INTERNATIONAL
FOOD POLICY
RESEARCH
INSTITUTE

Food and Agriculture
Organization of the
United Nations

PACE Research Report: Comprehensive Institutional Review for Climate Resilient Agriculture

PACE Research Report: Comprehensive Institutional Review for Climate Resilient Agriculture

For Support To:

“Transformation of the Indus Basin with the Introduction of Climate Resilient Agriculture and Sustainable Water Management Project” and “Strengthen Food Security and Nutrition Information Systems (FSNIS) in Pakistan”

Prepared by:

Abdul Wajid Rana

Program Leader

Pakistan Agricultural capacity Enhancement Program (PACE)

International food Policy Research Institute – Pakistan (IFPRI)

Table of Contents

	<u>Page No.</u>
Acronyms	4
1. Introduction	5
2. Institutionalization of Climate Change in Pakistan: Policy and Law	6
3. Governance of Water Sector	10
3.1. Legal Framework for Water Resources	12
3.2. Water Related Institutional Arrangements	15
3.3. Challenges facing Water Sector in Pakistan	16
4. Agriculture Sector of Pakistan	16
5. Federal and Provincial Policies for Agriculture, Land Use, and Water	19
5.1. Review of Federal and Provincial Policies	19
5.2. Land Use and Disaster Management	20
6. Political Economy and Decision Making	20
6.1. Political Economy Analysis	20
6.2. Decision Making for Climate Change, Water and Agriculture	21
6.3. Gaps in Relation to Climate Change	22
6.4. Stakeholders Mapping and Analysis	23
7. Approach and Mechanism for Mainstreaming Climate Change	25
7.1. Collaboration with Development Partners	30
8. Review of Proposed Activities	30
8.1. Water Accounting System	30
8.2. Proposed Institutional and Implementation Arrangements	31
8.3. Approval of PC-Is and Flow of Funds	33
8.4. Regulations, Taxation, and Insurance	35
8.5. Contribution to Regulatory Framework and Policies	35
Box 1 Stakeholders Mapping	24
 <u>Tables</u>	
Table 1 Legal Framework for Climate Change Related Issues	8
Table 2 Institutions Dealing with Climate Change and CRA	10
Table 3 Water Sharing under 1991 Water Accord	12
Table 4 Water Related Legislation in Pakistan	13
Table 5 Institutions Relating to Water Management & Mitigation	15

Table 6	Agriculture Related Legislation	18
Table 7	Stakeholders Analysis	26

Figures

Figure 1	Functional Distribution of Water Sector	11
Figure 2	Water Related Institutions	14
Figure 3	Political Analysis Map	21
Figure 4	Schematic Process for Approval of Project	33
Figure 5	Proposed Design of Project Implementation Unit	34
Figure 6	Flow of Funds from FAO/GCF to Implementing Agencies	34

Appendices

Appendix-I	Institutionalizing Climate Change in Pakistan	36
Appendix-II	Structure of Ministry of Climate Change	37
Appendix-III	Institutions Dealing with Agriculture	38
Appendix-IV	Provincial Irrigation and Drainage Authorities	40

Acronyms

asl	Above Sea Level
AWB	Area Water Board
BIDA	Balochistan Irrigation and Drainage Authority
BOR	Provincial Board of Revenue
CDM	Clean Development Mechanism
CDWP	Central Development Working Party
DCO	District Coordination Officer
DISCOs	Distribution Companies
DNA	Designated National Authority
ECC	Economic Coordination Committee of the Cabinet
ECNEC	Executive Committee of the National Economic Council
EPA	Environmental Protection Authority
FSC&RD	Federal Seed Certification and Registration Department
IAs	Implementing Agencies
KFHA	Korangi/Karachi Fish Harbour Authority
KIDA	KPK Irrigation and Drainage Authority
m	Meter
MAF	Million Acre Feet
MNFS&R	Ministry of National Food Security and Research
NARC	National Agriculture Research Council
NBC	National Biosafety Committee
NCCP	National Climate Change Policy
NDMA	National Disaster Management Authority
NEPRA	National Electric Power Regulatory Authority
NFML	National Fertilizers Marketing Limited
OFWM	On Farm Water Management
PAD	Provincial Agriculture Department
PDWP	Provincial Development Working Party
PMD	Pakistan Metrological Department
PSC	Punjab Seed Corporation
PARC	Pakistan Agriculture Research Council
PCCA	Pakistan Climate Change Authority
PCR	Project Completion Report
PIDA	Punjab Irrigation and Drainage Authority
PSA	Pakistan Statistics Authority
PSQA	Pakistan Standards and Quality Control Authority
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SIDA	Sindh Irrigation and Drainage Authority
WUA	Water Users Association

1. Background

Pakistan is vulnerable to climate change impacts. Like many developing countries, it is also facing the challenge of dealing with governance of climate change and restructuring associated institutions. It is estimated that the future cost of climate impact would be around \$6 billion to \$14 billion annually over the next 40 years.¹ Ministry of Climate Change is now focusing in creating necessary infrastructure and platforms for policy decisions and implementation.

2. ***Governance of mitigation*** requires a clear understanding of emission sources, cost-effective solutions to regulate it, and policy approaches. The continuous research in the area has developed various policy instruments to encourage mitigation. However, the major challenge lies not as much in designing approaches for mitigation than political ownership and will to implement those approaches. Countries are now implementing energy efficiency measures and regulatory standards to raise minimum efficiency requirements for industrial equipment, consumer products, and building standards. Additionally, developed countries are transferring mitigation technology to encourage mitigation efforts in developing countries.

3. ***Governance of adaptation, similarly, requires knowledge of potential regional and local climate effects on water availability, extreme weather events, changing temperature and precipitation patterns, and sea level rise.*** It requires detailed planning and policy approaches to deal with expected challenges and institutions to implement those policies as these have the potential implications for human settlement patterns, ecosystem, biodiversity, agriculture and infrastructure. The critical elements that are needed to be focused for adaptation measures include: scientific understanding of regional and local climate change, ecosystem and its impacts, developing public awareness and education, planning for infrastructure and key socio-economic sectors, changes in farming practices, development of new varieties, land use planning, appropriate societal adjustments, establishment of adaptation forums, collaboration with the insurance industry to identify vulnerabilities, integration of climate adaptation into agriculture and natural resources management plans, etc.

4. **The key element that influences the success of climate change governance is the ownership and support by the top political leadership.** Equally important is the leadership of institutions that are responsible for implementation of policy and plans. Secondly, the leadership must not consider climate change governance as an ‘environmental’ issue only as it extends across many sectors such as energy, industry, spatial planning, urban affairs, transport, international relations and forums, development plans and so on. Thirdly, the structure of the lead climate agency, its location, enactment of integrative measures and availability of resources play a vital role in mainstreaming climate change. Given the international environment and changing global policy regime, governments approach climate change from the perspective of their national

---

¹ M.A.A. Khan et al. 2011. Pakistan National Economics and Environmental Development Study. <https://unfccc.int/files/adaptation/application/pdf/pakistanneeds.pdf>

interest. Adaptation to climate change and building resilience need not only policy and legal framework but also strong institutions. Governments commission various studies to assess the potential risks of climate change, cost to deal with these risks and develop strategic policy framework for potential mitigation and adaptation actions. This framework, typically, include:

- (a) Country's overall perspective on climate change;
- (b) National objectives with respect to mitigation and adaptation;
- (c) Main policy approaches, instruments and funding mechanisms;
- (d) Institutions responsible for implementing climate change policy;
- (e) Expectation from various actors: layers of government, corporate business, civil society, individual citizens;
- (f) Resource allocation for continuous scientific research relating to climate change;
- (g) Approach to international cooperation about climate change; and
- (h) Adapting existing institutions and development programs to climate change issues and initiate programs for low carbon economy.

3. **Countries around the globe has adopted one of three or a combination of all three approaches to deal with adaptation (climate resilience) emerging out of climate change and to cover action in a number of sectors, such as energy, transport, industry, forestry, land use, air quality, poverty and food security.** These approaches include: (i) formulating a specific climate change law that addresses some or all of these issues; (ii) embedding climate change considerations into multiple existing sectoral laws and policies; (iii) enacting new sectoral laws and policies. 164 countries that have legislated on climate change so far have taken a combined approach enacting 1200 laws and policies.² These laws and policies address climate change and transition to low carbon economies through different prisms, such as, energy, climate change/low carbon transitions, general environment laws, mainstreaming into development plans, forestry, green transport, disaster risk reduction, agriculture and food security, and others. In other words, governance of climate change in countries, developing and developed, is increasingly becoming non-optional.

6. This paper will only deal with institutional review and stakeholders' analysis from the perspective of national food security and mainstreaming climate change in agriculture and water.

2. Institutionalization of Climate Change in Pakistan: Policy and Law

7. **Institutionalization of climate change in Pakistan started very early though, inefficient and weak institutions led to poor implementation of policies and programs.**

---

² Michal Nachmany, Sam Fankhauser, Joana Setzer, and Alina Averchenkova, *Global Trends in Climate Change Legislation and Litigation*, The Centre for Climate Change Economics and Policy, 2017.

Pakistan signed and ratified 14 international environmental commitments between 1975-2001, including the United Nations Framework Convention for Climate Change (UNFCCC) and Kyoto Protocol. However, these efforts largely remain fragmented with weak coordination, political support and ownership. Post-18th Constitutional Amendment, Environment was devolved to the provinces in 2010 and federal Ministry of Environment was abolished that disrupted the focus on climate change. The Ministry of Climate Change at federal level was ultimately revived in 2015. These recurrent changes in institutional arrangements relating to the subject conveys three things: (i) an evolving understanding among policy and decision makers about significance of climate change issues and its impact on water, agriculture, and disaster management; (ii) a fragmented and wayward approach towards managing climate change challenges; and (iii) lack of political support and ownership at the federal and provincial levels. A brief history of institutionalizing climate change in Pakistan is at **Appendix 1**.

8. **The efforts to focus on evolving challenges emanating from climate change is manifested in first comprehensive piece of legislation called Pakistan Environmental Protection Ordinance in 1983 which was later replaced with Pakistan Environmental Protection Act, 1997.** It provided the framework for implementation of a national conservation strategy, establishing Environmental Tribunals and Provincial Sustainable Development Funds, appointment of Environment Magistrates, establishing Environmental Examination laboratories and Environmental Impact Assessment. It also provided procedure for constituting Environmental Councils at federal and provincial levels. However, after devolution in 2010, most of these functions were devolved to the provinces that passed the enabling legislations in 2012 (Punjab and Balochistan) and 2014 (Sindh and KPK), although they had established Environment Protection Agency somewhere in early 2000.

9. **National Climate Change Policy (NCCP) 2012 provides the broad policy framework for climate change in Pakistan.** The Policy outlines the threats emanating or likely to be emanated from climate change for Pakistan and the policy measures, both mitigation and adaptation, to address these threats. The overarching goal of the policy is to “pursue sustained economic growth by appropriately addressing the challenges of climate change.” The policy proposes prioritization of adaptation measures over mitigation in the following sectors: water resources, agriculture and livestock, health, forestry, biodiversity, and vulnerable ecosystems; and mitigation measures in energy efficiency and conservation, transport, industries, agriculture and livestock, carbon sequestration, and forestry. It acknowledges better socioeconomic gains through tackling climate induced poverty, mainstreaming gender, improving town planning, appropriate measures for disaster management, capacity building, institutional strengthening, technology transfer and international cooperation. The policy underlines the significance of sectoral climate change action plans and proposes “implementation committees” at national and provincial levels reporting to the Prime Minister Committee on Climate Change.

10. **The NCCP is in line with the findings of IPCC 4th and 5th Assessment Report adequately covering adaptation and mitigation measures.** The policy is supported by a range

of regulatory and other policy documents, such as, the National Disaster Risk Reducing Policy (2013), Renewable Energy Policy (2011), Draft National Sustainable Development Strategy (2012), and the regulations establishing DNA for the CDM. Nevertheless, it needs adjustments post-Paris Agreement and Pakistan's commitment under this Agreement.

11. **The Parliament has recently approved Pakistan Climate Change Act, 2017.** It provides for Pakistan Climate Change Council headed by the Prime Minister, 9 Federal Ministers, 4 Chief Ministers, Chairman NDMA, Chairman PCCA, and 30 other members 20 of whom are non-official members to be inducted from various categories scientists, researchers, practitioners, etc. The Council is mandated to oversee the policy approval and implementation and is expected to generate political ownership of the issues and challenges relating to climate Change. The law also provides for Pakistan Climate Change Authority with representation from the four provinces which is responsible for formulating comprehensive adaptation and mitigation policies, plans, programs, projects and measures designed to address the effects of climate change and meet Pakistan's obligations under interactional conventions and agreements relating to climate change and within the framework of a national climate change policy. The authority shall also be responsible for establishment of institutional and policy mechanising for implementation of Federal and provincial adaptation and mitigation policies, plans, programs, projects including measures, including plans for renewable energy and clean technology measures for energy efficiency and energy conservation and awareness-raising and capacity building programs. **Table 1** provides the legal framework governing the climate change in Pakistan and the four provinces.

Table 1. Legal Framework Governing Climate Related Issues

Act/Policy	Purpose
National Forest Policy 2010	Focus on protecting soil from erosion and downstream siltation, watershed protection, local livelihood in terms of non-timber forest products, enhancing forest cover
Climate Change Policy 2012	Aims at achieving development goals set out in the Vision 2025 and spells out appropriate adaptation measures as well as measures for disaster preparedness, capacity building, institutional strengthening, technology transfer, and international cooperation
National Disaster Risk Reduction Policy 2013	Aims at laying the policy, principles and measures to reduce vulnerabilities
Renewable Energy Technologies Act, 2010	Establishes Pakistan Council of Renewable Energy Technologies, promoting the development, acquisition, propagation and dissemination of renewable energy technologies: Solar, wind, biogas/biomass, mini/micro hydro power
National Disaster Management Act 2010	Establishing National Disaster Management Commission to lay policies, plans and guidelines to deal with disaster management Establishing Provincial Disaster Management Commissions to implement policies and plans relating to disaster management and District Disaster Management Authorities

Punjab and Balochistan Environment Protection Act, 2012, Sindh and KPK Environment Protection Act, 2014	Provincial laws establishing provincial Environment Protection Council, Environment Protection Agency, Provincial Sustainable Development Fund, and regulating environment protection issues
Pakistan Climate Change Act 2017	Establishing Pakistan Climate Change Council for policy making, Pakistan Climate Change Authority to formulate mitigation and mitigation policies and their implementation, Preparing Adaptation Plan and Climate Change Technology Action Plan, establishing Pakistan Climate Change Fund

12. **Post-18th Constitutional Amendment, Pakistan has been transformed from a layered-cake federalism to participative and collaborative federalism which has ensued a comprehensive consultation process and effective coordination mechanism.** All policy decisions and consequential legislation on all matters list in Part II of the Federal Legislative list (electricity, water sharing, oil and gas, railway, industries, and regulatory matters, etc.) now requires approval of the Council of Common Interest (CCI).³ Therefore, all adaptation policy measures relating to energy, water, industries, transport, and regulatory measures will require consultation and concurrence of the provinces subject to approval of CCI. Likewise, Provincial Governments are represented in Pakistan Climate Change Council (chaired by the Prime Minister) and Pakistan Climate Change Authority.

13. **Table 2 reflects various institutions that deal with climate change related issues as well as disaster management in Pakistan, both at the federal and provincial levels.** The Ministry of Climate Change (MoCC) is the focal institution for climate change in Pakistan while Environment Departments and Environment Protection Agency are taking care of environment related issues in the provincial jurisdiction. The structure of MoCC is at **Appendix-2**. It also handles and support Clean Development Mechanism (CDM) and Reducing Emissions from Deforestation and Forest Degradation (REDD+) initiatives in the country. Guided by CDM Strategy (2006), the CDM cell in the Ministry is the designated authority on CDM projects. The strategy allows for unilateral, bilateral, and multilateral CDM projects, preferably in the areas of energy, including renewable energy, energy efficiency, energy conservation, and fossil fuelled cogeneration; land use, land use change, and forestry (e.g., biodiversity protection, soil conservation, watershed maintenance and sustainable forest and rangeland management); agricultural and livestock practices; waste management (e.g., landfills, solid waste management, recycling, animal and livestock wastes); transportation (e.g., alternative fuel vehicles, mass transit systems, cleaner engines, compressed natural gas); and industrial processes.

14. **Despite this elaborative legal and institutional arrangements, climate change has yet not achieved centrality in planning and development in Pakistan.** Lack of a realistic understanding of potential threats, particularly in water, agriculture and energy sectors, is hampering the mainstreaming of the climate change as well as a push for enforcement of adaptation

³ It is a constitutional institutions chaired by the Prime Minister and includes three federal ministers and four Provincial Chief Ministers).

measures. The transfer of “Environmental Pollution and Ecology” to the provinces along with 46 other subjects including food, agriculture, irrigation and population, livestock, forestry, biodiversity and conservation, after 18th Amendment, has also diluted the thrust needed to mainstream climate change. Secondly, provinces may not interchange climate change with environment but require cross-sector and multidisciplinary approach, requisite skills and expertise to address multi-dimensions of climate change. The mainstreaming of NCCP is not possible without clear division of implementation responsibilities between the federal, provincial and local governments and effective vertical and horizontal coordination as well as data sharing with full commitment of all stakeholders from the government, civil society, technocrats, businesses, and the general public. Additionally PCCC and PCCA need to be made fully functional.

Table 2. Institutions Dealing with Climate Change and CRA

Organizations	Responsibility	Status
Ministry of Climate Change	Deals with policy formulation, mitigation and adaptation plans, technologies action plan, and related issues	Federal
Ministry of National Food Security and Research & PARC	Deals with Climate Resilient Agriculture policies	Federal
Federal Flood Commission under Ministry of Water Resources Management	Prepares and coordinates implementation of national flood protection plans and the oversight of flood forecasting, warning and management	Federal
Ministry of Planning, Development, and Reform and Provincial Planning and Development Departments	Approval of development projects relating to climate change	Federal/ Provincial
Provincial Environment Departments, Environment Protection Agencies	Dealing with environment related issues at the provincial level and enforcement of environment related policies and plans	Provincial
Provincial Agriculture Departments	Promoting adaptation policies and strategies in agriculture and implementing these policies and strategies at farm level	Provincial
Provincial Irrigation Departments	Promoting and encouraging climate resilient water management techniques at system level	Provincial
Provincial Energy Departments and Industries Departments	Enforcement of Mitigation policies and strategies	Provincial
National Disaster Management Authority	Conducts oversight and coordination of disaster management including relief and rescue operations at the national level	Federal
Provincial Disaster Management Authorities and District Disaster Management Authorities	Coordinates with NDMA and other provincial departments for relief and rescue operations	Provincial
Alternate Energy Development Board	Develop national policies, strategies and plans for utilization of alternate and renewable energy resources	

3. Governance and Institutional Arrangements for Water in Pakistan

15. Indus Basin Irrigation system is the world’s largest contiguous and state managed surface irrigation system that forms the backbone of the country’s economy. Water is a trust held by the state rather than owned by individuals. It needs sustainable water storage infrastructure to smooth out peaks and troughs in water availability while aiming to preserve environmental flows. This necessitates an integrative policy framework for surface and groundwater across all sectors (storage, agriculture, domestic, industry) and effective arrangements for monitoring and

coordination while recognizing climate change impacts and inclusion of adaptation strategies. The policy must address the following issues: development of comprehensive water allocation plans at basin level, demand management including reuse, recycling and conjunctive use to make efficient use of water allocated, protection of water quality and aquifers, technical efficiency measures in major water using sectors, and appropriate arrangements for protection infrastructure against floods and water transfer to address areas of scarcity. It is equally important to educate the decision makers as well as all stakeholders and to engage all water user groups in developing this policy framework.

Figure 1. Functional Distribution for Water Sector

16. Governance and institutional framework for water management and climate change is complex. 18th Constitutional Amended in 2010, devolving agriculture, water, and environment to the provinces has added to this complexity. Federal government is now responsible for floods management, enforcement of water apportionment, some aspects of agriculture and climate change (see **Figure 1**). Development and maintenance of Indus Basin Irrigation System is jointly handled by the federal government (dams, reservoirs, hydropower, water apportionment, Indus Water Treaty) and provincial governments (barrages, canals, water courses and water management). This section will review challenges, legal framework and institutional arrangements governing agriculture, water, and climate change in Pakistan.

17. Externally, sharing of Indus Basin Water between Pakistan and India is regulated by Indus Water Treaty. Internally, Indus River water sharing is administered through Apportionment of the Water of Indus River System Between the Provinces Accord, 1991 signed by the Provinces on the

16th March, 1991 regulates the water sharing of Indus River between provinces.⁴ The Accord uses a baseline of historical flows (1977-1982) to compute water allocations for each province (*see* Table 3). Shortages and surpluses are then share proportionately and allow 10 MAF minimum water flow into the sea. The Accord does not encompass distribution of groundwater and intra-provincial surface water distribution.

Table 3. Water Sharing Under 1991 Water Accord (*unit: MAF*)⁵

Province	Average Use 1977-1982 (Para 14b of the Accord)	Agreed Water Sharing (Para 2of the Accord)						Surplus Water Sharing (Para 4 of the Accord) Percentage
		Kharif	%age	Rabi	%age	Total	%age of total	
Balochistan	1.63	2.85	2.49	1.02	0.89	3.87	3.38	12
KPK	3.06	3.48	3.04	2.30	2.01	5.78	5.05	14
Civil Canals ⁶		1.80		1.20		3.00		
Punjab	54.51	37.07	32.42	18.87	16.50	55.94	48.92	37
Sindh ⁷	43.53	33.94	29.68	14.82	12.96	48.76	42.64	37
Total	102.73	77.34	67.63	37.01	32.36	114.35	100.00	100

18. Water Accord has withstood all types of pressures for more than 27 years. However, a number of issues remain unresolved, primarily because of crisis of confidence between Punjab and Sindh and requires effective dispute resolution mechanism. These issues include: (i) construction of additional water storages (Para 6 of the Accord); (ii) water-escapeage down-stream Kotri (Para 7 of the Accord); (iii) mode of sharing shortages (Para 14 b of the Accord); and (iv) reduction of water storage due to sedimentation and silting. In addition, the country need to deal with the groundwater management, intra-provincial surface water distribution, water waster in irrigation and water governance.⁸

3.1. Legal Framework for Water Resources

19. Fundamentally, Pakistan continued with colonial legal and administrative structure for water management that British established. The driving forces behind undertaking development of extensive irrigation system by the British were: (i) famine prevention; (ii) anticipated increased state tax revenues; (iii) increasing government control by encouraging people to engage in settled agriculture and reducing potential threat to the state; (iv) control of environment; and (v) creation

⁴ The Accord is the largest intra-national water allocation plan by volume, ahead of the Krishna River Basin (46.13 MAF/year), Yellow River Basin (45.85 MAF/year), Colorado River Compact (14.63 MAF/year) and the Murray-Darling Basin (0.96 MAF/year).

⁵ Apportionment of the Waters of Indus River System between the Provinces

⁶ The Civil Canals, above the rim stations outside of the presumed limits of the Waters of the Indus River System, are irrigation canals that are managed by civil community/civil society in the KPK province, as opposed to state-managed canals

⁷ Including already sanctioned Urban and Industrial uses for Metropolitan Karachi.

⁸ Humaira Sharif, Inter Province water distribution conflict in Pakistan

of new layers of friendly local elites through settlement policies that followed⁹ consolidating the hold of landowning elites, particularly in the Punjab and Sindh. These factors are closely linked with the irrigation system and legal-administrative structures.

Table 4. Water Related Legislation in Pakistan

Year	Legislation	Implementation	Key Features
1860	Pakistan Penal Code	Federal/Provincial	Penalizes water pollution as a public health issue
1873	Canal and Drainage Act	Federal/Provincial	Governs irrigation water use in Provinces
1882	Easement Act	Federal/Provincial	Grants and limits rights for water pollution
1879	Sindh Irrigation Act	Provincial	
1905	Punjab Minor Canals Act	Provincial	Governs irrigation water use
1952	Punjab Development of Damaged Areas Act	Provincial	Allows Government to construct sewage and drainage in damaged areas
1952	Punjab Soil Reclamation Act	Provincial	Governs soil reclamation
1958	Water and Power Development Authority Act	Federal	Established WAPDA to construct water reservoirs and Hydropower stations
1976	Territorial and Maritime Zones Act	Federal	Declares maritime territory and boundaries
1978	Balochistan Groundwater Rights Administration Ordinance	Provincial	Regulation of groundwater rights in Balochistan
1980	Balochistan Canal and Drainage Ordinance	Provincial	Governs irrigation water use
1981	On-Farm Water Management and Water Users Association Ordinance and Sindh Ordinance 1982	Provincial Law	Provide resources for improved irrigation water management
1992	Indus River System Authority Act	Federal	Agency responsible for surface water regulation and distribution amongst provinces
1994	Coastal Development Authority Act	Provincial	Regulates marine and coastal waters
1996	Karachi Water and Sewerage Board	Provincial	Governs water supply and sewerage within municipal limits of Karachi
1997	Punjab, Sindh Irrigation and Drainage Authority Act	Provincial	Implemented Irrigation water Reforms
1997	Environmental Protection Act	Federal/Provincial	Governs Environment Protection & Pollution
2002	KPK River Protection Ordinance Sindh Water Management Ordinance	Provincial	Sindh Irrigation and Drainage Authority Act 1997 and Water Users' Association Ordinance 1982 were repealed.
2009	Nation Drinking Water Policy	Federal/Provincial	Provides institutional framework and guidelines to ensure supply of quality drinking water
	National Wetlands Policy	Federal/Provincial	
2018	National Water Policy	Federal/Provincial	Provides framework for integrated water management in Pakistan

20. Pakistan has multiple water related legislation and rules, both federal and provincial, starting from colonial rule (*see Table 4*). Indus River System Authority (IRSA) Act of 1992 is the key legislation. It is responsible for regulation and distribution of surface waters amongst provinces according to policies and allocations spelt out in the Water Accord and reservoirs operations; data management of surface water flows, determining priorities for river and reservoirs, reviewing canal withdrawal indents and addressing grievances of the provinces relating to water distribution. The provinces have the right to appeal to the Council of Common Interest (CCI) against any decision of the IRSA.

⁹ Dharma Kumar (Ed.), 1989, *The Cambridge Economic History of India (677–737)*. Cambridge, UK: Cambridge University Press.

21. The Canal and Drainage Act, 1873, is the most critical legislation. The law is accompanied by 73 appendices which explains further details of water management and administrative issues. It confers considerable administrative and judicial authority to Irrigation Department officials with little or no public accountability. At the same time, the law also recognizes the notion of public input into administration of the irrigation system (*see* Section 4-A of the Act)¹⁰ meant to assist the government in policing and maintaining order in water use. The law governs water resources management in Pakistan. The preamble¹¹ acknowledges unequivocal right of the Provincial Government to administer water and excludes any possibility of private ownership of the water resources located in that provinces except water rights created through *warabanadi*.¹² In this

Figure 2. Water-Related Institutions in Pakistan

¹⁰ The Provincial Government may constitute an Organization of Farmers comprising the local cultivators on a water-course, a group of water-courses or a distributary or a part thereof, and may confer any of Canal Officer's functions to such organization

¹¹ The Provincial Government] is entitled to use and control for public purposes the water of all rivers and streams flowing in natural channels, and of all lakes, sub-soil water, and other natural collections of still water; and whereas it is expedient to amend the law relating to irrigation, navigation and drainage in the said territories.

¹² In warabandi, farmers take turns getting the full flow of the water entering a watercourse from a distributary canal. Farmers are allotted a turn, a fixed amount of time during the course of a seven-day cycle, which represents their formal water right. The farmer must take the water at the allotted time or lose their right to the water. This water right is calculated by the amount of land the farmer has under cultivation—not by the water requirements of the crop. Thus, unlike other irrigation systems, control of water in the Indus lies completely in the hands of the supplier, not in the hands of the farmer.

system, location of farmer's fields is of paramount significance in terms of access to irrigation water. Privilege of preferential access to irrigation water was accorded to local elite as part of the bargain for its loyalty to the colonial Raj. The influential farmers continued to have substantial power to manipulate water distribution with the collusion of local irrigation staff. It formalized reliance of the British on local elites by reference to authority, customs and traditions for control of the local population.

3.2. Water-Related Institutional Arrangements

22. Canal and Drainage Act established centralized systems for allocation of water operated by hierarchical bureaucracies as it takes water from the rivers to main canals to the network of distributaries and finally to watercourses/outlets where the water is delivered to individual farms. The institutional arrangements governing the water resources is at **Figure 2**.

23. Responsibilities of these institutions are briefly described in **Table 5**.

Table 5. Institutions Dealing with water Management and Flood Mitigation Works

Organizations	Status	Responsibility
Ministry of Water Resources	Federal	Managing Water Resources
Water and Power Development Authority	Federal	Operates and manages Tarbela and Mangla , Dams, Reservoirs, and executes Hydropower projects
Pakistan Commissioner for Indus Waters	Federal	Coordinates with India regarding Indus Water Treaty as well as floods in the trans-boundary rivers
Indus River System Authority	Federal	Regulating water distribution amongst provinces in accordance with Provincial Water Accord of 1991
Federal Flood Commission	Federal	Prepares and coordinates implementation of national flood protection plans and the oversight of flood forecasting, warning and management
Flood Forecasting Division, PMD	Federal	Conducts model simulations, forecasting flood,
Pakistan Metrological Department	Federal	Forecast rainfall and flood, and issue warnings
National Disaster Management Authority	Federal	Conducts oversight and coordination of disaster management including relief and rescue operations at the national level
Provincial Disaster Management Authorities	Provincial	Coordinates with NDMA and other provincial departments for relief and rescue operations
Provincial Irrigation and Drainage Authorities	Provincial	Managing water resources and collection of water charges within mandated Canal Command Area
Provincial Irrigation Departments	Provincial	Construct, manages, operates and maintain barrages, canals and distributaries and flood protection works and implement protective measures within the provinces

24. Land ownership rather than water demand for crops serves as a proxy for water rights (*Warabandi system*) in Pakistan. Persistent lower than desired delivery performance ratio (measures water equity) of canals, water courses, institutional deficiencies and weak enforcement mechanism, overtime, has increased tensions among stakeholders. In this *warabandi* system, water users are tempted to bribe local officials of Irrigation Department to enhance their water share

illicitly which, generally, benefits the farmers at the head of a water course as it arrives first at the expense of tail-farmers. Thus, the politically influential farmers and big landowners continue to have substantial powers to manipulate water distribution system with the connivance of local irrigation staff. The water management bureaucracy is far too powerful and has discretion to determine the water entitlement in the field, which is generally tilts in favour of politically influential or big landowners.

25. Institutional weaknesses manifested in the form of: (i) low surface water delivery efficiency; (ii) water distribution inequities; (iii) wasteful on-farm water use; (iv) waterlogging and salinity; (v) poor operation and maintenance of the system and low cost recovery; (vi) constrained investment climate.¹³ The severity of these issues vary from province to province. Concerned with these institutional weaknesses in managing the water resources, the Provincial Governments introduced farmers-managed participatory irrigation and drainage system transforming existing Irrigation departments into Provincial Irrigation and Drainage Authorities (PIDA) in 1997. Sindh, however, repealed the SIDA Act and Water Users Association Ordinance, 1982 and replaced them with Sindh Water Management Ordinance.

3.3. Major Challenges facing Water Sector in Pakistan.

26. Major challenges facing water sector in Pakistan are listed below:

- (a) Safeguarding trans-boundary water
- (b) Variability of annual water resources
- (c) Diminishing live storage capacity due to sedimentation
- (d) Inter-provincial water issues
- (e) Floods, Disasters, and water going to sea
- (f) Water deficit, and poor conveyance efficiency
- (g) Declining per capita water availability
- (h) Increasing cultivated land
- (i) Poor land and water productivity
- (j) Delta, wetlands, and environmental issues
- (k) Groundwater management
- (l) Effects of climate change
- (m) Drinking water quality
- (n) Financial challenges in funding infrastructure and its maintenance
- (o) Institutional and human resource challenge
- (p) Participation of civil society and stakeholders in governance

---

¹³ The World Bank, Sindh Water Sector Improvement Phase-I Project PAD, 2007.

4. Agriculture Sector of Pakistan

27. **Pakistan's agriculture faces numerous policy constraints. Government intervention in agricultural markets remains excessive, particularly in wheat, sugarcane, fertilizer and seeds, which has discouraged sustainable and efficient production and marketing.** This intervention combined with powerful private marketing associations in cotton and quality problems in rice had led to low farm prices, low profitability for average farmers and few incentives for growth in productivity. Government spending has been dominated by subsidies. Public marketing enterprises and subsidies crowd out private sector involvement. Additionally, weak enforcement of standards has led to private sector developing their own mechanisms for certification and meeting standardization requirements by themselves and in response to their business investments rather than for the specific products. This has generated a situation where multiple regimes now exist with little to no coordination.

28. **Pakistan Vision 2025 envisages food security in the context of the entire supply-chain production, processing, storage and distribution to consumption.** Top 5 objectives for achieving food security are to:

- (i) Protect the most food-insecure segments of the population through effective relief measures, including long-term arrangements and adaptation mechanisms;
- (ii) Create a modern, efficient and diversified agricultural sector – aligned with associated water and energy infrastructure – that can ensure a stable and adequate provision of basic food supplies for the country's population, and provide high quality products to its industries and for export;
- (iii) Optimize production and supply mix in line with current and projected needs by leveraging our unique strengths;
- (iv) Ensure that the entire supply-chain related to food security is geared towards provision of stable and affordable access to adequate, nutritious and safe food for a healthy life; and
- (v) Use the resource base in an efficient and sustainable manner – with outcome based benchmarks agreed in line with regional and global standards.

29. **The Vision also acknowledges that increases in agricultural productivity and non-farm income, market access for small landholders, distortion free pricing mechanism for their products, supporting regulatory regime and the supply-chain are critical for agriculture growth, rural development and food security in the country.** However, this Vision is yet to be transformed into an implementable national policy and strategy as Pakistan has been without a formal "Agricultural Policy" for decades, the last being the National Agriculture Policy of 1980. First National Food Security Policy has been approved in 2018.

30. The legal regime that regulates agriculture, livestock and food safety are mostly provincial laws except laws dealing with Seed, Breeders' Rights, and fertilizers. The laws governing agriculture in Pakistan are at **Table 6**.

Table 6. Agriculture related legislation in Pakistan

Area	Legislation	Status
Inputs	Agricultural Pesticides Ordinance 1971	Federal
	Seed Act, 1976	Federal
	Plant Breeders' Rights Act 2017	Federal
	On-Farm Water Management and Water Users 'Association Ordinance 1981	Provincial
	Seeds and Fruit Plants Ordinance 1965	Provincial
	Agricultural Pest Ordinance 1959	Provincial
	Cooperative Societies Ordinance 1966	Provincial
	Fertilizer (Control) Order, 1973	Federal/ Provincial
	Seed Corporation Act 1976	Provincial
	Soil Reclamation Act, 1952	Provincial
Crops	Bahawalpur Cotton Control Ordinance 1967	Provincial
	Cotton Ginning and Pressing Factories Act, 1925	Provincial
	Cotton Industry (Statistics) Act, 1926	Provincial
	Cotton Control Ordinance 1966	Provincial
	Rice (Restriction on Cultivation) Ordinance 1959	Provincial
	Silkworms (Regulation and Control) Ordinance, 1972	Provincial
	Cotton Standardization Ordinance 2002	Provincial
	Sugar (Licensing Control) Order, 1972	Provincial
	Sugar Factories Control Act, 1950	Provincial
	Sugarcane Act, 19342	Provincial
	Paddy Husking Tax Rule, 1978	Provincial
Marketing and Processing	Boilers and Pressure Vessels Ordinance, 2002	Provincial
	Price Control and Prevention of Profiteering and Hoarding Act, 1977	Federal/ Provincial
	Agriculture Food and Drug Authority Act, 2016	Provincial
	Food Authority Act, 2011	Provincial
	Agricultural Produce Markets Act, 1939/1978	Provincial
	Essential Articles (Control) Act, 1973	Provincial
	Tobacco Vend Act, 1958	Provincial
	Foodstuffs (Control) Act, 1958	Provincial
	Pure Food Laws 1963/2007	Provincial/Federal
Research, Education and Training	University of Agriculture Multan, Faisalabad, Rawalpindi, Peshawar, Balochistan, Tandojam	Provincial
	Agriculture Research Board, 1997	Provincial
	University of Veterinary and Animal Sciences, 2016	Provincial
Livestock	Livestock Breeding Act, 2014	Provincial
	Animal Slaughter Control Act 1963	Provincial
	Animal Quarantine Ordinance, 1979	Federal
	Milk Boards Ordinance 1963	Provincial
	Poultry Production Act 2016	Provincial
	Cattle Trespass Act 1871	Provincial
	Prevention of Animal Cruelty Act, 1890	Provincial
	Livestock, Dairy and Poultry Development Board Act, 1974	Provincial
	Halal Development Agency Act, 2016	Provincial

31. Post-18th amendment, the achievement of any concrete national goals related to agricultural production, food security, or rural development now depends heavily on the ability of sub-national governments to maintain momentum for agricultural investments, ensure that provincial agriculture and food security strategies are coherent with national objectives, and provide mechanisms that better integrate rural citizens' priorities into the policy arena. Controls, regulatory

regime and institutional arrangements in Pakistan are organized on the basis of commodity groups, such as, plant, livestock, seed, etc. There are several federal ministries, provincial departments and bodies concerned dealing with agriculture and livestock. Corresponding legislation is largely linked to the responsibilities of the organization. The institutions that deal with various aspects of agriculture and livestock are listed at **Appendix 3**.

5. National and Provincial Policies for Food Security, Agriculture, Land and Water Management, Disaster Risk Management and Rural Development.

5.1. Review of National and Provincial Policies

32. The food price crisis of 2007-08 brought food security to the forefront of the Pakistani national agenda. Nation Food Security Policy, first of its kind, has been recently approved by the CCI that envisages: (i) adequate production through enhancing productivity; (ii) availability of farm inputs at reasonable prices and ensuring better return to farmers; (iii) stability of food prices; (iv) targeted subsidies and safety nets for poor and vulnerable; (v) free movement of agricultural commodities through a sustainable food distribution system; and (vi) increasing investment to build grain storage space through public and private sector participation.

33. The policy aims at (a) achieving agriculture growth at the rate of 4% per annum to improve food security and economic development; (b) developing innovations for improving food systems for producing nutritious and healthy food; (c) initiating special programs for reducing poverty and hunger (zero hunger, kitchen gardening, rural poultry and other enterprises) as per government's commitment towards Sustainable Development Goals; (d) bridging the yields gaps and ensure farm profitability for sustainability of agriculture sector; (e) augment existing water resource base by promoting efficient use through applying alternate sources of energy; (f) **develop climate smart agriculture while focusing on the use of bio-technology, resources conservation and harmonious production packages**; (g) develop hybrid seeds of vegetables, oil seeds, food grain and fodder crops; (h) harvest untapped potential of high value agriculture in Rod-Kohi, FATA, Gilgit-Baltistan/Chitral, Balochistan, AJK, Potohar, Thar, Nara and Kohistan through rain-water harvesting technologies; (i) enhancing institutional infrastructure for developing a cadre of agriculture service providers; (j) facilitate to enhance food and horticulture exports by up to 10-20 percent; (k) legislate agricultural and food safety regulatory laws, and establish credible regulatory trade regime for food products; and (l) developing land use policy planning to control the conversion of productive agriculture land into towns and cities.

34. The objective of **Khyber Pakhtunkhwa (KPK) agriculture policy, notified in 2015**, are to (i) enhance sector productivity and competitiveness by activities such as improving the supply chain, technology dissemination and trade promotion; (ii) address food security and incomes needs of the vulnerable sections of the population and targeted actions are needed to improve food security, reduce poverty and enhance the role of women; and (iii) improve national resource

management, **adaptation to climate change and disaster risk management**. Likewise, the objectives of **Sindh Agriculture Policy**, approved in April 2018, include: (a) raising overall growth rate in the sector to 4-5 percent annually; (b) reducing rural poverty to half as well as food insecurity and malnutrition; (c) preserving agro-ecological base and efficient and sustainable use of natural resources; and (d) **enhancing resilience and climate change adaptability**. The Agriculture Policy of Punjab is in final stages of approval by the Government.

5.2. Land Use and Disaster Management

35. The agriculture land use is regulated through Land Colonization Act, 1912, and Land Revenue Act, 1967 while land use in the cities is governed by the respective town planning rules as well as laws of respective development authorities. The objectives of Disaster Risk Reduction Policy 2013, *inter alia*, include creating Multi-Hazard Early Warning capacity, raising resilience of vulnerable groups, strengthening institutions, and promoting inter-governmental coordination. National Disaster Risk Management Fund in Pakistan aims at preparing and implementing national and sub-national emergency response plans, establishing early warning system and disaster awareness campaigns. The National Disaster Management Authority (NDMA) along with Provincial and District Authorities have been assigned the task of dealing with all kinds of disasters.

6. Political Economy and Decision Making

6.1. Political Economy Analysis

36. Fritz, Kaiser and Levy (2009) and Fritz, Levy and Ort (2014) suggested problem-driven governance and political economy analysis approach which broadly comprises of four steps as under (see **Figure 3**):

Step 1	Identify a specific development challenge ²
Step 2	Analysis of three political economy drivers: (a) relevant structural factors that influences stakeholders' position; (b) existing institutions including institutional dysfunctions that channel behavior; and (c) stakeholder interests and constellations. These are interdependent. Elements under each of these drivers are reflected in the right-hand side boxes in Figure 3.
Step 3	Identify ways forward including how to initiate change. Generally, these are technical recommendations intended to offer a road map for operational engagement. It also requires clearly highlighting risks and various options for understanding of the political economy drivers.
Step 4	Implement the identified approach

Figure 3¹⁴

¹⁴ Verena Fritz, Brian Levy, and Rachel Ort, editors., "Problem-Driven Political Economy Analysis-The World Bank's Experience," The World Bank, (2014) p.5 and Verena Fritz, Kai Kaiser and Brian Levy, editors., "Problem Driven Governance and Political Economy Analysis: Good Practice Framework," The World Bank, (2009), p. 42

6.2. Decision Making Relating to Agriculture, Water, and Climate Change

36. Post-18th Constitutional Amendment, agriculture, water sector and climate change management are fully devolved to the provinces and are fully empowered to take decision relating to these sectors. The role of the federal government is limited to federal-provincial and inter-provincial coordination, national food security, and national water policy, regulating the water apportionment according to 1991 Accord through IRSA, climate change either through Council of Common Interest, or respective Ministry, or the Planning Commission. Therefore, decision-making on most issues relating to these factors rests with the provinces.

37. The Council of Common Interest has already approved the National Water Policy and the Federal Government has already notified it. The Federal Cabinet has cleared the National Food Security Policy while Sindh and KPK have notified their own Agriculture Policy. Punjab is in the process of finalizing its agriculture Policy. Likewise, Punjab is implementing its Livestock Policy.

6.3. Gaps in Relation to Climate Change

38. The gaps identified in these policies are as follows:

- (a) While policies as well as related legislation have included climate change as a major challenge to agriculture, livestock, water management, and disaster preparedness and response, none of these policies deal with adaptation measures in a comprehensive manner.
- (b) Punjab and Sindh have made a beginning towards this, especially in irrigation by introducing high efficiency irrigation system for the farmers, laser land levelling and zero tillage. Punjab Agriculture Department is also moving towards promoting climate smart agriculture as well as high value agriculture. Nevertheless, such inclusion of projects by the Provincial Governments in their respective annual development plans is done randomly rather than based on a **comprehensive strategy and development plan for mainstreaming climate change in agriculture and water sector on sustainable basis**.
- (c) The provincial implementing departments (Agriculture, Irrigation, and Livestock Departments) generally lack capacity and expertise to develop climate resilient strategies.
- (d) The provincial governments also lack capacity and expertise to develop framework for regulating groundwater.
- (e) There is absence of technology based monitoring of evapotranspiration, its dissemination to stakeholders, and climate smart water management, both in the

relevant federal ministries and provincial departments. There is a need to establish early warning system at federal, provincial, and ultimately at Regional levels as well as technology based monitoring evapotranspiration for smart water use.

- (f) Food Security policy lacks focus on Micronutrient deficiencies such as deficiencies of iron, vitamin A, and calcium are on the rise.
- (g) It is extremely important to raise awareness and understanding to integrate these measures with sectoral policies, action plans, and resource allocation.
- (h) The critical challenge in the provinces is the inter-departmental coordination as they do not have a formal mechanism provided in the Rules of Business for such coordination. The only platform currently available is the Planning and Development Department and that too, at the time of project approval.

6.4. Stakeholders Mapping and Analysis

39. Stakeholders are categorized by their power and salience in a grid as (a) **promoters** who attach high priority to reforms and have high impact; (b) **defenders** who attach high priority to reforms but have low impact; (c) **latents** who attach low priority to reforms but their actions can affect the reform implementation; and (d) **apathetics** who attach low priority to reforms and their actions cannot affect reform implementation.¹⁵ The stakeholder are mapped at **Box 1**. For stakeholders' analysis, four major attributes are critical:

- (i) stakeholders' position on reform issue;
- (ii) level of influence (power) they hold;
- (iii) level of interest they have in the specific reform; and
- (iv) the group/coalition to which they belong or can reasonably be associated with.

40. The level of influence depends on the quantity and type of resources and power the stakeholder can marshal to promote its position on the reform. The level of interest is the priority and importance the stakeholder attaches to the reform area. Broadly, these attributes signal the capability the stakeholder has to block or promote reform, join with others to form a coalition of support or opposition, and lead the direction/discussion of the reform.

41. **An analysis of multiple stakeholders in the power sector of Pakistan is mapped at Table 7.** While there is a renewed interest in reforming the agriculture sector following

---

¹⁵<http://www1.worldbank.org/publicsector/anticorrupt/PoliticalEconomy/stakeholderanalysis.htm>

demonstrations by the farmers in Punjab and Sindh and water sector sequel to reports of water shortages, the political ownership at provincial and federal level is lukewarm. The federal government has succeeded in getting the new legislation approved from the Parliament providing the broad framework, policy making as well as administrative, it is important that the government, both federal and provincial now assume political leadership to deliver on its commitments at Paris Conference, allocate resources to put in place the necessary infrastructure, and develop adaptation strategies to mainstream climate change in water and agriculture sector.

Box 1. Stakeholders Mapping

Policy Making: Council of Common Interest with for Water Policy, Federal Cabinet for Food Security Policy, Pakistan Climate Change Council for National Climate Change Policy, Pakistan Climate Change Authority for inter-provincial coordination on Climate Change, Provincial Cabinets for (a) Provincial Agriculture and Livestock Policy; (b) Surface and Ground water Management Policy and Water Pricing; and (c) Environment and Climate Change

Implementation Ministries & Departments:

Federal Ministries of Climate Change, Water Resources, National Food Securities, Pakistan Meteorological Department, Planning Commission, Pakistan Forest Institute, Global Change Impact Studies Centre, Pakistan/National Agriculture Research Council, Federal Flood Commission, Pakistan Council for Research on Water Resources, Pakistan Space and Upper Atmosphere Research Commission, National Disaster Management Authority

Provincial Departments for Agriculture, Livestock, Irrigation/PIDAs, Environment, Forest, Board of Revenue, Planning and Development, On-Farm Water Management, Extension and Adaptive Research,

Regulatory Institutions: Provincial Environmental Protection Agencies

Accountability Institutions: Superior Courts (public interest litigation under Article 184 of the Constitution), Standing Committees of the National Assembly, Provincial Assemblies and Senate on Agriculture, Water, and Climate Change; Public Accounts Committees of the National and Provincial Assemblies; National Accountability Bureau and Federal Investigation Agency.

Think Tanks: SDPI, LEAD, IGC,

Academic Institutions: PIDE University, COMSATS University, Karachi University, LUMS University, University of Punjab, Agriculture Universities Faisalabad, Tandojam, Peshawar, and Balochistan

Civil Society Organizations: Individual Farmers, WUA, Farmers Organizations, Agriculture Chambers, Civil Society Organizations,

Media: Express Tribune, Dawn, The News International, Dunya TV, Dawn TV, GeoTV

Development Partners: World Bank, ADB, UNDP, DFID, FAO, International Union for Conservation of Nature (IUCN), International Centre for Integrated Mountain Development (ICIMOD), ASIANICS Agro-Development International, SDC, DFAT

42. **The legislative oversight institutions lack technical capacity and are not very effective, particularly at Provincial Level.** There is a need to strengthen technical capacity of relevant Standing Committees of the Parliament and Provincial Assemblies and integrate climate change with water and agriculture. They can provide a good platform to drive the reform process, required legislation, and allocation of needed resources and then holding the Governments accountable.

43. The development partners such as WB, ADB, USAID, DFID, FAO, DFAT, UNDP, and IFPRI are endeavoring to address climate change issues in isolation. The Academia, Think Tanks, Media and the Civil Society as well as Consumer Associations can be motivated to become promoters of reform as the situation is suitable for that because of water shortages and negative agriculture growth 2 years before. Additionally, Pakistan Business Council, American Business Council, Overseas Chamber of Commerce and Industries, Federation of Chambers of Commerce and Industries can also be encouraged with the right communication strategy to become supporters of reform.

7. Approach and Mechanism for Mainstreaming Climate Change

44. Post-devolution, the provinces are the main stakeholders in agriculture, on-farm water management, livestock, land-use and revenue record, and irrigation while regulating water sharing amongst the provinces, water policy, national food security, seed certification, climate change to the extent of policy as well as mitigation and adaptation strategy, and disaster management are with the Federal Government. Therefore, it is critical to work with the provinces for mainstreaming climate change in agriculture and farm water management.

45. The approach and mechanism for mainstreaming climate change are highlighted below:

- (i) Establish Climate Change Extension Cell in provincial Agriculture, Livestock, Irrigation and Planning and Development Departments and Ministry of Food and National Security;
- (ii) Build institutional capacity of these Cells in developing framework, strategy, and action plans as well as preparing developing projects for mainstreaming climate change and adaptation strategy in these sub-sectors and monitor implementation progress on regular basis;
- (iii) Establish a baseline of fertilizer and pesticides application for each crop and monitor the level of application to ensure optimal use of fertilizer and pesticides under different cropping patterns;
- (iv) Conduct training of extension workers as well as on-farm water management staff, and Directorate of Pest Warning and Quality Control of Pesticides in climate change risk management and optimal application of fertilizer and pesticides;

- (v) Train farmers in integrated pest management and the balanced use of fertilizers through extension workers;

Table 7. Stakeholders' Analysis

Stakeholder Category	Relevant Stakeholder	Responsibility of Stakeholder	Importance of Stakeholder	Interest in Reform	Influence	Stakeholder's Category on Reform
Government Policy Making and Supervisory Institutions	Council of Common Interest	Formulating policy on water and hydropower	Key Forum representing Federal and all Provincial Governments	Strong	Political face for Policy Formulation and enforcement	Promoter
	Pakistan Climate Change Council	Policy Formulation on Climate Change	Key Forum chaired by the PM and includes federal Ministers for Climate Change, Water, Finance, Planning, NFS&R, MPNR, Foreign Affairs & Chief Ministers	Yet to establish its visibility	Can be a key influencer in policy formulation and future direction	Latent but can be strong promoter provided a clear reform policy is developed which address the political economy and real issues relating to climate change.
	National Water Council	Key Policy Forum for decisions on water management and governance issues	Significant chaired by the Prime Minister and includes Federal Ministers for Water, Power, Finance, Planning and Chief Ministers	Recently Approved. Yet to be notified and establish its visibility and strength	Can be a key influence and resolve inter-provincial water related policy issues other than CCI	Latent and may become promoter to take major policy reforms decisions in power sector in due course. Support
	Steering Committee on Water	Inter-provincial coordination and reviewing policy papers and monitoring reports before submission to the Council	Headed by Federal Minister for Water Resources and includes relevant secretaries and provincial Irrigation Secretaries	Yet to be notified and meet formally	Can influence the decision making by National Water Council	Too early to determine
	Pakistan Climate Change Authority	Formulate, comprehensive adaptation and mitigation policies, plans, programs, projects and measures designed to address the effects of climate change and meet Pakistan's obligations under international conventions and agreements relating to climate change and within the framework of a national climate change policy	Chairperson, Members of the Authority, and One representative from each province	Yet to be notified and establish its visibility	Can become a key influencer to influence decision-making by the Council	Too early to be determined

Stakeholder Category	Relevant Stakeholder	Responsibility of Stakeholder	Importance of Stakeholder	Interest in Reform	Influence	Stakeholder's Category on Reform
Implementing Institutions	Ministry of Climate Change	Processing and drafting key policies in coordination with the provinces and implementing the approved policies for mitigation and adaptation as well as climate finance	Significant and Key	Depends on the bureaucratic and political leadership. Focus on international visibility and collaboration with donors	Strong. However, technical capacity is weak to lead the reform process and collaboration with the provinces	Can be Promoter given the visibility by the political leadership and strong technical capacity to lead mainstreaming climate change in Water and Agriculture
	Ministry of National Food Security and Research	Responsible for National Food Security, Procurement coordination, Fertilizer Import, Research, Biosafety & Biodiversity, and Seed Certification	Significant and Key	Depends on Political and bureaucratic leadership	Limited after devolution	Can be a defender
	Ministry of Water Resources	Responsible for regulating water sharing and managing water resources including its governance	Significant and Key	Recently formed Ministry. Yet to show visibility	Can influence the policy making and coordination with the provinces	Can be defender
	Ministry for Planning & Reform	Responsible for developing national plans and reform for all sectors of national economy	Key Ministry for planning, development and reform	Strong at political leadership with weak capacity below	Weak and Limited. No major reform package sponsored	Defender at political level. Latent at technical level.
	Pakistan Meteorological Department	Responsible for providing information on weather, climate, geophysical, seismology, and geomagnetism	Support Department	To the extent of modernizing their system and equipment	Significant but only during the flood or monsoon season	Latent
	NDMA	Disaster Preparedness and management	Support Authority	Strong	Significant during the disaster	Promoter
	Provincial Irrigation Departments	Responsible for water management, water pricing and infrastructure development	Key department for water management	Varies across provinces Punjab is leading	Generally, wait for political signals for reform	Can be promoters with political support and capacity enhancement
	Provincial Agriculture Departments	Responsible for Research, Extension, OFWM, Markets, Ag. Engineering, Ag Education,	Key department for agriculture management & governance	Varies across provinces. Punjab is leading the reforms	Strong.	Can be promoters with political support and capacity enhancement

Stakeholder Category	Relevant Stakeholder	Responsibility of Stakeholder	Importance of Stakeholder	Interest in Reform	Influence	Stakeholder's Category on Reform
Implementing Institutions	Provincial Environment Departments	Responsible for environment at provincial level	Limited	Muted	Weak	Apathetic
	Provincial Forest Departments	Responsible for development of forest cover and their management	Limited	Muted	Weak	Apathetic
	Board of Revenue	Responsible for land management, land records, and land revenue	Key institution for land governance	Varies across provinces	Strong	Latent
Regulatory Institutions	Environmental Protection Agency	Responsible for regulating environment and environmental pollutions	Limited	Muted	Limited.	Apathetic
Accountability Institutions	Senate, National and Provincial Assemblies Standing Committees on Water, Agriculture, and Climate Change	Legislative oversight on Government's performance in Agriculture, Water, and Climate Change Sectors	Medium	Muted. Lack of independent research on the related issues to support these Standing Committee to perform oversight function makes them less effective	Strong occasionally but generally weak	Latent. Can be promoters if provided with right research to strengthen its accountability skills
Think Tanks	SDPI, IGC, LEAD	Produces analytical papers, Info-Graphs, policy recommendations and dissemination of research Work	Medium as the linkage between research and policy decisions in the government is weak	Significant	Strong in terms of awareness	Defenders but can be promoters if a linkage is formalized between the policy formulation and these Research of Think Tanks for evidence based policy reforms
Academic Institutions	PIDE, COMSATS, LUMS, Provincial Agriculture Universities	Do the survey based empirical research and modeling on public policy issues including Agriculture, Water and Climate Change sector	Medium as the linkage between academic and policy process including decision making in the government is weak	Significant	Limited.	Defenders but can be promoters if linkage between academia and policy processing is established. General support for reform from the Academia

Stakeholder Category	Relevant Stakeholder	Responsibility of Stakeholder	Importance of Stakeholder	Interest in Reform	Influence	Stakeholder's Category on Reform
Civil Society and Consumer Groups	WUAs, FOs, Individual Farmers, Agriculture Chambers, CSOs	Protecting the interests of the water as well as agricultural inputs consumers and concerned with Climate Change	Medium to significant	Strong which can ensure equitable distribution of water, reformed markets and pricing and adaptation to climate change	Weak	Defenders. At times weak support due to lack of awareness and understanding of issues & benefits of reform
Key Individuals	Big land owners-cum-politicians (either Members of the Parliament/ Provincial Assemblies	They lobby and influence decision-making to secure their interests and achieve maximum benefits.	Significant.	Medium to Strong. Proposed reform must not risk their actual and perceived interests.	Strong. Mostly belong to the government in power.	Neutral. Encouraging them with right incentives to participate in reforming the system which could be a win-win for all, they can be transformed into promoters.
Media	Express Tribune, Dawn, The News International, Dunya TV, Samaa TV, Business Recorder	Highlights weaknesses in the system, projecting policy flaws and holding government accountable, suggest reforms	Significant	Strong	Strong. Especially Dawn, Tribune and TV Channels	They could provide a good platform to promote reforms
Development Partners	World Bank, ADB, UNDP, DFID, FAO, IUCN, ICIMOD, ASIANICS Agro-Development International, Swiss Agency for Development Cooperation, DFAT	Funding programs and projects that are strategically important for the economic and social development of Pakistan including water, agriculture, and Climate Change	Significant as they provide the external financing to the Government	Significant	Very Strong. Funding is tagged with reforms driving the government to take reform path.	Promoters. Strong support

- (vi) The Provincial Governments, particularly the Irrigation and On-Farm Water Management Department of Agriculture Department, may be encouraged and trained to install and use technology based monitoring evapotranspiration at farm level for smart water use and ICT-based monitoring of extension workers performance. It will require support from Board of Revenue which maintains the land records and farm sizes;
- (vii) Planning Department may be sensitize to push for designing climate change mainstreaming projects for inclusion in the Annual Development Plan and allocation of funds;
- (viii) Additionally, all projects proposed in each of the sub-sector must be cross-checked by these departmental Climate Change Cells to see whether these projects are in line with the approved framework and adaptation strategy; and
- (ix) Each Provincial Government must establish an Inter-Departmental Coordination Mechanism, either a Steering Committee or Standing Committee on Mainstreaming Climate Change, which can be located in the Planning and Development Departments.

7.1. Collaboration with Development Partners

46. The FAO may enter into a partnership with the World Bank, Asian Development Bank, Islamic Development Bank, DFID, DFAT, and possibly with USAID. Some of these development partners are already working on climate change, especially the World Bank. The World Bank is also looking for an opportunity to access GCF funds for Sindh water operation. The starting point could possibly be working with the provinces (Board of Revenue, Irrigation Department, Agriculture Department, with Irrigation Department as the focal point for technology based monitoring the farm water consumption and Provincial Disaster Management Authorities for Early Warning System linking it with Agriculture Extension Departments and Irrigation Departments). At the Federal level, the key Ministries would be Water Resources, National Food Security, Climate Change, Planning Commission, and Pakistan Meteorological Department and NDMA. The focal point could possibly be in the Planning Commission or Climate Change because of their convening authority.

8. Review of Proposed Activities

8.1. Water Accounting System

47. Establishing water accounting system is critical for water governance including water pricing, both surface and ground water, in Pakistan. The system will require a close coordination

amongst Provincial Departments of Irrigation, Agriculture (OFWM), and Board of Revenue and at macro-level with Federal Ministry of Water Resources and IRSA. The key steps in that direction would be:

- (i) Develop Agri-Climate Water Portal (ACWP) in Ministry of Water Resources with its on-line linkages to IRSA, Provincial Irrigation Departments, Pakistan Meteorological Department, and WAPDA (Water Wing).
- (ii) Operationalize on-line telemetry systems displaying data in IRSA, Pakistan Council for Research in Water Resources (PCRWR) and Provincial Irrigation Departments regarding water discharges by IRSA against provincial shares and actual receipt of water in each province. This water accounting and all related technical and reference material may be made available online to concerned agencies website through ACWP.
- (iii) Install acoustic water level sensors in canal commands (Head, midstream, and tail) which are connected with operational telemetry system to assess discharges entering canals as well as to compute delivery performance ratio ($DPR = 1$) of each canal at three levels.
- (iv) Install similar acoustic water level sensors in Minor Canals as well as water courses in a gradual manner. It will help in assessing water discharges in the water courses, water theft or misuse, water flowing to the tail-ends and water lost through evapotranspiration leading to proper water accounting.
- (v) Each Provincial Irrigation Department/Authority may notify and publish groundwater zoning and map thereof and demarcate the critical groundwater areas of the province.
- (vi) Each Provincial Irrigation Department/Authority may establish an electronic geo-referenced database for tubewells and register all existing tubewells including their geographic coordinates.
- (vii) Install automatic groundwater level sensors connection with operational telemetry system for water extraction, aquifer management and assessment of aquifer vulnerability to depletion and salinization.
- (viii) Train provincial level selected manpower as well as select farmers in precision based irrigation techniques and develop aquifer management at local level in the use of piezometers and associated data collection, recording and analysis.

- (x) Working with Ministry of Water Resources, IRSA, PCRWR, and Pakistan Meteorological Department and Provincial Irrigation Department/Authority and OFWM, install Evapotranspiration Monitoring System at canal command level for water distribution management through (a) determination of real-time crop-water requirements; (b) planning crop pattern adjustments for increasing water productivity and efficiency; (c) optimization of water allocation for major canals and sub-canals according to crop requirements; and (d) supervision of water withdrawn and consumed at each farm or outlet.
- (xi) Develop plan for gradual adjustments in water pricing, both surface and ground, based on actual water withdrawn and consumed and implement it.
- (xii) Develop plan for gradual detachment of water rights with the land holdings (*warabandi* system) and link it to water withdrawn.
- (xiii) Develop skills of Pakistani experts (Federal as well as Provincial) in computing Agriculture Stress Index System designed to enhance early warning systems with global information on developing agricultural drought and Modelling System for Agriculture Impacts of Climate Change (MOSAICC) an interdisciplinary modelling system to evaluate the impacts of climate change on agriculture, crop productivity, river water resources, forests, and the economy at large.
- (xiv) Sensitize the stakeholders and decision-makers at federal and provincial level for mainstreaming climate change in Water and Agriculture through workshops and restricted meetings.
- (xv) Make necessary amendments needed in the Canal and Drainage Act and IRSA Act.

8.2. Proposed Institutional and Implementation Arrangement

48. As already mentioned, the key institutions for mainstreaming climate change in water and agriculture and developing technology-based water management system will be: (i) Ministry of Water Resources, IRSA, PCRWR, and PMD at Federal Level; and (ii) Departments of Irrigation/Authority, Agriculture (OFWM), and Board of Revenue. It will be proper to make Ministry of Water Resources (IRSA) and Provincial Irrigation Department as the focal point for implementation of this project with inter-ministerial (Federal) and inter-departmental (Provincial) institutional arrangements. At the federal level, this coordination mechanism can be located in the Ministry of Water resources with the Federal Minister as its chair as IRSA and PCRWR are under this Ministry while the PMD is under Ministry of Defense and the provincial coordination mechanism may be located in Provincial Planning and Development Departments which has the

convening power and will be in a better position for collaboration and coordination amongst concerned departments on regular basis. The Steering Committee, federal and provincial, may meet on bi-monthly basis or as the need arises during implementation of the project. This arrangement may be institutionalized to replicate the system to all provinces.

8.3. Approval of PC-I and Fund Flow

49. The Schematic Process for approval of foreign funded projects, in accordance with the Executive Committee National Economic Committee (ECNEC) guidelines, is at **Figure 4**. The participating provincial governments need to initiate the process for preparing the PC-I including the foreign component (expected grant from FAO/GCF) and counterpart funding (Provincial Contribution), procurements [equipment, experts (local and foreign), and other items with cost estimation. If the PC-I proposes to import some equipment, it must get foreign exchange allocated for the year of import through External Finance of the Ministry of Finance and indicate counterpart rupee component. The PC-Is of respective provincial government as well as the PC-I of the federal components have to be approved by the CDWP as well as ECNEC before signing the grant/loan or as all the parties mutually decide.

Figure 4. Schematic Process for Foreign Funded Projects-Project Planning

50. All parties and the lender has to decide about the establishment of Provincial and Federal Project Implementation Units in each implementing Ministry and Departments or one Project Coordination and Monitoring Unit at the federal level (PCMU). However, since the project will include provincial contributions, it will be proper to establish one PIU in each Province, the natural option would be the Provincial Planning and Development Department or Irrigation Department and one at the federal ministry (Water Resources). The design of the PIUs is proposed at **Figure**

5. The PIU will be responsible for regular reporting to the lender as well as the respective Planning and Development Department or the Planning Commission, as the case may be. The FAO/GCF will be responsible for preparing the Implementation Completion Report or the Project Completion Report after full implementation of the project. The Flow of Funds is reflected at **Figure 6**.

Figure 5. Implementation of the Project-Designing PIU/PCMU

Figure 6. Fund Flow – From FAO to Provincial Governments to Payments

8.4. Regulation, Taxation, and Insurance

51. The payable federal taxes include GST and Custom Duties and other expenditures such as insurance of advanced technological equipment. Generally, the implementing agencies are responsible for payment of taxes and other expenditure on any procurement or imports from the counterpart funding and grant or loan portion is not expensed on such items. Alternately, the Implementing Agencies can collectively seek exemption from all taxes and duties through Economic Committee of the Cabinet (ECC) as the project is in the national interest geared towards water accounting, water conservation and appropriate water pricing through advanced technology. Since the project in some form or the other involve satellite technology to assess farm level water consumption and to measure evapotranspiration throughout Indus Delta, the Implementing Agencies must seek approval of concerned law enforcement agencies through the Ministry of Interior to avoid any complication at a later stage.

8.5. Contribution to Regulatory Framework and Policies

52. The operationalization of on-line telemetry system, installation of acoustic water sensors in canals, water courses, installation of Evapotranspiration Monitoring System and establishing Agri-Climate Water Portal will need a clear policy and a regulatory framework before implementation of the project. It may also need clearance from Frequency Allocation Board through Ministry of Defense.

Appendix-1**Institutionalization of Climate Change in Pakistan**

Year	Milestone	Purpose
1974	Establishment of Environment and Urban Affairs Division at the Federal level	S4 equal to Stockholm Declaration in June 1972
1983	Enacted Pakistan Environment Protection Ordinance	Comprehensive environment specific legislation
1989	Federal Ministry for Environment, Forestry and Wildlife established	Grants and limits rights for water pollution
1991 - 1993	National Conservation Strategy prepared National Environmental Quality Standards adopted	Provided framework for addressing environmental challenges
1995	Cabinet Committee on Climate Change established	Steering and coordinating climate change policies
1997	Pakistan Environmental Protection Act enacted	Provided governance framework in the country
2002	Global Centre for Impact Studies on Climate Change established	For research and development
2004 - 2005	Prime Minister Committee on Climate Change	
2006	National Energy Conservation Policy National Renewable Energy Policy National Operational Strategy on Clean Development Mechanism	
2010	18 th Constitutional Amendment enacted Devolution various federal functions to provinces	
2011	Ministry of Environment ceased to exist	
2012	Ministry of Climate Change reincarnated National Climate Change Policy approved Punjab and Balochistan Environmental Protection Acts enacted “Green Benches” established in all High Courts and Supreme Court of Pakistan National Disaster Management Plan approved National Sustainable Development Strategy	
2013	Global Change Impact Studies Centre Act enacted and Centre established	
2014	Framework for Implementation of Climate Change Policy adopted Sindh and KPK Environment Protection Acts enacted	
2016	KPK Climate Change Policy approved	
2017	Pakistan Climate Change Act enacted	

Source: ADB: Pakistan Climate Profile, 2017

Appendix-2

Structure of Ministry of Climate Change

Pakistan Climate Change Council: Prime Minister, 9 Federal Ministers, 4 Chief Ministers, 30 prominent experts, Chairman NDMA, Chairman PCCA

Pakistan Climate Change Authority: Secretary MoCC, Member (Mitigation), Member (Adaptation), Member Climate Finance, Member Coordination, 4 members from Provinces

Attached Wings: Administrative, Development Environment and Climate Change, Forestry, and International Cooperation. The Clean Development Mechanism (CDM) Secretariat and Global Change Impact Studies Centre (GCISC) act as the secretariat of the Prime Minister Committee on Climate Change.

Attached Departments: Natural Disaster Management Authority, Pakistan Environmental Protection Agency, Pakistan Environmental Planning and Architecture Consultants, Pakistan Environmental Protection Council, and Zoological Survey Department.

Appendix-III

Institutions Dealing with Agriculture

Activity	Federal	Punjab	Sindh	KPK	Balochistan
Inputs					
Land	CDA	BOR	BOR	BOR	BOR
Fertilizer	NFML				
Seed	FSC&RD	Seed Council/PSC	Seed Council	Seed Council	Seed Council
Water	Ministry of Water Resources	Irrigation Deptt. PIDA Area Board WUA	Irrigation Deptt. SIDA Area Board WUA	Irrigation Deptt. KIDA Area Board WUA	Irrigation Deptt. BIDA Area Board WUA
Plant Protection	MNFS&R	PAD	PAD	PAD	PAD
Extension & Adaptive Research	PARC MNFS&R	Agriculture Ext and Adaptive Research Department	Agriculture Ext and Adaptive Research Department	Agriculture Ext and Adaptive Research Department	Agriculture Ext and Adaptive Research Department
Agriculture Machinery		Agriculture Engg.	Agriculture Engg.	Agriculture Engg.	Agriculture Engg.
Water Extension		OFWM Deptt	OFWM Deptt	OFWM Deptt	OFWM Deptt
Forest	MNFS&R	Forest Deptt.	Forest Deptt.	Forest Deptt.	Forest Deptt.
Livestock	MNFS&R Commerce	Livestock Deptt.	Livestock Deptt.	Livestock Deptt.	Livestock Deptt.
Fisheries	MNFS&R KFHA KFHA	Fisheries Deptt	Fisheries Deptt	Fisheries Deptt	Fisheries Deptt
Soil Conservation	MNFS&R	PAD	PAD	PAD	PAD
Research	PARC NARC	DG Ag Research PARB/AARI University of Ag	DG Ag Research Research/Institutes University of Ag	DG Ag Research University of Ag Research Institute	DG Ag Research Research Institute
Infrastructure					
Electricity	MoWP	DISCOs	DISCOs	DISCOs	DISCOs
Farm to Market Roads	None	Works Deptt District Govts	Works Deptt District Govt	Works Deptt District Govts	Works Deptt District Govts.
Regulation/Intervention					
Prices	ECC	Industries Deptt.	Ag Marketing	Ag. Marketing	Ag. Marketing
Biosafety	NBC/Climate Change				
Electricity	NEPRA				
Quality and Standards	MoST/PSQA	PSQA	PSQA	PSQA	PSQA
Environment	MoCC	Environment Deptt./EPA	Environment Deptt./EPA	Environment Deptt./ EPA	Environment Deptt./EPA
Resource Mobilization					
Land Revenue/AIT		BOR	BOR	BOR	BOR
Abiana/Drainage Cess		PIDA/BOR	SIDA/BOR	KIDA/BOR	BIDA/BOR
Agriculture Statistics	MNFS&R	PAD	PAD	PAD	PAD
Agriculture Census	PSA	PSA	PSA	PSA	PSA
Output					
Procurement	PASSCO	Food Deptt	Food Deptt	Food Deptt	Food Deptt
Food Safety		Food Safety Authority	Food Safety Authority	Food Safety Authority	Food Safety Authority

Institutional Mapping with Functions

Office	Area of Responsibility	Status
Animal Quarantine Department	Animal health conditions for import and export; meat inspection for exported meat/casings. Controls at border inspection posts. Under Animal Quarantine (Import and Export of Animal Products Ordinance, 1979)	Federal
National Veterinary Laboratory	Disease surveillance; veterinary drug testing; vaccination quality and residue testing	Federal
Department of Plant Protection	Import/export controls at 26 border inspection posts for plant pests/diseases. Operates under Plant Quarantine Act 1976. Responsible for authorization of pesticides (Pesticide Ordinance 1971)	Federal
Department of Plant Protection	Plant pest & disease surveillance; control on use and distribution of pesticides	Provincial
Grain Quality Testing Laboratory	Sampling and testing for import and export of grains (and other foods); pesticide residue and aflatoxin testing	Federal
National Animal and Plant Health Inspection Service (NAPHIS)	NAPHIS to be responsible for development of policy, initiate legislation, and ensure efficient enforcement.	Federal
Pakistan Standards and Quality Control Authority	The Pakistan Standards and Quality Control Authority, under the Ministry of Science and Technology, is the national standardization body. It is responsible for enforcement of standards and to inspect and test products and services, including food items, for their quality, specification and characteristics during use, and for import and export purposes.	Federal
National Institute of Health	Communication with provinces on food safety	Federal
The Customs Department	Its primary function is to ensure that imported foods meet Pakistan's labeling and shelf-life requirements, are not on the list of banned items, and are assessed the appropriate tariffs	Federal
Livestock/Dairy Departments	Meat & dairy inspection at farm/ slaughterhouse/ dairy; poultry and eggs inspection at producer level	Provincial
Pakistan Council of Scientific and Industrial Research (PCSIR)	Analytical and Testing Services for importers and exporters; Quality Control Services Biotechnology, Food Technology and Fermentation	Federal
Pakistan Agriculture Research Council (PARC)	Pesticide residue & aflatoxin testing, any other plant, seed and animal related testing	Federal
Pakistan Council for Research in Water Resources (PCRWR)	Water and related testing	Federal

Appendix-IV**Provincial Irrigation and Drainage Authorities**

The Provincial Irrigation and Drainage Authorities were created through an act of respective Provincial Assembly in 1997. These authorities were meant to be autonomous bodies ultimately assuming all functions of irrigation departments. Main responsibility assigned to them was to regulate water from the barrages to the canals and maintain the infrastructure. Under the umbrella of these provincial authorities, the Government established Area Water Boards (AWBs) for each canal to manage the canals or secondary level channels. Below this, farmers were organized into Water User Association (WUA) empowered to improve, rehabilitate, operate, and maintain watercourses; establish water delivery schedules and supervise water allocation and distribution; ensure all members get their share of water in a timely manner; removing obstructions on watercourses; employing labour for maintenance activities and ensure that all members contribute through water charges. 50 percent of these WUAs and Drainage Beneficiary Group (DBGs) could form Farmer Organizations (FOs) to manage the distributary/minor or tertiary level structures.

A country like Pakistan, with nearly 107,000 watercourses stretching over more than 1.6 million kilometres and irrigation about 35 million acres of land, the irrigation management transfer from government to WUAs, FOs, and AWBs had far-reaching implications for country's agricultural production and its economy. The decentralization stripped authority from Irrigation Department bureaucrats and transferred to AWBs, FOs, and WUAs. These FOs and WUAs have been captured by these upstream elites. Consequently, decentralization in irrigation sector changed the venue for rent-seeking without reforming the system as intended.¹⁶ Despite 1997 legislations in all the provinces, there has been slow and gradual transfer of the management of irrigation networks to WUAs. Much of the irrigation networks continues to be governed by primarily Irrigation Department through Canal and Drainage Act 1873 except on the canals where Area Water Boards exist as corresponding changes were never made in the enabling legislation, i.e. the Canal and Drainage Act, 1873. It is mainly due to opposition from powerful political stakeholders as well as resistance from Irrigation Departments' bureaucracy and general perception that WUAs cannot be trusted to manage their water. However, there is no empirical evidence that has analysed that the new governance structures would result in expected benefits of water equity, improved watercourse maintenance, reduced water conflicts, reduced water theft, improved water rotation and timely delivery, and increased agricultural productivity.

Secondly, globally, Pakistan is the fourth largest user of the groundwater.¹⁷ It is estimated that India extracts water from aquifers at a rate of 251 km³/year, followed by China and the USA, both extracting 111 km³/year, and by Pakistan which extracts 65 km³/year. Pakistan currently has

---

¹⁶ F.R. Rijsberman, (2008). Water for Food: Corruption in Irrigation Systems. *Global Corruption Report 2008*, P. 67-84.

¹⁷ National Groundwater Association Report, USA, 2015

more than 1 million shallow and deep tube wells across the country, with almost 70 percent installed in Punjab. It has the highest reliance on groundwater for the reasons: (i) increasing deficit in the actual water requirements and canal water supply; (ii) availability of fresh recharged groundwater aquifers; and (iii) availability of cost effective technology for extraction. Currently, groundwater volumes extracted to be estimated around 60 MAF annually. However, there is no law in Pakistan to regulate extraction or recharge or pricing groundwater and the users are extracting water at will causing serious problems in many areas of the Punjab and Sindh.