastal sediments, causing a progression of deltas, and reducing coastal erosion.

- **Nutrient cycling storage, recycling, processing, and acquisition of nutrients:** Wetlands, especially marshes, swamps and constructed wetlands, accumulate nutrients and help to remove them from building up in free-standing and flowing waters where they can become problematic. Too high nutrient levels can cause algal blooms in both fresh and marine waters, sometimes causing fish kills and problems with water supply. In a country such as Pakistan where agricultural run-off with high fertilizer content, nutrients are a potential issue and wetlands perform a useful function in reducing the risk of such problems.

6.3 *Valuing wetland benefits and services*

The contribution that wetlands make to the economy is very large, but often unrecognized because the products and ecosystem services are often only partially recorded in the market economy. The contribution to the livelihoods of local people in terms of water supply, food, fuel and fibre is significant, and fish often provide the main source of cash income, as well as being nutritionally important. Water and sediment regulation, such as water storage and groundwater recharge, water purification for reducing pollution, protection from extreme climatic events, and recreational and educational services are highly appreciated but rarely given an economic value. Usually they are noticed when the wetland is lost or damaged, when it is too late. Valuing the wetlands of Pakistan is complex, but the example of the Indus Delta in the box below illustrates how the dollar value mounts up very quickly.[12]

[12] Abstracted from L. Emerton (ed), 2005, Values and Rewards: Counting and Capturing Ecosystem Water Services for Sustainable Development. IUCN Water, Nature and Economics Technical Paper No. 1, IUCN — The World Conservation Union, Ecosystems and Livelihoods Group Asia.

The economic significance of the Indus Delta

Loss of freshwater flow, and consequent saltwater intrusion, has had devastating effects on the ecology and human economy of the Indus Delta. Land in the area has become unsuitable for agriculture, and potable water sources have become very scarce or have disappeared. In Thatta, a predominantly agricultural District in Sindh where the Indus River flows into the Arabian Sea, almost a third of land has been affected by saltwater intrusion. It is estimated that up to 0.5 million hectares of fertile land in Thatta and adjoining areas, or about 12% of total cultivated area in the entire Province, is now affected by sea water intrusion. As well as crop losses, this has resulted in severe damage to livestock through rangeland depletion, shortage of fodder, pasture and watering areas, and a resulting mass migration of both livestock and human populations out of the area.

The human population in and around mangrove forests on the coast of Pakistan is estimated to total 1.2 million people, nearly 900,000 of whom reside in the Indus Delta. Of these, a predominantly rural population of more than 135,000 depends on mangrove resources for their livelihoods.

Reductions in freshwater inflows have had tangible impacts on mangrove ecology, and on the fish populations that rely on them for breeding and habitat. At least three quarters of the Delta's rural population depend, directly or indirectly, on fishing as their main source of income, and most of Pakistan's commercial marine fishery operates in and around the mangrove creeks on the coast of Sindh Province. A large proportion of fish and crustaceans spend at least part of their life cycle in the mangroves, or depend on food webs originating there. The annual value of catch from mangrove-dependent fish species in the Indus Delta is estimated at around $20 million. Shrimps are also particularly important, with a domestic value of $70 million and an export value of about one and a half times this figure, and the export of mud crabs contributes an additional $3 million to the regional economy.

Over 60% of the rural population uses the Delta's mangroves as their major source of domestic fuel, estimated to account for around 18,000 tonnes of firewood which is worth up to $460,000 a year. Mangroves are also used by coastal villagers as fodder for domestic animals. In addition to cattle, sheep and goats kept permanently in the Delta, it has been estimated that at certain times of the year about 16,000 camels are herded into the mangroves. In total, the Indus Delta's natural ecosystems are thought to contribute about 67,000 tonnes of leaves and 20,000 tonnes of grasses as livestock pasture and fodder each year, together worth up to $1.35 million.

The loss of freshwater to the Indus Delta, and consequent saltwater intrusion and natural habitat degradation, is manifest in a wide range of economic benefits foregone, including economic costs related to mangrove loss and reduction in agricultural land use opportunities. Both aggregate crop production and fish catch has declined steadily as salinity has increased. An economic study showed that three talukas in Thatta District with 30,000 households had incurred average annual losses of $70,000 in crop damage and $45,000 from reduction in fish catches as a result of saltwater intrusion.

Table 3: Key ecosystem services associated with wetland types in Pakistan

Key Ecosystem Services	Type of wetland																		
	Glaciers	Alpine lakes	Springs and streams	Rivers		Lowland natural lakes		Small dams	Large reservoirs	Barrage headponds	Canals irrigation & drainage works	Rice paddy	Urban wetlands	Peat swamps	Marshes	Coastal wetlands			
				cold water	warm water	freshwater	brackish									Mangroves	Estuaries	Beaches	Coral reefs
Provisioning																			
Food production of fish, wild game, fruits, and grains																			
Fresh water storage, water retention for domestic, industrial, agricultural use																			
Fiber and fuel production of logs, fuelwood, peat, fodder																			
Biochemical extraction of medicines and other materials from biota																			
plant pathogens, ornamental species, and so on																			
Regulating																			
greenhouse gases; influence local and regional temperature, precipitation, and																			
Water regulation (hydrological flows) groundwater recharge/discharge																			
retention, recovery, and removal of excess nutrients and other pollutants																			
Erosion regulation retention of soils and sediments																			
Natural hazard regulation flood control, storm protection																			
Pollination habitat for pollinators																			
Cultural																			
Spiritual and source of inspiration;																			
Recreational opportunities for recreational activities																			
Educational opportunities for formal and informal education and training																			
Supporting																			
Soil formation sediment retention and accumulation of organic matter																			
Nutrient cycling storage, recycling, processing, and acquisition of nutrients																			

Key Role	
Minor role	

7. What are the threats to Pakistan's wetlands

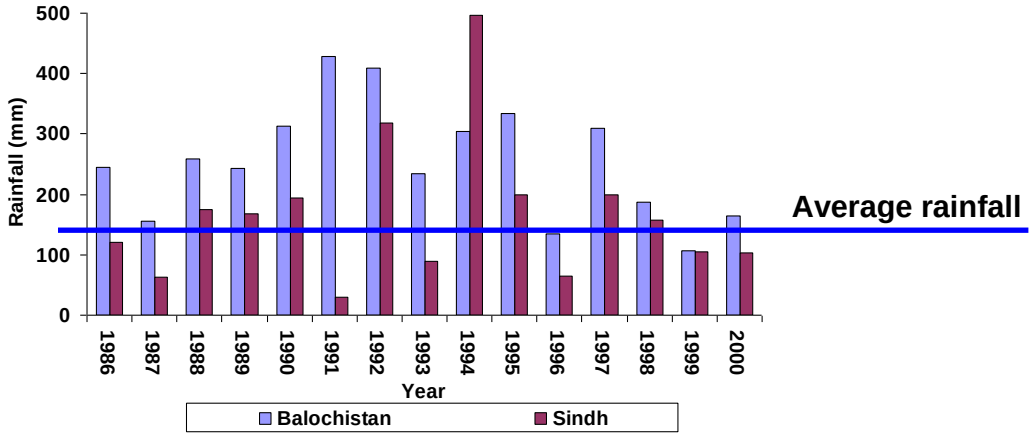
7.1 *Water availability*

Water shortages and changing water availability throughout Pakistan are amongst the major causes of wetland loss and degradation. Without adequate water to maintain the wetlands, they will disappear. Stakeholders consulted in all the sub-national areas report concerns about water availability for wetlands.

- **Climate change** is one of the biggest threats to water availability for wetlands, since increasing temperatures will increase the rate of glacier shrinkage. In the short term there could be an increase in flows available in the Indus system as the glaciers melt, even to the extent of increased risk of flooding. In the longer term, reduced glaciers regulate flows in the Indus less, and there could be less water available for alpine lakes and the Indus River and its wetlands. Climate change threatens to decrease water availability in Pakistan as a whole, through changing patterns of rainfall, with more dry years, and higher temperatures increasing evaporation.

- **Flood and drought:** There is a natural variability of rainfall in Pakistan, such that prolonged periods of low rainfall in some years lead to drought conditions. In recent years drought has occurred in the drier areas of Pakistan, especially in Sindh and Balochistan, as shown in the figure below:

Figure 1: Rainfall data for Sindh and Balochistan showing years of water shortage and drought (source: IWMI)



During drought years, most attention is paid to the impacts upon agriculture and water supply for domestic consumption and industry. The water available to maintain wetlands in reasonable condition will be even more limited. Increasing risks of drought as a result of climate change, together with increased demand for water, is likely to have a dramatic impact upon Pakistan's wetlands.

Conversely, flood conditions can occur when there is heavy localised rainfall, or flash floods in a watershed. Climate change is likely to increase climate variability – high rainfall and storm events will become more frequent. Floods can wash out wetlands, causing damage to river banks and riverine forests, and cause erosion and increased sediment transport.

- **Watershed management issues:** deforestation of watersheds has led to increased run-off of rainfall and soil erosion throughout many parts of Pakistan. The rainwater flows more rapidly into the rivers and flooding has increased. The recharge of groundwater may be impaired since the rain water has less chance to infiltrate. In some watersheds there has been a tendency to build larger water storage dams, e.g. in Balochistan[13], when smaller dams might be more effective. Measures for reforestation of the denuded hillsides and for improved water harvesting through check dams and constructed wetlands to improve infiltration should be considered as part of improved watershed management.

- **The demand for water**: The biggest issue related to water availability is the ever growing demand for water throughout the country for domestic supply to the expanding cities, for industry and especially for agriculture. There is already severe water scarcity in Pakistan due to over extraction of water for agriculture, leading to saline intrusion in the Delta. In 1995, the Indus River supplied much less water per person than the minimum required by the United Nations – 830 m^3 /person/year, compared to the UN minimum of 1000 m^3/person/year.[14]

  In Sindh, 12 out of 42 natural wetlands have become completely dried up and the rest are becoming more water depleted - this illustrates the impact of water demand upon wetlands. At Haleji Lake, conditions have been worsening as a result of water shortages, sedimentation, spread of aquatic vegetation, and loss of the wetland as a sanctuary for migratory water birds. Haleji was originally constructed to provide water supply for Karachi, but water is now delivered directly from Keenjhar Lake, bypassing Haleji.

- **Environmental flows:** ecosystem requirements for water are often overlooked, with statements that all water available in the country should be put to "productive use". However, there is a requirement for water in rivers and streams, lakes and marshes and in groundwater; without these wetland ecological services and benefits will be lost. The loss of these services – provisioning, regulating, cultural and supporting – would be as disastrous as the direct shortage of water. Freshwater is required in the Indus Delta to maintain the delta ecosystems - mangroves, fish nursery and breeding grounds and protection against storm and tsunami; this has been clearly expressed in the annual requirement for the releases of freshwater downstream of Kotri Barrage of 10 MAF. Water resource managers have regarded this as a "waste of water". Ensuring environmental flows at all levels requires a change in awareness about ecosystem requirements for water.

[13] IUCN Orientation visit to Gwaddar, 2008
[14] Revenga et al. 2000

Water abstraction upstream has resulted in changes in the Indus Delta, so that it is now evolving into a wave-dominated eroding shoreline compared to the earlier sedimentary shore. In 1992, there was 1,030 sq km of open water in the Indus River delta plain, located in the tidally dominated lower delta plain. By the year 2000, or some eight years later, small areas of new open water were appearing within the delta, and nearly 1,990 sq km of open water existed in tidally dominated lower delta, an increase of 960 sq km of new open water[15].

There are no laws on the subject of environmental flows. The Water Apportionment Accord of 1991 recognises the importance of maintaining a "certain minimum escapage to the sea, below Kotri [barrage], to check sea intrusion" but the matter itself is left undecided because the optimum level proposed by the province of Sindh during Accord discussions is held to be disputed: "It was, therefore, decided that further studies would be undertaken to establish the minimal escapage needs downstream Kotri."[16] Some consultant studies were commissioned by the Federal Government, but the issue remains to be decided.

In the province of Sindh, the Sindh Irrigation and Drainage Authority & Power Department is required to advise the provincial government on "strategic and tactical" matters, including "drought management and sea water intrusion", but this role remains a mere formality in the absence of any understanding on the outcome of the above studies on flows downstream Kotri Barrage besides authority to enforce or implement any such recommendations.

- **Hydropower developments:** Large hydropower dams on river systems such as the Indus are inevitably controversial. Potentially they threaten wetlands because of the changes in the river flow that they produce. The construction of a dam will impound the water upstream creating another sort of wetland – a man-made lake – and this will have different biota and productivity. As with any change of land use, the flooding of the areas upstream of the dam will irrevocably change the nature of any unique wetlands there.

  Hydropower dams are not net consumers of water, but their operation changes daily and seasonal flows of water downstream. This can have an impact upon the fish and other aquatic life in the river, especially if there are migratory species, and the livelihoods of the people that depend upon them. There are a number of big hydropower dams in Pakistan, including Tarbela and its associated downstream, run-of-river Ghazi-Barotha power scheme. The height of the Mangla dam has recently been raised, and there are proposals for the construction of the Kalabagh Dam on the border between NWFP and Punjab, or the alternative Bhasha Dam, in Diamer in the Northern Areas, some 314 km upstream of

[15] Coleman, Huh and Braud, Louisiana State University. Wetland Loss in World Deltas. www.geol.lsu.edu/WDD/PUBLICATIONS/CH&B04/wetland_loss.htm
[16] Quotations from 1991 Water Apportionment Accord

> Tarbela. Concerns have been expressed over the flooding of large areas, resettlement of large numbers of people, and the potential loss of water for downstream provinces, especially Sindh and Balochistan. The stretch of river between Tarbela and Ghazi Barotha hydropower plant has been converted from a major river to only a seasonal wetland as a result of water diversion. A similar drying of the Neelum River would occur through Muzzaffarabad, if the proposed Neelum-Jhelum scheme goes ahead without adequate attention to the environmental flows required to maintain the river. The proposed Kishan-Ganga hydropower of India just upstream of the border to Pakistan, would have similar but transboundary impacts.

Water availability is controlled by a number of statutory bodies and agencies, depending on the source and/or location, and there is no system of co-ordination. Waters from the Indus are controlled by the Indus River System Authority, WAPDA & provincial IPDs control all underground water resources throughout the country, and provincial governments are permitted to use "any river, stream, lake, or water body […] for any public purpose at any time" Canal and Drainage Act 1873 (section 5). This legally enabled discretion of the provincial governments would need to be limited as a matter of strategy, policy and law.

Irrigation and water management laws create a hierarchy of user groups and committees at various levels to receive irrigation supplies and distribute the water within their own areas of jurisdiction, but these are procedural legal instruments with no provisions outlining principles or priorities for water sharing. The Indus River System Authority is responsible for distributing water among the provinces. Their shares are determined by the terms of the Water Apportionment Accord of 1991.

Wetlands resources in many areas are linked to local livelihoods. But there are no laws that provide for community-based management of these resources. Water management and irrigation laws in all provinces allow a hierarchy of user-level bodies to be created, to oversee the distribution of water in relatively small areas of jurisdiction. These bodies, which may be set up by users, NGOs or community organisations, simply receive irrigation supplies from water boards and irrigation authorities, and redistribute the water within their areas of operation. In some cases, these user-level bodies also have responsibility for maintaining watercourses and minor irrigation channels and infrastructure. No 'management' functions are involved and there are no provisions requiring community participation in decision making.

The term "integrated water management" is used four times in the Sindh Water Management Ordinance, which requires the Sindh Irrigation and Drainage Authority (SIDA) and local area water boards to develop a "strategy statement" for the improvement of "integrated water management". The task of developing "plans for improvement of integrated water management [and] setting goals and objectives, formulating implementation policies and identifying priority and other actions" is left to local-level farmers organisations, who must do so within their own command and catchment areas. SIDA reserves for itself the task of drafting, implementing and regularly

updating "policies, studies and research programmes it considers relevant to its functions and tasks; e.g. integrated water management".

In Sindh, as well as in the other provinces, local councils are also responsible for "reviewing" the development of an "integrated system of water reservoirs and water sources". Here, responsibility has been delegated without making it clear how it links to macro-level planning.

Irrigation and drainage authorities in three provinces are charged with the responsibility for watershed management. Watersheds are not mentioned in the Sindh law on water management but are likely to be covered under its broader objective of "integrated water management". In Sindh, however, SIDA is responsible for developing a strategy for wetlands management, a task that is not mentioned in other provincial irrigation and drainage laws.

In the NWFP, the provincial government has the power to prepare land use and zoning plans for the catchment area of any river and to require mandatory compliance with such plans. Management plans for reserved forests in the NWFP are required to "emphasise" protection of watersheds. Such provisions do not appear in the laws of other provinces.

The subject of watershed management is specifically excluded from the ambit of local governments. This sets up an interesting equation in provinces such as Sindh, where farmer-level user groups are responsible for integrated water management but watershed management is left up to the provincial government.

7.2 *Water quality*

Change in water quality can adversely affect wetlands causing a loss in biodiversity and productivity. There are several forms of water pollution:

- **Organic pollution**: The discharge of organic matter into water bodies results in a depletion of dissolved oxygen. As the dissolved oxygen levels in the water fall, so conditions for different forms of aquatic life become impossible. Eventually the water becomes anaerobic, foul smelling and severely degraded, with only specialised forms of life. Rivers all around the country provide examples such as the Ravi near Lahore, and the Kabul River downstream of Peshawar.

  Organic pollution comes from untreated domestic sewage, livestock wastes, e.g. Landhi cattle colony near Karachi, and many industrial wastes – food and drink processing, textiles, tanneries etc. In Karachi a total of some 450 mgd of industrial waste waters and sewage is discharged per day, or which only 150 mgd receives any treatment. In Lahore and many other cities, there is no waste water treatment at all. Most industrial waste waters are discharged untreated into the rivers or into the coastal zone. However, some industries have taken steps to at least partially treat their wastes, for example the tanneries of Kasur, Sialkot and Korangi, which have established treatment of the waste waters, with chrome recovery being a valuable incentive. In terms of solid waste, the Karachi City Government claims

to collect 60% of between 6 – 8 thousand tones per day. A considerable portion of the garbage is dumped informally in drains and creeks.

- **Bacterial pollution:** The discharge of untreated sewage carries high levels of pathogenic bacteria into the waters. Surface and ground waters can become contaminated and threaten drinking water supplies. Contaminated ground water can infiltrate into leaky water supply pipes. Gastrointestinal diseases caused by poor drinking water quality are one of the biggest causes of disease and infant mortality in Pakistan.

- **Chemical pollution:** Industries use many chemicals in their production processes, which are often discharged in the waste waters. These may include heavy metals, e.g. chromium from tanneries and metal plating, lead from car batteries. Many metal ions, when dissolved in water are very toxic to aquatic life and can poison water bodies, sometimes permanently. Muds and sediments may accumulate these toxic materials and release them when they are disturbed through dredging or floods, giving rise to fish kills. Other inorganic wastes may include arsenic or cyanide, or complex organic compounds such as PCBs (polychlorinated bi-phenyls) which are very highly toxic and can accumulate in the food chain. Industrial pollution has been causing losses is fish production in both the coastal areas of Sindh and Balochistan and in the Central Indus wetlands.

- **Oil pollution:** Although usually seen as a marine and coastal issue, oil pollution can occur in any body of water where oil is released e.g. from vehicle maintenance. Even a small quantity of oil on the water surface can stop aeration and reduce dissolved oxygen. Certain elements in oil are also toxic to aquatic life.

  In marine and coastal areas, the issue may be much larger because of the quantities of oil being carried by tankers. Generally oil spillage is relatively commonplace but small scale. However, in July 2003, the Tasman Spirit, a tanker containing 67,500 tons of light crude oil grounded in the KPTs navigational channel, spilling an estimated 37,000 tons. Oiling was recorded along Clifton Beach, Oyster Islands and inside Karachi Harbour and Chinna creek. Ballast waters, carried by cargo ships, may also contain oil and other wastes, and are sometimes discharged into the coastal areas, although KPT and Port Qasim have regulations and procedures for controlling the discharge of ballast.

- **Agricultural chemicals:** Agricultural chemicals – herbicides and pesticides – are one of the most difficult threats to water quality and wetlands. Cotton is one of the most demanding of crops in terms of disease prevention. These find their ways into irrigation drainage channels and thence into water bodies. Because the contamination comes from "non-point" sources, it is difficult to control. The Right Bank Outfall Drain discharges directly into Manchar Lake, carrying with it both a mixture of agricultural chemicals and nutrients (see below). This affects the suitability of the lake for water supply.

- **Nutrients:** Nitrates and phosphates are used in inorganic fertilisers on most agricultural lands, increasing crop yields. However, not all the nutrients can be absorbed by the growing crops and a significant proportion gets washed down into drainage canals and into rivers, lakes and streams. In natural water bodies, the build up of nutrients can become a problem giving rise to algal blooms, which then die and decay imposing a heavy oxygen demand on the water. Some blue-green algae are also toxic causing "red-tides" in coastal and freshwaters, leading to massive fish kills. Eutrophication is a problem in a number of Pakistan's water bodies, especially those receiving agricultural run-off, for example the freshwater lake of Manchar in Sindh many of the smaller lakes. Agrochemical pollution has led to increased eutrophication in the Salt Range and Central Indus Wetland Complexes.

- **Salinity:** the discharge of saline waters into freshwaters can seriously impact upon the water quality and change the biodiversity of the water body. Some areas of Pakistan have naturally high salinity, e.g. in the Salt Range and some water bodies are naturally saline. However, irrigation without adequate drainage has given rise to high salinities in the soils, which may be washed into freshwater lakes and rivers.

- **Thermal pollution:** Heated waste waters from power stations and industries can cause a plume of thermal pollution when discharged into rivers and coastal waters, e.g. in River Indus near Jamshoro, Korangi-Phitti Creek and Hub Power station. Unless the waters are allowed to cool before discharge, this can destroy the natural flora and drive aquatic inverts and fish away.

There are nearly 60 separate legal instruments at the federal, provincial, regional and local level that deal directly with the pollution of water resources. Pollution is thus heavily regulated, but without effective monitoring and enforcement, which is the responsibility of the Federal and provincial EPAs, water quality across the country continues to be very poor. Most of the pollution laws and regulations borrow archaic language from the 1860 Penal Code and there appears to be no conflict in the provisions, although most such laws are applicable in a highly localised context. The government has started to develop standards for water quality and has developed National Environmental Quality Standards (NEQS) [17] which appear quite comprehensive, but need monitoring and enforcement.

7.3 *Land use change*

Whilst falling water availability and quality are key factors in the degradation of wetlands, it is land use change which is most responsible for loss of large areas of wetland throughout Pakistan, as in the rest of the world. In Pakistan, land use change has usually come about through the conversion of wetlands into agricultural land, both in large scale irrigation schemes, but also through smaller encroachment on wetland areas by individual farmers, clearing and draining them to make them suitable for agriculture.

[17] For NEQS, please see http://www.environment.gov.pk/NEQS/SRO742%20I93-SRO1023%20I95-NEQS.pdf as amended by http://www.environment.gov.pk/NEQS/SRO549%20I2000-NEQS.pdf

Land reclamation problems are especially evident in the SRWC and CIWC, where expansion of agricultural area is a common practice. In the Indus Delta, some 635 sq km of wetlands had been converted into agricultural and industrial use between 1992 and 2000. This represents an average annual rate of wetland loss to agriculture of 79 sq km/year.[18] Agricultural encroachment is also clear in the Salt Range wetlands, especially where seasonal and inter-annual fluctuations in water levels allow farmers to cultivate the wetland edges. Guidance for privately owned and communally farmed areas surrounding wetlands is required to encourage sustainable use of these wetlands.

As the Indus floodplain shrinks in size due to water abstraction, so encroachment for agriculture progresses on areas that would have previously been flooded. The result is often the loss of the characteristic riverine forests that extended throughout Sindh. The forests, already under pressure from lack of water, are cleared for agriculture. Conversely, sea level rise from climate change presents a long-term threat to land use in many coastal areas.

The threats to wetlands from urban and industrial development are perhaps increasing faster than agriculture developments. The increasing population pressures create a demand for expansion of the urban areas and represent opportunities for major development schemes such as in Karachi, where there are at least four mega-city developments along the coast, and also in Gwaddar. The coastal areas are very attractive for developers, but even where there are clear planning regulations specifying that no development should be allowed within 150m of the shoreline, developments are proposed right up to the shore, threatening turtle beaches, and encroaching on key mangrove areas, e.g. Sandspit and Hawksbay.

Of 258 legal instruments reviewed, more than 150 allow land use changes to be made or restricted. There is great potential for degradation and loss of wetlands in these, particularly with laws related to commercial and industrial development, housing schemes, development authorities, etc., because these instruments do not take into account the impact on wetlands, or on ecosystems, or on environmental flows that affect wetlands. Local governments have wide-ranging powers to carry out zoning and planning, and to determine land use within their areas of jurisdiction, and so can make decisions that have significant positive or negative impacts on wetlands.

Key development projects affecting wetlands include irrigation schemes, hydropower dams and reservoirs, thermal and nuclear power stations, and any industrial developments that require abstraction of large volumes of water or discharge of waste waters. In the transport sector, ports inevitably impact upon the coastal areas, often where there are mangroves. Where oil terminals are proposed, attention to oil spillage contingency planning is essential. Roads and railways may pass through areas of wetland. If not designed well with adequate cross-drainage, roads may impede the flow of water, resulting in water logging on one side and water stress on the other side. Even quite small roads across wetlands can cause major problems as evidenced by the now-aborted road built across one end of Ucchali Lake. Road building in hilly areas such as in AJK can

[18] Coleman, Huh and Braud. opp.cit.

result in increased sediment loading as cut spoils are often disposed of down the hills and into the wetlands below.

For large development projects, the Environmental Impact Assessment process is now a standard requirement, although deficiencies in application and enforcement have discredited the process to some extent. However, all too often wetlands are scarcely considered and wetland users and stakeholders may not be consulted. Even the agencies responsible for wetlands may not receive copies of such EIAs and be able to comment, e.g. Sindh Wildlife Department did not receive the EIA for the RBOD. These developments then are approved without adequate attention given to wetland issues and appropriate measures to protect the affected wetlands. The EIA for the Ghazi Barotha plant was not shared with the NWFP Wildlife Department.

Regulations framed under PEPA 1997 apply, and an EIA or IEE is mandatory for larger projects and schemes, but many potentially detrimental projects are likely to escape the net of the regulatory regime because of the caps placed in the Regulations on the size or cost of schemes. The EIA/IEE regime is difficult to enforce in a meaningful way and is not practical for every single type of project or development activity. A mechanism needs to be devised to bring small-scale operations under a regulatory regime as well.

Another sort of land use change occurs in the watershed, through deforestation for the supply of fuel wood and timber. This leads to increased run-off and soil erosion, with higher sediment loads in the rivers, and increased sedimentation in reservoirs and lakes. Deforestation rate in Pakistan, estimated at 0.2 % to 0.5 % annually, is the highest in the world, accounting for 4-6 % decline in wood biomass per annum. The total natural forest cover has reduced from 3.59 million hectares to 3.32 million hectares at an average rate of 27,000 hectares annually. The unchecked cutting of trees has resulted in rapid deforestation and now the forest cover is less than 5%.[19] Widespread deforestation, e.g. in the Salt Range wetlands, has caused substantial losses of wetlands habitat through siltation. Deforestation in the mountainous areas in NWFP, the Northern Areas and AJK has increased run-off and sediment loads in the rivers.

Protected areas are a specific form of land use, with an emphasis on the regulation and restriction of resource use within the areas so designated. There is no single, national system of protected areas in Pakistan. National parks, wildlife sanctuaries and game reserves of various types are designated and can to some extent be managed under provincial wildlife laws. Wetlands may be designated by declaring them to be "protected areas" under wildlife laws. However, these laws focus almost exclusively on hunting and do not provide for the management of protected areas except to specify activities that are prohibited in each category of protected area. Even these prohibitions are subject to broad exemptions that may be granted for scientific purposes, or for "any other purpose". Wildlife laws in their current form do not provide a sufficiently robust framework for protection of wetlands and their sustainable use.

[19] "Deforestation rate in Pakistan highest in world" 2007. www.pakissan.com/english/news/newsDetail.php?newsid=15697

Another problem with wildlife legislation is that protected areas are conceived as islands or pockets, demarcated by a boundary, rather than as ecosystems that are affected by activities and processes occurring at some distance from their boundaries. This, in particular, is a serious drawback as far as wetlands are concerned because wetlands by their very nature cannot benefit from this type of highly localised 'protection'.

A final point about wildlife laws is that the template used more or less unchanged in all provinces was devised in the early 1970s, borrowed from even more hunting-focused colonial laws [20] and their post-Independence offshoots. The purpose, as their titles suggest, is really just to regulate the 'use' of wildlife. A major overhaul is required, to bring these laws up to date with current thinking on conservation issues, to introduce the 'ecosystems' or 'landscape' approach, to take into account the rights and livelihood needs of nearby communities and to establish some sort of regime that links protected areas together and brings conformity to the regulatory regime. No protection is guaranteed to waterfowl that fly out of a game sanctuary or wildlife reserve and though Pakistan has been a Party to the Convention on Migratory Species since 1987, nothing has been done to implement its obligations under the CMS.

A number of wetlands are included in National Parks, e.g. part of Hub reservoir in Kirthar NP, Shoesar Lake in Deosai NP, the Hingol River, estuary and coastal areas in Hingol NP and Patisar Lake in Lal Sohanra NP. Demands for irrigation water around Lal Sohanra have seriously reduced the water in the Patisar Lake resulting in its shrinkage. Conformity, consistency and inter-provincial coordination are key issues for protected areas. Migratory species are not specifically mentioned in any law and the species to which protection is provided differ from province to province. Wildlife is a provincial subject and there is no mechanism for inter-provincial co-ordination. This is problematic in the case of wetlands resources because of the wide range of sectors involved, and the impact of processes occurring far away, e.g. flows of water and patterns of migration. Provincial wildlife laws also allow broad exemptions to be granted, thereby nullifying protection clauses. This can be very destructive when applied to a wetland ecosystem.

The Pakistan Environmental Protection Act (PEPA) 1997 allows for the declaration of "environmentally sensitive areas" but it is not clear what level of protection is afforded, how long such protections would remain in place, and who is responsible for management. The designation of a wetland as a Ramsar site of international importance does not imply any particular protection or management regime. Protection of the site depends upon the national system of protection designation, and a site-specific management plan.

7.4 *Overexploitation of natural resources*

The natural resources within the wetlands, the vegetation, mammals, birds and fish are all under pressure. Floating and emergent vegetation may be excessively extracted for fuel and grazing or to support industries such as rope, basket, mat and blind making. Even

[20] Wild Birds and Animals Protection Act of 1912 and West Pakistan Wildlife Protection Ordinance of 1959

though livestock grazing in and around the wetlands can be considered as part of the ecosystem, overgrazing with too many livestock, beyond their carrying capacity, can degrade the wetlands. Examples of this come from the Salt Range lakes and the Alpine lakes where the land around has become degraded and barren. Livestock also add organic pollution to the water.

Hunting, especially for animals such as hog deer and wild goat, and shooting of migratory waterfowl is traditional both for sport for the elites and subsistence for rural people. Over-exploitation of these mammals and birds reduces the populations. All the provincial wildlife departments report overhunting as a major cause of loss of wetland wildlife populations.

The fisheries resources of Pakistan include both freshwater and marine species. The government statistics recorded that in 2001, the total fish production was just under 600,000 tonnes of fish, of which 166,000 tons of fish were produced from freshwater sources, much from aquaculture. In the coastal zone, the valuable shrimp catch was about 15,000 tonnes and fin fish at 425,000 tons of which nearly 70% comes from the coast of Sindh. This reflects the importance of the Indus Delta and its mangroves as a breeding and nursery ground for shrimp and fish. The export value of Pakistan's fishery is over 130 million USD per year. There are reported to be about 280,000 fishermen dependent upon these resources of which 130,000 live along the coast. Fishery resources are being depleted because of fishing pressures combined with other environmental pressures. Fishing pressure also includes the use of explosives, inappropriate nets, net material or netting techniques, over extraction of juvenile life forms, unacceptably high by-catch levels and failure to observe prescribed seasonal and species-specific restrictions. Nevertheless, fishermen of Balochistan have requested mangrove rehabilitation to help improve the fish stocks along the Makran coast.

Fish are both a valuable export commodity, but also underpin nutritional and food security throughout the country. Even if fish is not consumed directly, small fish by-catch is often converted to fish meal for the poultry and livestock industry. If this resource is lost, both the livelihoods of the fishing communities and the associated industries will be threatened. The 2007 World Wetland Day theme linked wetlands and fish with the slogan of "Fish for Tomorrow" encapsulated many of the challenges being faced by wetlands, including:

1. Sustainable management of fish populations, especially those that are commercially fished
2. Supporting sustainable aquaculture practices
3. Effective management of wetlands and other important fish habitats to protect and conserve fish populations
4. Increase buyer awareness of fish species for consumption i.e. conscientious consumer.

There are more than 100 laws at the federal, provincial and regional level which allow natural resources, including water sources, to be accessed or exploited. The majority of these legal instruments are not concerned with sectors involved in the management of

natural resources. None of the provincial wildlife laws include the protection or harvesting of fish. Whilst wildlife laws protect or restrict hunting of certain species, generally there are no clauses covering restrictions, protection or sustainable use of wetland resources.

Close to 60 legal instruments not related to natural resources allow for their use. Such laws include the provincial and regional local government ordinances which give district-level authorities specified powers with respect to forests and fisheries, and in the case of Balochistan, wildlife as well.

A non-consumptive use of wetlands resources is tourism. Sustainable tourism can bring important revenues for wetland management, but increased tourism pressures can have serious water pollution impacts, disturbance of wildlife and degradation of the wetlands. This can be highlighted by the pressure on the marine turtles, which come at night to lay their eggs on the most favoured beaches near Karachi. It is only as a result of long-term protection of the nests and the hatchlings, that these turtle nesting sites continue to be used by the turtles, but there is continued pressure from egg hunters, dogs, lack of awareness, lights from the beach houses and urban development.

7.5 *Invasive Alien species*

Another issue which affects biodiversity and the ecological character of wetlands is the spread of Invasive Alien Species, (IAS). These can be aquatic plants such as:

- *Prosopis juliflora* where the worst affected areas are the riparian forest of *Acacia nilotica* in Sindh
- *Eichhornia crassipes*, Water hyacinth, affecting many of the water bodies of Pakistan especially in Sindh and Punjab
- *Salvinia molesta*, Kariba weed or Water fern, affecting the wetlands and irrigation channels of Thatta
- *Pistia stratiotes***,** Water cabbage, growing in water reservoirs, the edges of large lakes.

The introduction of brown and rainbow trout into the cold water rivers in the mountainous areas of NWFP, NA and AJK, has resulted in loss of some indigenous fish species as trout can be aggressive carnivores.

Climate change is beginning to affect the character of habitats through rainfall and temperature changes, and the distribution patterns of some species of both flora and fauna are changing as a result. In the long-term this may be so significant as to affect the rationale for the designation of some protected areas, including wetlands.

7.6 *Social threats*

One of the biggest threats to wetlands from all aspects must be the increase in population. In July 2008, the population was estimated at about 173 million people, with a population growth rate of just under 2% per annum. Increasing population puts pressure upon land and water resources, raising the demand for water and productive land, and for all forms of wetland natural resources.

Population pressures are reflected in economic pressures – scarcity increases prices and values of land and water. In the urban context, the value of land is often so great that it makes it worthwhile for landowners near wetlands to encroach upon them, filling in wetland edges and building upon them, even if this is illegal. Once encroachment has occurred, the wetland is damaged irreparably. This is evident around the urban mangrove areas of Karachi, e.g. Chinna creek. No natural values of the wetlands can compete with the potential land values, so economic justifications for wetland conservation are useless in this context.

Development pressures on wetlands inevitably displace traditional users. The fishermen are often most at risk from large scale development of the coastal areas, but there has been evidence of protest and social unrest at the displacement of some fishing communities in Karachi, e.g. the fishermen of Korangi protested against the proposed development on Bundal/Buddoo Island, and the Manora communities using the back swamps behind Sandspit and Hawksbay have protested against the Sugarland development.

Social unrest may also occur over water resources. As the population and the demand for water increases, so the idea of environmental flows and water for the environment will be put to the test. The imperative of providing water for people may be so politically compelling that water for wetlands will not be considered, and wetlands will continue to be stressed and lost through lack of water.

In the immediate future, one of the biggest issues facing wetlands conservation is lack of awareness. People do not generally know about wetlands, why they are important and what threatens them. They are not aware of what they will lose if the wetlands that they enjoy or use will be lost. If they are not aware of the value of the wetlands, they will make little effort to protect them, not to pollute them, and they will not protest if they are encroached or developed.

7.7 *Institutional factors*

There are a large number of agencies with various jurisdictions in river basins and coastal areas, some with conflicting or duplicating mandates, constraining ecosystem management at that level. Strategically the most important federal agencies in the context of conservation and wise use of wetlands are IRSA, NCCW, Pakistan EPA, the Water & Environment sections of Planning and Development Division, Environment Directorate General of WAPDA and the Marine Fisheries Department. The Ministry of Environment and the NCCW have the mandate for coordinating between agencies managing wetlands and liaises with the wildlife organizations in the provinces, AJK, NAs and ICT. The NCCW plays a key coordinating role for wetlands, being the Ramsar focal point agency on behalf of the Ministry of Environment. However, its principal focus has been rather narrowly defined in terms of wildlife conservation, without a role and responsibilities for some of the other factors affecting wetlands, such as water availability and water quality.

At the provincial level the Wildlife and Fisheries departments, Environmental Cells in provincial Irrigation Departments e.g. PIDA, provincial EPAs, and water supply and sanitation agencies are most important.

Jurisdictional overlaps and inconsistencies are common over Pakistan's wetlands. At least three to four agencies (WAPDA/ irrigation or small dams/ fisheries/ wildlife) are managing the respective resources of some wetlands without shared understanding, jointly developed management plans or action plans and with little coordination. Neither the national nor the sub-national administrative authorities have adequate powers and human, technical and financial resources to implement wetland conservation and wise use programmes.

There is no legal basis to encourage positive conservation measures and stewardship by wetland owners, users and non-governmental organizations through contracts, conservation leases or economic incentives. However, Provincial Sustainable Development Funds are supposed to be set up in all provinces to pay for activities and projects that promote sustainable development including conservation.

The procedures do not clearly exist for coordination within agencies managing wetlands and cross-sectorally between relevant agencies. However, some consistency between sectoral policies, plans and programs as well as planning for sustainable use has been promoted through the process and products of the National Conservation Strategy (NCS), provincial conservation strategies (SPCS, BCS, SCS[21], NASSD) and the district conservation strategies (CCC, ACS) or integrated development visions (IDV-Qila Saifullah District, IDV- DIK District, IDV- Gawadar District, IDV- Badin District and pioneer IDVs in Chitral and Abbottabad).

Institutional measures for coordination and integration include the provincial wildlife management boards, provincial biodiversity committees and the relevant cross-sectoral groups that were established with the help of IUCN. Now the stakeholders are being involved in wetland policy making.

By mandate, the institutional priorities of water and power agencies, fisheries departments and tourism organizations are development oriented, without considering the needs of environment in general and wetlands in particular. The wildlife agencies are reacting to problems to avoid adverse impacts, rather than developing forward-looking wetland management initiatives. There is no agency that has the mandate or capacity to promote community-based wetland management and sustainable use.

7.8 *Wetland stakeholders and sectors*

There are many different stakeholders involved with or affecting wetlands – they are a truly cross-sectoral resource, and this often represents a management problem, since either one sector dominates management to the exclusion of the interests of other stakeholders, or there is no co-ordination or collaboration between any of the sectors, so

[21] At time of writing the approval for the Sindh Conservation Strategy is still pending.

that there is no effective management of the wetland resource. Yet all will stand to lose if the particular wetland resource is degraded or lost.

Often overlooked in the management of wetlands are the local users or the natural resources, the fishermen, the herders, the farmers and local communities reliant upon the natural resources. Other key sectors involved in wetlands and use of wetland resources include natural resource management agencies, those sectors that have negative impacts, and those that support wetlands. They are shown in the table below, with greater detail provided in a separate report on the Institutional and Administrative Framework for Wetlands in Pakistan[22].

Natural Resource Management Sectors	**Negatively impacting Sectors**	**Support Themes/ Organizations:**
Wetland management for biodiversity **(Wildlife sector)**	Water (environment flows impacted due to abstraction & extraction for irrigation & power) - e.g. WAPDA, Small Dams Organizations in Punjab and NWFP, Soil Conservation and Mini Dams Organization in AJK and PWD/ WASA in NAs.	Environment Environmental Protection Agencies (EPAs) for control of water pollution
Management of fisheries **(Fisheries sector)**	Housing & settlements, (extraction of water for drinking & discharging untreated sewage - especially big metropolis; and land use change after drainage e.g. WASA, city district governments, TMAs	Education and training
Water storage and management creating new wetlands (mega, medium & small purpose built dams **(Water sector)**	Industry (discharging untreated industrial effluents e.g. polluting industries - represented by CCI&E;	Research & development
Soil conservation, mini storage dams **(Agriculture sector)**	Communications (oil spill and land use change for ports, housing e, g. KPT/ PQA)	Database
Management watersheds **(Forestry sector)**	Energy (water abstraction/ extraction for hydro power and discharge of pollutants and hot water from thermal power plants)	Information & communication (e.g. media)
Management of coastal and marine resources including mangroves (**Forestry, Fisheries, Communications** - within port jurisdiction e. g. Karachi Port Trust, Port Qasim Authority.	Tourism (pollution, disturbance to wetland species, land area used for infrastructure e.g. PTDC, TDCP, private companies Requirement for timber and fuelwood by eco-tourism initiatives in mountain ecosystems	Armed forces and other security agencies
	Agriculture (extraction of water for irrigation, land use change for agriculture after drainage of wetlands, pollution from the use of agro-chemicals)	Population Planning
		Gender and women

[22] Rao, A.L. (2008) Institutional and Administrative Framework for Wetlands in Pakistan – background paper for National Wetland Policy.

		in development
		Health
		Water and sanitation

Within the private sector, companies using significant quantities of water, abstracting it from groundwater or surface waters, and thus affecting local availability of water for wetlands, should be considered as important stakeholders. Companies discharging significant quantities of waste water, especially if this is untreated or heated, into the rivers, lakes and coastal areas should also be considered as stakeholders. Some of the key private sector industries include food and drink processing, electricity generation, tanneries, textiles and developers of residential and tourism facilities. Tourism operators and resorts that depend upon healthy wetlands are important stakeholders. Many of these companies are linked through Chambers of Commerce and industry associations.

A number of international organisations have been closely associated with wetlands including WWF, IUCN, WCMC, BirdLife International, SUSG, Global Water Partnership, International Water Management Institute (IWMI), LEAD Pakistan, Aga Khan Rural Support Programme (AKRSP), UNEP, UNDP, UN Food and Agriculture Organisation (FAO). A number of national NGOs with interests in wetlands include Sustainable Development Policy Institute (SDPI), Sungi Development Foundation, SHEHRI, STEP, Himalayan Wildlife Foundation, BASDO, Pakistan Fisherfolk Forum.

7.9 *Legal and policy shortcomings*[23]

Pakistan became a Party to the Ramsar Convention on Wetlands in 1976 with NCCW as the designated focal point agency. There is no single piece of legislation in Pakistan that enables the country to fulfil its obligations under Ramsar. Whatever measures have been taken so far with respect to the declaration of Ramsar sites have been carried out under the provisions of other laws, none of which recognises wetlands as a distinct type of landscape, land use or ecosystem.

Of the country's many obligations under Ramsar, only four are addressed directly or indirectly under Pakistan law. Key requirements, such as legal definitions for 'wetlands' and 'waterfowl', and criteria for selecting Ramsar sites, are absent from the legal regime. Since no Ramsar-specific law has been enacted, procedural obligations, such as requirements to notify the Ramsar bureau, are not covered by law. Of the 258 instruments reviewed the word 'wetlands' was mentioned in only one law, the Sindh Water Management Ordinance 2002. This shows how wetlands management is a neglected issue in the legal regime.

In terms of oversight, two mechanisms of broad applicability are available.

- PEPA 1997 and its accompanying Rules and Regulations, since the term, 'environment' in that law is defined to include natural resources.

[23] Formation for the legal aspects has been drawn from a separate legal and policy review undertaken for IUCN by Firuza Pastakia. 2009.

- The other mechanism lies in the office of the Ombudsman, charged with responsibility for investigating cases of "mal-administration". However these mechanisms have not been tested with respect to natural resources and wetlands in particular.

There are two ways to provide for effective legal protection and sustainably management of the country's wetlands. One is to amend existing laws so that wetlands management is included where relevant, the other is to enact a law specifically for wetlands. Considering the number of separate legal instruments that affect wetlands management issues, the first option might not be realistic as shown by a summary of the legal instruments involved:

- There are close to 60 separate legal instruments at the federal, provincial, regional and local level that deal directly with the pollution of water resources. Most of these laws establish and provide for the functioning of local governments, irrigation and drainage bodies, port authorities, urban and rural development agencies, and water and sewerage boards.

- There are nearly 20 laws that provide mechanisms through which water quality can be controlled and protected; and about a dozen legal instruments indirectly affect the pollution of water resources.

- Of the 258 legal instruments reviewed for this study, more that 150 allow land use to be made or restricted.

- More than 100 laws at the federal, provincial and regional level allow natural resources to be accessed or exploited. Of these, close to 60 legal instruments are not even related to natural resources but still allow them to be exploited.

- PEPA Regulations for environmental impact assessments focus on large-scale and medium-scale projects (between 10 and 50 million rupees mostly for IEEs above 50 million for EIAs; it varies according to the sector). Highly polluting small-scale operations are not covered.

- One of the main laws governing the use of water resources across the country is 125 years old (Canal and Drainage Act 1873). The forest law in force in most of the country dates back to 1927. Wildlife laws in all four provinces are from the 1970s. Age is important because, of course, these old laws reflect outdated attitudes towards natural resource use and management.

- Even more important are the issues and processes that are NOT mentioned in the law such as wetlands themselves, climate change, environmental flows, community participation, collaborative management etc. For these matters new legislation would be required.

7.10 *Political factors*

Most political factors that threaten wetlands and make wetland conservation more difficult are related to transboundary issues and allocation of water resources. The Partition of the Indian Subcontinent in 1947 raised issues about the distribution of water, and particularly about supply of water to Pakistan. However, under the terms of the 1960 Indus Water Treaty, India and Pakistan agreed to share the Indus' water supply. The three eastern rivers Sutlej, Ravi and Beas went to India while the Indus, Jhelum and Chenab waters were allocated to Pakistan. The 1960 Treaty also made provisions for the transfer of irrigation water from the eastern rivers to parts of Punjab formerly supplied by them. The Indus Water Basin Treaty is considered a landmark achievement in terms of resolving water disputes and reaching mutually acceptable terms for sharing supplies. There have been some issues with implementation of the Treaty, particularly related to the construction of new barrages and dams by India, but on the whole the Treaty remains an effective instrument.[24]

In 1991 the Indus Water Accord, established an agreement between the four provinces of Pakistan for the sharing of water. This allowed for a minimum flow of water into the sea, and shared the remainder between the four provinces. In this way, the Accord allowed for the erratic flow of water in the Indus, and ensured that all provinces gained from surpluses or loss from shortages in supply. Despite the Water Accord there have been some significant inter-provincial disputes over water, especially with Punjab, which is seen as the larger, upstream province that controls the water infrastructure, by the smaller and downstream provinces. Sindh in particular is concerned that the reduced flow is insufficient to meet minimum requirements for inflow to the sea; seawater now comes up to 100 km inland. The result of this is increased salination of lower Sindh agricultural lands, which subsequently adversely affects ecosystems, soil quality and deterioration in the quality and quantity of water supply to Thatta & other areas in lower Sindh causing diseases and health problems for vast populations.

These political and water allocation issues are likely to continue and increase as water stress in different parts of the country begins to affect both urban and rural populations. As can be seen above the concept of environmental flows had origins even within the Water Accord in which the minimum flow below Kotri Barrage was set at 10 MAF, even if this has rarely been achieved in practice.

There is considerable inter-provincial debate about the Kalabagh Dam, with Punjab advocating for its construction and NWFP, Balochistan and Sindh opposing it for various reasons. NWFP is concerned about the loss of land and the displacement of communities in the fertile Nowshera valley, and the threat of earthquakes. Balochistan is concerned about the water resources available to the province and that the dam will strengthen historic positions of control of resources by Punjab. Sindh's concern is primarily focused on the diminished supplies of water reaching the province.

[24] www.alaiwah.wordpress.com/2008/09/24/inter-provincial-disputes-over-water-in-pakistan

In April 2006, the then President Pervez Musharraf, laid the foundation stones for the Diamer-Bhasha dam in the Northern Areas, moving the focus away from the controversy of the Kalabagh Dam. The inter-provincial water resource issues are very similar, although the reservoir flooding will not affect NWFP, but in Chilas valley in the Northern Areas, nor it is likely to affect the share of other provinces as rights are clearly safeguarded through Indus Water Accord-1991.

7.11 *Sub-national concerns and issues*

The importance of the various issues and threats to wetlands differs according to the concerns of the provinces and other administrative units. Addressing these issues in different parts of the country may require changing the emphasis in application of the wetland policy, with strategies and action plans being formulated by each administrative unit. Tables 4 and 5 show the different emphases of the primary threats and underlying causes identified. Whilst many issues are common to all areas, especially the underlying issues, the following differences emerged through the sub-national consultations:

Northern Areas – The main issues of concern to the Northern areas concern the impacts of climate change on the glaciers, combined with watershed management issues and the increasing demand for water for different uses. Pollution issues appear to be only a moderate to low concern, as are the issues of encroachment for agriculture, urban development, drainage and hydropower schemes. However, overexploitation of natural resources, water fowl, vegetation and fish, is a high priority threat to the wetlands in the Northern Areas. High priority underlying causes include the lack of alternative livelihoods, lack of awareness both amongst the general public and decision makers and population pressures. The usual institutional issues, overlaps and conflicts are apparent, and the legal issues feature highly, as do the shortfalls in the EIA and planning systems.

AJK – There is great awareness in AJK of watershed management issues, and addressing issues of soil erosion, slope stability and sedimentation in the water bodies, especially in Mangla reservoir, where the height of the dam has been recently raised. Road development, especially with careless disposal of cut spoils, may increase sediment in the water courses. There is less dependence on glacier melt for the rivers, but there is a concern over water availability in the rivers flowing in from India. Potential for changing flows in the rivers, e.g. by the Neelum-Jhelum hydropower scheme is viewed with concern for the rivers. Water pollution is a growing issue and there is no form of sewage treatment. The lakes are valued both for their fish and migratory birds, and as tourism resources, but these natural resources are in danger of overexploitation.

NWFP and FATA – The types of wetland in NWFP range from the high alpine lakes through to the wetlands in the alluvial plains of the Kabul River, and small storage dams of FATA. The issues of concern include the long-term availability of water from the glaciers and the integrity of the alpine lakes, especially those with high tourist pressure such as Saiful Muluk and Shandur. Pollution of the rivers by domestic and industrial wastes is a big issue for the people along the Kabul River. The impact of hydropower schemes on wetlands is an ongoing concern, illustrated by the Tarbela dam and Ghazi-

Barotha HEP. The pressures on the wildlife resources, waterfowl and fish are recognised as significant.

Punjab – The key issues for Punjab are water availability and management of the allocation of water for irrigation. Water needs of wetlands are a low priority, resulting in the loss of a number of wetlands. Encroachment of wetlands by agriculture is significant, and to a lesser extent urban and industrial development. Water pollution in the Ravi and Sutlej is a major problem with no treatment facilities in Lahore and other cities. The improved multi-purpose management of the man-made wetlands such as barrages and headponds for wildlife and fisheries as well as for irrigation is needed.

Balochistan – General water availability is the chief concern in Balochistan, and water harvesting and storage providing opportunities for the creation of man-made wetlands. The principal wetland resources are the coastal wetlands, with issues such as loss of mangrove areas from overexploitation, and disturbance of turtle beaches, potential encroachment as urban areas develop along the coast, and sea level rise. Marine pollution and oil spillage, e.g. form ship breaking are a concern. The fisheries resources are significant, and the importance of the mangroves for fish breeding has been realised.

Sindh – the major concern in Sindh is water availability, especially for the Indus Delta, but also for other wetlands such as Manchar & Haleji. Loss of water quality from pollution from domestic, industrial wastes is significant around all the major cities, in lakes such as Manchar and along the coast. Agricultural run-off, salinisation and eutrophication of wetlands are concerns. The case of the Tasman Spirit highlights the risk of major oil spillage in the busy shipping areas around Karachi. The loss and overexploitation of mangroves in the Delta is a high profile issue in Sindh, especially as they provide protection against storms and tsunamis. Urban encroachment along the coast, collapse of Cholri Weir (LBOD System) and the threat of the unrestricted development of the mega-cities is a cause for concern along the coastal wetlands. Overexploitation of the fishery resources off the coast of Sindh is also a concern.

Key:

No priority	
Low priority	
Medium priority	
High priority	

Table 4: Priority issues and threats to wetlands for each province or administrative area

Issues - Primary threats to wetlands	Northern Areas	AJK	NWFP/ FATA	Punjab	Balochi-stan	Sindh
Changes in water availability						
Climate change and glacier melt						
Flood and drought						
Watershed management issues - deforestation						
Demand for water for agriculture, domestic supply and industry						
No consideration of environmental flows						
Hydropower developments changing flow patterns						
Changes in water quality:						
Organic pollution						
Bacterial pollution						
Chemical pollution						
Oil pollution						
Agricultural chemicals						
Nutrients						
Salinity						
Thermal pollution						
Spread of Invasive Alien Species						
Change in ecological character						
Land use change						
Encroachment for agriculture						
Encroachment for building						
Urban developments – mega-cities						
Industrial development						
Irrigation and drainage schemes						
Hydropower schemes						
Transport sector – ports, roads and railways						
Climate change and sea level rise						
Over-exploitation of natural resources						
Over-use of vegetation for grazing, fuel, handicraft industries						
Hunting pressures on wetland mammals and waterfowl						
Fisheries – Over-fishing						
Illegal fishing methods, dynamite and poison						
Illegal nets and net materials						
Non-observance of fishing regulations						
Introduction of exotic species						
Non-sustainable tourism – water pollution, disturbance, development pressures						
Climate change induced ecological changes – temperature, rainfall, species shift						

Table 5: Prioritisation of underlying causes of wetlands loss and degradation by province and administrative area

Underlying causes	Northern Areas	AJK	NWFP/ FATA	Punjab	Balochi-stan	Sindh
Socio-economic factors						
Lack of viable alternative livelihoods for wetland users, not to over-exploit						
Perception of common user rights to wetland resources						
Displacement of wetland users, lack of user rights						
Economic value of land compared to value of natural wetlands						
Social and political unrest with regard to water resources						
Lack of awareness amongst general public						
Population pressures						
Institutional factors						
Lack of awareness amongst decision makers and resource managers						
Conflicting and duplicated mandates for management of wetlands						
Lack of coordination between organisations responsible for wetlands						
Lack of institutional capacity for enforcement, technical management and advice						
Lack of financial resources						
Legal Issues						
No legal definition of wetlands or specific legislation for management and protection						
In adequate protection under wildlife laws or PEPA						
No legislation to deal with issues such as environmental water requirements, climate change or community-based management						
Inadequate enforcement of water pollution or water quality NEQs						
No legal basis or financial incentives to encourage positive conservation measures						
Planning issues						
EIAs do not consider wetlands and conducted with inadequate consultation with wetland stakeholders						
Non-observance of planning and building regulations near wetlands and beaches						

4. What is being done to address these threats?

4.1 *Wetland conservation and management*

One of the most comprehensive wetland initiatives in Pakistan is the Pakistan Wetlands Programme (PWP), within which the development of the National Wetlands policy is an important component. In developing the PWP, the status of wetland management at the beginning of the project is described on the website[25].

By 2003, the national and site level investment in wetlands was generally inadequate to meet the challenge of conserving globally important biodiversity. At the national level, the key significant drawback was the absence of an effective enabling environment that could encourage and sustain initiatives for biodiversity conservation. Key barriers to creating an enabling environment remained:

- lack of effective and integrated policies;
- absence of decision-making tools and reliable information to support effective wetlands conservation planning;
- technical deficiencies related to skills and equipment; and
- lack of general public awareness or political pressure that would favour wetlands conservation.

If the 2003 scenario were to continue, it is projected that wetlands conservation in Pakistan would continue to encompass a series of essentially unrelated, short-term initiatives driven by donor support. In the absence of the measures proposed under the Pakistan Wetlands Programme, the existing national and site level conservation efforts are likely to have little sustainable impact on the globally important wetlands and their associated biodiversity in Pakistan.

The work of other organisations, notably IUCN Pakistan, and its longstanding work with the Sindh Forest Department in rehabilitation of mangroves in the Indus Delta, and along the Makran Coast has done much to raise the awareness of the importance of mangroves nationally, and the need to maintain the flows of water downstream to the sea. Similarly the development of the National and Provincial Conservation Strategies have also considered wetlands natural resources, but less specifically.

Many other organisations and sectoral agencies have also worked on wetlands conservation and management in different ways, including WAPDA Environmental Department and Punjab Irrigation and Drainage Authority, which has produced guidelines for wetland management for EIA and irrigation development; *Sindh Irrigation & Drainage Authority, which has worked on all important wetlands of Sindh including Hamal, Manchar, Chotiari, Mehro, Sanhro[26];* the Wildlife Departments, the Fisheries Departments and the EPAs. All have interests and conservation activities for wetlands,

[25] www.pakistanwetlands.org
[26] Sindh Irrigation Department is currently conducting a study on Haleji Lake (Ramsar site),

but these are largely marked by a lack of coordination and awareness about what each is doing.

4.2 *Pakistan Wetlands Policy*

The proposed Pakistan Wetlands Policy is focused on addressing these issues, largely reflected in the outputs of the Pakistan Wetlands Programme. The policy would serve to endorse these areas of sustainable management of wetlands nationally and encourage implementation at federal, provincial/territorial and community level. The proposed policy consists of the following objectives and strategies.

1. Primary threats to Pakistan's wetlands addressed

1.1. Ensuring water availability for priority wetlands in Pakistan
1.2. Ensuring water quality in Pakistan's wetlands, especially rivers, lakes and coastal zones
1.3. Managing land use change to protect Pakistan's wetland resources
1.4. Encouraging sustainable use of Pakistan's wetland natural resources
1.5. Addressing issues of climate change and natural disasters affecting wetlands

2. Regulatory framework for the conservation and sustainable use of wetlands created and implemented

2.1. Harmonising national wetland policy with other policies
2.2. Clarifying legal status for the protection and sustainable use of wetlands and developing new wetland legislation

3. Greater coordination and collaboration between agencies and sectors on wetland issues encouraged from local to international levels

3.1. Ensuring greater coordination between institutions with wetland responsibilities
3.2. Developing site-level collaborative wetland management
3.3. Developing coordination and collaboration on wetland issues at the provincial level
3.4. Developing inter-provincial collaboration on wetland issues
3.5. Developing International collaboration on wetland issues

4. Wetland research, education and data management promoted

4.1. Improving the understanding of wetlands science – processes, use, threats and management
4.2. Encouraging wetland education at all levels from primary to tertiary education
4.3. Developing and improving wetland maps and data management
4.4. Valuing Pakistan's wetland benefits and services
4.5. Providing access to wetland information

5. Pakistan's capacity for sustainable wetland management built

5.1. Building the capacities for site level wetland management
5.2. Building the capacity for addressing wetland issues amongst provincial government agencies

5.3. Building the capacity for addressing wetland issues amongst federal government agencies

6. Greater understanding, perceptions and attitudes towards wetlands promoted

6.1 Creating awareness about wetlands amongst:

- The general public
- Wetland stakeholders and users
- Specific influential groups
- Government officials
- Senior decision makers

7. Financing mechanisms for sustainable wetlands management secured

7.1. Sourcing wetland finance from various environmental funds
7.2. Ensuring specific wetland allocations in government budgets
7.3. Developing corporate sector finance for wetlands
7.4. Developing donor funded projects