Climate Governance: Implementing Water Sector Adaptation Strategies in Pakistan

Kanwar Muhammad Javed Iqbal and Muhammad Irfan Khan[*]

Abstract

Climate extreme events, during 1994 to 2014, have witnessed high vulnerability index for Pakistan. Droughts (particularly 1998-2002) had drastic impacts on agriculture and livestock production and forced people to migrate. Pakistan is fundamentally an agricultural economy and its Framework for Implementation of Climate Change Policy (FICCP), 2014-2030 is obviously on adaptation actions to address current and future anticipated climate change threats to Pakistan's various sectors. South Asia has generally been vulnerable to climate change and transboundary water issues are taking serious shape. This paper addresses the Strengths, Weaknesses, Opportunities and Threats (SWOT) of Pakistan's current climate governance in the context of institutional arrangements at federal, provincial and diplomatic levels in relation to implementation of water sector adaptation strategies as outlined in FICCP. Standard SWOT analysis highlights key challenges and shortcomings towards climate response strategies and actions. In this attempt, the nexus of water and agriculture, post 18th amendment provincial coordination, various aspects of recently promulgated Climate Change Act, transboundary and riparian issues, and the obligations of Sustainable Development Goals (SDGs) as well as Sendai Framework for Disaster Risk Reduction have been taken in to account. Based on overall assessment of existing gaps, this paper suggests way forward for good and sustainable climate governance in Pakistan to implement water sector adaptation strategies.

Introduction

Climate change has been the most serious externality of the 21st century that is being faced by the whole world.[1] This worldwide externality would have adverse economic, social, political and environmental impacts on our planet. The major factor responsible for the climate change is the rise in greenhouse gases (GHGs) emissions and their concentrations in the atmosphere. By reducing these emissions, the extent of effects of climate change can be reduced. It was observed that 60% of emissions

[*] Kanwar Muhammad Javed Iqbal – PhD Scholar at Department of Environmental Science, International Islamic University, Islamabad, and Senior Researcher at National Institute of Maritime Affairs (NIMA), Bahria University, Islamabad – Pakistan. Dr. Muhammad Irfan Khan – Professor at Department of Environmental Science, International Islamic University, Islamabad – Pakistan.

[1] Arif Rahman, and Aneel Salman. "A District Level Climate Change Vulnerability Index of Pakistan." No. 2013: 05. Pakistan Institute of Development Economics, 2013.

come from fossil fuel sources of energy that supply 66% of the world's electricity demand.[2]

The Intergovernmental Panel on Climate Change (IPCC) provides a beneficial classification of vulnerability, which is a function of 3 components: sensitivity, adaptive capacity, and exposure.[3] By year 2030, up to 325 million extremely poor people will be living in the 49 most hazard-prone countries due to climate extreme events particularly drought, the majority in South Asia and sub-Saharan Africa. The 11 countries are found to be most at risk of disaster-induced poverty are Bangladesh, Democratic Republic of Congo, Ethiopia, Kenya, Madagascar, Nepal, Nigeria, Pakistan, South Sudan, Sudan, and Uganda.[4]

Pakistan was ranked 8th among the most vulnerable countries to climate change based on its long-term Climate Risk Index 1995-2014 annual average.[5] Although, Pakistan is one of the lowest carbon emitters state i.e. 0.8%, but still facing severe impacts of climate change due to its global nature. High frequency of climatic variations has been witnessed in Pakistan in the recent years. These variations led to drastic climatic changes in the region, which have caused a severe degree of socioeconomic impacts on the livelihoods of the individuals residing in Pakistan.

Recently, Pakistan has confronted various climate change impacts i.e. Peshawar faced huge tornado during April 2015 which resulted 35 human deaths and 150 persons got injured; Karachi faced worst heat wave during July 2015 which led to 1300 deaths in a week; a glacial lake outburst was observed in Chitral in the year 2015, and an

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[2] EIA 2006. Independent statistics and analysis: international electricity generation. Energy Environmental Obligations Regulatory Framework. Environmental Obligations Regulatory Framework. Strategy and Development Division, Pakistan Telecom Authority (PTA), 2018. Available at https://www.pta.gov.pk/en/media-center/single-media/environmental-obligations-regulatory-framework-250118

[3] James J. McCarthy, Osvaldo F. Canziani, Neil A. Leary, David J. Dokken, and Kasey S. White, eds. Climate change 2001: impacts, adaptation, and vulnerability: contribution of Working Group II to the third assessment report of the Intergovernmental Panel on Climate Change. Vol. 2. Cambridge University Press, 2001; Karen o'Brien, Robin Leichenko, Ulka Kelkar, Henry Venema, Guro Aandahl, Heather Tompkins, Akram Javed et al. "Mapping vulnerability to multiple stressors: climate change and globalization in India." *Global Environmental Change 14*, no. 4 (2004): 303-313.

[4] Andrew Shepherd, Tom Mitchell, Kirsty Lewis, Amanda Lenhardt, Lindsey Jones, Lucy Scott, and Robert Muir-Wood. *The geography of poverty, disasters and climate extremes in 2030*. London: ODI, 2013.

[5] Sönke Kreft, David Eckstein, Lukas Dorsch, and Livia Fischer. *Global climate risk index 2016: who suffers most from extreme weather events? weather-related loss events in 2014 and 1995 to 2014.* Germanwatch Nord-Süd Initiative eV, 2015.

avalanche hit Naran mine in 2015 which greatly affected many tourists. In order to cope with this threat in Pakistan, the adaptation strategies focus mainly on the water sector.

Pakistan is blessed with approximately 7,000 glaciers and 3044 glacial lakes. Out of 3044 glacial lakes, 36 are in danger to extreme weather events i.e., cloudburst, heavy rains, high temperatures etc. The water resources are intricately connected to the climate of any region and Pakistan's water resources are already confronting serious impacts of climate change.[6] Drastic impacts of droughts (1998-2002) on agriculture & livestock production greatly affected the livelihoods of the people and ultimately forced them for migration. Pakistan's water resources are principally dependent on precipitation, snowmelt & glacier melt. Its rivers are closely connected to several sources of precipitation in the major rivers.[7]

The FICCP is a leading federal policy implementation instrument that provides comprehensive guidance on climate strategies and cross-sectoral roles, and also provides avenue to evolve coordinated mechanism for water sector adaptation actions at provincial and local level. Being an agrarian country, the major focus of the of Pakistan's Framework for Implementation of Climate Change Policy (FICCP), 2014-2030 is on the adaptation actions to address current & future anticipated climate change threats to Pakistan's various sectors. In future, the variation in the precipitation will rise and the snow storage will reduce, which would cause an increase in the streamflow variability with a decrease in the low flows. Thus, it would ultimately affect surface water reliability.[8]

The overall South Asian high climate vulnerability profile has also rendered serious riparian issues in transboundary water context, particularly important for ensuring sustainable agricultural economy through benefit sharing as well as disaster risk reduction. The case of Kabul River would most likely render serious riparian concerns. Pakistan and Afghanistan share 9 large and small rivers. River Kabul and its tributaries flow into River Indus of Pakistan and all the four provinces of

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[6] GoP. "National Water Policy." Ministry of Water Resources, Government of Pakistan, 2018

[7] Pervaiz Amir, "Government of Pakistan's Agriculture and Water Policies with respect to Climate Change: Policy Gap Analysis," IUCN, 2009.

[8] Zbigniew W. Kundzewicz, Luis Jose Mata, N. W. Arnell, Petra Doll, Pavel Kabat, Blanca Jimenez, Kathleen Miller, Taikan Oki, S. Zekai, and Igor Shiklomanov. "Freshwater resources and their management." *IPCC Working Group II Report*, 2007: 173-210.; Zbigniew W. Kundzewicz, L.J. Mata, Nigel William Arnell, P. Döll, B. Jimenez, K. Miller, T. Oki, Z. Şen, and I. Shiklomanov. "The implications of projected climate change for freshwater resources and their management." *Hydrological Sciences Journal* 53, no. 1, 2008: 3-10.

Pakistan utilize the water of River Kabul. High population growth rate, urbanization & climate change have led to an increase in water scarcity and its quality degradation in Pakistan and Afghanistan. Both countries are facing huge water shortage. Annual flow from River Kabul to Pakistan has also declined in the past years. Afghanistan is planning construction of dams along the river. This infrastructure development would likely have adverse impacts on the irrigation system of Pakistan, incomes and livelihoods of all the provinces.[9] On western side, both the countries lack benefit-sharing mechanism as no mutual agreement exists, whereas; on eastern side, India and Pakistan have Indus Water Treaty 1960 but its scope is very much limited to water distribution only.

In the above context, this paper undertakes Pakistan's Framework for Implementation of Climate Change Policy (FICCP) in order to examine the governance for climate compatible development vis-a-vis the water sector adaptation strategies and their actions e.g. priority actions (within 2 years), the short-term actions (within 5 years), the medium-term actions (within 10 years), and the long-term actions (within 20 years).

This paper stems out of a broad research study by the lead author, who employed qualitative research method with standard SWOT analysis for overall evaluation, content analysis for scrutiny of secondary sources, questionnaire based experts' interviews for primary data techniques, and analyses of the adaptation strategies of water sector in current climate governance of Pakistan i.e. the overall philosophy and arrangements for climate compatible development. The SWOT analysis has also been frequently used in business spheres.[10] It was also used by Freire-Gibb for analysing the implementation status of marine strategy framework directive in European Waters.[11] Alhuseen and Kozová too applied the SWOT analysis technique for the examination of climate change institutional arrangement and policy mainstreaming in Sudan.[12] Primary qualitative research included content analysis of relevant documents for preliminary screening, questionnaire development and subsequent cross-analysis. Semi-structured qualitative questionnaire-based preliminary and advance stage key informant interviews (KIIs)

[9] Khawar Shahzad, "Hydro-diplomacy between Pakistan and Afghanistan," Policy Brief No. 54, 2016. LEAD Pakistan.
[10] Erhard K Valentin, "Away with SWOT analysis: use defensive/offensive evaluation instead." *The Journal of Applied Business Research* 21, no. 2 (2005): 91-105.
[11] Freire-Gibb, Lucio Carlos, Rebecca Koss, Piotr Margonski, and Nadia Papadopoulou. "Governance strengths and weaknesses to implement the marine strategy framework directive in European waters." *Marine Policy* 44, 2014: 172-178.
[12] Alhuseen, Ahmed, and Mária Kozová. "SWOT analysis of climate change institutional arrangment and policy mainstreaming in Sudan." *Acta Environ Univ Comen* 22, no. 2, 2014.

were conducted. This included experts and other stakeholders' representatives from academia/think tanks, relevant civil society organizations and government departments.

Interviews were conducted face-to-face as well as through electronic means to cover different Territories/Provinces; 10 each from Islamabad, Punjab, Khyber Pakhtunkhwa (KPK), Baluchistan and Sindh and 5 each from Gilgit Baltistan (GB) and Azad Jammu & Kashmir (AJK). The questionnaire covered key challenges and shortcomings towards climate response strategies and actions, particularly in the nexus of water and agriculture for critical review of performance on FICCP, the 18th amendment in the constitution of Pakistan regarding provincial coordination, various aspects of recently promulgated Climate Change Act at federal level, transboundary and riparian issues, and the obligations of Sustainable Development Goals SDGs) as well as Sendai Framework for Disaster Risk Reduction. Situational analysis of primary and secondary data was done through a single table SWOT technique, considering the high number of interdependent issues.

Existing Climate Governance System

Pakistan is a signatory of more than 25 Multilateral Agreements (MEAs). Out of them, seven agreements are directly linked to water resources of Pakistan i.e. United Nations Framework Convention on Climate Change (UNFCCC) 1992, Sendai Framework for Disaster Risk Reduction 2015-2030, Sustainable Development Goals (SDGs), United Nations Convention to Combat Desertification 1994, Indus Water Treaty 1960, Ramsar Convention on Wetlands of International Importance 1971, Convention Concerning the Protection of World Cultural and Natural Heritage 1972. These agreements were taken into account during development of National Climate Change Policy, formulation of adaptation strategies devised for the water sector in the FICCP and subsequent development of Pakistan Climate Change Act 2017 at federal level.

The FICCP has included 9 sectors with their respective adaptation strategies in order to combat with the global threat of climate change. The water section under FICCP is divided into six objectives, which are supported with different strategies. Each strategy has further actions for the accomplishment of overall climate goal. Considering the cross-sector importance and involvement on climate issues particularly for water sector adaptation strategies and actions, the FICCP involves Ministry of Water & Power, Ministry of Food and Agriculture, Ministry of Law & Justice, provincial irrigation and agriculture departments, Planning & Housing Departments, local governments and rural development

departments, education department, national and provincial highways authorities environmental protection agencies (EPAs), Indus River System Authority (IRSA), Provincial Livestock Departments, Water and sanitation Authority (WASA), Pakistan Meteorological Department (PMD), The Space and Upper Atmosphere Research Commission (SUPARCO), Water Resource Management Authority, National Engineering Services Pakistan (NESPAK), academia, water conservation groups, electronic and print media, developing authorities of federal and provincial capitals and metropolitan cities, city municipalities, etc. as implementing institutions.

SWOT Analysis

The results below present the findings of the SWOT analysis applied in the current study. The analysis (Table 1) sums up the current conditions of adaptation strategies of FICCP in the water sector. Each component of SWOT has carefully elucidated below to understand the current status of water adaptation strategies in Pakistan.

Table 1: SWOT Analysis of FICCP Water Sector Adaptation Strategies

Strengths	**Weaknesses**
S1: Federal FICCP is able to evolve and can have a leading role S2: Visible role of stakeholders at Federal level S3: Reasonable engagement of federal and province level institutions / departments for policy segment S4: Many organizations support FICCP S5: Riparian issues: visible policy research, advocacy and track 2 diplomacy at Federal Level for shared-basins S6: Consultations on benefit sharing approaches (Preliminary engagement of stakeholders) S7: Realization by the Government at the Federal level to translate FICCP's water sector adaptation strategies and actions into budgetary planning and subsequent implementation S8: Coherence on Sea water/marine ecosystem in National Water Policy 2018 and FICCP	W1: Institutional Ambiguity - Federal vs. Provincial strategies W2: Being dependent mostly on Federal level initiatives W3: Lack of sectoral coordination mechanism at federal and province level W4: Lack of sector specific climate change and disaster management strategies W5: Lack of provincial legal cover - Pakistan Climate Change Act 2017 vs. Provinces W6: Poor preparation for extreme events – federal vs. provincial W7: Water rights and ownership issues W8: Trust deficit between provinces regarding riparian's benefit-sharing and effective management of water W9: Poor and unclear engagement of private sector W10: Lack of research and response linkage for irrigation basins W11: Lack of proper mechanism for the groundwater mapping

Opportunities	**Threats**
O1: Integration of FICCP at Province and local level O2: Potential for engagement of local governance system for effective water management O3: Donor Funding by taking the advantage of Paris Agreement and High Vulnerability Index O4: Climate financing through Public-Private Partnership (PPP) model O5: CPEC Initiative can complement adaptation strategies for marine water / coastal ecosystem management	T1: Volatile scenario of political governance T2: Inflation, economic instability, lack of funding and political will T3: International relations and diplomacy challenges for transboundary riparian issues T4: Migration and urbanization T5: Challenges to On-farm Water Management (OFWM) T6: Lack of institutional ownership of wetlands T7: Reliable data vs. research, knowledge and policy gaps T8: Lack of adequate human and financial resources T9: Cross-sectoral linkage and legal cover for departmental roles

Strengths

The federal FICCP is a strong policy implementation tool, which can play a leading role in combating the global threat of climate change. Since FICCP covers all those priority sectors, which can be directly affected due to climate change, it is considered to be a comprehensive policy execution document for the philosophy of climate compatible development in Pakistan. Considering the provincial legal implications, it allows, under its water adaptation sub-section 4.1.4, to put into practice effective means for water sector adaptation through removal of deficiencies in the existing legislation at all levels (S1).

The Government of Pakistan took initiative to translate its water sector related commitments, made under Climate Change Policy, into action oriented water sector adaptation strategies as part of FICCP at federal level. FICCP has also mentioned relevant government departments for the purpose of coordinated response at all levels. Federal government has also included the requirements for the climate change response mechanism under FICCP, to some extent, in the recent years' budgetary planning for their subsequent implementation to conserve and manage water for the country (S7).

The involvement of different stakeholders including the relevant government departments is also sought in the policy framework in order to implement participatory approach across the country and the initial adherence by the relevant government departments for water sector adaptation agenda is a positive sign (S2). Many stakeholder institutions

and organizations are supporting water sector adaptation strategies in particular and the overall FICCP document in general due to its comprehensiveness, cross-sectoral ties, flexibility, participation, diversity and authenticity of the proposed actions (S4). The National/Provincial Disaster Management Authorities (N/P DMAs), Planning Commission of Pakistan, Federal Environmental Protection Agency (F-EPA) and Provincial Agriculture Departments (PADs) referring the FICCP and take basic guidance for their planning and information purposes. The Punjab Agriculture Policy 2017 has also acknowledged the importance and challenges of climate change; adaptation and mitigation strategies and actions.[13] It has provided a commitment to apply the principles of climate smart agriculture and promote modern knowledge and innovative techniques by establishing an Institute for Climate Smart Agriculture (ICSA) under its proposed institutional structures. Such a provincial initiative for institutional development is critically important to support FICCP's priority action 5.1.1 for strategy 5 under section 4.1.5 regarding provincial and regional research planning (S3).

Adherence with the strategy 3.9 under FICCP has been observed as the stakeholder institutions particularly the civil society led think tanks and other academic institutions have been found trying to explore the avenues for the management of shared basins. The western transboundary matters of Kabul and Indus rivers are particularly under debates. Thus there is visible policy research, advocacy and track 2 diplomacy at Federal Level for shared-basins in order to rationalize policy decisions for transboundary riparian issues (S5). Such a participatory consultation and engagement of stakeholders for policy research would also help the provinces for understanding the actual issue of water availability and storage in the context of climatic variations (S6).

Pakistan has a coastline of more than 1000 km and the marine ecosystem supports a large number of biodiversity inside the sea and estuarine areas as well as the coastal communities. For the marine ecosystem, FICCP has included strategies not only under its water adaptation but also under its sub-section 10.3 coastal and marine ecosystems on other vulnerable ecosystems. The National Water Policy has also addressed seawater/marine ecosystem and coastal management to a greater extent and found in coherence with FICCP water sector adaptation strategies and actions (S8).[14] Based on this arrangement, a proper marine management strategy framework can be developed further, for effective management of marine waters ecosystem of Pakistan. Europe provides a good example. It has also

[13] *Punjab Agriculture Policy*. *Punjab Agriculture Department.* Government of Punjab, Pakistan, 2017.
[14] Ibid - National Water Policy

devised European Marine Strategy Framework and Water Framework Directives in order to conserve the European marine waters.[15]

Weaknesses

As an outcome of 18th amendment in the Constitution of Pakistan, the Federal Ministry of Environment was devolved to provinces and the environmental mandate under Pakistan Environmental Protection Act (PEPA) 1997 was placed under the new Ministry of Climate Change at federal level. After the 18th amendment in the Constitution of Pakistan, major ambiguities in roles and responsibilities have been caused in the overall legal and institutional framework regarding environment and climate change at the federal and provincial levels. Though the water sector together with agriculture sector's On-farm Water Management (OFWM) always remained provincial subject but its governance and ownership are the major issues for climate adaptation strategies. The provincial institutions need to have their own climate strategies, frameworks and concerned legislation. In order to remove ambiguity, FICCP includes action under section 4.1.4 for the review and identification of deficiencies in all relevant existing legislation. Currently, development for water sector climate response at provincial level remains very poor (W1).

The scope of Federal Ministry of Climate Change has no legal cover at provincial level and the mandate is being dealt under Provincial Environment Ministries. This kind of arrangement undermines the actual implementation of FICCP's water sector adaptation strategies due to lack of coordination between the federal and provincial departments in particular as well as at provincial level among the concerned departments. In absence of provincial water sector adaptation strategies and legal cover, climate response primarily has reliance on federal initiatives thus provinces are not well prepared for extreme events like early warning system for disaster risk, which is developed by National Disaster Management Authority - NDMA only (W2, W3, W4, W5 and W6). Such kind of ambiguities and other governance challenges also exist in many countries across the world, considering the fact of evolving phase of climate response mechanism. The adaptation strategies are also found to be challenging in different countries due to political, institutional and cultural differences in the area. In European Union (EU), a high degree of institutional ambiguity exists among states due to variable arrangements in their political governance system. Stakeholders' roles

[15] Ángel Borja, Mike Elliott, Jacob Carstensen, Anna-Stiina Heiskanen, and Wouter van de Bund. "Marine management–towards an integrated implementation of the European Marine Strategy Framework and the Water Framework Directives." *Marine Pollution Bulletin* 60, no. 12, 2010: 2175-2186.

have not clearly been elucidated in the policy framework, which might lead to social, political and economic heterogeneity in the society.[16]

The Punjab Agriculture Policy (2017) provides information that On-farm Water Management (OFWM) section of Punjab Agriculture Department has initiated several on-farm techniques for the conservation and efficient utilization of water. It also emphasizes on yield optimization per unit of water that can play a significant role in reducing water scarcity. Significance of data collection has been outlined in the policy, which would be prioritized in order to identify water supply, demand and availability for various crops at different places. However, OFWM lacks skilled workers for the assessment of water demand.[17] Provincial water subsidy is also reported to be a major hindrance for the effectiveness of OFWM techniques due to limitation of funds, water rights and ownership issues (W6).

It is a critical viewpoint of majority of respondents, included in this study, that lack of clarity on future riparian's water needs, irrational water usage in agriculture and industrial sectors, lack of pricing and licencing mechanism, poor management of groundwater, provincial subsidy for irrigation water, lack of clarity on engagement of private sector, and gaps in research for irrigation basins and response linkage are complex issues and are mostly related to cultural inheritance. All such issues have been aggravated owing to lack of definition of water rights due to which water sector ownership could not be developed so far (W7, W9 & W10).

FICCP has clear guidance on riparian issues and other disaster management measures. However, lack of sector specific provincial climate change and disaster risk management strategies is causing a huge challenge for federal level initiatives to meet requirements for water sector adaptation. Due to poor coordination, arrangements between the provinces and also water diplomacy to tackle the transboundary context with India and Afghanistan (W4) are getting affected. There is also low level of awareness about marine and riverine segments. Trust deficit has also been observed between the provinces regarding riparian's rights, benefit sharing mechanism and effective management of water which has further aggravated the situation to effectively apply FICCP strategies (W8).

[16] Ibid - Freire-Gibb, Lucio Carlos, Rebecca Koss, Piotr Margonski, and Nadia Papadopoulou
[17] Ibid - Punjab Agriculture Policy

Since groundwater meets 50% domestic, 40% industrial and 20% irrigation use,[18] it is one of the vital resources to meet human water supply and its need will increase in the future climate conditions.[19] It is critically important to determine groundwater vulnerabilities due to the climatic variations and extreme events. Although FICCP included a strategy for groundwater recharge adaptation under water sector's section 3.3, but no proper provincial mechanism for the groundwater mapping has been developed so far (W11).

Opportunities

FICCP offers the platform through which benefits can be taken by defining roles and responsibilities of the participating institutions in developing and executing provincial strategies and action plans. Climate Change Authority under Pakistan Climate Change Act 2017 can also extend jurisdiction at provincial and local levels for sectoral coordination and effective planning and output mechanism by engaging local governance system for effective water management (O1 & O2).

Since Pakistan is signatory to Paris Agreement and also falls in High Vulnerability Index, advantage can be taken to attract donor funding for water sector adaptation response initiatives by mobilizing projects for different funding windows such as Green Climate Fund (GCF) and UNFCCC (O3).

The FICCP also supports role of private sector for climate financing. Public-Private Partnership (PPP) models are already materialized successfully for climate mitigation under the Clean Development Mechanism (CDM) in Pakistan such as Lahore Compost Project. There are a lot of opportunities available to promote climate financing on water sector adaptation projects by providing incentives and encouraging private investors through PPP models (O4).

Some successful examples of PPP are also found in China. Since 2001 to 2012, 237 PPP projects are working under the water and sanitation sectors in China.[20] The China-Pakistan Economic Corridor (CPEC) initiative has the potential to complement and support certain adaptation actions regarding marine water/coastal ecosystem

[18] Igor S. Zektser and Everett Lorne. "Groundwater resources of the world: and their use." In *IhP Series on groundwater*, no. 6. Unesco, 2004.
[19] Petra Döll, "Vulnerability to the impact of climate change on renewable groundwater resources: a global-scale assessment." *Environmental Research Letters* 4, no. 3 (2009): 035006.
[20] Xun R. Wu, Schuyler House, and Ravi Peri. "Public-private partnerships (PPPs) in water and sanitation in India: lessons from China." *Water Policy* (2016): wp2016010.

management for which private sector may also be encouraged to support climate compatible development endeavours in Pakistan (O5).

Threats

Since creation, Pakistan has faced volatile scenario for the overall political governance. Political instability and lack of consensus in ruling patterns are the major drivers for lack of clarity on top-down and bottom-up legal and institutional mechanisms especially for water sector adaptation response where cross-sectoral linkages with the role of federal and provincial institutions is critically important. In this context, lack of institutionalization approach with clear roles and legal cover has been observed in the context of Federal and provincial governments. After the 18th amendment in the Constitution of Pakistan, the problem is further aggravated due to the factor of different ruling parties at the level of Federal and Provincial governments. Water sector is a provincial subject and its success is linked with cross-sector input for climate adaptation where response level is disappointing. In the absence of provincial climate strategies with defined roles and legal cover for cross-sector linkages, the success of FICCP's outlined water sector adaptation agenda would not be possible (T1).

Though a reasonable size of stakeholders is adhered with the agenda at federal level, it is altogether missing link at the province level desired input due to inflation, economic instability, lack of funding and political will. Water sector adaptation agenda cannot be successful without allocation of sufficient amount of financial resources at the provincial level (T2).

Persistently tense relations between Pakistan and India has remained a critically important irritant for the settlement of water rights in shared basin not only on eastern border but also towards western side considering the Indian monetary engagements in Afghanistan for water sector projects on the Kabul River. On eastern side, Indus Water Commission (IWC) deals with the transboundary water rights with India. The performance of IWC remained under debate, as a lot of controversies exist between India and Pakistan, mainly because the foreign policy is not supported with climate security and diplomacy instrument. On western side, Afghanistan is planning about the construction of dams along Kabul River, which flows in eastern Afghanistan and northwest of Pakistan. Studies from 1990 to 2010 revealed that the Kabul River has already been used for hydropower generation and irrigation by both the riparian countries, Pakistan and Afghanistan. It has been observed that Afghanistan has completed the feasibilities of 12 hydropower energy

projects with installed capacity of 1177 MW on the River Kabul.[21] If Afghanistan constructs so many of dams on the Kabul River or on its channels, it will have negative impacts on Pakistan.[22] This infrastructure development would likely have adverse impacts on the irrigation system, and consequently on incomes and livelihoods at provincial levels in Pakistan, due to water availability issues. While no sharing agreement exists between Afghanistan and Pakistan, climate-diplomacy can help in preventing the conflicts and resolve the issue. FICCP has included strategy related to transboundary issues in section 3.9, but it is not sufficient to address the serious threats of water availability in the context of upcoming riparian issues on Kabul River, without employing climate diplomacy and linking it with the foreign policy advocacy. The prevailing scenario of international relations and diplomacy is also not favourable to address transboundary issues with a win-win outcome and thus to cope with the threats of water availability for all riparian countries. Foreign policy needs to address all the riparian issues of Pakistan comprehensively. It is quite challenging task considering the importance of consensus at the level of provinces in Pakistan as a pre-requisite of overall process (T3).

A recent interview-based study of Afghanistan and Pakistan policymakers suggest that Pakistan's policymakers see a scope on the fabrication of the agreement over River Kabul. But Afghanistan's senior policymakers showed lack of interest and remained sceptical about the legal agreement over Kabul River with Pakistan. There is a strong need to apply International Water Negotiation Framework and Principles in the Pak-Afghan region. It was proposed that these water riparian issues could be addressed effectively through trust-building and mutual cooperation that ensures fair sharing of benefits and resources among all the stakeholders.[23]

Pakistan is facing rapid urban growth, which is changing its socio-economic profile.[24] Increasing unregulated urbanization trend due to internal migration is a major challenge considering the climatic variations and extreme weather events. The rise in population and urbanization are contributing towards increasing water pollution and widening the gap

[21] Khalid Mustafa, "India Out to Damage Pakistan's Water Interests on Kabul River," *The News*, June 5, 2016

[22] Mohammad Nafees, A. Shabir, and U. Zahid. "Construction of dam on Kabul River and its socio-economic implication for Khyber Pukhtunkhwa, Pakistan." Paper presented in seminar on Pak–Afghan Water Sharing Issue, February 2016. SASSI.

[23] Ibid – LEAD Pakistan, Policy Brief No. 54, March 2016.

[24] M. N. Minallah, A. Ghaffar, M. Rafique, and M. Mohsin. "Urban Growth and Socio-Economic Development in Gujranwala, Pakistan: A Geographical Analysis." *Pakistan Journal of Science* 68, no. 2, 2016: 176.

between the demand and supply of water.[25] Changes in rainfall pattern would not only affect the agricultural practices but also the cities in Pakistan. On one hand, the cities would be under water in case of any extreme weather event and the masses would be affected badly. On the other hand, the increased population would create more water demand and also create pollution problem to the water bodies. Unregulated and unplanned urbanization is a major threat for water sector adaptation at Federal and Provincial levels. The absence of provincial water sector adaptation strategies compatible with the needs of migration and urbanization is further increasing the severity of the threat (T4).

The extreme weather events would likely to increase water demands in agriculture sector where On-farm Water Management (OFWM) is already facing numerous challenges in terms of human and financial resources as well as techniques concerned. In case of increased water demands, there is a likelihood of intensifying disputes among farmers on water rights. Lack of coordination also exists among as well as within the departments due to which poor performance of the staff is seen. The pay packages of the staff is also a limiting factor towards effective grievance redressal mechanism in order to settle outstanding disputes among farmers by counselling them. Improved coordination between OFWM and Agriculture Extension Department (AED), and incentives for their staff for extra input would help in resolving such disputes, but no policy or legal cover exists in order to support enhanced coordination for the success of FICCP water sector adaptation strategies (T5).

Pakistan is blessed with a large variety of wetlands spread throughout the country, from the coastal mangroves and mudflats on the Indus delta to the frozen Himalaya glacial lakes. These wetlands encompass unique habitats, species and genomes.[26] Although National Water Policy has included National Wetland Management Plan and FICCP also addresses it, but there exist challenges regarding departmental ownership due to lack of legal cover, clarity in the departments and coordination for the proper management of this very vital water resource (T6).

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[25] Dos Santos, Stéphanie, E. A. Adams, G. Neville, Y. Wada, A. De Sherbinin, E. Mullin Bernhardt, and S. B. Adamo. "Urban growth and water access in sub-Saharan Africa: Progress, challenges, and emerging research directions." *Science of the Total Environment* 607 (2017): 497-508.

[26] Robert J. Swap, Thomas A. Szuba, Michael Garstang, Harold J. Annegarn, Lackson Marufu,and Stuart J. Piketh. "Spatial and temporal assessment of sources contributing to the annual austral spring mid-tropospheric ozone maxima over the tropical South Atlantic." *Global Change Biology* 9, no. 3 (2003): 336-345.

There is growing consensus of experts that routine climatic impact on Himalayas is lower, but the occasional extreme events have the likelihood of Glacial Lake Outburst Flood (GLOF) phenomenon and fluctuations in the river flows. Such an ambiguity is due to lack of reliable data which causes difficulty in understanding the actual gravity of the problem and taking appropriate policy decisions. It also limits the performance of the concerned departments by increasing knowledge gaps regarding water sector adaptation agenda at various tiers of the governance. Though FICCP addresses the issue of reliable data, but translation of even existing information into policy decisions and execution planning a major challenge due to unclear mandates, overlapping roles, sectoral linkages and coordination, and funding issues (T7).

Experts and all stakeholders have consensus regarding provision of adequate human and financial resources in order to ensure climate compatible development. On one hand, funding is a major issue while the lack of technically sound manpower is another critical problem especially at the level of provincial institutions to deal with the water sector adaptation agenda. Lack of employment opportunities and job security are also the reasons behind development of skilled human resource pool in this discipline. Provincial governments need to create employment opportunities for climate professionals for successful endeavours. At the moment, no governmental initiative exist in order to address such a major gap particularly important for FICCP's water sector adaptation strategies (T8).

Although FICCP has mentioned relevant institutions for water sector adaptation strategies but the roles are not supported legally with a well-coordinated mechanism for the desired outcomes. There exists sectoral overlaps, poor coordination and dependence e.g. ambiguity and overlaps in roles of Agriculture Extension Department with OFWM. Similarly, no institution has the mandate to regulate the un-checked pumping and irrational use of ground for existing agricultural irrigation and industrial practices thus posing severe threat to groundwater depletion. These issues need clear roles and cross-sectoral linkage mechanism with proper legal cover to fix the responsibility. Apparently it seems difficult to address this issue considering the diverse political governments in different provinces as well as the fact of bureaucratic hurdles towards the acceptable solutions for the roles among different government departments (T9).

Conclusion and Recommendations

The above SWOT analysis has scrutinized FICCP in order to present the current state of climate governance system at the federal and provincial levels in Pakistan by taking into account the strengths and weaknesses for the implementation of water sector adaptation strategies. The exclusive SWOT analysis highlights key challenges and shortcomings towards climate response strategies particularly in the connection of water and agriculture while critically reviewing the performance on FICCP. Institutional ambiguity with unclear departmental roles and responsibilities at federal and provincial levels institutions are the major weaknesses, together with the water sector ownership issue due to lack of definition of rights. It has also identified key threats particularly on the issue of riparian/transboundary challenges due to lack of appropriate arrangements for climate diplomacy. The funding and private sector engagement opportunities are also identified e.g. the Paris Agreement and CPEC initiative. Based on a detailed assessment of existing gaps, this paper gives the following recommendations, which are critically important for the federal and provincial governments in Pakistan in order to address policy, legal and institutional shortcomings for water sector adaptation strategies and ensure overall climate compatible development.

(i) Develop and implement provincial climate change strategies, disaster preparedness and implementation plans by defining action-oriented sectoral mandates, sectoral coordination mechanism, water rights, urbanization challenges and responsibilities in coherence with FICCP and other provincial sectoral policies. Improved coordination between OFWM and AED, and incentives for their staff for extra-input would help in resolving water disputes and creating ownership.

(ii) Extend the mandate of Pakistan Climate Change Act 2017 and establish provincial climate change authorities in order to ensure compliance of delivery system for water sector adaptation actions at provincial and local level, for considering and addressing the provincial departmental implications.

(iii) Establish provincial adaptation funds particularly for water sector adaptation in order to deal with the funding issues and allocation of sufficient fiscal resources on regular basis.

(iv) Establish climate change section at provincial Ministry of Environment with an appropriate design and build its capacity vis-a-vis water sector adaptation activities.

(v) Carry out comprehensive vulnerability assessment and mapping in order to manage water availability issues and promote water conservation.

(vi) Carry out water sector capacity mapping for the scope of adaptation in order to assess and plan human and financial resource requirement.

(vii) Develop linkages with academia for periodic assessments, monitoring, and evaluation of water sector adaptation scenarios.

(viii) Expand wider coverage and strengthen further newly established Early Warning System by strengthening the existing planning of PDMAs.

(ix) Establish a knowledge management platform for water sector adaptation.

(x) Establish stakeholders' engagement mechanism by taking on board, all stakeholders.

(xi) Develop and launch massive awareness raising campaign, especially for OFWM and better understanding of farmers for climatic variations, with the help of stakeholders especially the civil society organizations (CSOs) and academia. International funding can be tapped as the Paris Agreement supports the active engagement of CSOs towards climate adaptation actions.

(xii) Devise a proper mechanism for collection and management of reliable data sets, important for water sector adaptation. Additionally, there is also a need to build capacity of the relevant departments to translate all such data sets into policy aid instruments by rationalizing the changes over time in order to continually improve the relevant planning documents and their execution mechanism.

(xiii) Develop and implement a proper marine management strategy framework for the conservation and effective management of marine waters/coastal ecosystem of Pakistan.

(xiv) Devise a mechanism for climate-diplomacy by linking it with foreign policy advocacy of Pakistan in order to tackle the transboundary and riparian issues of water sector.

(xv) Develop a legal cover for institutional framework and proper placement of wetlands at federal or provincial level with clear roles and responsibilities in order to meet requirements for adaptation strategies.

(xvi) Promote climate financing on water sector adaptation projects by providing incentives and encouraging private investors through PPP models. For CPEC initiative, encourage private sector to complement and support certain adaptation actions towards marine waters/coastal ecosystem management.

(xvii) Devise a mechanism for the development of human resource on water sector adaptation needs. Such a mechanism should ensure employment opportunities and job security.