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National Institute of Public Administration

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Report of Policy Lab on

Disaster Management in Pakistan in the Context of Recent floods A Multi-pronged Approach

پاکستان میں قدرتی آفات کے انتظام
حالیہ سیلابوں کے پس منظر میں
مجموعی حکمت عملی

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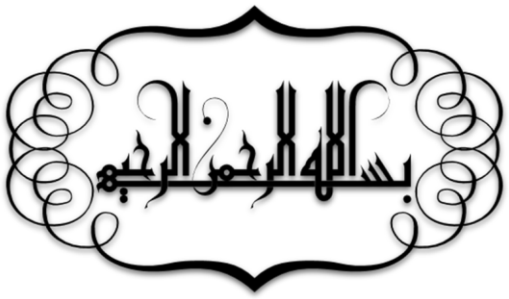
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Khyber Journal of Public Policy

Volume: 1 Winter, 2022 Issue:1 (Special)

Disaster Management in Pakistan in the Context of Recent floods, A Multi-Pronged Approach (This special issue consists of the proceedings of a 2-Day Public Seminar held on 29th november to 6 december 2022, on " Disaster Management in Pakistan in the Context of Recent floods, A Multi-Pronged Approach " conducted at the conclusion of the Public Policy Simulation Exercise during the 35th Mid Career Management Course.)

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Message of the Capt. (Retd) Usman Gul,

Director General National Institute of Management, Peshawar on the eve of Special Issue of the Khyber Journal of Public Policy:

It is a pleasure to present this edition of the Khyber Journal of Public Policy, published by the National Institute of Public Administration (NIPA), Peshawar—a constituent unit of the National School of Public Policy. This issue focuses on A Critical Analysis of the Implementation of Economic and Industrial Development Strategies in Pakistan.

Pakistan has introduced various economic and industrial policies aimed at sustainable growth, job creation, and national competitiveness. However, the implementation of these strategies remains inconsistent, often hindered by administrative, structural, and coordination challenges. This edition provides a timely and critical examination of these issues, offering insights that are both academically grounded and policy-relevant.

The contributors highlight the gaps between policy intent and outcomes, emphasizing the need for stronger institutional capacity, better intergovernmental coordination, and long-term planning frameworks. Their research contributes meaningfully to the national discourse on economic reform and development.

At NIPA Peshawar, we remain committed to fostering policy dialogue and research that inform effective governance. I commend the editorial team and contributors for their valuable work and hope this volume serves as a useful resource for policymakers, practitioners, and scholars.

Capt. (Retd) Usman Gul,
Director General
National Institute of
Management, Peshawar

Preface

of the Special Issue of Khyber Journal of Public Policy

The Khyber Journal of Public Policy, published by the National Institute of Public Administration (NIPA), Peshawar—a constituent unit of the National School of Public Policy (NSPP)—proudly presents this special edition focused on the wide-ranging impacts of the recent floods that devastated large parts of Pakistan. This issue brings together critical perspectives, field-based analyses, and policy reflections from a diverse group of researchers and practitioners working across health, infrastructure, agriculture, food security, climate science, and public administration.

Natural disasters like floods do not exist in isolation; they expose deep structural vulnerabilities in our systems—be they in health services, governance frameworks, or community resilience. The articles in this issue respond to the urgent need for evidence-based assessments and recommendations to strengthen Pakistan's disaster management infrastructure in the wake of climate-induced emergencies.

Abdul Qadir Shah, Abdul Hadi, and their co-authors provide a detailed overview of health services and epidemics emerging in post-flood contexts, emphasizing the importance of preventive care and timely emergency response. Similarly, Asfandayar Khan and colleagues explore nutritional deficiencies and food availability during displacement, pointing to critical policy and operational gaps.

Coordination challenges across district, provincial, and federal levels in managing water flows within the Indus River system are examined by Muhammad Ali Asghar and his team, drawing attention to the need for a coherent inter-governmental framework. Complementing this, Hina Afzal and co-authors assess evacuation efforts and related security concerns, highlighting logistical challenges and key lessons.

Rahim Ullah and collaborators critically evaluate disaster mitigation practices, identifying planning and implementation gaps. The issue of encroachments on riverbeds and waterways—and their role in exacerbating flood impacts—is addressed by Raza Ali Habib and fellow researchers.

Tariq Mehmood and his team present a comparative study of civil society organizations, assessing their roles, capacities, and limitations in delivering relief and advocacy during crises. The journal also features contributions analyzing agricultural damages and food security concerns, which are central to rural livelihoods and national economic stability.

The impact of climatic phenomena such as El Niño and changing monsoon patterns is examined by Baseer Ali Rehman Khan and others, underlining the climate crisis as a growing threat multiplier. Finally, Zahidullah and colleagues conclude with a critical analysis of how floods intensify poverty and economic fragility, particularly among already vulnerable populations.

A common thread throughout these studies is the leadership and scholarly input of Dr. Muqeem ul Islam, whose consistent involvement reflects a deep commitment to interdisciplinary, action-oriented public policy research.

This issue is both a sobering reflection on institutional shortcomings and a forward-looking call to action. It underscores the need for integrated policy responses, sustainable planning, and proactive governance. We hope this volume serves as a valuable resource for policymakers, practitioners, scholars, and all stakeholders committed to building a more resilient and equitable Pakistan.

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Health Services and Epidemics in The Context of Recent Floods

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Abstract:

In the aftermath of the 2022 floods, the Health Department adopted a three-pronged strategy to address the crisis: restoring health facilities, coordinating with partners for a collective response, and monitoring disease outbreaks. As a signatory to the International Health Regulations (IHR) 2005, a collective response to outbreaks was necessary, leading to collaboration with organizations like WHO, UNICEF, and ICRC. Health facility clusters were established, and the government's strategy focused on Prevention, Detection, and Response. The department set up Provincial Disease Surveillance and Response Units (PDSRUs) and District Disease Surveillance and Response Units (DDSRUs) under the supervision of the DGHS and Deputy Commissioner. These units aimed to provide rapid action in case of outbreaks. This paper evaluates the operational gaps in health department responses, including monitoring, damage assessment, and surveillance of diseases. It critically examines leadership tenures and response effectiveness, offering conclusions and recommendations for improving health department operations.

Key words:

Flood response, Disease surveillance, Health facilities restoration, Provincial Disease Surveillance Units, Outbreak management

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Introduction

There is a great deal of pressure on the supply of healthcare services in flood-affected communities since epidemics and diseases of all types are frequently caused by floods. Pools of standing water that form as floodwaters subside can serve as mosquito breeding grounds, raising the risk of illnesses like dengue fever and malaria that are spread by the insects. As of September 15, 2022, Sindh province had reported at least 3,830 dengue cases, including 9 fatalities. This indicates that dengue cases in Pakistan had already increased. A rise in malaria, diarrhea, and skin diseases has also been noted by health professionals as a result of the flooding.

In Pakistan, ongoing illness outbreaks such as acute watery diarrhea, dengue fever, malaria, polio, and COVID-19 are worsening, especially in camps and areas where water and sanitation infrastructure has been devastated. Pakistan had already reported 4,531 cases of measles and 15 cases of wild poliovirus in 2022 before the significant rains and consequent flooding. The nationwide polio vaccination program has been hampered in impacted areas due to the rain and flooding (Web, Major Health Risks Unfolding Amid Floods in Pakistan, 2022).

After significant flooding, access to potable water is frequently a serious issue. Sewer backups brought on by flooding can contaminate drinking water and raise the risk of gastroenteritis, while filthy conditions and overcrowding in shelters can make matters worse (Geddes, 2022). Typhoid fever, rotavirus, norovirus, hepatitis A and E, and other illnesses are also linked to flooding incidents. Leptospirosis (Weil's disease), which is spread by coming into contact with rodent urine, can also develop from being submerged in or breathing floodwater, as well as skin or eye disorders.

The potential increase in aquatic illnesses is a major issue as well. In temporary camps, those who have fled the destruction are residing with little to no access to potable water. According to the nonprofit organization Water Aid, in some of Pakistan's most severely affected regions, 50% of all water, sanitation, and hygiene facilities have sustained significant damage, and hundreds of cases of dysentery have already been reported (Khan, Pakistan floods: health crisis of epic proportions. Doctor's Note, 2022).

Oral cholera vaccines and surveillance programs were being established in Pakistan prior to the floods due to an increase in cholera cases, particularly in the Khyber Pakhtunkhwa (KP), Sindh, Punjab, and Balochistan regions. However, many of these have been delayed since the floods hit.

People with disabilities may experience a decline in their health due to such disruption (Khan, Pakistan floods: A health crisis of epic proportions, 2022).

The Health Department of KP started responding immediately. The Khyber Pakhtunkhwa government planned a cholera vaccination campaign to prevent the spread of the acute diarrheal infection among flood survivors. Health officials told Dawn that the cholera vaccination plan had been approved, and people would soon begin receiving the oral cholera vaccine free of charge (Yusufzai, 2022).

Even though it might not be as fatal, losing a home, possessions, or one's source of income has a lasting emotional effect. This psychological cost is increased by the economic hardship related to rebuilding. In comparison to the direct health effects of flooding, mental health issues are frequently disregarded and understudied. In close collaboration with the Ministry of National Health Services, Regulations, and Coordination, WHO is stepping up surveillance for cholera, acute watery diarrhea, and other communicable diseases to prevent further spread. In addition, WHO is supplying vital medications and medical supplies to functional health facilities caring for affected communities (Web, Major Health Risks Unfolding Amid Floods in Pakistan, 2022).

There was a considerable gap in access to health services between rural and urban communities even before the current floods. These remote locations have proven challenging to reach. The World Health Organization (WHO) reported that more than 1,400 healthcare facilities had suffered full or partial damage, and that the key healthcare concern was still access to "health facilities, healthcare staff, and necessary medicines and medical supplies" (Khan, Pakistan Floods: A health crisis of epic proportions, 2022).

In the period of nine months, from January 1 to September 27, 2022, a total of 25,932 confirmed dengue cases and 62 deaths were reported in Pakistan, with 74% of these cases reported in September alone. On September 2, 2022, the Health Department of Khyber Pakhtunkhwa reported that waterborne diseases had started spreading in the flood-affected districts of the province, as cases of diarrhea, rashes, chest, and respiratory diseases among residents of the flood-affected areas were on the rise (News, 2022).

After the waterborne diseases, most of the flood-hit districts of Khyber Pakhtunkhwa (KP) were gripped by malaria and dengue, multiplying the miseries of flood victims who are yet to be rehabilitated. This happened despite repeated warnings from experts who had urged the provincial government and health department to take preventive measures (Tribune, 2022).

Problem Statement

Pakistan is a signatory of the IHR, 2005, which warrants a synchronized effort by the member countries. It calls for the development of core facilities in 19 technical areas, broadly divided into three groups: a) Prepare, b) Detect, c) Respond. This framework is applied in every disaster situation. Since Pakistan has subscribed to the IHR, 2005, it must give a befitting response to the international obligation by effectively addressing the crises arising from the flood situation. This is where the concept of the "One Health Approach" assumes international significance. Consequently, two vital pivots, PDSRU/PDSRC and DDSRU/DDSRC, were established. Since floods require a multi-sectoral response and the Health Department alone cannot tackle the situation that ensues from mega floods, a concerted effort was required to address gaps and propose ways for future policy interventions. Our policy paper will revolve around these two hinges, as espoused by the law.

Scope of Study

The policy paper aims to critically evaluate health services and epidemics in the context of the recent floods (2022) in KP. The study duration is from November 28 to December 12, 2022. Information and meetings with the Health Department will be held to gauge the planning, preparedness, and performance of health service delivery and epidemic management during the flood. The study will identify gaps and suggest a way forward for better provision of public health services as per the International Health Regulations, 2005.

Literature Review

One of the significant reasons for the sluggish industrialization in Pakistan is the prolonged absence of a dedicated industrial policy. Consequently, the roles such a policy would typically fulfill are being managed through other public sector policies related to investment, trade, and monetary matters. The SMEDA Act of 1998 was established to regulate small and medium enterprises (SMEs) by the federal government, followed by Vision 2025 (Burki, 2008). An SME policy was formulated in 2007, which has since been amended and is pending cabinet approval. The 18th Constitutional Amendment devolved Part I of the Federal Legislative List, including the industrial sector, to the provinces, transferring industrial affairs to provincial governments (MOIP, 2021). Frequent changes in government are a major contributor to policy uncertainty in Pakistan. Moreover, past governments have often implemented ad-hoc industrial policies in reaction to crises (Kemal, 2008). The conflict between federal and provincial industrial policies has further complicated the achievement of desired outcomes in the industrial sector (Burki, 2008).

The Pakistan Business Council advocates for a "Make-in-Pakistan" initiative to drive industrial growth, leveraging Pakistan's domestic market of over 200 million consumers to develop scale and competitiveness, eventually addressing global demand (PBC, 2018).

Research Methodology

The research method used in this policy paper is both qualitative and quantitative. We have relied on primary data collected from in-depth interviews with officials from the office of the Directorate General Health Services. A number of published research papers, along with newspaper articles, have also been considered.

Impact of Floods 2022

In late August 2022, Pakistan faced the most severe torrential rains, resulting in floods that displaced 33 million people, washed away villages and homes, destroyed infrastructure and standing crops, and damaged schools and health facilities. In KP, the 2022 floods fully damaged 10 health facilities and partially damaged 151. Additionally, 175 LHW health houses were fully damaged, and 331 were partially damaged (DHMIS, 2022). We can draw insights from this regarding the scope of the study and the statement of the problem.

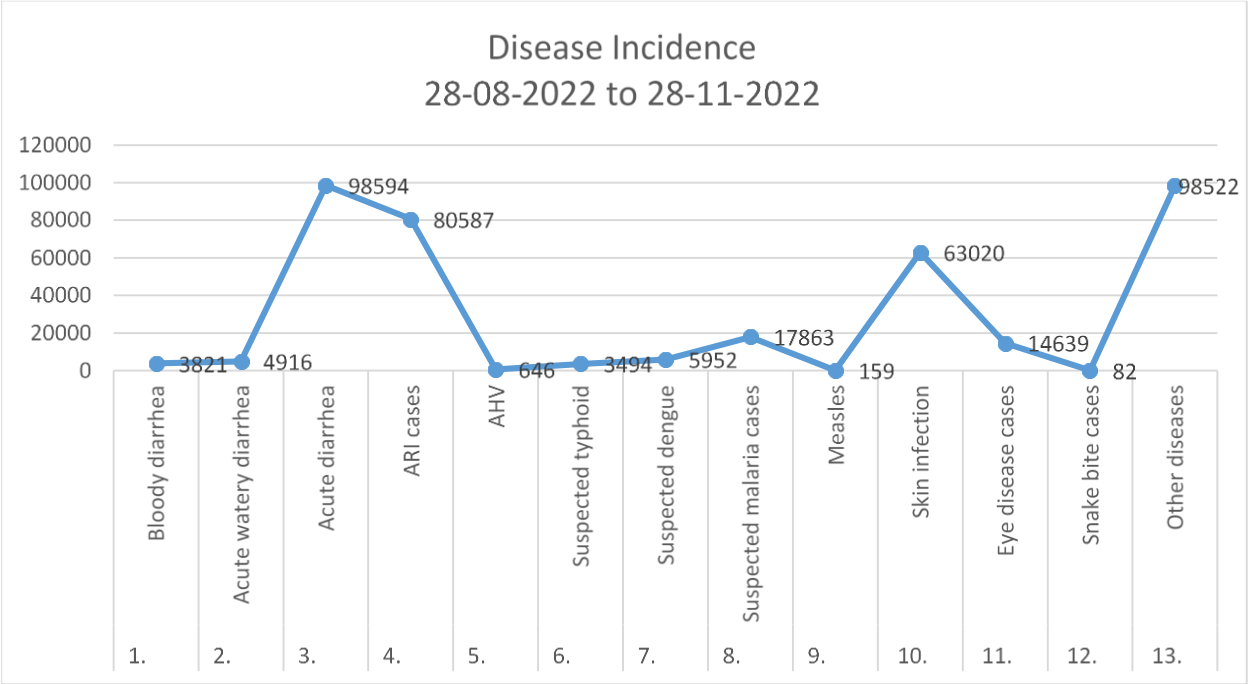
The other significant impact on public health was the outbreak of various diseases among the affected communities, as shown in the table and line graph below:

Table: Detail of Outbreak after 2022 Floods (as of 28-11-2022)

S .No.	Name of Disease	Number of Patients
1.	Bloody diarrhea	3821
2.	Acute watery diarrhea	4916
3.	Acute diarrhea	98594
4.	ARI cases	80587
5.	AHV	646
6.	Suspected typhoid	3494
7.	Suspected dengue	5952

8.	Suspected malaria cases	17863
9.	Measles	159
10.	Skin infection	63020
11.	Eye disease cases	14639
12.	Snake bite cases	82
13.	Other diseases (Body aches, weakness, muscle spasm etc)	98522

(DHMIS, 2022).



Source: IDSRS (Integrated Disease Surveillance Response System), Health Department Government of Khyber Pakhtunkhwa

Response of Health Department

The Health Department took the following steps:

1. Operationalized 24/7 flood emergency control rooms at the DGHS and across affected districts to timely assess and provide robust support to health-related interventions.
2. Emergency was declared by the Health Department through a notification on 1st September 2022, and the procurement process was relaxed.
3. Flood control rooms were established in the DOH office, linked with the DGHS office and line departments in the Deputy Commissioner office. Data was shared daily by the health department with PDMA, and a simultaneous linkage was established with NDMA and NIH.
4. Demand for supplies was generated from the flooded districts. The logistics and supply chain management section, which is at the disposal of the flood control room, kicked in.
5. Mobilized healthcare staff to aid on-ground public health interventions by establishing medical camps across flood-affected districts.
6. The Health Cluster (Health Working Group in the DGHS office), comprising UN agencies like WHO, UNFPA, UNICEF, and INGOs, was activated to identify areas of support and improve coordination to ensure HR deployment, emergency medicine supplies, and logistics support for immediate relief in flood-affected districts.
7. A Google sheet was developed and updated daily, showing the scope of work and work area allocation, thereby tracking the availability of essential medicines and supplies.
8. DGHS diverted 30-40% of the top-up stock toward flood districts, including supplies, medicine, and equipment.
9. Establishment of Mobile Field Health Camps, duly supplied with medicine, equipment, and human resources: doctors, paramedical staff, LHW (Maternal and Neonatal healthcare), and ancillary staff. The number of staff is proportionate to the population of the flooded area.
10. THQ and DHQ staff were strengthened to accommodate referrals.
11. The supply chain management, along with logistics and transport officers, distributed medicines among districts as per demand submitted to the DGHS office.
12. The medicine inventory of flooded districts was submitted to health working groups (INGOs, GIZ, ICRC, MDM, and UN agencies, who help in-kind only) who pledged different relief goods like medicines, transport, equipment, and mobile tent hospitals within timelines given by the DGHS office.

13. Malaria-specific Indus hospitals, an implementing partner of the Global Fund for Malaria, AIDS, and TB, have branches in every district in the form of Frontier Primary Healthcare, working closely with DHO. They use Rapid Diagnostic Kits for Malaria and microscopy.
14. A mass awareness campaign was launched by the DOH and DC regarding malaria and dengue by carrying out fumigation, Insecticidal Residual and larvicidal sprays, and Long-Lasting Insecticidal Bed Nets (LLINs).
15. The Integrated Disease Surveillance and Response system was mobilized at the DG office, with one District Surveillance and Response Unit in each district.
16. Data analysts uploaded disease trends and daily situation reports on DHIS-II, directly connected to the DGHS office, which then consolidated the sheets to measure disease trends and generate daily situation reports for the perusal of all line departments and health working group members, including the Chief Secretary.
17. The Field Epidemiology and Laboratory Training Program worked under PDSRU. They were activated to meet the challenge.
18. Connectivity was established with all stakeholders in the 18 flood-affected districts of KP, and they were made fully resourceful and authorized.
19. Data regarding damaged health facilities was collected, and DNA was carried out on partially, fully, and washed-away health facilities.
20. For the dispensation of health services, a demand was generated by the concerned health officer. The demand generated was uploaded by the data analyst on DHIS-II, directly connected to DGHS.
21. The Health Department created a health cluster (Health Working Group in the DGHS), including all UN agencies, where the DG is the Chairperson, and WHO is the co-chair. UNFPA, USAID, UNICEF, and INGOs also developed a 4 Matrix (who, when, where, what). A Google Sheet was shared on corresponding email addresses and WhatsApp groups with partners. Every partner knew the scope and mandate of the work assigned and the area allocated. The Google Sheet was regularly updated.
22. A National Flood Relief Control Centre (NFRCC) was established at the federal level by the Prime Minister of Pakistan, following the pattern of the COVID-19 NCOC. NFRCC has representatives from the federal and provincial governments and armed forces. It spearheaded flood control activities across the country. DGHS was requested to provide medicines and supplies to the government of Balochistan, as well as services, including four mobile health units with HR and medicines for four districts of Sindh. This was an acknowledgment of the befitting response of the DGHS office to the floods.
23. DGHS, KP extended services to 3,200 patients in four districts of Sindh.

24. Winter, Monsoon, and Heatwave contingency plans have also been chalked out to cater to the future needs of the province.

Health department services are already in place in the form of Provincial Disease Surveillance and Response Units (PDSRU/PDSC) and District Disease Surveillance and Response Units (DDSRU/DDSC). These two units were established in accordance with the provisions of The Khyber Pakhtunkhwa Public Health (Surveillance & Response) Act, 2017. Initially, these units conducted surveys and responded to the emerging situation. Additionally, top-up medicine stocks were available with the department to replenish supplies in the most affected districts by floods.

This policy paper aims to study the response of the health department to the emergency situation, the existing institutional setup, and identify gaps in the provision of health services during the recent floods. After thorough analysis using various analytical techniques, the research group will put forth recommendations for policy decisions by the government, resulting in enhanced public health service delivery before, during, and after natural disasters. The research group has carried out gap analyses in three aspects of the health department to find out gaps and propose ways to bridge them. These three aspects are:

1. Gap analysis of flood epidemics and surveillance.
2. Gap analysis of health services delivery.
3. Gap analysis of disaster needs assessment.

Analysis

Gap Analysis of Flood Epidemics Surveillance

	Current State	Future State	Gap	Actions to close gap
What	Disease Surveillance (PDSRU operational at provincial level and DDSRUs at district level)	Fully functional PDSRU & DDSRUs with one health approach (as per IHR 2005 Requirement)	1. Multi sector involvement 2. Notified Roles & Responsibilities with defined ToRs with measurable KPIs 3. Technical Capacities & support for Core Function 4. Financial Constraints	1. Fully Resourced PDSRU & DDSRU 2. Development and notification of roles, responsibilities with ToR and KPIs 3. Strengthening technical capacity and development of core team in PDSRU & DDSRU
Where	At provincial level and district level	At provincial level and district level	Multi Sectorial coordination	Focal person from all stakeholders with protected tenure for at least 03 years (through administrative decision)
When	Already in place (PDSRU/DDSRU)	3-4 Years	Not fully functional	Agreed upon Administrative, Financial, Political & stakeholders ownership
Who	Public Sector and Partners	Conversion from ADP to regular mode	Health department with Stakeholders	The Cabinet
How	Health to spearhead the process	Resources from the Health Department within 6 Months	By ownership, efficiency and accountability with transparency	Starting from severely flood affected districts

Gap Analysis of Disruption of Public Health Services Delivery

	Current State	Future State	Gap	Actions to close gap
What	Disruption of health service delivery in flood affected districts (Including Immunization, MCH, MNCH, OPD, Family Planning, nutrition and referrals)	Restoration of health services as per notified health care standards (EHSP) under HSS	1. Disruption in routine health services 2. Low accessibility to Health care services, medicine and equipment 3. Absence of purpose-built medicine warehouse	1. Provision of health care service through mobile health units/ camps 2. Reconstruction and Rehabilitation of Health Infrastructure 3. Supply of essential medicines & supplies to flood affected districts

Where	Roles & responsibilities of stakeholders	Well-defined and measurable roles and responsibilities	Well-defined job description of stakeholders	Improving health status of the flood affected population through provision of health service delivery (MCH, MNCH, Immunization, EPI, Nutrition and referrals)
When	Stop gap arrangement already made, essential medicines, vaccines and supplies already provided to flood affected districts	After restoration of health services	Immediate	Linked with rehabilitation and reconstruction of health facilities
Who	Health Department in coordination with C& W, P&D and Finance Department	District and provincial formations	Health department in coordination with stakeholders	Political executive
How	Phased manner, starting from Preparedness, response and reconstruction and rehabilitation.	Subject to availability of financial resources for restoration and rehabilitation of health care delivery services	Ownership of stakeholders and timely decision making	Initial restoration through mobile camps and stop gap arrangements. Restoration of health services by reconstruction of resilient health facilities.

GAP analysis of Damage Need Assessment (DNA)

	Current State	**Future State**	**Gap**	**Actions to close gap**
What	Damaged HF (10 FD, 151 PD, Reconstruction worth ~1.2 bn PKR)	Health infrastructure restoration and rehabilitation of services to pre flood state	Capacity of health dept. to provide public health services hampered	Detailed DNA through C&W or independent consultants based on a comprehensive framework of 4RFs i.e. Resilient, Recovery, Reconst. & Rehab. (Min of Planning, GoP for Donors Conference: BBB approach) Securing funds for reconstruction & Rehab (WB supported HCIP identified, re-appropriation underway, 10 m USD available)

				Partner support and pledges for rehab, UNICEF pledged for rehab in 19 health facilities.
Where	Across KP in Flood affected Districts	Reconstruction of flood resilient HF in flood prone districts	Technical Expertise for construction of resilient to hazards infrastructures in Health Department and decreased dependence on C&W	Amendment of RoB to allow 3rd party for DNA and Rehabilitation to improve quality, compatible with future needs e.g. Prefabricated structures etc.
When	28 Aug - 02nd Sept. 2022 (Health Emergency declared under Epidemic Control and Relief Act 2020 on 1st Sept. 2022). Still in vogue	when futuristic building code is implemented	by executing development project with 03 years throw forward liability	Services Restored, DNA conducted with cost estimation, ensuing processes in action.
Who	Health Department along with stakeholders	in coordination with PDMA, P&D and C&W and with the support of partners	Health Department in coordination with relevant stakeholders	Collective decision by Public, Legal, political leadership
How	In a phased manner from severely affected to least affected districts	PSDP, ADP and donors support, well before the onset of monsoon and after slack season	Effective stakeholders coordination, public dialogue and policy	(Political + Multi-sectorial) commitment

Critical Analysis

A devastating flood struck Khyber Pakhtunkhwa on August 28, 2022, leading to the declaration of an emergency on September 2, 2022. The flooding necessitated coordinated, multi-sectoral interventions. Numerous diseases and epidemics frequently brought on by floods put immediate pressure on the delivery of health services in flood-affected communities. As floodwaters subside, they leave behind pools of stagnant water, which can turn into mosquito breeding grounds, increasing the risk of mosquito-borne illnesses, including dengue fever and malaria. Health officials in Sindh province recorded at least 3,830 cases and 9 deaths from dengue as of September 15, 2022, indicating a spike in dengue cases in Pakistan. Additionally, according to health officials, the flooding has caused an upsurge in skin diseases, diarrhea, and malaria. Current disease outbreaks in Pakistan, including Acute Watery Diarrhea, Dengue Fever, Malaria, Polio, and COVID-19, are becoming more severe, especially in camps and areas with damaged water and sanitation infrastructure.

Before the intense rain and associated flooding, Pakistan had already reported 15 instances of wild poliovirus and 4,531 cases of measles in 2022. In impacted locations, the nationwide polio vaccination program has been hampered by the rain and flooding (Web, 2022). After significant flooding, access to potable water is frequently a serious issue. As a result of flooding, sewers may overflow, contaminating drinking water and raising the risk of gastrointestinal illnesses. Additionally, unsanitary conditions and crowded shelters may exacerbate the situation (Geddes, 2022). Khyber Pakhtunkhwa, Sindh, Punjab, and Balochistan provinces of Pakistan were experiencing an increase in cholera cases prior to the floods. Oral cholera vaccinations and surveillance programs were being established, but many of these were delayed when the floods hit (Khan, 2022). In Khyber Pakhtunkhwa, an emergency was declared on September 1, 2022, under Section 3 of the Khyber Pakhtunkhwa Public Health (Surveillance and Response) Act, 2017, to fill the gap created by the deluge in the delivery of health services as outlined in the Health Sector Five-Year Plan 2018-2023. The emergency declared is still in effect. Epidemics occur frequently globally and will only increase in the future. Where there is risk, there is also an opportunity. We should use our interconnectedness to better prepare, prevent, detect, respond to, and recover from public health events to address the challenges of building multi-sectoral partnerships. UNOCHA-Pakistan brings together humanitarian actors to ensure a coherent response to emergencies. It establishes a framework within which each actor can contribute to the overall response effort. In 2015, member states, partners, and donors requested WHO to establish a strategic partnership for health security: WHO-SPH (World Health Organization Strategic Partnership for Health). The SPH is a one-stop multi-sectoral platform that supports countries in accelerating the implementation of the International Health Regulations (IHR) 2005, thereby strengthening global health security. WHO-SPH offers member states, partners, and donors the opportunity to exchange best practices so that we can combat future epidemics, endemics, and pandemics effectively. Solutions to global health security lie beyond the public health sector, and what is unique about the platform is that it facilitates broad-spectrum collaboration between stakeholders. Moreover, it synergizes efforts between member states, partners, and donors. It enables countries to match their needs and gaps with the priorities of donors and partners. The SPH promotes four pillars of multi-sectoral partnership: a. Leadership b. Networks c. Resources d. Forum

The IHR, 2005, is a legally binding agreement among 196 countries to build the capacity to detect and report potential public health emergencies worldwide. IHR requires that all countries have the ability to detect, assess, report, and respond to public health events. It covers 19 technical areas, which can be broadly divided into three groups: Prepare, Detect, and Respond.

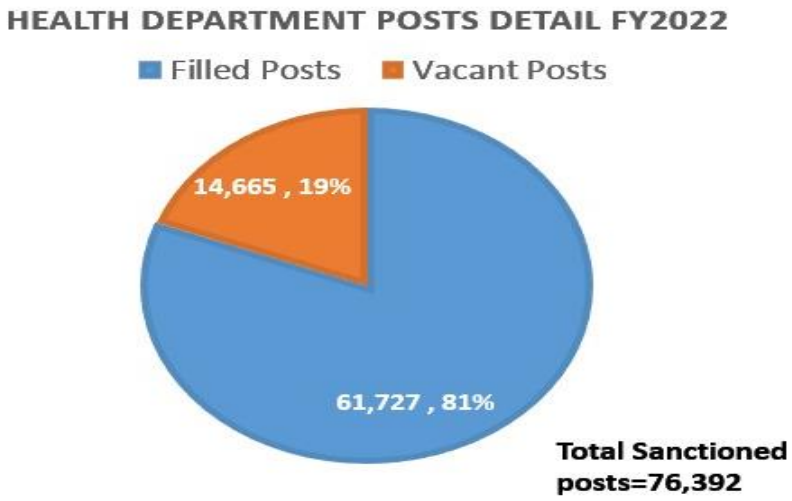
The regulatory framework of IHR calls for a "One Health Approach," embodied within the DDSRU and PDSRU at the district and provincial levels, respectively.

By addressing the shortcomings of the district and provincial response units, a major portion of the public health services delivery outcomes can be improved substantially. In this policy paper, we have applied the Pareto Principle, as bringing all dimensions of the health department into a single policy paper would be a gigantic task, beyond the mandate of our paper. When wants are unlimited and means are limited, we resort to prioritization. This can be achieved by identifying the vital few stakeholders, which in our case are the PDSRU/PDSC and DDSRU/DDSC. If we can address the issues (say 20%) of these two vital stakeholders, it will translate into 80% of the outcomes. For the implementation of IHR and the dispensation of a robust response, the "One Health Approach" is developed in the form of a Provincial Disease Surveillance Centre (PDSC) chaired by the Director of Public Health. At the district level, the District Disease Surveillance Centre (DDSC) is chaired by the Deputy Commissioner concerned. In these centers, all relevant government agencies at the provincial and district levels are represented. They generate a weekly bulletin providing guidance. The One Health Approach is difficult to accomplish in a country like Pakistan since there are no rules governing the formation of a public sector conglomerate at the district and provincial levels. This is the actual hurdle in the way of a coordinated and robust response. These two units, however, generate a weekly bulletin providing guidance. In the aftermath of the 18th Constitutional Amendment, health became a devolved subject. It has its own indigenous flood response mechanism with little or no input from the federal government. The Ministry of National Health Services, Regulation & Coordination has offered the provision of some life-saving medicines through the NDMA, for which lists have been sent via PDMA by the health department. Their response is awaited. A comparative analysis of the 2010 and 2022 floods has been carried out to show the evolution of the health department in tackling natural calamities over the course of a decade.

A comparative analysis between 2010 and 2022 Floods:

S.No.	Floods 2010	Floods 2022
1.	Response was haphazard.	Response was systematic.
2.	No DHMIS-II software available in 2010. Ineffective monitoring of disease trends.	An effective DHMIS-II system in place ensuring efficiency.
3.	Logistics Management & Information System (LMIS) not in place.	LMIS and Inventory management system in place.
4.	No telemetric equipment installed by Irrigation dept. in collaboration with the PDMA	Telemetric equipment installed at different locations along the rivers course to monitor flood water.
5.	No Integrated Disease Surveillance & Response Unit (IDSRU)	Integrated Disease Surveillance & Response Unit (IDSRU) in place in 2022 as per KP Public Health (S&R) Act, 2017.
6.	30-40% top up medicine stock wasn't available in 2010.	Available in DG health office prior to 2022 floods. DG health has centralized procurement from the last 03 years in addition to procurements by the MSs & DOHs. The impetus came from COVID-19.
7.	Health Dept. was a devolved subject operated from Account-4.	Health Dept. is provincial subject operated from Account-1.
8.	No Sehat Sahulat Card in vogue	Sehat Sahulat Card throughout KP
9.	Budget of the Health Department: 18.34 billion Rs.	Budget of the health Dept. 205 billion Rs.
10.	Staff position in 2010: 42,522	Staff position in 2022: 76,392
11.	Lower & Upper Kohistan, Chitral lacks medical officer.	Same as before. Medical Officers like to serve only in Peshawar for service and pursuit of higher degrees.
12.	Lack of warehouse facility where temperature and humidity is controlled.	Still prevalent and medicine are stored in EPI warehouses.
13.	Health department wasn't held in priority by the then political government.	Health is the most favorite flagship department of the political government.
14.	Many dysfunctional health facilities at the districts level	Dysfunctional facility turned into effective ones through PPP. Caesarian are carried out in Razmak and Dasu.

The total sanctioned strength of the health department in 2010 and 2022 is exhibited in the pie chart shown below which show substantial increase in the human resources. This is partly due to the political ownership of the health department and due to merger of the erstwhile FATA into the province of Khyber Pakhtunkhwa. As far as 2022 is concerned, the total sanctioned posts, filled and vacant posts are known while in the year 2010-11 only sanctioned posts could be traced from the Financial Management and Implementation Unit of the finance department government of Khyber Pakhtunkhwa. This information about the human resources is followed by the tenures in offices of the Secretaries health department (0.8 years) along with the Director General Health Services (0.9 years).

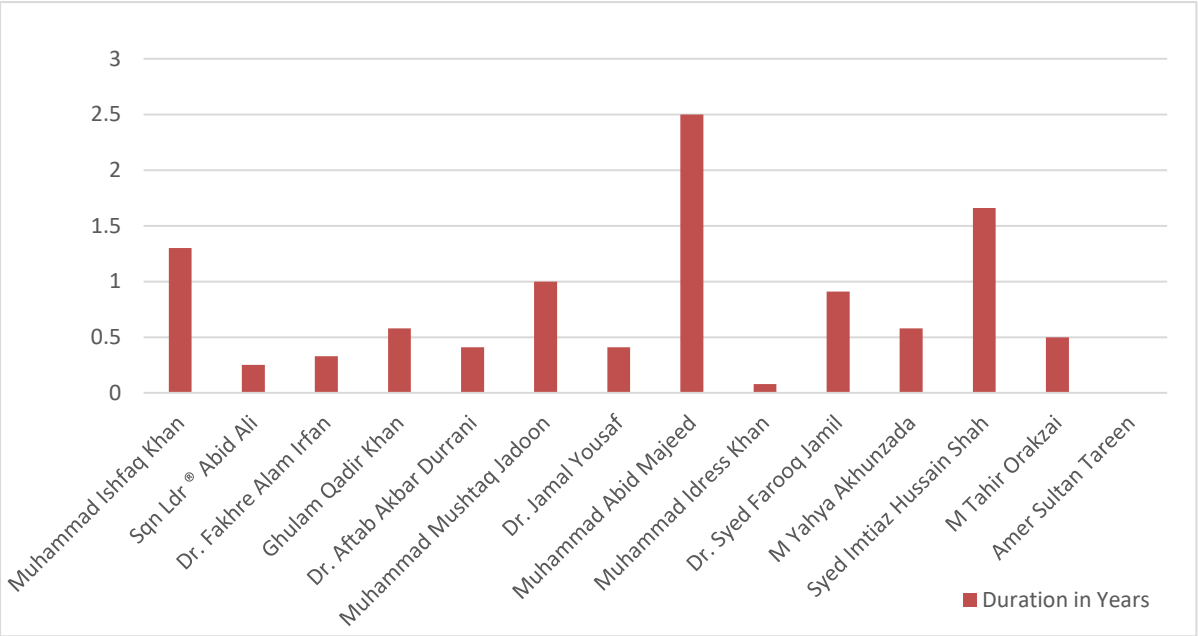


Total Sanctioned Posts in 2010-11 were: 42,522

Secretaries Health Tenure (2011 till date)

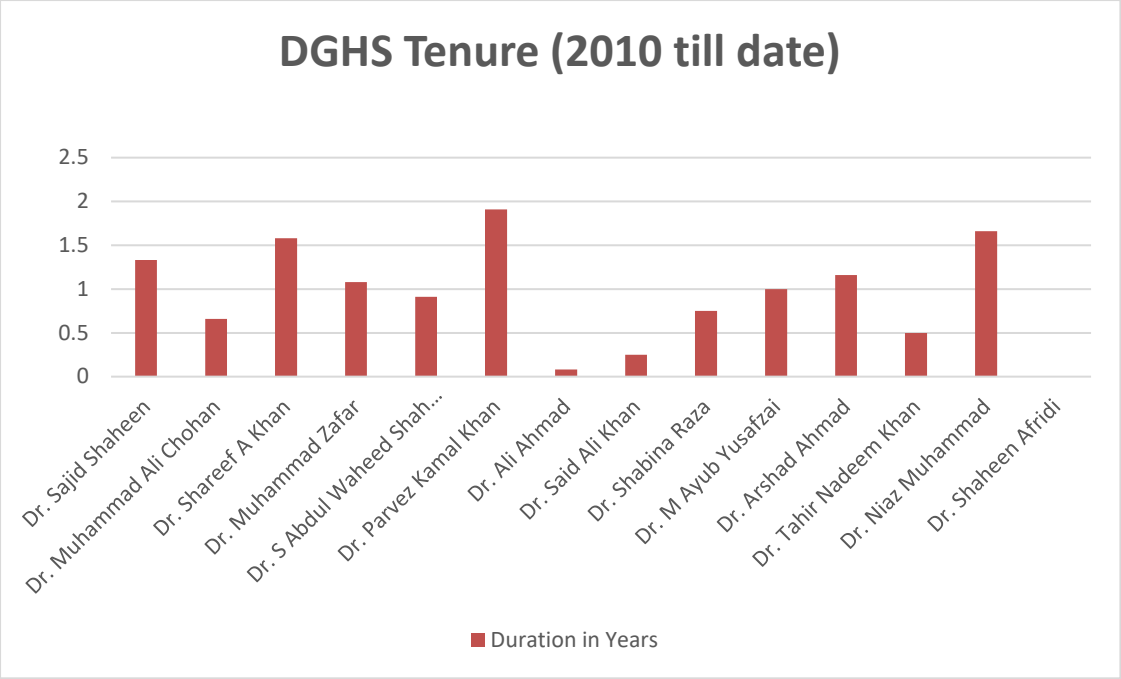
S. No.	Name	Tenure From – To		Duration in Months	Duration in Years
1.	Muhammad Ishfaq Khan	09-12-2011	08-04-2013	16	1.3
2.	SqnLdr ® Abid Ali	08-04-2013	03-07-2013	03	0.25
3.	Dr. Fakhre Alam Irfan	05-07-2013	08-11-2013	04	0.33
4.	Ghulam Qadir Khan	08-11-2013	11-06-2014	07	0.58
5.	Dr. Aftab Akbar Durrani	12-06-2014	17-11-2014	05	0.41
6.	Muhammad Mushtaq Jadoon	20-11-2014	04-11-2015	12	1
7.	Dr. Jamal Yousaf	04-11-2015	17-03-2016	05	0.41
8.	Muhammad Abid Majeed	17-03-2016	06-09-2018	30	2.5
9.	Muhammad Idress Khan	06-09-2018	18-10-2018	01	0.08
10.	Dr. Syed Farooq Jamil	06-11-2018	02-09-2019	11	0.91
11.	M Yahya Akhunzada	02-09-2019	03-04-2020	07	0.58
12.	Syed Imtiaz Hussain Shah	04-04-2020	27-12-2021	20	1.66
13.	M Tahir Orakzai	29-12-2021	27-05-2022	06	0.5
14.	Amer Sultan Tareen	30-05-2022			
15.	**Average Tenure of Secretary during the last 10 years**				**0.80 years**

Secretaries Health Tenure (2011 till date)



DGHS Tenure (2010 till date)

S. No.	Name	Tenure From - To		Duration in Months	Duration in Years
1.	Dr. Sajid Shaheen	30-07-2010	27-03-2011	16	1.33
2.	Dr. M. Ali Chohan	28-03-2011	05-09-2011	08	0.66
3.	Dr. Shareef A Khan	05-09-2011	18-04-2013	19	1.58
4.	Dr. Muhammad Zafar	19-04-2013	12-02-2014	13	1.08
5.	Dr. S Abdul Waheed Burki	13-02-2014	16-11-2014	11	0.91
6.	Dr. Parvez Kamal Khan	28-11-2014	24-10-2016	23	1.91
7.	Dr. Ali Ahmad	25-10-2016	04-12-2016	01	0.08
8.	Dr. Said Ali Khan	05-12-2016	02-02-2017	03	0.25
9.	Dr. ShabinaRaza	03-02-2017	25-10-2017	09	0.75
10.	Dr. M AyubYusafzai	26-10-2017	22-10-2018	12	1
11.	Dr. Arshad Ahmad	23-10-2018	16-01-2020	14	1.16
12.	Dr. Tahir Nadeem Khan	17-01-2020	15-06-2020	06	0.5
13.	Dr. Niaz Muhammad	16-06-2020	26-02-2022	20	1.66
14.	Dr. ShaheenAfridi	07-03-2022			
Average Tenure of DGHS KP					**0.99**



Conclusion

Floods in 2022 resulted in a notable spike in waterborne diseases, including acute watery diarrhea, skin, and respiratory infections. IDSRS data from the health department illustrates a high incidence of acute diarrhea, acute respiratory infections, and skin infections in the aftermath of the floods. Dengue fever cases were on the rise, as flood relief camps were densely populated, thereby providing an impetus for the spread of contagious diseases. The high incidence of waterborne diseases demonstrates that the provision of clean drinking water was an insurmountable challenge for the health authorities. The IDSRS data does not provide information on leptospirosis, which is caused by potable water coming into contact with cattle and rodent urine. The oral cholera surveillance program was hampered by the floods, leading to a disruption in the administration of the cholera vaccine. Mental health issues arising from the destruction of homes have been disregarded and understudied throughout Pakistan. IDSRS and access to health personnel in remote areas remain a challenge. The data also does not provide information about deaths caused by epidemics, which presents a utopian view that contrasts with the ground realities. Since snake bites were frequent in the districts of Tank, Nowshera, and D.I. Khan, they need to be provided with sufficient antivenom before the onset of the next monsoon. A top-up stock of medicines and supplies, to the tune of 30-40%, needs to be maintained in the DGHS office in the future as well.

The response to the 2022 floods was better due to the installation of telemetric equipment on the course of rivers by the PDMA with technical support from the irrigation department. In the health department, the improved response to the floods can be attributed to IDSRS, PDSRU, DDSRU, coherent efforts by line departments, and the top-up stocks of medicines and supplies maintained by the DGHS

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Evaluation Of Availability of Food and Nutritional Requirement During Flood Related Displacement

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Abstract:

Floods are the most frequent natural disaster globally, causing widespread devastation, including loss of life and damage to infrastructure. In Pakistan, the 2022 floods, exacerbated by the country's existing food insecurity, severely impacted the already vulnerable communities, especially children and lactating mothers. Despite efforts by various national and international organizations, the floods amplified food and nutrition-related issues. Pakistan's pre-existing challenges, such as high rates of malnutrition and low rankings on the Global Hunger Index, were worsened. This paper evaluates the relief efforts during and after the floods, identifies gaps in response, and highlights the need for better coordination and targeted strategies to address malnutrition and food insecurity. Effective interventions are crucial to mitigate the impacts of future floods and improve overall nutrition and health outcomes for the affected populations.

Key words:

Floods, Malnutrition, Food Insecurity, Pakistan, Relief Efforts

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Introduction

Floods are one of the most frequent and devastating natural disasters across the world. Characterized by the overflow of water that submerges land that is typically dry, floods are caused by various factors, including heavy rainfall, rapid snowmelt, storm surges from tropical cyclones or tsunamis, and other climatic events. The damage caused by floods is wide-ranging, often resulting in the loss of life, destruction of property, displacement of communities, and severe disruption to public health infrastructure. As one of the most common types of natural disaster, floods have had significant impacts on human societies across the globe. From 1998 to 2022 alone, floods affected over 2 billion people, highlighting their global prevalence and the scale of their consequences.

Pakistan, due to its geographical location and climatic conditions, is highly susceptible to flooding, especially during the monsoon season. The country's varied topography, ranging from plains to mountainous regions, combined with its vulnerability to intense rainfall patterns, makes it prone to frequent and severe floods. In particular, the monsoon rains, which typically occur between June and September, result in the overflow of rivers and streams, inundating large swathes of land. These floods often devastate agricultural crops, disrupt transportation networks, damage homes, and threaten the livelihoods of millions of people.

The floods of August 2022 serve as a recent and significant example of the widespread destruction caused by such natural disasters in Pakistan. The 2022 floods were triggered by a combination of unusually high monsoon rainfall, climate change effects, and the country's inadequate flood management infrastructure. The floods affected nearly one-third of the country, displacing millions of people, destroying crops, and causing widespread damage to infrastructure. This catastrophic event resulted in the loss of thousands of lives, along with the destruction of homes, schools, hospitals, and other critical facilities. However, beyond the immediate physical damage, the floods also had a lasting impact on public health, particularly in terms of nutrition and food security. This dimension of the disaster, which is often overshadowed by the more visible effects of infrastructure destruction, is particularly alarming given the pre-existing vulnerabilities in the country's nutrition landscape.

Before the 2022 floods, Pakistan already faced significant challenges related to food insecurity and malnutrition. The country has long ranked poorly on global hunger indices, and its malnutrition rates have been high, especially among vulnerable populations such as children, women, and marginalized

communities. According to reports, the prevalence of malnutrition in Pakistan was alarmingly high even before the floods. In provinces such as Balochistan, Khyber Pakhtunkhwa (KP), Punjab, and Sindh, high rates of chronic malnutrition were reported, with nearly 96 percent of children under the age of 2 failing to consume a minimum acceptable diet. Additionally, at least 40 percent of children under the age of 5 were chronically malnourished, suffering from stunting. These pre-existing nutritional challenges worsened dramatically in the aftermath of the floods.

The floods of August 2022 not only devastated the food production systems but also exacerbated existing food insecurity in the affected regions. Floodwaters inundated vast agricultural lands, destroyed crops, and disrupted local food supply chains, making it difficult for affected communities to access nutritious food. The loss of livestock, which many rural communities rely on for both food and income, further compounded the problem. With agricultural production severely impacted, food prices skyrocketed, placing basic foodstuffs out of reach for many families, particularly those already living in poverty. Consequently, the nutritional status of communities, particularly vulnerable groups such as children and lactating mothers, deteriorated rapidly.

In response to the crisis, various national, provincial, and international organizations mobilized to provide relief to the affected communities. Humanitarian organizations such as the World Food Programme (WFP), UNICEF, and the Food and Agriculture Organization (FAO) played key roles in delivering emergency food assistance, healthcare, and nutritional support to the most vulnerable populations. However, despite the efforts of these organizations, significant gaps in the response efforts were evident. Many areas, particularly those in remote or hard-to-reach locations, faced delays in receiving aid, and the relief efforts were often inadequate to meet the massive scale of the crisis.

The impact of the 2022 floods on food security and nutrition highlights the urgent need for a comprehensive, multi-sectoral approach to disaster response, particularly in terms of addressing food and nutrition-related problems. While immediate relief efforts are crucial in alleviating the suffering of affected populations, it is equally important to ensure that long-term recovery strategies focus on building resilience in the food systems of flood-prone areas. This includes strengthening disaster risk management frameworks, enhancing food production and supply systems, and improving the nutritional status of vulnerable populations in the aftermath of disasters. More attention must also be paid to addressing the underlying causes of food insecurity and malnutrition, such as poverty, lack of access to healthcare, and inadequate sanitation, which exacerbate the impact of floods on nutrition.

One of the most critical areas of focus in flood response efforts is the protection and promotion of nutrition, particularly for high-risk groups such as children under 5, pregnant and lactating women, and the elderly. Malnutrition, especially among young children, has long-term consequences on physical and cognitive development, leading to lifelong health challenges. Therefore, ensuring that these vulnerable groups receive adequate and nutritious food during and after a disaster is vital to mitigating the long-term impact of floods on their health.

This paper aims to critically analyze the food and nutrition-related impacts of the 2022 floods in Pakistan, with a particular focus on the province of Khyber Pakhtunkhwa. The study will examine the roles and efforts of relevant government departments, international organizations, and local stakeholders in addressing the nutritional deficiencies exacerbated by the floods. It will also highlight the gaps in the response efforts and propose strategies for improving coordination and effectiveness in future flood responses. By identifying key lessons learned from the 2022 floods, this study seeks to contribute to the development of more robust and sustainable disaster response frameworks that prioritize food security and nutrition.

In conclusion, the 2022 floods in Pakistan underscore the need for a comprehensive approach to disaster management, one that incorporates not only immediate relief efforts but also long-term strategies for improving food security and nutrition in flood-prone areas. By addressing the root causes of food insecurity and ensuring better preparedness for future floods, Pakistan can enhance its resilience to such natural disasters and safeguard the health and well-being of its most vulnerable populations.

Problem Statement

Floods have a significant impact on food and nutrition-related problems in the affected communities. In the context of Pakistan, this impact was even more severe due to the country's already low ranking on the Global Hunger Index and the high incidence of malnutrition prior to the floods. Therefore, the August 2022 floods only exacerbated food insecurity in an already vulnerable community, creating a food crisis during and after the floods. This led to severe malnutrition, especially among lactating mothers and children. It is, therefore, imperative to analyze the current state of affairs, devise strategies to address this issue effectively, and explore alternatives to avoid such dilemmas in the future.

Scope of Study

The scope of this study is to critically analyze the food and malnutrition-related impacts caused by the recent floods in Pakistan, with a special focus

on the province of Khyber Pakhtunkhwa. The study will also explore the role of relevant departments within the KP government and other stakeholders in addressing nutrition-related deficiencies, the gaps observed in the system, and potential ways forward.

Literature Review

Numerous research efforts have been made by environmentalists and nutritionists to explain the impact of climate variations on food security, particularly by analyzing how climate change influences food production. Much of this research has been commissioned by international organizations such as WFP, UNICEF, and the Food and Agriculture Organization (FAO) of the UN, and conducted by professional researchers. Most of these studies establish a negative relationship between climate variations and food security.

Some research in this field has also been conducted by Pakistani researchers. For example, Asif (2013) analyzed the impact of climate variations on food security conditions in Pakistan, an agricultural country. Some studies predict that, due to global warming, the likelihood of floods in Pakistan will increase in the future. This could lead to a water crisis, food shortages, inflation in food prices, and trans-boundary water conflicts.

Pakistan is a prominent developing economy in South Asia, struggling simultaneously with poverty and hunger. The country envisions achieving food security, where people have economic and physical access to adequate food and health by the end of 2025 (Pakistan Economic Survey, 2015). Food security has become a key target for sustainability in Pakistan, as highlighted in the second United Nations Sustainable Development Goals (SDGs), which aim to end hunger by 2030.

Given the recent nature of the floods, there is limited scholarly literature on the impact of floods on the nutritional status of affected communities in Pakistan. However, many surveys have been conducted by international organizations such as WFP, UNICEF, and FAO, as well as national organizations like the Ministry of Planning, Development, and Special Initiatives, and the Ministry of National Health Services, Regulations & Coordination (MNHSR&C), and provincial organizations such as Scaling-Up Nutrition (SUN)-KP and the Nutrition Wing of the Directorate General of Health Services-KP. All of these surveys indicate an increased incidence of malnutrition following the floods, particularly among lactating mothers and children.

Research Methodology

This research was conducted primarily using secondary data. The data sources include scholarly articles by professional researchers available online, surveys conducted by relevant international, national, and provincial organizations, and news articles from prominent newspapers. Additionally, the research team visited SUN-KP and the Directorate General of Health Services to collect relevant information and data. Furthermore, some data was gathered telephonically from the Ministry of National Health Services, Regulations & Coordination (MNHSR&C) in Islamabad.

Floods

Definition and Causes

Floods are the most frequent type of natural disaster and occur when an overflow of water submerges land that is usually dry. They are often caused by heavy rainfall, rapid snowmelt, or a storm surge from a tropical cyclone or tsunami in coastal areas. Floods can cause widespread devastation, resulting in loss of life and damage to personal property and critical public health infrastructure. From 1998 to 2022, floods affected more than 2 billion people worldwide. People who live in floodplains or non-resistant buildings, or those lacking warning systems and awareness of flooding hazards, are most vulnerable to floods. Additionally, floods are becoming more frequent and intense, and the frequency and intensity of extreme precipitation are expected to continue to increase due to climate change.

There are three common types of floods:

1. Flash floods, caused by rapid and excessive rainfall, like monsoons in South Asia, which quickly raise water levels, overtaking rivers, streams, channels, or roads.
2. River floods, which occur when consistent rain or snowmelt forces a river to exceed its capacity.
3. Coastal floods, which are caused by storm surges associated with tropical cyclones or tsunamis.

Implications

Floods can have severe implications, with drowning accounting for 75% of deaths in flood disasters. Floods are becoming more frequent, and this trend is expected to continue. Drowning risks increase during floods, particularly in low- and middle-income countries where people live in flood-prone areas, and the ability to warn, evacuate, or protect communities from floods is weak or developing. Deaths from floods can also result from physical trauma, heart attacks, electrocution, carbon monoxide poisoning, or fire caused by flooding. Often, only immediate traumatic deaths are recorded, and the magnitude of the physical and human costs from floods can be reduced if adequate emergency prevention, preparedness, response, and recovery measures are implemented in a sustainable and timely manner.

Floods can also have medium- and long-term health impacts, including:

- Water- and vector-borne diseases, such as cholera, typhoid, or malaria
- Injuries, such as lacerations or punctures from evacuations and disaster cleanup
- Chemical hazards

- Mental health effects associated with emergency situations
- Disrupted health systems, facilities, and services, leaving communities without access to health care
- Damage to basic infrastructure, such as food and water supplies and safe shelter.

Floods impact both individuals and communities and have social, economic, and environmental consequences. The consequences of floods, both negative and positive, vary greatly depending on the location and extent of flooding and the vulnerability and value of the natural and constructed environments they affect. The immediate impacts of flooding include loss of human life, damage to property, destruction of crops, loss of livestock, and deterioration of health conditions due to waterborne diseases. Additionally, communication links and infrastructure such as power plants, roads, and bridges are damaged and disrupted, some economic activities may come to a standstill, and people are forced to leave their homes, disrupting normal life. Similarly, disruptions to industry can lead to a loss of livelihoods. Damage to infrastructure also has long-term impacts, such as disruptions to supplies of clean water, wastewater treatment, electricity, transportation, communication, education, and healthcare. Loss of livelihoods, reduced purchasing power, and loss of land value in floodplains can leave communities economically vulnerable. Floods can also traumatize victims and their families for long periods. The loss of loved ones has deep impacts, especially on children. Displacement from one's home, loss of property, and disruption to business and social affairs can cause continuing stress. For some people, the psychological impacts can be long-lasting.

Flooding in key agricultural production areas can lead to widespread damage to crops, fencing, and loss of livestock. Crop losses through rain damage, waterlogged soils, and delays in harvesting are further intensified by transport problems due to flooded roads and damaged infrastructure. The downstream effects of reduced agricultural production can often impact well beyond the production area, as food prices rise due to shortages in supply. On the other hand, flood events can result in long-term benefits for agricultural production by recharging water resource storages, especially in drier, inland areas, and rejuvenating soil fertility through silt deposition. Damage to public infrastructure affects a much larger proportion of the population than those whose homes or businesses are directly inundated by the flood. In particular, flood damage to roads, rail networks, and key transport hubs, such as shipping ports, can have significant impacts on regional and national economies.

In many natural systems, floods play an important role in maintaining key ecosystem functions and biodiversity. They link the river with the surrounding land, recharge groundwater systems, fill wetlands, increase the connectivity between aquatic habitats, and move both sediment and nutrients

around the landscape and into the marine environment. For many species, floods trigger breeding events, migration, and dispersal. These natural systems are resilient to the effects of all but the largest floods. The environmental benefits of flooding can also help the economy through increased fish production, groundwater resource recharge, and maintenance of recreational environments.

Pakistani Context

Pakistan is one of the most flood-prone countries in the world, mainly due to its physical and climatic characteristics. Three types of weather systems influence precipitation in catchments that produce floods in Pakistan:

1. Monsoon depressions originating from the Bay of Bengal (the most important system)
2. Westerly waves coming from the Mediterranean Sea (winter rains)
3. Seasonal lows from the Arabian Sea (cyclones)

Pakistan is exposed to frequent riverine floods, flash floods, and coastal floods. Historical records show that Pakistan has experienced almost all types of floods, with river and flash floods being the most common in terms of frequency and magnitude. The discharge in the Indus River and its tributaries fluctuates seasonally, with high discharges in summer due to snowmelt, glacier runoff, and monsoon rainfall, and low discharges in winter due to reduced glacier ablation and precipitation in the form of snow. Occasionally, the Indus River and its tributaries overflow their levees, causing heavy damage to human lives, crops, agricultural land, infrastructure, and other properties.

The Indus plain is home to more than 120 million people, where agriculture is a major source of livelihood. A significant portion of the population is poor and consists of tenant farmers. Since the country's inception, Pakistan has been hit by severe floods on average every four years. This increasing population, ecological degradation, and changing climate have multiplied the risk of flood disasters. It is estimated that Pakistan has suffered from frequent flood disasters, resulting in the loss of 11,239 human lives, including 1,985 deaths from the super-flood of 2010. That year, 20 million people were affected, over 100,000 km² of land was inundated, and the economic loss was recorded at US$10 billion.

Flood 2022

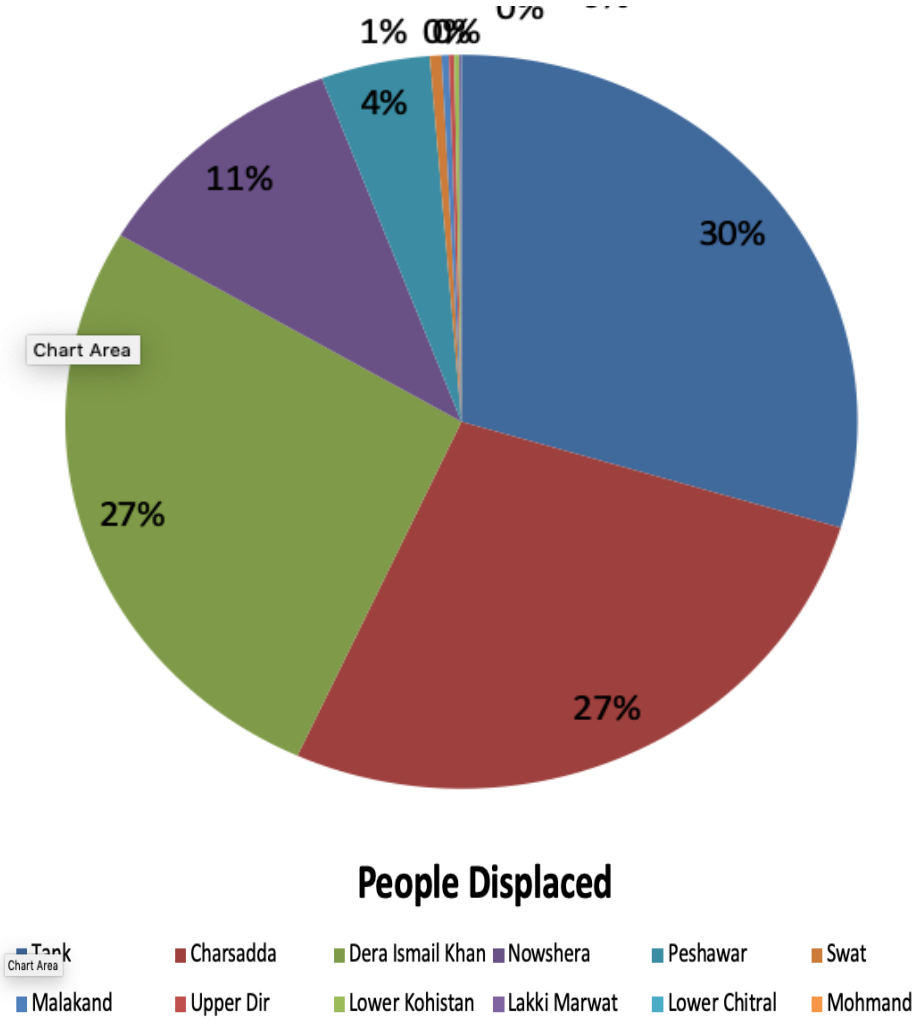
The 2022 floods in Pakistan were the deadliest since 2010, with more than one-third of the country submerged and at least 33 million people affected. 1,739 people died, including 647 children, and 12,867 were injured. The National Disaster Management Authority (NDMA) reported that 72 districts out of 160

were affected, with damage to more than 5,000 km of roads, over 1.1 million houses, and the death of over 800,000 livestock. Government officials estimated reconstruction costs and economic damage at $30 billion, equivalent to about 10% of the GDP. A needs assessment led by the Ministry of Planning, Development, and Special Initiatives, in collaboration with the Asian Development Bank, the European Union, and relevant UN agencies, estimated damages to exceed $14.9 billion, with economic losses reaching $15.2 billion and estimated rehabilitation needs of $16.3 billion.

Flood 2022 in Khyber Pakhtunkhwa

The unprecedented flooding in Khyber Pakhtunkhwa during the year 2022, with the Malakand division being the worst hit, played havoc with the province as dozens of people, including females and children, were reported killed. In some districts, entire villages were washed away by the gushing waters. 309 people died and 600,000 others were displaced by floods. Among them were five children in Upper Dir who had been returning home from school. 326,897 houses were damaged due to floods and landslides, and 7,742 cattle died from collapsing sheds. In Swat, a newly built hotel collapsed due to excessive flooding. In Lower Kohistan, five people stranded in a hill torrent were swept away; four of them were killed, and one was rescued. In Balakot, eight nomads were killed due to flooding in a tributary of the River Kunhar. Twelve people were also killed in flooding in different areas of D.I. Khan due to flash floods from hill torrents.

Large-scale destruction of property, including famous hotels, houses, shops, private buildings, and government installations, was reported from various parts of the province. Thousands of acres of standing crops and hundreds of thousands of cattle were also destroyed by the gushing waters, and dozens of bridges, including those linking main cities, were washed away. The residents of low-lying areas and those residing close to riverbeds in all the districts were directed to shift to the safest places at the earliest. The Deputy Commissioner of Nowshera, while issuing a high alert, said a flood wave of 300,000 cusecs was expected to pass through the River Swat at Nowshera, causing floods in the Nowshera district. Even the main GT road was expected to submerge up to three feet. Most of the population of Nowshera was evacuated amid rising threats of high flood.



Source, PnD, KP

Extent of Damage to Districts

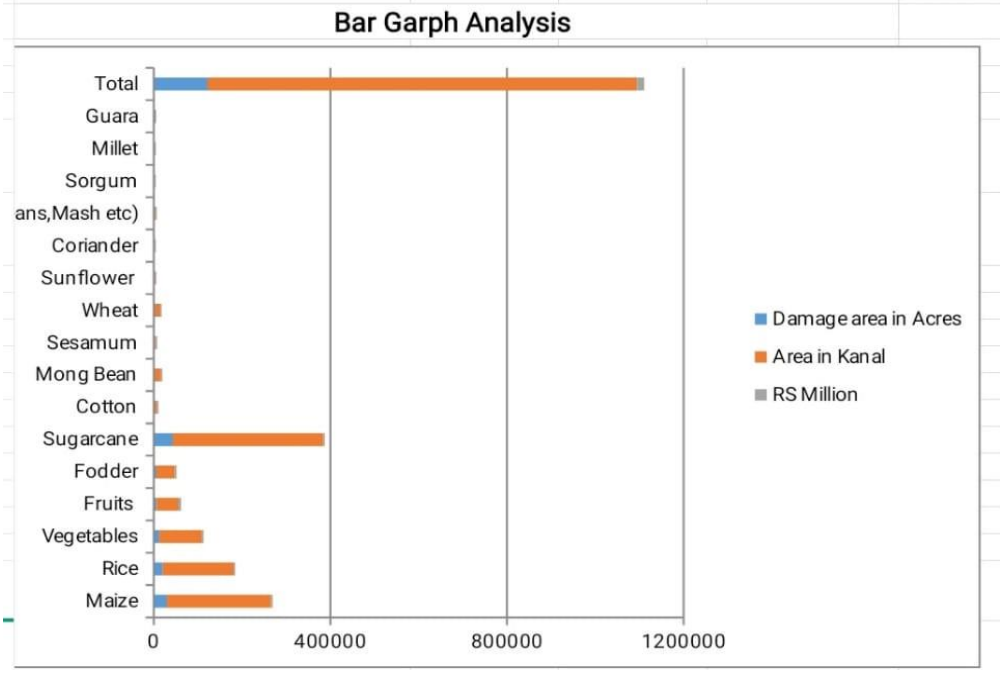
District	Type of Damage
Charsadda	Partially Damaged
Kohistan Lower	Completely Damaged
Kohistan Lower	Partially Damaged
Kohistan Upper	Partially Damaged
Kohistan Upper	Completely Damaged

Nowshera	Completely Damaged
D. I. Khan	Partially Damaged
D. I. Khan	Completely Damaged
Chitral Lower	Partially Damaged
Shangla	Partially Damaged
Lakki Marwat	Partially Damaged
Lakki Marwat	Completely Damaged
North Waziristan	Partially Damaged
Kurram Upper	Partially Damaged
Tank	Partially Damaged
Tank	Completely Damaged
Swat	Partially Damaged
Karak	Partially Damaged
Dir Lower	Partially Damaged
Dir Upper	Partially Damaged
Chitral Upper	Completely Damaged
Chitral Upper	Partially Damaged
SW Mehsud Belt	Partially Damaged
SW Mehsud Belt	Completely Damaged
Abbottabad	Completely Damaged
Abbottabad	Partially Damaged
Kolai Palas (Kohistan)	Partially Damaged

Source, PnD, KP

Extent of Damage to Crops

Crop Name	Damage area in Acres	Area in Kanal	RS Million
Maize	29528	236222	1534
Rice	20118	160945	1641
Vegetables	12160	97277	3656
Fruits	6198	49583	6012
Fodder	5373	42984	743
Sugarcane	42661	341290	2294
Cotton	788	6300	104
Mong Bean	1764	14114	42
Sesamum	484	3870	33
Wheat	1568	12542	19
Sunflower	245	1958	13
Coriander	55	440	13
Cereal (Mong,Beans,Mash etc)	365	2920	31
Sorgum	32	259	2
Millet	89	711	2
Guara	213	1702	32
Total	121640	973118	16171



Source, PnD, KP

Legislation and Organizations

Legal Framework

Pakistan is one of the many nations that has been confronted with growing environmental concerns. The diverse range of issues that affects Pakistan meant that the nation must adapt its legislative framework in a way to accommodate the increasingly problematic and sometimes dire environmental scenario. The following are some of the important legislative instruments pertaining directly or indirectly to flood control and mitigation measures in the country.

National Calamity Act, 1958

The National Calamities Act of Pakistan 1958 was the only legal document to regulate the relief, rehabilitation and reconstruction. This was only the reactive legal document functioned throughout the country for a long time. Under this regulation, there was an emergency relief cell within the cabinet division. Again it is referring just relief/compensation in either disaster or post-disaster phase. Under the Calamity Act, in each province there were relief commissioners, who supervised and coordinated the relief and rehabilitation efforts. Few provinces have also developed Disaster Plans such as the NWFP Disaster Plan 1978, where a list of hazards are available to which the province is susceptible. Similarly, it has also elaborated the Government line departments and their primary and secondary responsibilities in the disaster phase. Under the Act, the Provincial Board of Revenue was made responsible for collecting damages data and records of compensation.

Pakistan Environmental Protection Act, 1997

The Pakistan Environmental Protection Ordinance, 1983 was amended via the Pakistan Environmental Protection Act, 1997. The Act approved comprehensive national environmental policies and ensured their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time. This role is particularly important in the context of increased development and industrial activity, as there is a need for firm consideration of the appropriateness of any proposed activity. It has divisions dedicated to the environment, urban development, and wildlife and is responsible for the coordination of its derivative institutions, such as the Pakistan Environmental Protection Council (PEPC) and the Environmental Protection Agency (EPA).

KP River Protection Ordinance, 2002

The Ordinance was promulgated in 2002 to prepare land use and zoning

plans for the catchment area of rivers. In addition, it directed that no person shall construct public or private property within two hundred feet of the high-water limit on either side of the rivers and their tributaries.

National Disaster Management Act, 2010

The Act was promulgated in 2010 with the aim to lay down guidelines to be followed by the federal and provincial governments for dealing with different disasters, including floods. It also arranged to oversee the provision of funds for the purpose of mitigation measures, preparedness, and response in case of disaster. The National Disaster Management Authority was established under this Act. The Act has established three levels for disaster risk management in the country: national, provincial, and district levels. The National Disaster Management Authority works at the federal level, the provincial disaster management authority at the provincial level, and the district disaster management authority/unit at the district level.

Miscellaneous Acts

Prior to the promulgation of the Pakistan Environmental Protection Ordinance, 1983, Pakistan had some laws containing provisions for environmental protection that had an indirect impact on flood mitigation and control measures. These laws dealt with land use, water quality, air quality, noise, toxic and hazardous substances, solid waste and effluents, marine and fisheries, forest conservation, mineral development, energy, public health, etc. They were not effective, as punishment for violations was mild and easy to circumvent. The laws included:

1. The Pakistan Penal Code, 1860
2. The Canal Drainage Act, 1873
3. The Punjab Local Government Ordinance, 1979
4. The Motor Vehicles Ordinance, 1965; and The Motor Vehicles Rules, 1969
5. The Factories Act, 1934
6. The West Pakistan Fisheries Ordinance, 1961
7. The Forests Act, 1927
8. The Boilers Act, 1923
9. The Pakistan Petroleum (Exploration and Production) Rules 1986
10. The Antiquities Act, 1975
11. The West Pakistan Epidemic Diseases Act, 1959, etc.

Relevant Organizations

Effective enforcement of environmental legislation is contingent upon the availability of adequate staff and financial resources, the administrative and political will of the enforcement agencies, and the level of awareness of

environmental laws. It is common, however, to find situations where responsibility for enforcement of laws is divided amongst a number of government agencies that pursue conflicting interests, thereby delaying or forestalling the implementation of these laws. In response, for enforcement to be effective, developmental planning processes have to be closely coordinated. Many federal and provincial organizations are directly or indirectly concerned with flood management activities. These institutes are responsible for the construction of structural and non-structural entities to control floods and rescue, relief, and rehabilitation operations. Non-structural measures mainly pertain to the establishment of modern flood forecasting and warning systems to provide timely and reliable flood information to the flood mitigation agencies and to the public.

Federal Flood Commission (FFC)

The Federal Flood Commission was established in 1977 and assigned the task of preparing the National Flood Protection Plans (NFPPs) on a countrywide basis. Its specific jobs were to construct flood protection and river embankment works, standardize designs and specifications for flood protection works, evaluate and monitor the progress of implementation of NFPPs, improve the weather data, and create understanding and adaptability among the locals and prepare a research program for flood control and protection. The approach followed by the FFC encompasses both structural and non-structural measures.

Provincial Irrigation and Drainage Authorities

The Provincial Irrigation and Drainage Authorities are an upgraded form of the Provincial Irrigation Departments with the extended scope of irrigation and drainage management. The Provincial Irrigation and Drainage Authorities play an important role in flood mitigation by performing design, construction, and complete maintenance of river training and flood protection works. These also provide the flow measurement of rivers, canals, and drains for flood forecasting. In addition, their role in crisis management is to prepare flood emergency plans before, during, and after the floods.

Water and Power Development Authority

The Water and Power Development Authority is involved in the flood forecasting process by providing river and rain data from its telemetric gauge sites within the upper catchments of Indus and Jhelum rivers. The safety of the Mangla and Tarbela dams is the top priority for this data collection. It is also involved in providing inflow and outflow data from various dams and barrages.

Pakistan Meteorological Department

The Pakistan Meteorological Department provides services of flood forecasting and early warning together with the generation of weather data and its dissemination to the relevant agencies. The Pakistan Meteorology Department has so far installed 97 weather stations all over the country to record rainfall and other weather elements. One of the core areas of Pakistan Meteorology Department is the Flood Forecasting division. This division is fully equipped with Doppler radar to remotely sense and measure the quantitative precipitation over the catchment area of major river systems. Such 10-cm Radar facilities are available at Lahore and Mangla, whereas 5-cm radar at Sialkot, Islamabad, Dera Ghazi Khan, Rahim Yar Khan, and Karachi, which cover almost all the catchment area of major river systems in Pakistan. The Flood Forecasting Division is also applying a mathematical model on the Indus river system for computing the stream hydraulics and to identify vulnerable areas for issuance of early flood warning.

Crisis Management Institutes

These are the institutions that offer help to the general public during and immediately after the floods.

Emergency Relief Cell

The Emergency Relief Cell works at the federal level and mainly deals with the planning and assessment of relief requirements for major disasters. The scope of their activities covers stockpiling of basic necessities needed during an emergency, establishing emergency funds, and assisting international donors in their relief efforts. The provincial governments and local administrations provide relief for disasters. The National Disaster Plan from 1974 covers procedures, organizational set-up, and standard procedures for the monitoring of disaster operations.

Pakistan Army

The Army provides necessary help to civil authorities to carry out rescue and relief operations during and after floods. The Army also takes part in pre-flood season surveys and inspections of the flood protection works. It is the responsibility of the provincial government to provide all support equipment (boats, life jackets, vehicles, tents, etc.) to the Army for these operations. During the flood season, the Army sets up flood emergency cells at each corps headquarters. In the case of major floods, the Army is responsible for actuating controlled breaching of predefined flood bunds to divert the peak away from the cities. Although there exists no standard procedure, the breaching is decided based on existing and forecasted flood stages with the mutual consultation of local officials of civil administration, irrigation department, and army.

National Disaster Management Authority (NDMA)

NDMA is an autonomous and constitutionally established federal authority mandated to deal with disaster management in Pakistan. It constitutes and enforces national disaster policies at federal and provincial levels and collaborates closely with various government ministries, military, and international organizations to jointly coordinate efforts to conduct its disaster management. During floods, NDMA procures relief supplies and coordinates bilateral in-kind donations for distribution through the Army and other civil agencies. It also provides data and relevant information during the flood for guidance and coordination among relevant agencies.

Provincial Relief Departments

The Provincial Relief Departments are responsible for flood preparedness, rescue, and relief plans. The department arranges surveys to ensure that all flood protection bunds are satisfactorily maintained before the flood season. It also sets up flood warning centers and flood centers at district and union levels. The Relief Department functions through control and coordination of the personnel and resources of other government departments, generally organized in the form of committees.

Provincial Disaster Management Authorities (PDMA)

The National Disaster Management Ordinance insisted on the establishment of a Provincial Disaster Management Commission (PDMC) as well as Provincial Disaster Management Authority (PDMA) to cope with the challenges of Disaster Management in a professional and efficient manner. Both the organizations have been mandated to effectively set up a system to look after disasters and calamities, whether natural or man-induced, and coordinate with the key players. Previously, the Provincial Relief Commissionerate had been responsible for the relief, compensation, and rehabilitation of people affected by natural disasters. With the establishment of PDMA, the functions of the Relief Commissionerate have been incorporated into the new organization. The Provincial Disaster Management Authority works in close liaison with the NDMA and all other relevant agencies for effective control and management of floods.

District Disaster Management Authority/Unit

In order to involve local organizations in planning and implementation, the district disaster management authority (DDMA) has been in the process of being established at the district level. In Khyber Pakhtunkhwa, there is a district disaster management unit instead of authority. As per the plan, the

Head of the local council at the district level shall be the chairperson, Deputy Commissioner/District Coordination Officer as secretary, whereas District Police Officer and Executive District Health Officer are the ex-officio members. The power and function of the District Authority include the preparation of the district disaster management plan, coordinating, and monitoring the implementation of the National Policy, Provincial Policy, National Plan, Provincial Plan, and District Plan. In addition to this, DDMA shall ensure that the vulnerable areas in the district are identified, and measures have been taken for their prevention and mitigation at the district level.

Flood 2022 and Nutrition Sector

Pre-Flood Nutrition Status of Pakistan

Global Hunger Index and Pakistan

The Global Hunger Index (GHI) is a tool that attempts to measure and track hunger globally as well as by region and by country. It is prepared by European NGOs, namely, Concern Worldwide and Welthungerhilfe. The GHI is calculated annually, and its results appear in a report issued in October each year.

In the international ranking of the GHI 2022, Pakistan ranked 99 out of 116 nations, with its hunger categorized as 'serious.' Pakistan faces a scenario in which it is largely food-sufficient but not food-secure. We have been facing chronic food insecurity, with appalling implications for the nutrition and health of children. Approximately 43% of Pakistanis are confronted with food insecurity, 18% of whom are acutely insecure, as estimated by the World Food Programme (WFP). The incidence is twice as high among the rural population, with three out of five households being food-insecure. A similar trend is observed with malnutrition among children. We have 82% of children who are deprived of a meal when they need one, as shown in a recent WFP survey. Moreover, 18% of children under five suffer from acute malnutrition, and 40% in the same age group suffer from stunted growth. According to WFP, affordability is the greatest barrier in achieving a nutritious diet, as a majority of Pakistanis are incapable of affording nutritionally satisfactory food.

Despite Pakistan being ranked 8th in producing wheat, 10th in rice, 5th in sugarcane, and 4th in milk production, a 2019 report of the State Bank of Pakistan (SBP) showed that nearly 37% of households in Pakistan are food insecure. In the three years since the SBP's report, matters have only worsened. Food price inflation in Pakistan has been in double digits since

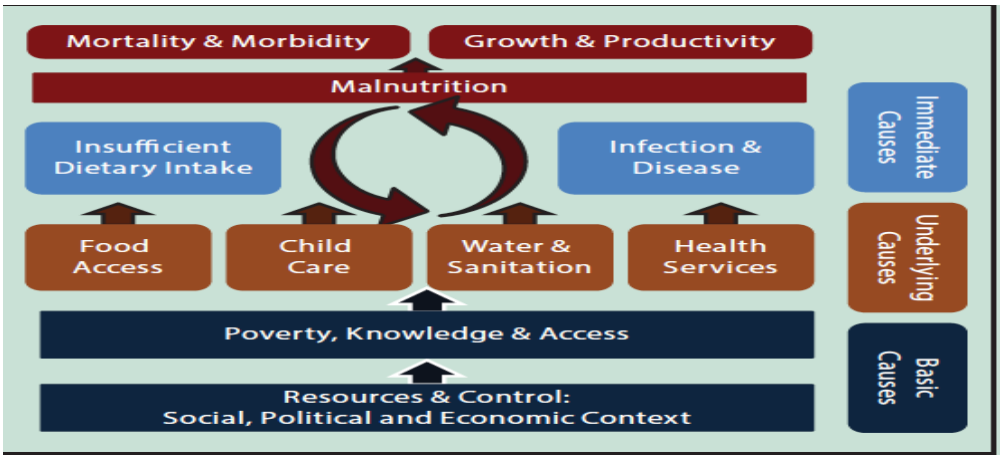
August 2019. The cost of food has been 10.4-19.5% higher than the previous year in urban areas and 12.6-23.8% in rural areas, according to figures published by the Pakistan Bureau of Statistics.

So how does a country with one of the largest agrarian economies in the world find itself unable to sufficiently provide food for nearly 40% of its population? For decades, agriculture has been neglected, and people's earnings have been hit by one economic crisis after another. On top of this, particularly in the past decade or so, climate change-related disasters and changes in the environment have resulted in our already neglected agriculture becoming less competitive.

Nutrition Status

Widespread undernutrition determines a range of negative consequences impacting the welfare of individuals and families, as well as the economic and social development of the nation. This economic, social, and human burden is largely preventable and can be significantly reduced by the application of proven, affordable, and effective nutrition interventions.

Optimal nutrition is fundamental to achieving sustainable development and promoting resilience in any society. Over the past two decades, the Government of Pakistan has recorded significant achievements in the development sector; however, progress in nutrition has presented mixed results. Pakistan continues to suffer from high rates of malnutrition. The last National Nutrition Survey (2011) found that 44% of children under five were stunted, 32% were underweight, and 15% were acutely malnourished. Micronutrient deficiencies and maternal malnutrition were also shown to be on the higher side. Malnutrition not only adversely affects the country's Gross Domestic Product (GDP) but has serious implications for the country's most important asset – the future human resource.



Due to various humanitarian vulnerabilities in different provinces of Pakistan, a review of the most pertinent scenarios has been conducted. Pakistan has a global acute malnutrition (GAM) rate of 17.7 percent, exceeding the emergency threshold. Drought-like conditions are affecting 5 million people in Sindh and Balochistan provinces, and monsoon rains and floods in all provinces are contributing to the worsening of the situation. The proportion of food-insecure households, already high in Pakistan (71%), and the lack of access to basic services, including health and nutrition, are the main factors likely to worsen malnutrition.

Impact of Russia-Ukraine War on Food Security in Pakistan

Russia and Ukraine are known as the breadbasket of the world and are the fifth-largest exporters of wheat. The war between these countries has disrupted agricultural production and trade from one of the world's major food-exporting regions. The contribution of Russia and Ukraine in the global food market for wheat and barley export was 30%, which derailed with the advent of the crisis, as Russia suspended all grain exports until August 2022, along with blocking the Black Sea ports.

For Pakistan, the situation was anticipated to worsen against the backdrop of the Ukraine-Russian conflict due to the disruption of the food supply chain, since Ukraine has been the main wheat supplier to Pakistan, exporting around 1.2 megaton of wheat, along with Russia also supplying 0.92 megaton of wheat to Pakistan for the period 2020-2021. Pakistan imported around 80-90 percent of its total wheat imports from Russia and Ukraine in 2020, and therefore, the war has meant that the country is likely to face longer timelines and higher prices with regard to wheat that needs to be imported.

In light of the foregoing, the nutritional status of Pakistan was far from satisfactory even before the floods of 2022. Therefore, the conditions were only worsened by the devastations caused by the floods.

Post-Flood Nutrition Status of Pakistan

A strong causal relationship exists between disasters and undernutrition. Slow and rapid onset crises and disasters can impact nutrition levels both directly (i.e., loss of agricultural production and assets) and indirectly by reinforcing some of the causes of undernutrition (increased poverty, scarcity of safe water, disruption of livelihoods, inadequate nutrition behaviors), particularly in developing countries. Following a disaster, infants, young children, and pregnant and lactating women are particularly vulnerable, with

maternal undernutrition having serious impacts on the health of the fetus and newborn baby. Undernutrition not only impairs the development of children but weakens their immune systems, making them more susceptible to disease and being an underlying cause of 3.5 million preventable child deaths annually.

The Integrated Food Security Phase Classification (IPC), also known as the IPC scale, is a tool for improving food security analysis and decision-making. It is a standardized scale that integrates food security, nutrition, and livelihood information into a statement about the nature and severity of a crisis and its implications for strategic response. It was developed by the United Nations Food and Agriculture Organization.

Prior to the floods, an Integrated Food Security Phase Classification (IPC) analysis of 28 vulnerable districts in Balochistan, KP, and Sindh estimated 5.96 million people to be in IPC Phase 3 (crisis) and 4 (emergency) between July and November 2022. A figure that was expected to increase to 7.2 million people from December 2022 to March 2023. According to the latest WFP and FAO projections, initial estimates indicate that floods will increase the number of people requiring emergency food assistance (IPC3/4) to 11 million.

The incidence of severe acute malnutrition is also growing. The prevalence of Global Acute Malnutrition was significantly high in Balochistan, KP, Punjab, and Sindh prior to the floods: 96 percent of children under 2 were not consuming a minimum acceptable diet, and at least 40 percent of children under 5 were chronically malnourished (stunted). It is inevitable that these numbers will increase given the impact of the floods. This, along with the huge number of fallen and dead livestock, means Pakistan is facing a monumental hunger crisis. The floods were caused by weeks of extreme monsoon rainfall after months of extreme heat waves and at a time when Pakistan was trying to cope with a major economic crisis, with high inflation and food and fuel prices rocketing. Preliminary estimates by the World Bank suggest the national poverty rate could increase because of recent floods by 4.5 to 7 percentage points, pushing between 9.9 and 15.4 million people into poverty and intensifying the severity of poverty for already poor households. Therefore, the flood has created food insecurity along with many other problems. After millions of acres of crops flooded and hundreds of thousands of cattle were killed, the low food supplies are likely to induce malnutrition-related tragedies.

Flood-Related Displacements

Displacement may be defined as the forced relocation of people to new places of residence due to several conditions, both natural as well as man-made.

Displacement in the present context means the displacement that occurred due to floods in the country. People had to be moved to safe locations before their areas were inundated, which was part of the precautionary measures. However, all displacement was not of this category alone. People moved on their own when their homes were flooded, and they had to wade through running and standing waters.

There is no confirmed figure regarding the number of people displaced. Different sources quote different figures. According to one source, some 33 million people got displaced in the summer floods of 2022 in Pakistan. According to the same source, one-third of the country was under water. The Southern Provinces of Pakistan—Sindh and Balochistan—do not receive much rain commonly, but this time the rains were heavy and severe, which devastated the provinces of Sindh and Balochistan.

Displaced People in Khyber Pakhtunkhwa

In Charsada and Nowshera District of KPK, there were floods or flood-like situations in several districts. According to one source, some 30,000 people in the two districts were displaced by the floods. A large number of cattle and livestock were also shifted to safe areas, as a large population of these districts depended on livestock for their livelihood. Swabi, Dir Upper and Lower, and Swat were the other calamity-hit districts in the northern parts of the province. Tank and D.I. Khan were the most hit districts in the south of the province. The total number of displaced people was cited as 600,000 people. According to the same source, the authorities evacuated 364,000 people from the flood-hit areas and rescued 96,228 people.

The three districts of Upper and Lower Kohistan and Kolai-Palas were other affected areas. According to sources, some 630 houses were completely destroyed, and 250 were partially damaged, and the residents had to relocate to other safe areas.

Displaced People in Punjab

Punjab province is home to five large and several small rivers. The southern parts of the province were badly affected by the floods. According to sources, some 490,256 households were damaged, resulting in the displacement of around 2-3 million people. There were floods in Dera Ghazi Khan, Rajanpur, and Jhang districts. In the rest of Punjab, the situation was under control, and the amount of rain was less than what was recorded in Sindh and Balochistan.

Displaced People in Sindh

Flooding in Sindh was due to the overflowing of rivers/canals as well as heavy rains. The rains in Sindh province were 500% higher than the annual average. According to one source, the floods in Sindh Province alone left 1.25 million people homeless, and they are living in camps or beneath the open sky. A large number of displaced people relocated to higher areas along the major canals of the province. Thousands of mud-houses were completely wiped out in many parts of the province. According to the Provincial Disaster Management Authority (PDMA), 4.9 million people were affected by the floods. These people had to be shifted to camps and makeshift shelters. A total of 23 districts were badly hit by the floods in the province of Sindh. According to sources, some 50,000 displaced people shifted to Karachi from different parts of Sindh.

Displaced People in Balochistan

Balochistan usually does not receive rain in the summer, but this year there were heavy and torrential rains, which washed away embankments and small dams, destroying thousands of dwellings and leaving the inhabitants homeless. According to sources, some 20,000 people were displaced due to floods.

Problems Faced by Displaced People

The displaced people faced several problems, especially with the cold weather adding to their miseries. In rural areas, people have taken refuge with their relatives or are living in makeshift shelters that cannot protect them from the severity of the weather. These people have lost their cattle and crops due to floods and torrential rains. Their agricultural land has either been washed away by the floods, or the water is still standing in these areas, meaning there would be no rabi crops in the affected areas. The poor sanitary conditions have led to several health problems, including gastro diseases and typhoid fever. Safe drinking water is not available in these areas.

	District	People Displaced
1.	Tank	200,000
2.	Charsadda	183,000
3.	Dera Ismail Khan	180,000
4.	Nowshera	72,678
5.	Peshawar	30,000
6.	Swat	3,220
7.	Malakand	2,000
8.	Upper Dir	1,440
9.	Lower Kohistan	1,300
10.	Lakki Marwat	550
11.	Lower Chitral	100
12.	Mohmand	30
13.	Swabi	0
14.	Tor Ghar	0
15.	Kohat	0
16.	Batagram	0
17.	South Waziristan	0
18.	Buner	0
19.	Hangu	0

	District	People Evacuated
1.	Charsadda	183,000
2.	Nowshera	67,917
3.	Bannu	48,425
4.	Dera Ismail Khan	40,000
5.	Hangu	40,000
6.	Swat	14,000
7.	Tank	5,000
8.	Malakand	3,000
9.	Peshawar	2,352
10.	Lower Kohistan	1,318
11.	Lower Chitral	500
12.	Khyber	500
13.	Lakki Marwat	491
14.	Mohmand	30
15.	Upper Dir	5
16.	Swabi	0
17.	Tor Ghar	0
18.	Kohat	0
19.	Batagram	0

	District	People Rescued
1.	Charsadda	21,300
2.	Nowshera	20,925
3.	Dera Ismail Khan	13,500
4.	Peshawar	8,625
5.	Swat	2,481
6.	Tank	1,300
7.	Lakki Marwat	873
8.	Mardan	450
9.	Lower Chitral	200
10.	Lower Kohistan	51
11.	Malakand	45
12.	North Waziristan	23
13.	Bannu	2
14.	Swabi	0
15.	Tor Ghar	0
16.	Kohat	0
17.	Batagram	0
18.	South Waziristan	0
19.	Buner	0

International Organizations

World Food Program (WFP)

WFP began its scale-up of relief assistance on 25 September to reach 1.9 million people with 15,524 metric tons of food in the provinces of Balochistan, Khyber Pakhtunkhwa (KP), Punjab, and Sindh. Prior to the floods, 96 percent of children under 2 were not consuming a minimum acceptable diet, and at least 40 percent of children under 5 were stunted in Balochistan, KP, Punjab, and Sindh. WFP provided 5,982 children aged 6-23 months and 5,286 pregnant and lactating women in Balochistan and Sindh with 10.6 metric tons of specialized nutritious foods during September 2022. WFP used 20 boats from Operation Rescue 1122 to provide food assistance to a total of 104,000 people in hard-to-reach areas of Sindh.

As of September, in KP, WFP had provided 75,927 people (11,681 households) with 616 metric tons of food in Lower Chitral and Upper Dir districts. In Sindh, WFP had provided 117,936 people (18,144 households) with 909 metric tons of food in Jacobabad, Khairpur, Larkana, Naoshero Feroz, Qambar Shahdadkot, and Sanghar districts since 5 September.

These efforts by WFP were complementary to the cash stipends provided by the Government through BISP, as well as other support from the Government (including food and non-food items [NFIs] to 2.3 million beneficiaries) and humanitarian actors (providing food and NFIs to over 900,000 people). WFP also opened provincial relief offices in Balochistan, KP, and Sindh to coordinate with other UN agencies and humanitarian actors to ensure an integrated response for the affected populations.

During these efforts, road access remained a challenge. There were increasing threats to food dispatch and potential risks associated with food distribution, considering WFP's scale-up plan to reach 1.9 million people. As a mitigation measure, WFP informed authorities whenever commodities were dispatched to cooperating partners. No night movement of staff was authorized, and all staff movement to the field was done with police escorts. Alternative roads were also identified by provincial administrations to ease congestion.

Beyond immediate needs, WFP announced plans to transition to recovery and resilience activities through early 2023 to help communities rehabilitate climate-smart infrastructure and restore livelihoods.

United Nations International Children's Emergency Fund (UNICEF)

Post-flood, UNICEF expanded delivery of life-saving assistance and services

and reached 51 of the 82 hardest-hit districts with integrated services. Child protection services were introduced in 15 districts, water tankering of 970,000 liters of safe water per day was provided to 194,000 people, 71 mobile health camps were established that catered to 64,000 people, and 70 temporary learning centers were set up where 6,000 children received education.

Nutrition Cluster

The Global Nutrition Cluster exists to collectively strengthen the technical and coordination capacities for nutrition in countries, based on the needs of affected populations. This initiative aims to enable countries to forecast nutrition trends and prepare for, respond to, and recover from shocks during humanitarian emergencies, contributing to global efforts to prevent and treat malnutrition in all its forms.

In Pakistan, the cluster, called the National Nutrition Cluster, is led by the UN and aims to strengthen partnerships, as well as the predictability and accountability of international humanitarian action, by improving prioritization and clearly defining the roles and responsibilities of humanitarian organizations. With the support of the National Nutrition Cluster, the Provincial Nutrition Cluster is responsible for leading the Nutrition Cluster at the provincial level in Khyber Pakhtunkhwa (KP). The need for a nutrition cluster in KP and the Newly Merged Districts (NMDs) remains vital as an effective mechanism to address the ongoing humanitarian needs in the nutrition sector in the province. During the current floods, the Cluster played an active role as a liaison between federal, provincial, and international organizations. Additionally, in coordination with other agencies, it provided Ready-to-Use Therapeutic Food (RUTF) cartons to the affected regions of KP.

Federal Organizations

Ministry of Planning, Development, and Special Initiatives

The Ministry of Planning, Development & Reform (MPDR)/Planning Commission (PC) provides policy guidance, planning, and coordination, serving as the "institutional home" for nutrition planning and programming at the national level, including AJK, GB, and NMDs, to carry out development and recurring activities. The Nutrition section, a regular section within MPDR, acts as a resource, provides guidance, and offers a reference point for cross-cutting multi-sectoral food and nutrition interventions. The SUN secretariat housed in the Nutrition Section serves as a bridge between

provincial, national, and international stakeholders, providing a platform for multi-sectoral and multi-stakeholder coordination and harmonizing efforts for progress at the Pakistan level.

The Ministry has recently issued the Pakistan Multi-Sectoral Nutrition Strategy, in collaboration with national and international stakeholders, to effectively address nutrition-related deficiencies in Pakistan.

The Post-Disaster Needs Assessment (PDNA) – Main Report of the 2022 Pakistan Floods was also prepared under the leadership of the Ministry of Planning, Development, and Special Initiatives through its Flood Coordination Cell, supported by the Asian Development Bank, the European Union, the United Nations agencies with technical facilitation by the United Nations Development Program, and the World Bank. The assessment estimates total damages to exceed USD 14.9 billion, with total economic losses reaching about USD 15.2 billion. The estimated needs for rehabilitation and reconstruction in a resilient way are at least USD 16.3 billion, excluding much-needed new investments to support Pakistan's adaptation to climate change and overall resilience to future climate shocks. WFP and other food and nutrition-related organizations were represented by the agriculture and food security sector, which was led by the Food and Agriculture Organization of the UN.

Ministry of National Health Services, Regulation & Coordination (MNHSR&C)

The Ministry of National Health Services, Regulation & Coordination (MNHSR&C) is the lead ministry for nutrition-specific intervention delivery. Its major roles and responsibilities include health emergency management, policy planning and guidance, compliance and reporting to international health agreements, research, special studies, and technical training. It also handles health information collection, consolidation, analysis, and its relay for decision-making at the appropriate levels (including management information systems, disease surveillance, epidemiological surveillance, and registries). Other functions include regulatory roles, coordination with the provinces, tracking progress against priorities, and donor coordination on technical aspects. MNHSR&C leads and coordinates nutrition-specific interventions at the federal level.

During the floods, the Ministry played an active role by promoting awareness regarding the nutritional needs of the flood-affected population, especially regarding the promotion of breastfeeding during flood-related emergencies.

HEALTH PROGRAMS

No.1-2 (Emergency-IYCF)/2022-Dir(P/N)-NHSRC
GOVERNMENT OF PAKISTAN
Ministry of National Health Services, Regulations and Coordination
Telephone: +92 51 9213142; Fax: +92 51 9255096
****

Islamabad the 10th August, 2022

Subject: **Protection and promotion of breastfeeding in Flood Emergencies.**

Respected Dear Sir

Appropriate feeding practices are essential for growth, development and survival of infants and young children. Given the criticality of the issue and the considerable experiences gained since that time especially in relation to large scale emergencies, different guidelines have been developed for IYCF by Nutrition Wing MoNHSR&C with the support of UNICEF and WHO, including IYCF in Emergency guidelines.

2. Pakistan is hit by the floods now a days leading to huge catastrophes at many places in the country especially Balochistan, northern Sindh and South Punjab and KP. Not only hundreds of precious lives have been lost but hundreds of thousands of people have been displaced requiring support in the form of shelter, protection and food. Simultaneously there are dangers of spread of communicable diseases due to improper hygiene and sanitation and insufficient health services at different areas. So there is a need to adopt preventive health and nutrition measures. It is important to note that malnourished population especially women and children are already in an immune compromised state and if denied from malnutrition treatment or nutritious diet, they may develop severe life threating condition.

3. I would like to commend your leadership to tackle the flood emergency in the country. The response to the devastating floods continues to be challenging with increasing number of people being displaced, deaths and scarcity of resources. Concerted efforts to roll out social protection measures through cash and non-cash assistance to mitigate the negative socio-economic impact of displacement are also welcomed.

4. The Nutrition Wing of Ministry of National Health Services, Regulation & Coordination (MoNHSRC) would like to take this opportunity to further support your efforts in tackling the food and nutrition issues. Distribution of food rations provides a golden opportunity for disseminating messages on adequate nutrition practices, mainly targeting the most vulnerable (women and children). It is important to mention here that Breast Milk Substitutes are very dangerous for health and survival of Newborn and infants. WHO and UNICEF as well as guidelines developed by MoNHSR&C strongly recommend only and only breast feeding for children under 6 months of age, with continued breast feeding from 6 to 23 months along with age appropriate complementary feeding. Emergencies are a time of stress for the families especially parents and they are more likely to adopt unhealthy and dangerous practices of BMS use for infants and young children. It is therefore extremely important to protect these families from illegal promotion of BMS by the industry through free of cost donations but also safeguard the health and survival of the children by promoting and protecting breast feeding only.

Best regards

(Dr. Baseer Khan Achakzai)
Director Health Programs & Nutrition

The Honorable Chairman
National Disaster Management Authority (NDMA)
Prime Minister Secretariat, Islamabad
CC

- Chairpersons Provincial Disaster Management Authorities, All Provinces
- SPS to the Secretary, Ministry of NHSR&C, Islamabad
- SPS to the Director General Health, Ministry of NHSR&C, Islamabad
- Director General Health Services, Director Nutrition Programs, all provinces and regions
- National Coordinator Nutrition & NFA, MoNHSR&C, Islamabad

Nutrition Wing, Third Floor, Kohsar Building, Pak Secretariat, Constitution Avenue, Islamabad
nfapakistan@gmail.com

Benazir Income Support Program (BISP)

BISP operates under the Ministry of Poverty Alleviation. The BISP Nashonuma Program provides active help and support to deserving families.

The primary objectives of the program are to prevent stunting in children under two years of age, improve weight gain in pregnant women during pregnancy, reduce anemia and micronutrient deficiencies, and prevent low birth weight. The World Food Program is the lead implementing partner for Benazir Nashonuma.

A total of 50 Benazir Nashonuma Centres have been established across 14 districts at the district and tehsil levels to provide health services and conditional cash transfers for children under two years old: Rs 1,500 for a boy child and mother, and Rs 2,000 for a girl child, mainly to prevent stunted growth in children. For this purpose, an additional amount of one billion rupees was allocated for flood-affected mothers and children, apart from the existing beneficiaries. In addition to this program, BISP has been tasked with disbursing Rs 25,000 per family to flood victims by the Prime Minister, given the severity of the flood situation in the country.

National Disaster Management Authority (NDMA)

NDMA designated special relief units to handle relief cargo at ports and airports, as well as its onward transportation, as significant amounts of bilateral in-kind relief items continued to arrive. Since early September, NDMA and WFP facilitated relief cargo at ports and airports and supported onward transportation to more than 25 different locations across Pakistan, via 2,030 contracted trucks.

Pakistan Meteorological Department

The Pakistan Meteorological Department provides flood forecasting and early warning services, along with the generation of weather data and its dissemination to relevant agencies. During the 2022 floods, the department stated that the floods were caused by the La Nina effect. This weather phenomenon refers to cooler-than-normal ocean surface temperatures in the eastern and central Pacific Ocean, which in turn causes heavy monsoon rains in Pakistan. The department also predicted that the La Nina effect is likely to increase in the future.

Provincial (KP) Departments

Khyber Pakhtunkhwa Stunting Prevention and Rehabilitation Integrated Nutrition Gain (KP SPRING)
KP SPRING is a project of the Planning & Development Department of KP. KP SPRING has operationalized 20 sites in three districts: DIK, Tank, and

Nowshera, as they were severely affected by the floods. The main aim of the SPRING sites was to reduce stunting through preventive, nutrition-specific interventions focusing on adolescent girls, lactating women, and children.

Provincial Disaster Management Authority (PDMA)

As shown in the letter below, PDMA constituted Thematic Working Groups in response to the emergency declared by the government of KP, to ensure a better and more cohesive response.

PDMA/PaRRSA
Provincial Disaster Management Authority/
Provincial Reconstruction Rehabilitation & Settlement Authority
PDMA Building Plot 46-B, Sector B-2, Phase –V, Hayatabad, Peshawar
Phone: (091) 9216212, Fax: (091) 9216212
www.pdma.gov.pk

REVISED NOTIFICATION

PDMA/KP/FLOOD-22(1/7)/20222. In view of the ongoing flood emergency situation, the Competent Authority is pleased to constitute the following thematic working groups in pursuance of the emergency declared by the Government of Khyber Pakhtunkhwa for a better and cohesive response:

S. No	Working groups	UN Co-chair	Departmental Chair	Member from PDMA
1	Health	WHO & UNFPA	Health	Director DRM, PDMA
2	Nutrition	UNICEF	Nutrition Directorate /Health	PM, GCC, PDMA
3	WASH	UNICEF	LGRDD/PHED	PM, GCC, PDMA
4	Food Security & Agriculture	WFP & FAO	PDMA & Food/ Agriculture Department	Director DRM, PDMA
5	Protection (Women & Child Protection & GBV)	UNHCR, UNWOMEN, UNICEF & UNFPA	Social Welfare Department	PM, GCC, PDMA
6	Education	UNICEF	Education Department	Deputy Director, T&A, PDMA
7	Early Recovery, Rehabilitation, Reconstruction.	UNDP	PDMA, C&W, Irrigation, PHE	Deputy Director Infra
8	Shelter / NFIs	IOM/IFRC	PDMA	Dey. Director Relief

Generic TORs of the working groups are as under, however, each working group may develop its own TORs:

- Ensure timely and robust coordination among Government Departments and UN agencies including humanitarian organizations operating in KP;
- Departmental / thematic gap analysis
- Develop joint response plans/frameworks, and conduct periodic reviews;
- Identify programmatic synergies and thematic issues which overlap or affect more than one sector to be addressed by a multi-dimensional approach;
- Ensure sharing of best practice and lessons learned among different sectors for a better and cohesive response to the ensuing flood emergency situation;

-sd-

Directorate General Health Services

The Directorate General Health Services addressed a letter to the Director General of PDMA regarding the protection and promotion of breastfeeding in flood-affected areas. The same is reproduced below for reference:

DIRECTORATE GENERAL HEALTH SERVICES
KHYBER PAKHTUNKHWA PESHAWAR

mmunications should be addressed to the Director General Health Services Peshawar and not to any official by name.

E-Mail Address: dghealthkpk2014@gmail.com Office Ph# 091-9210269 Fax# 091-9210269 Exchange# 091-9210239

No. 495 / DGHS/Nut/Flood . Dated: 05 / 09 / 2022

To

Director General PDMA, Khyber Pakhtunkhwa.

Subject: **PROTECTION AND PROMOTION OF BREASTFEEDING IN FLOOD EMERGENCIES.**

In response to the Flood emergency situation in various districts of Khyber Pakhtunkhwa, the Directorate General Health Services, Khyber Pakhtunkhwa is assessing all options to ensure the Nutritional wellbeing of most vulnerable mothers and children, particularly those less than 05 years of age. The risk of malnutrition is particularly more alarming due to the resulting Food Insecurity situation due to widespread destruction of roads infrastructure and standing crops.

Reference to Nutrition Wing, Ministry of National Health Services, Regulations & Coordination, Islamabad letter on the subject noted above, it is to communicate to all concerns that department of health is committed to protect, support and promote breastfeeding for children between 0 to 24 months of age and regulating the marketing and promotion of designated products including breast milk substitutes and feeding bottles etc. under the **"Khyber Pakhtunkhwa Protection & Promotion of Breastfeeding & Child Nutrition Act, 2015" & Rules, 2017.**

During the current Pandemic, the Global call emphasizes on; **"Do not call for, support,** accept or **distribute donations of BMS (including infant formula), other milk products, complementary foods, and feeding equipment (such as bottles and teats). Do not include purchased or donated supplies in general distribution".**

It is important to mention here that Breast Milk substitutes are very dangerous for health and survival of Newborn and infants. WHO and UNICEF as well as National IYCF in Emergencies Guidelines- 2017, (Use and Distribution of BMSs in Emergencies Contexts- Page 8) clearly states that "The use and distribution of BMS in emergencies should be tightly controlled to protect infants and caregivers from inappropriate marketing of BMS and to control unsolicited donations and distribution of unsuitable products, according to national and international guidance"

It is therefore requested to direct/instruct everyone engaged as part of the response to the flash floods to promote and protect breastfeeding and curb the inappropriate use of the BMS/powdered milk, which is unsafe, expensive and detrimental to the health of children.

ADDL. DIRECTOR GENERAL HEALTH
Services, Khyber Pakhtunkhwa, Peshawar.

Copy Forwarded to the:

Al-Khidmat Foundation

Al-Khidmat Foundation Pakistan, a nonprofit organization, arranged 41 kitchens, 85,200 cooked meals, and 171,041 food packs. In the sector of safe drinking water, the Foundation provided 21 units of Mobile Water Filtration Plants, 10 units of water filtration plants, 95 water tankers, and 132 water storage tanks. The beneficiaries of clean drinking water were approximately 266,341 people per day.

Scaling Up Nutrition (SUN) – KP

It is a subordinate wing of the Planning & Development Department, KP. Its main aims include the provision of technical guidance to relevant sectors (including health, agriculture, food, education, local government, public health engineering, social welfare, and industries) on evidence-based interventions pertaining to nutrition-sensitive and specific strategies. It also assists these sectors in the development of sector-specific nutrition-sensitive development plans and donor proposals as needed. Additionally, it liaises with donors/UN agencies and other organizations to align nutrition-related interventions with a multi-sector integrated nutrition strategy.

During the floods, SUN-KP constituted a Provincial Nutrition Working Group to maintain active liaison with relevant provincial agencies like the Directorate of Nutrition of the Directorate General Health Services, the Directorate of Food, and other agencies such as PDMA, UNICEF, WFP, WHO, UNHCR, and relevant NGOs. Data and information flow was managed in coordination with SUN-KP, PDMA, and the Pakistan National Nutrition Sector, UNICEF. The Working Group mentioned above prepared an elaborate Nutrition Sector Response & Preparedness Plan and a Rapid Need Assessment. Some of the actions executed under the plan are as follows:

- **Outpatient Therapeutic Feeding Program (OTP)**

The Outpatient Therapeutic Feeding Program (OTP) brings services for the management of Severe Acute Malnutrition (SAM) closer to the community by making services available at decentralized treatment points within primary health care settings, through the use of ready-to-use therapeutic foods, community outreach, and mobilization.

During the floods, OTP sites remained functional in flood-affected districts like Chitral Upper & Lower, Dir Lower, Swat, and Malakand. Moreover, 322 all-nutrition sites, where therapeutic food was provided to the community, were also established in the flood-affected Union Councils.

- **Assistance for BISP Nashonuma Beneficiaries** Assistance was provided to the beneficiaries of the BISP Nashonuma program (14 UCs) in flood-affected districts.
- **Community-based Acute Malnutrition Model (CMAM) Project** Funded by the Kingdom of Saudi Arabia and the World Food Program, the Community-based Acute Malnutrition Model (CMAM) Project introduced 10 Targeted Supplementary Feeding Program Sites in Shangla and Kohistan in coordination with PDMA, SUN-KP, and representatives of DGHS.
- **Distribution of Ready-to-Use Therapeutic Food (RUTF)** Available supplies of Ready-to-Use Therapeutic Food (RUTF) were distributed to flood-affected districts by the KP government with the help of relevant international organizations like WFP, UNICEF, and the NGO Integrated Health Partners (IHP).
- **Blankets and Supplementary Feeding Programme** The WFP executed a Blanket and Supplementary Feeding Programme for flood-affected districts. Around 53,000 flood-affected people benefited from it over 2 months. General Food Distribution (GFD) activities were also carried out by WFP in affected areas in collaboration with SUN-KP and other relevant stakeholders.
- **Additional Support for Nutrition Services** Additional support for nutrition services was provided in DIK & Tank by UNICEF for children with Severe Acute Malnutrition (SAM).
- **Details of the above efforts are tabulated below for reference:**

S. No.	Name of District	No of OTP	UNICEF OTP Sites	RUTF Carton Dispatch
1	Shangla	11	0	70 IHP
2	Dir (Lower)	19	07	300 UNICEF
3	Dir (Upper)	19	0	80 IHP
4	Swat	26	08	350 UNICEF
5	Tank	13	0	150 IHP
6	D I Khan	19	0	150 IHP
7	Swabi	29	0	70 IHP
8	Chitral (Lower)	16	12	300 UNICEF
9	Chitral (Upper)	-	-	-
10	Kohistan (Upper)	8	0	30 IHP
11	Kohistan (Lower)	-	-	30 IHP

12	Charsadda	25	02	200 UNICEF
13	Peshawar	31	34	400 UNICEF
14	Nowshera	22	0	120 IHP
15	Malakand	16	04	300 UNICEF
Total	-	**254**	**67 OTP**	**2550**

Analysis

Area Under Consideration

Role of PDMA in providing relief to flood victims by ensuring adequate nutrition and food supply to avoid food insecurity and malnutrition.

Desired State

1. **Identification of Threats from Incoming Floods by Analyzing Data**

- Conducting risk assessments and designing detailed risk reduction solutions for various hazards.
- Development and use of new technologies that support disaster risk management (DRM), such as the collection of high-resolution imagery, use of drone imagery to support better planning and environmental management, and open-source community-based creation of hazard and exposure maps.

2. **Building Resilient Infrastructure in Hazard-Prone Areas to Reduce Potential Damage**

- Improvements in urban infrastructure (particularly stormwater drainage).
- Investments in solid waste management to reduce flood and public health risks.
- Use of nature-based solutions, such as ecosystem restoration and management to mitigate disaster risk.
- Investments in community infrastructure and services, such as water supply and sanitation facilities, roads, and health and education facilities.

3. **Increasing the Capacity of Disaster Risk Management Authorities for Response to Disasters with Early Warnings**

- Building capacity and strengthening institutions to properly operate and maintain early warning systems.
- Upgrading infrastructure to modernize and operate information systems needed to collect data and develop forecasts, particularly for hydro-meteorological hazards (floods and droughts).
- Improving service delivery to offer timely and reliable early warnings to users and communities.

4. **Resilient Reconstruction by Supporting Post-Disaster Assessments and Financing Reconstruction Programs**

- Supporting disaster management authorities at the local level in understanding post-disaster damages and losses using innovative rapid-assessment tools, as well as traditional post-disaster needs assessments.
- Financing recovery programs, including the reconstruction of housing, infrastructure, and the public sector, and building more resilience through safer school projects.

5. **Strengthening Systems & Strategies for Preventing Malnutrition and Food Insecurity**

- Making plans for emergencies by putting the right policies, programs, and strategies in place ahead of time and securing the human resources needed to scale up emergency responses when needed.

6. **Tracking Nutrition Information**

- Monitoring and collecting national data on malnutrition to help make critical decisions before, during, and after a crisis.

7. **Identifying and Managing Risks to Nutrition and Food Security**

- Anticipating threats to good nutrition and developing risk-informed systems and programs that are flexible and poised to adapt when an emergency strikes.

8. **Directing a Coordinated Response for Prevention of Malnutrition and Food Insecurity**

- Leading disaster risk management authorities for timely, well-coordinated, and effective responses, especially when the scale of an emergency is so large that no single agency or authority can address it alone, as witnessed by the 2022 floods.

9. **Preventing Malnutrition Before It Starts**

- All the steps mentioned above will directly or indirectly prevent malnutrition before it starts. This will contribute to the overall improvement of the nutrition status in Pakistan.

Current State

- No uniform disaster management policy in the country, from the national level to the district and community levels.
- Natural disasters are handled at the national level by NDMA and at the provincial level by PDMA. However, disaster management institutions are not yet established at the local level.
- No strategy regarding public awareness has been devised by PDMA.
- The Disaster Management Ordinance of 2006 deals with disasters at the federal level. No such document exists at the provincial level.
- In the current floods, rescue operations were extremely difficult due to the lack of professional expertise, specialized machinery, equipment, and limited internal capacity, as well as the non-availability of foreign specialists within a short time frame.

Actions Required

- There is a wide gap between policy and implementation that needs to be addressed. Natural disasters in our country are handled at the federal and provincial levels, and disaster management institutions are not yet established at the local level. This exacerbates the vulnerability of the people to a considerable extent. Consequently, the help for needy flood victims is often delayed and insufficient. Therefore, disaster risk management authorities need to be strengthened at the lowest levels, as they are the frontline organizations for disaster risk reduction and response. In this regard, a decentralized mode of operation should be adopted from the national to the regional (provincial) level, from the regional to the district level, and from the district to the local level (union council). This would help follow an integrated framework, bringing all stakeholders and victims together to develop organized emergency management planning systems and operational frameworks that effectively address the immediate needs of disaster victims.
- Additionally, during the current floods, rescue operations were extremely difficult due to a lack of professional expertise, specialized machinery, and limited internal capacity, as well as the non-availability of foreign specialists within a short time. The responsibility for building community preparedness and catalyzing coping strategies lies with the government and disaster management

institutions in the areas of disaster preparedness and sharing information to raise community awareness. This requires a well-coordinated mechanism between national and provincial agencies with active participation from community members. Therefore, PDMA should identify key players in a disaster, such as the police, fire services, and community organizations, and conduct training sessions to teach them how to collaborate effectively during a disaster. Emergency management awareness can be promoted by PDMA even when there is no disaster, as many organizations are unaware of the measures to take during such events.

- On the lines of the Disaster Management Ordinance of 2006, the provincial government may draft a document to better define the aims and objectives of PDMA.
- PDMA may be strengthened by the provincial government to enable it to:

    - Adopt high-resolution imagery for early flood warnings.
    - Provide technical training to selected members of flood-prone communities to build resilient infrastructure in hazard-prone areas.
    - Establish programs to track nutrition information and monitor and collect data on malnutrition, so that risks to nutrition and food security may be identified and managed in a timely manner.

SWOT Analysis of Nutrition-Related Institutions of KP

Strengths	Weaknesses
• There are institutions in KP dedicated to providing adequate nutrition to the general public. Examples include SUN-KP, the Food Department KP, and the Nutrition Wing of DGHS.	• There is a lack of coordination between international, federal, and provincial organizations.
• The functioning of these institutions is supplemented by international organizations that are highly active in the province in the context of nutrition. Examples include WFP, UNICEF, and FAO.	• There is a lack of coordination among provincial organizations. • There is a heavy reliance on international organizations by federal and provincial organizations. • There is a lack of skilled staff in provincial organizations. • Provincial organizations have no warehouses where RUTF and other nutritional packages can be stored. • There is no preparedness on the part of provincial organizations regarding floods. • Provincial organizations have no active liaison with Utility Stores or other relevant organizations for food provision. • Data management and maintenance are not properly handled.
Opportunities	**Threats**
• The havoc wreaked by the recent floods has sensitized both the government and the general public to the seriousness of nutrition-related problems.	• The Pakistan Meteorological Department has warned that the incidence of floods due to the La Niña effect is likely to increase in the near future. This increases the likelihood of floods in Pakistan. • Global warming, caused by the greenhouse effect, is on the rise. Moreover, major global players contributing the most to global carbon emissions are beyond the control of the government of Pakistan. This also increases the likelihood of floods in Pakistan.

	• Establishing proper infrastructure and human resources to tackle flood-related malnutrition may take a long time in Pakistan.

EETH Analysis of Nutrition-Related Institutions of KP

Enhancement of Strengths	**Elimination of Weaknesses**
• Joint assessments and regular information sharing between disaster risk management authorities to address any hazard before its occurrence.	• Rehabilitation of waterways to avoid major damage caused by floods.
• Planning and capacity-related issues can be tackled by involving authorities from the national level down to union-level communities.	• Deforestation and soil conservation should be prevented at all levels.
• Preparedness measures should be taken in advance of any expected hazard to prepare for and reduce the potential adverse impacts of the hazard.	• Capacity building of communities and relevant stakeholders to reduce the death toll in any flood.
• Village-level contingency planning for providing nutrition and food to flood victims to avoid malnutrition and food insecurity.	• Crop insurance should be implemented to secure farmers' earnings from their fields.
• Information and procedures should be developed comprehensively and shared with the public to ensure the evacuation of people and animals to safe places during floods.	• Capacity building of farmers to develop flood-resilient crops.
• Stockpiling of food, water, and feed at the national, provincial, and local levels to avoid delays in providing food supplements to flood victims.	• Coordination between various stakeholders is limited to information sharing only; it should extend from planning to implementation. • Create a liaison body responsible for coordination from the national level down to the local level quickly. • Conduct assessments of

	previous floods at the national level to prevent future emergencies. • Reduce reliance on international organizations as much as possible. Focus on local resources.
Take Advantage of Opportunities	**Hedge Against Threats**
• Implement systems to disseminate information to the general public to create awareness about malnutrition and food insecurity.	• Allocate funds for the rehabilitation and reconstruction of productive infrastructure related to agriculture, which will secure nutrients and food supplies for flood victims.
• Create a dynamic emergency system for future floods to secure food supplements for flood victims.	• Build the capacity of various stakeholders to perform their assigned responsibilities in contingency plans at the national, provincial, and union levels to counter malnutrition and food insecurity.
• The recent floods have sensitized both the government and the general public to the seriousness of nutrition-related problems. This opportunity can be used to secure better financing for provincial institutions to improve infrastructure and human resources.	• Support the horticulture and agriculture sectors to stock food/nutrients for future hazards. • Conduct research to improve storage facilities, raised seed beds, windbreaks, firebreaks, and livelihood diversification, making disaster risk management more reliable.

Logical Framework Matrix

Overall Objective	**Logic**	**Indicators**	**Means of Verification**	**Assumptions**
Specific Objective	Reduction of malnourishment	Incidence of malnourishment will reduce	Surveys may be conducted by international, national and provincial organizations	[6] Will helping the flood prone community reduce malnourishment in KP?
Output	Ready availability of food to [6] ~~flood prone~~ malnourished community [6] of KP with a special focus on flood prone areas	Vulnerable community will be satisfied	Conducting interviews, checking stock registers and checking vehicle log books	[5] What if the malnourished have no resources to reach to the location of warehouse
Activity	Construction of [1]50 [3] - 70 warehouses [4] at a safe location in [6] KP with a special focus on flood prone areas , [5] along with provision of suitable mode of transportation, [2] with the help of WFP, where required.	Activity of concerned department, C & W	**Warehouses:** Field visits **Vehicles** Checking documents and physical verification	[3] Due to devaluation of rupee, fifty warehouses may not be built [4] The warehouses may get inundated
Input	➢ Finance	Ready availability of funds	Relevant documents of Finance Department and bank statements	[1] Provincial government does not have enough funds, how many warehouses? [2] Provincial government still does not

				have enough funds
Pre-condition is Political will				

Conclusion

Floods are the most frequent type of natural disaster and occur when an overflow of water submerges land that is typically dry. Pakistan, due to its geographical location, is often exposed to floods caused by monsoon rains. During the recent floods of August 2022, significant damage, both human and otherwise, occurred. Additionally, malnutrition-related problems were exacerbated by the floods. Food security and nutritional issues in the affected areas were already chronic, as these regions were impoverished and heavily reliant on livestock and agriculture. Since both sectors were severely affected by the floods, the situation worsened. Consequently, various international, national, and provincial organizations took action during and after the flood to provide relief to the affected people. While many relief goods and services were provided, some gaps remain. Concerted efforts are required to address these gaps and ensure proper nourishment and resolve health-related issues, especially for children and lactating mothers.

Recommendations

There is a significant gap between policy and implementation that needs to be bridged. In our country, natural disasters are managed at the federal and provincial levels, but disaster management institutions are not yet established at the local level. This significantly exacerbates people's vulnerability. As a result, the help provided to flood-affected individuals is often delayed and insufficient. Therefore, disaster risk management authorities must be strengthened at the grassroots level, as these are the frontline organizations for disaster risk reduction and response.

In light of this, a decentralized operational model should be adopted, extending from the national level to the regional (provincial) level, then from the regional to the district, and finally from the district to the local level (union council). This will help implement an integrated framework that brings all stakeholders and victims together to develop an organized emergency management system and operational framework to reach disaster victims and meet their immediate needs effectively.

Moreover, in the recent floods, rescue operations were extremely challenging due to a lack of professional expertise, specialized machinery, limited internal capacity, and the non-availability of foreign specialists within a short time. In building community preparedness and catalyzing coping strategies, the responsibility lies with the government and disaster management institutions to enhance disaster preparedness and share information to raise community awareness. This requires a well-coordinated mechanism between national and provincial agencies, with active participation from community members. Therefore, training sessions for key players like police, fire services, and community organizations should be conducted to improve collaborative disaster response. Creating awareness about emergency management should be an ongoing process carried out by relevant organizations, even in the absence of an active disaster, as many organizations are unaware of the proper measures to take during a disaster.

It is globally well-established that achieving nutrition security requires a complex, multi-sectoral response, involving well-coordinated efforts across various sectors through multi-sectoral planning, sectoral implementation, and monitoring. This translates into improving the quality and coverage of 'nutrition-specific' interventions, maximizing synergies for 'nutrition-sensitive' approaches, and creating a conducive enabling environment to shape political, institutional, and policy processes for nutrition. Therefore, there is an urgent need to prioritize addressing malnutrition and ensuring an effective and timely response to the Pakistan Vision 2025, the Global World Health Assembly Targets, the Framework of the Second International Conference on Nutrition (ICN-2), Sustainable Development Goals (SDGs), and the Global Scaling up Nutrition (SUN) Movement.

In this regard, disaster management authorities should be strengthened by the provincial government to establish programs for tracking nutrition information and monitoring and collecting data on malnutrition, ensuring that risks to nutrition and food security are identified and managed promptly. Active liaison should be established between the Ministry of National Health Services, Regulations and Coordination, and the Provincial Disaster Management Authority. Additionally, SUN-KP should be declared the central organization for tackling all nutrition-related issues in the province. SUN-KP may work in close liaison with relevant international and national organizations, particularly the Nutrition Wing of DGHS and the Food Department of KP.

A comprehensive Nutrition Sector policy should be drafted by SUN-KP, outlining the responsibilities of all relevant organizations to ensure swift and effective flood responses across various sectors in case of any future emergencies. Lastly, institutions like the Utility Stores Corporation of Pakistan should work closely with SUN-KP to devise mechanisms for

ensuring food provision during flood events.

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Situation of Embankments and Coordination of Flow of Water in the Indus River System at District, Province, and Federal Level Towards Tackling Flood Related Issues

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Abstract:

Pakistan has faced recurring floods over the past 75 years, with devastating impacts on land, lives, and the economy. The country has experienced 28 super riverine floods, resulting in extensive damage, loss of life, and economic losses. This study explores the role of various public sector institutions in managing water flows, flood protection infrastructure, and their coordination during floods. Focus is placed on the effectiveness of embankments, particularly along the River Kabul, and the influence of the Indus Water Treaty. By analyzing institutional frameworks, flood management strategies, and challenges in coordination, the research highlights the need for enhanced collaboration, improved early warning systems, and climate-resilient infrastructure. Additionally, the study calls for revising the Indus Water Treaty to better address climate change and water security concerns. The findings provide recommendations for improving flood management through better institutional coordination, advanced water management techniques, and more sustainable funding mechanisms.

Key words:

Flood management, Water security, Indus Water Treaty, Embankments, Climate resilience

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Introduction

In the 75 years of Pakistan's existence, the country has experienced 28 super riverine floods, affecting 616,558 km² of land, resulting in the loss of 13,262 lives, and causing economic losses of approximately $39 billion, up until the year 2020 (FFC, 2022). The 2022 floods affected around 33 million people across the country, with 3.2 million people affected in Khyber Pakhtunkhwa (P&D KP, 2022). Flood mitigation and preparation require a coordinated response from various institutions and public agencies mandated to deal with water-related disasters. In addition to coordinating relief and rescue activities, institutions also coordinate on a range of tasks such as managing water flows in rivers and canals, collecting and compiling early warning data, and making accurate predictions about potential floods. Pre-flood preparedness measures include the construction of flood protection infrastructure along vulnerable segments of the river plain to protect adjacent human settlements. Embankments or dykes along riverbanks are the most widely used flood protection infrastructure in the Indus River Basin. These works are carried out by multiple public agencies at both the federal and provincial levels. Over the last four decades, substantial investments have been made in developing these infrastructures, which have yielded significant benefits for communities at risk from floods. With the adverse impacts of climate change becoming more apparent with each passing day, new methods are being devised to enhance the effectiveness of these infrastructures, improve the quality of early warning systems, and take advantage of opportunities presented by transboundary water flow treaties.

Statement of Problem

Floods are a recurrent occurrence in Pakistan. Both federal and provincial governments have established institutions to manage and mitigate their impacts. These institutions coordinate at various levels on different aspects of disaster management. One such aspect is the coordination of water flow management during floods and in non-flood periods. The government also builds flood protection infrastructure to minimize these impacts, with Provincial Irrigation Departments playing a key role in developing and maintaining this infrastructure. This study will examine these aspects and analyze them through the following research questions:

1. What kind of coordination takes place between the relevant institutions regarding the control of water flows in the Indus Basin?
2. What role have embankments played in mitigating the effects of recurrent floods, and what return on investment have they provided, particularly at the River Kabul?

3. What influence has the Indus Water Treaty had on flood mitigation and water security for Pakistan?
4. How do provincial irrigation authorities perform in relation to the above aspects?

Scope of Study

This research will focus on public sector institutions in Pakistan, at both federal and provincial levels, that are responsible for controlling river water flows. It will analyze the framework administering the Indus Basin and the flood protection structures, particularly embankments, built by public agencies since 1978, with particular emphasis on the period following the 2010 floods.

Research Methodology

For the purposes of this study, a primarily qualitative research methodology is employed, utilizing both primary and secondary sources of information. Primary sources include a review of legislation and policies, departmental data, the development portfolio of provincial and federal governments (ADP/PSDP), domain knowledge, and key informant interviews with relevant resource persons from provincial irrigation departments, FFC, and IRSA. Secondary sources include published reports and academic studies.

The study will analyze various aspects of the research using the following analytical tools:

- Institutional analysis and stakeholder analysis
- Situational analysis based on PESTLE analysis techniques
- Policy analysis of policy instruments and action plans
- Comparative analysis with the 2010 floods
- Need assessment and gap analysis
- SWOT-EETH analysis

Analysis of Coordination Mechanism

This section will analyze the coordination mechanism between various levels of government to manage and control water flows in the Indus River System, particularly during flood seasons, through institutional, stakeholder, situational, and policy analysis:

Institutional Analysis

The management of water flows in the Indus River System is a technical subject, coordinated among specialized institutions at the federal and provincial levels. This section explains their institutional setup and roles in coordinating water flows, especially during the flood season, followed by stakeholder analysis:

- **Indus River System Authority (IRSA)**

Following the Water Accord of 1991, IRSA was established in 1992 under an Act of Parliament as the national body responsible for regulating and monitoring the distribution of water resources in the Indus River in accordance with the Accord. The Authority consists of five members, each nominated by the provinces and the Federal Government from among water engineers. IRSA's main function is to regulate and distribute surface waters, coordinating water flows as per the allocated shares between the provinces (IRSA, 2022). For this purpose, an Advisory Committee is established under Chapter-III of the IRSA Act, comprising technical representatives from respective governments. Under normal conditions, the Advisory Committee holds pre-Kharif and pre-Rabi season meetings to authorize water distribution to the provinces as per the Water Accord 1991. Special meetings are held during changes in hydrological patterns, such as water shortages or floods, to adjust water flows accordingly. During floods, the role of the Advisory Committee is minimized, and FFC and other disaster management bodies come to the forefront.

- **Federal Flood Commission (FFC)**

Established in 1977, the FFC is the premier national body responsible for managing flood administration across the country, preparing and overseeing the implementation of national flood protection plans, executing flood protection works, standardizing specifications, reviewing flood protection infrastructure damages, conducting research, and improving flood forecasting and warning systems. The FFC is the forerunner to IRSA and played a key role in negotiating the Water Accord of 1991 and preparing four ten-year National Flood Protection Plans (NFPPs). It is a technical body, led

by an Advisor/Chief Engineer, assisted by engineers, inspectors, and sectoral experts. Its primary role is to coordinate and advise during the flood season, holding meetings with stakeholders to review preparedness and advising the Ministry of Water Resources and IRSA on water flow regulation during floods. During the flood season, FFC sets up a flood monitoring cell that disseminates daily flood situation reports to relevant forums, leaving disaster response to NDMA/PDMA and provincial governments. FFC does not control water flows in normal times (Kamal, 2022). Additionally, FFC evaluates flood protection projects, issues standard designs for embankments, and recommends regulatory principles for Reservoir Management Committees (RMCs) (FFC, 2022).

- **Pakistan Meteorological Department (Flood Forecasting Division)**

The Pakistan Meteorological Department (PMD), one of the oldest departments in Pakistan, was established in 1947 to develop a comprehensive early warning system (EWS) for forecasting weather changes, cyclones, droughts, heatwaves, and floods. In 1978, PMD established the Flood Forecasting Division (FFD) in response to repeated flooding. FFD uses an extensive network of 97 observatories, 50 automatic weather stations, and 46 telemetry stations from WAPDA and provincial irrigation departments to predict flood occurrences and intensities (PMD, 2022). The data collected is relayed to IRSA, FFC, and other relevant institutions on a periodic and real-time basis during floods. While the EWS has been useful, it has not been optimally utilized. Recently, the system was upgraded to include hydrological models for the River Swat and Kabul basins, from Warsak to Nowshera.

- **Water and Power Development Authority (WAPDA)**

Established in 1958, WAPDA is the federal government's lead executing agency for water resources. WAPDA manages gauge stations at major rivers to collect hydrology data. Its main role in water flow management is to implement decisions made by IRSA, FFC, and Reservoir Management Committees (RMCs). FFC also assisted WAPDA in deploying a Meteor-burst-based telemetry system across Pakistan, which transmits hourly rainfall and river level data to IRSA, FFD, and FFC. WAPDA is also responsible for managing water flows from major reservoirs, with reservoir management committees formed to establish standard operating procedures (SOPs) for flood situations (FFC, 2017).

- **Reservoir Management Committees (RMCs)**

As per international best practices, RMCs are formed for all large reservoirs with clear SOPs for water flow management. These bodies make decisions on

spillway control during floods, authorizing changes in water discharge from reservoirs. In Pakistan, two such committees exist for Tarbela and Mangla Dams. These committees are composed of representatives from WAPDA, IRSA, FFC, PMD, NESPAK, respective provincial governments, and district administrations. SOPs are periodically revised, particularly after major flooding events, incorporating lessons learned. Under normal conditions, releases from reservoirs are made as per IRSA's instructions, whereas during floods, releases are determined by RMCs, considering advice from forums such as IRSA, NDMA, and FFC, with a priority on reservoir safety, water storage, energy generation, and flood mitigation (WAPDA, 2015).

- **Provincial Irrigation Departments (PIDs)**

Provincial irrigation departments (PIDs) are the primary operational arms in flood forecasting and management. PIDs collect real-time hydrology data through gauge stations and share it with relevant agencies such as IRSA, FFC, PDMA, and district administrations. Normally, this data is shared on a ten-day basis, but during floods, the frequency of reports increases to daily and even hourly intervals. Currently, data collection is mostly done through manual gauge readings, though provinces have begun deploying digital telemetry systems for real-time data streaming (Kamal, 2022).

- **Pakistan Commissioner for Indus Waters**

Under the 1960 Indus Water Treaty (IWT) between India and Pakistan, a Permanent Indus Water Commission was established, with each country appointing a commissioner. In 1989, an agreement was made to share river flow data for flood forecasting. The Pakistani Commissioner receives daily flow data from India, and during floods, this frequency increases to six-hourly or hourly updates. This data is then relayed to FFD Lahore and IRSA for flood forecasting in the Jhelum, Chenab, Sutlej, and Ravi rivers. The Indus Water Commission is the sole point of contact for hydrology data clarification from India. However, no such arrangement exists for sharing data from Afghanistan regarding the Kabul River (Irshad, 2022).

- **National and Provincial Disaster Management Authorities**

The national and provincial disaster management authorities (NDMA and PDMA) are not directly involved in water flow management but play a vital role in pre-flood preparedness, disaster mitigation, and coordinating post-flood rescue, relief, and rehabilitation efforts. NDMA and PDMA remain in constant communication with the aforementioned bodies to obtain real-time flood data to plan and execute mitigation strategies effectively.

Stakeholder Analysis

It is crucial to analyze the role, influence, and interests of the stakeholders involved in managing water flows under normal and flood situations, along with the coordination strategy employed. The stakeholder analysis is enumerated in the table below:

Stakeholder	Power/Influence	Interest	Coordination Strategy
IRSA	Allocates and monitors water resources in the Indus Basin as per the Water Apportionment Accord of 1991. Reviews and specifies river and reservoir operation patterns. Passive role during floods.	Maintain harmony in water distribution among provinces. Ensure fair distribution of water resources.	Periodic meetings of the Advisory Council, including before the start of each cropping season. Implements water discharge advisory to WAPDA and reservoir management guidelines/SOPs.
FFC	Monitors and evaluates flood response efforts. Disseminates daily flood situation reports and weather advisories during floods. Prepares and coordinates the implementation of NFPPs and oversees flood forecasting and management.	Ensure the implementation of national flood protection plans in coordination with federal and provincial bodies. Ensure a coordinated response during floods.	Pre- and post-monsoon/flood season meetings of the Commission. Establishes a Flood Communication Cell for daily flood situation reporting during floods.
WAPDA / RMCs	Operates and manages reservoirs. Collects and processes hydrometeorological data. Issues advisory in discharge of water	Protect reservoirs and their associated infrastructure. Ensure optimal filling of storage and continued energy	Regular meetings at WAPDA HQ, issuance of seasonal instructions to RMCs. Disseminates

	flow from dams during floods.	generation. Protection from floods.	flood levels at reservoirs to flood response agencies.
Provincial Govts./ District Admins.	On-ground execution of national or provincial water policies. Declaration of emergency and mobilization of relevant flood response agencies. Provision of human, material and machinery resources.	Protection of lives and property. Control losses to infrastructure and livelihoods. Ensure continued supply of allocated share of water and electricity.	Collates and disseminates daily situation reports. Superintendence of flood response through Cabinet. District disaster management authorities coordinate efforts of line agencies.
Provincial Irrigation Departments	Construct, manage, operate, and maintain barrages and flood protection works. Diversion of water in distribution networks.	Protect canals, barrages, and drainage systems. Protect water resources by conserving, redistributing, augmenting, and allocating water.	Inter-Provincial coordination through IRSA, FFC. Sharing of real-time data with FFD(PMD), field formations. Enforcement of water laws. Collection of hydrology data.
NDMA / PDMA	Not directly involved with water flow management. Their role pertains more to pre-flood preparedness, disaster mitigation, and coordinating post-flood efforts.	To ensure timely coordination and response to floods. Enhance disaster preparedness and mitigation efforts.	Active communication with stakeholders like FFC, IRSA, and provincial authorities. Coordinates post-flood relief and recovery efforts.
Permanent Indus Water Commission	Coordinates with India on water flow in trans-boundary rivers under the IWT (1960). Relies on relay of	Timely reporting of trans-boundary water flow data.	Daily reporting of telemetry data from Indian counterpart. Dissemination to FFD, IRSA.

	information from India.		
Flood Forecasting Division (FFD), PMD	Collects and collates weather and hydrology data, forecasting through climate models. Issues rain advisories and flood warnings.	To accurately forecast rains and floods. Ensure timely dissemination of reports/warnings to stakeholders.	Real-time collection of data and weather modeling.

Situational Analysis

The flood management regime in Pakistan operates in a dynamic environment influenced by various external factors. The PESTLE analysis helps identify the opportunities and challenges within this environment:

Factor	Description
Political (P)	- There is strong political support by political leadership towards flood management, across party lines. - There is strong commitment and consistency of government in the provision of funds for flood mitigation and other support. - The National Flood Protection plans have support from all provinces and the federal government. Approved by CCI. - However, some projects of flood management are driven more by political considerations than based on need assessment.
Economic (E)	- The country's weak economic position does not permit greater fiscal allocation towards flood mitigation measures. - Disasters like the 2022 floods incur large damages with huge financial requirements. 2022 flood damages were estimated at Rs. 3,202 billion. - Due to repeated disasters, donor fatigue has set in, with donor assistance dwindling. Against the total UN flash appeal of $816 million, only $170 million have been committed by international donors. - Other than damage to public infrastructure, there are private losses, livelihood losses, and income

	loss. - The agrarian economy of the country has suffered a huge loss of Rs. 800 billion to crops and livestock.
Socio-Cultural (S)	- Social disregard for the nature and ecology of rivers, resulting in constriction of river flows. - Society already has income disparities, which are likely to be aggravated by disasters like recent floods. - Children, women, and the poor are the most vulnerable segments of society in the event of any disaster. - Diversion of scarce resources for rehabilitation is likely to attenuate the socio-economic disparity. - The incidence and culture of donations for public causes and relief efforts is high in Pakistan. Alternate delivery channels through direct assistance or through NGOs supplement the efforts of governments.
Technological (T)	- Traditional and manual gauge reading techniques are used for collecting hydrology data. - Warning messages are disseminated predominantly through community-based traditional methods like mosque announcements. - There is a desire and commitment of resources to gradually shift to modern telemetry and technology-based Early Warning Systems (EWS). - Latest modelling software is being procured by PMD and FFC for accurate mapping, forecasting, and dissemination of weather data.
Legal (L)	- Well-defined laws, regulations, and SOPs are in place for defining the institutions involved in flood management, their roles, and operations. - Realizing the importance of water resources, policy instruments are being developed. The first National Water Policy has been approved. FFC regularly prepares actionable ten-year plans detailing all aspects. - Enforcement of water laws is very weak, partially due to capacity constraints and partially due to discouragement and low penal actions from judicial forums.

Environmental (E)	- In addition to affecting human settlements, floods cause unprecedented damage to local flora and fauna. - Floodwaters bring large quantities of silt deposits, which are beneficial for agricultural lands but damaging for settlements. - Floodwaters intermix with hazardous waste and sewage from drains, contaminating large areas of cultivable land. - In the past, deforestation has accelerated climate change and soil erosion, triggering flash floods and Glacial Lake Outburst Floods (GLOFs). - Realization and increased focus on tree plantation are likely to reverse the negative effects of earlier deforestation.

Policy Analysis

At the national level, there are two policy instruments in place: the National Water Policy, 2018, formulated by the Ministry of Water Resources, and the 4th National Flood Protection Plan, 2017, formulated by the Federal Flood Commission. Apart from these, there are no flood-specific policies at the federal or provincial level relevant to the coordination of water flow mechanisms between different stakeholders. These policies are analyzed as follows:

National Water Policy, 2018

The Government of Pakistan approved the first National Water Policy in 2018 to address the emerging water crisis, especially in the wake of climate change. The policy aims to provide a framework and guiding principles to institutions working in the water sector. Under Pakistan's federal structure, water resources are a national subject, while environment, irrigation, agriculture, and related water sub-sectors are provincial subjects. The Policy attempts to harmonize their efforts and provides a list of objectives to be achieved collectively. It also outlines strategic priorities and national targets for water conservation, storage, and usage. However, these policy targets are not binding on provincial governments unless confirmed by the provinces before their incorporation into the national planning framework (12th and 13th Five-Year Plans).

The policy mandates that at least 10% of federal PSDP (Public Sector Development Program) funding be allocated to the water sector, gradually increasing to 20% by 2030. It also calls upon provinces to increase their

respective allocations for the water sector (MoWR, 2018). In the 2017-18 PSDP, the water sector received only 4% of development funds, but this allocation has subsequently increased to 11.3% (Rs. 91.6 billion) in the 2022-23 PSDP. To achieve its targets, the Policy recognizes the need for a robust implementation plan with clear responsibilities and a transparent reporting process. The establishment of a National Water Council is fundamental to mitigating inter-provincial tensions arising from water distribution and addressing social, environmental, and economic safeguards in managing Indus River Basin water resources.

The policy document briefly touches upon water-related hazards, including floods and seawater intrusion. However, the policy recommendations focus on developing flood protection plans, floodplain mapping and zoning, and the construction of flood protection infrastructure. The only policy measure relevant to floodwater management is the recommendation for the revision of reservoir operation rules. It does not specifically address the coordination mechanism for water flow management in rivers. The Policy could have provided a perspective on transboundary water management with Afghanistan, following the pattern of the Indus Water Treaty (IWT). Realizing the objectives of the Water Policy would require significant investment, for which a financial plan, like the one in the 4th NFPP of FFC, could have been provided.

4th National Flood Protection Plan, 2017

The FFC issues a policy document in the form of ten-year national flood protection plans, with the 4th NFPP being the latest, approved in 2017. The plan was prepared jointly by national and international consultants from the Netherlands, a country that has successfully managed high water levels in its urban landscape throughout its history. The plan has the consensus of all federating units and was approved after thorough consultations and deliberations by the Council of Common Interests (CCI). The plan encompasses all five major types of flooding prevalent in Pakistan: (i) riverine floods, (ii) flash floods in hill torrents, (iii) coastal floods, (iv) urban floods, and (v) glacial lake outburst floods. One of the unique features of the 4th NFPP was the preparation of a national inventory of flood protection infrastructure. In addition to listing the required infrastructure works, the plan also provides a flood protection investment plan, detailing the financial resources required over a ten-year period and the sources of funding. The plan proposes a shift from public funding to raising revenues through water charges, irrigation cesses, and other taxes, with an estimated revenue collection of Rs. 60 billion from water charges (FFC, 2017).

The plan discusses both structural and non-structural measures required for flood protection. Structural measures are easier to implement, are visible, and

show early results. However, the past three NFPPs have been partially successful in achieving their targets. Of the 2014 proposed flood protection schemes in the three plans, only 874 schemes were completed by 2017, leaving a large backlog. Table-1 lists the federal investments in flood protection works/schemes completed by 2017:

Plan	Time Period	Proposed Schemes		Executed Schemes	
		No.	Cost *(Rs. Mn)*	No.	Cost *(Rs. Mn)*
NFPP-I	1978-88	840	9,500	311	1,730
NFPP-II	1988-98	735	8,500	180	1,419
NFPP-III	1998-08	439	11,703	383	4,292
Total		**2014**	**29,703**	**874**	**7,441**

We observe that despite such a large investment, the 2010 and 2014 floods caused widespread damage. The 4th Plan proposes a range of structural measures, such as the construction of embankments, gabions, diversion channels, and lining of drains. The plan also details the criteria for scheme proposals, selection, and prioritization. As of now, 582 schemes worth Rs. 91 billion are included in the 4th NFPP. The provinces have further proposed additional works amounting to Rs. 194 billion (FFC, 2017). Given the pace of development, resource availability, and the remaining time until 2027, it remains to be seen if the current plan will be able to execute the proposed projects.

Non-structural measures, on the other hand, require behavioral change on the part of all stakeholders, are not as attractive or resource-intensive, and, given the psyche of the nation, are difficult to implement. Encroachment on floodplains, sewage dumping in city drains, and the blockage of drainage paths require determined laws, regulations, policies, and implementation. The 4th NFPP presents a range of proposals for non-structural measures and 28 schemes costing Rs. 14 billion. One of the most significant policy proposals is the draft River Act, which is to be enacted by the four provinces. Although the Government of Khyber Pakhtunkhwa (GoKP) promulgated the Rivers Ordinance in 2002, much before FFC recommended the legislation, its implementation in the province has been sketchy. The Plan also discusses strengthening of the Early Warning System (EWS) according to the density standards of the World Meteorological Organization (WMO).

However, the plan does not provide any guidelines or mechanisms for better coordination among the different stakeholders engaged in water flow management, especially during the flood season. The role of coordination is taken over by the RMCs during floods, for which the plan only mentions revising their SOPs, without providing any tangible recommendations.

Analysis of Embankments in The Indus River System

Embankments are flood protection levees or dykes, also known as bunds in the local language. They are large earthen wall-type structures built at the edges of the active floodplain of a river to confine its flow within a specified area, preventing water from spilling over and causing flooding. Embankments constitute the bulk of flood infrastructure in the Indus Basin. They increase the channel depth and cross-sectional area of the river, thereby increasing its hydraulic radius and water-carrying capacity.

Embankments in The Indus River Basin

Province	**Embankments (km)**
Punjab	3,334
Sindh	2,424
KP	352
Balochistan	697
AJ&K	13
Total	**6,820**

Table-1: Length of Embankments

To safeguard the areas from inundation, approximately 6,820 km of embankments have been constructed along the major rivers and their tributaries in the Indus Basin. These embankments have gradually improved with the development of barrage-controlled irrigation and have expanded to protect irrigated agriculture and the population. The length of constructed embankments, province-wise, is given in **Table-1**.

In KP, floods are mainly caused due to flash flooding in secondary rivers (Kabul, Swat, Panjkora, Kurram, etc.) and major hill torrents generating nullahs, which have steep bed slopes that increase water velocity, thereby causing inundation across the banks. Many spurs and flood embankments/flood protection walls in critical locations have also been constructed along the Kabul, Swat, Panjkora, and Kurram rivers, as well as their tributaries, including flood flows generating nullahs/hill torrents. Their details are given in **Table-2**.

Structure	**No.**

Embankments	105
Flood Walls	455
Spurs	223
Dispersion Structures	1
Total	**784**

Table-2: KP Flood Protection Structures

NEED/GAP Assessment of Embankments

River/Basin	No. of Schemes	Estimated Cost (Rs. Mn.)
Indus	45	13,546
Kabul	22	3,704
Swat	5	2,750
Total	**72**	**20,000**

Table-3: Proposed Additional Works for KP

Based on a 2018 study that modeled data to predict flooding, it was concluded that there is an increasing trend in flooding due to rising precipitation and higher temperatures. The current flow with a 1-in-50-year return period is likely to occur five times more frequently (i.e., once every 10 years) in the future (Iqbal et al., 2018). The 4th NFPP proposes the construction of 582 flood protection schemes/embankments across the country to control spill and erosive action in vulnerable reaches of the rivers. An estimated amount of Rs. 91 billion would be required over a 10-year period to fund the construction of these schemes. However, provinces have proposed additional flood protection works, which were duly approved by the CCI, bringing the total cost of such works to Rs. 194 billion, to be financed by federal and provincial governments on a cost-sharing basis (FFC, 2017). For Khyber Pakhtunkhwa, flood protection works required for the Indus River Basin, including the Kabul and Swat Rivers, are listed in **Table-3**.

Analysis of Embankments in The Indus River Basin

Additionally, these levees have been constructed gradually over six decades under various programs, and thus differ in design and construction quality. At some locations, construction has caused sedimentation and aggradation of the riverbed, which may require a continuous increase in the heights of the levees. Likewise, wetting channels, which were built along these structures to test their strength against water leaks, are now largely non-operational. Consequently, their structural weaknesses cannot be determined before actual flooding. Other challenges include their remote locations, inadequate maintenance, and continuous degradation due to natural and human factors.

Flood embankments are mostly appropriate for floodplains that are already intensely used, in the process of urbanization, or where the residual risks of

intense floodplain use may be easier to handle than the risks in other areas (e.g., landslides or other disturbances). Since embankments cannot guarantee absolute flood prevention, they are designed to provide only a moderate level of protection. The degree of protection is generally driven by economic considerations. For instance, it may be appropriate to protect agricultural lands against floods of a one-in-ten-year return period and allow them to be inundated during higher floods, thus still maintaining the natural benefits of flooding (e.g., delivery of nutrients and organic-rich sediments). In Pakistan, the height of embankments is often arbitrarily determined at a height of 6 feet above previously observed high flood marks (Shireen, 2022). However, due to morphological changes in the rivers, flood stages do not necessarily have a linear relationship with the quantity of floodwater. Thus, scientific data is needed to accurately determine the optimal levee height. The existing barrages, designed for a 100-year return period, performed better in flood protection.

By containing flows within embankments and impeding seasonal floodplain inundation, the active floodplain that was previously exposed to inundation is restricted. This disrupts the lateral hydrological connectivity along the river corridor, with various effects on both the ecology of the channel and its floodplain. Floodwater spreading onto the floodplains improves soil fertility by depositing silt, exchanging nutrients and carbon between the floodplain and the channel, creating new habitats, reinstating floodplain refuges, and providing spawning areas for river species. Embankments reduce floodplain fertility because sediments and their nutrients are no longer deposited and exchanged.

Instead of using traditional embankments, the FFC has developed a draft concept proposal regarding the use of a Tube Barrier System, an innovative solution being used by European countries like Hungary and Denmark. It consists of rubber tubes filled with water to act as temporary walls to divert flood flows for the protection of important installations, land, and settlements. The draft Concept Paper has been circulated to all provinces and federal line agencies for their views/comments and further adaptation of this new innovative technology (FFC, 2020).

For the Swat and Panjkora rivers, a comprehensive plan for the development of embankments, similar to that of the Kabul River, is absent. Embankments around these rivers are built on an ad-hoc basis and constructed over time as needed, with varying strengths and lengths. Hence, these embankments do not provide the same level of protection against floods as those along the Kabul River.

Role Of Embankment Along the Kabul River

In the aftermath of the 2010 floods, the GoKP launched an ambitious project to erect embankments along both sides of the Kabul River, from Warsak Dam to Khairabad at Nowshera, the point where the Kabul River joins the Indus River. Initially, the length of these structures was planned at 70 kilometers but was later revised to 105 km. The embankment is being constructed at a cost of Rs. 13 billion, funded through the ADP, and to date, almost 80% of the work has been completed (Shireen, 2022). An amount of Rs. 3.3 billion is required to complete the remaining work.

Analysis of The Embankment at Kabul River

The 2022 floods were the first real test of the Kabul embankment, which faced peak flows of 349,000 cusecs near Nowshera. The structure has been beneficial in terms of curtailing losses to human settlements around the river plain, as observed when compared to the damages sustained in the 2010 floods. Therefore, the project has a high rate of return on the investment made. The reduction in losses very well compensated for the costs incurred in its construction.

The embankment was designed to carry 215,000 cusecs of water, based on a 100-year return period, but it was able to successfully sustain water flow up to 281,000 cusecs during the 2022 floods, after which floodwaters spilled over. Of the entire length of the constructed embankment, only one major breach occurred near Manakhel, Nowshera Kalan, which initially was 40 feet wide, but the deluge expanded the breach to 200 feet. Overall, the embankment sustained moderate damage, calculated at Rs. 1.1 billion (Shireen, 2022).

The entire embankment was constructed on negotiated private lands, and no land acquisition took place for its construction. However, there are some unresolved gaps, primarily due to land disputes and litigation, with major ones at three places. The largest of these openings is 750 meters wide, which was a major cause of water spillover onto adjoining lands. The Irrigation Department, with the assistance of the District Administration, is actively negotiating to settle these disputes out of court, and work has resumed on filling these gaps. Secondly, some smaller gaps are caused by the local population for cattle crossing or accessing grazing areas. Finally, due to resource limitations, the openings of nullahs and tributaries into the Kabul River were left ungated, resulting in the backward flow of water into these channels. To mitigate this, the Irrigation Department has initiated the installation of Valve Flood Gates on these openings, with three gates already installed at Garhi Momin drain and Zakhai drain. The installation of similar gates at 20 more locations is planned at a cost of Rs. 71 million. Once

completed, this issue of backward flow is likely to be resolved to a large extent (P&D, 2022).

Due to the construction of the Kabul embankment, a large area of cultivable land has been reclaimed—approximately 33,469 acres on the Nowshera side and 9,278 acres on the Charsadda side—enabling cropping on these reclaimed lands. However, a negative consequence of the assurance against deluge has prompted people to start constructing restaurants and other built-up structures (Kamal, 2022).

Need For Additional Works

Realizing the benefits of the embankment along the Kabul River, the provincial government has planned the construction of an additional 58 kilometers of embankment, raising the existing average height from 20 feet to 24 feet, and incorporating elements of climate change resilience. The cost of these additional works is estimated at Rs. 14 billion, which would be collectively financed by the GoKP and the Federal Government (PSDP allocation for the 4th NFPP), along with international funding from the Asian Development Bank. Upon completion of these additional works, the carrying capacity of the river would be raised to 320,000 cusecs (FFC, 2017).

Comparative Analysis With The 2010 Floods

Details	**2010**	**2022**
Max Water (cusecs)	436,000	337,000
Villages affected	40	31
Affected Population	571,221	250,000
Evacuations	350,336	67,917
Human Loss	167	3
Livestock Loss	67,000	0
Houses Damaged	67,940	19,736
Crops Damaged (Kanal)	59,000	46,553
Flood Protection Wall	No	Yes

The 2010 floods serve as a benchmark in recent times to evaluate the extent of flood damages and the role played by the embankment along the Kabul River. **Table-4** compares the water levels and the extent of damages between the 2010 and 2022 floods. We observe that the extent and magnitude of damages in 2022 remain comparatively low. The geographic spread of the 2022 floods in and around Kabul was less than 50% of the 2010 floods, as visualized in **Fig-1** (GIS Hub, 2022). In terms of the number of villages affected, there was a reduction of 25%. The affected population decreased by 56%, with very little human loss, and evacuations were reduced by 81%. Some of the damages to

infrastructure were caused due to the direct impact of floodwaters on structures erected within the active floodplain.

Fig-1: Comparison of flood span Nowshera: 2010)and 2022 ( )

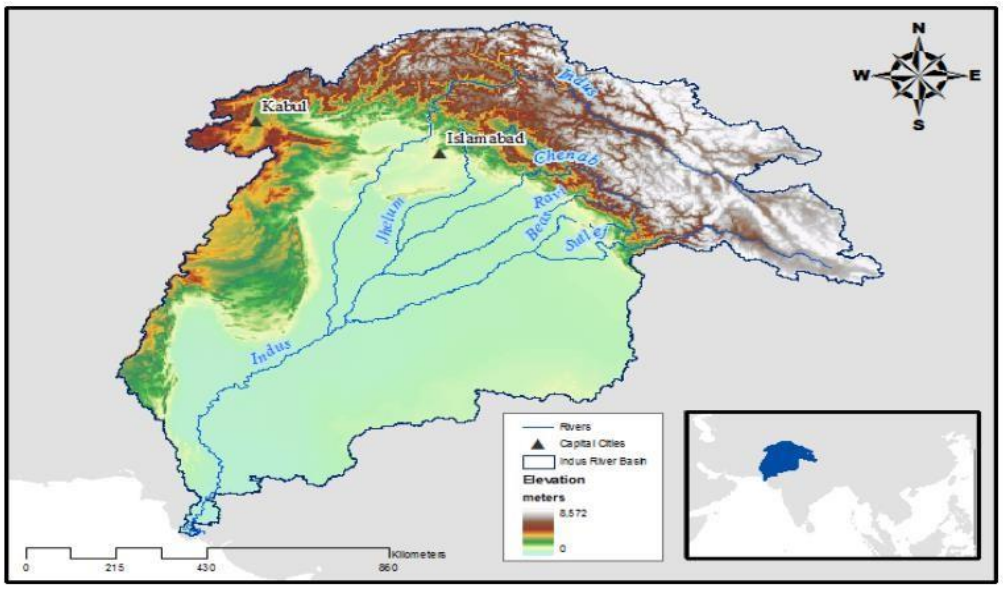
We also observe that the extent of damage to houses was almost one-third of that during the 2010 disaster, and there was almost no loss to livestock. The contributing factors that can be identified for the lower damages are: (i) the construction of the flood protection wall alongside the riverbank, and other drainage infrastructure costing Rs. 19 billion in Nowshera, (ii) better preparedness and timely planning by the provincial government and district administration, (iii) swift evacuations and effective use of the early warning system, and (iv) management of water discharge levels in the River Indus through joint coordination mechanisms.

Analysis of Indus Water Treaty

The Indus River basin originates from Tibet in China and passes through Indian-held Kashmir before entering Pakistan, finally falling into the Arabian Sea near Karachi. Its five major tributaries join the Indus in the Punjab province of Pakistan. Soon after the independence of British India, a dispute arose between India and Pakistan in 1948 over the distribution of river waters, when India halted the supply of water flowing into canals irrigating lands in Pakistan. After lengthy negotiations between the two riparians, and under the auspices of the World Bank, an accord named the Indus Water Treaty (IWT) was signed in 1960, which divided the basin by granting unrestricted use of three western rivers – Indus, Jhelum, and Chenab – to Pakistan, and three eastern rivers – Ravi, Sutlej, and Beas – to India. The treaty established the offices of the Permanent Indus Water Commissioner in each country for coordination and information exchange related to river flows. The World Bank, with financial support from the USA, UK, New Zealand, Germany, and Australia, funded the construction of irrigation infrastructure for water

storage and distribution in Pakistan to compensate for the loss of the three eastern rivers.

The IWT is considered one of the world's most successful treaties, which has remained intact for sixty years and survived three wars between the two arch-rival riparians.



Although the treaty holds intact, there have been advantages, disadvantages, and complexities regarding the Treaty and its implementation. These are listed as:

Strengths of The Treaty

i. The treaty divided the water source available between the two riparians, and upon completion of replacement irrigation works, allowed them to independently manage their water supplies.

ii. Each country became responsible for planning, constructing, and administering its own irrigation system. This incentivized the most effective use of its water resources, enhanced efficiency, and increased storage capacities. Pakistan was able to increase its water storage capacity, thereby increasing canal water diversions from 67 MAF to 104 MAF.

iii. The treaty reduced disputes and acrimony between the two states and allowed independence and assurance against interference from the other.

iv. The Indus Basin Irrigation System is based on the run-of-river system, which allowed for more storage facilities to cater to seasonal variations.

v. The hydrology of the Indus Basin enabled the availability of 80% of the total water during the monsoon period. With storage now available in reservoirs, water availability is also assured during dry/drought periods.
vi. A Permanent Indus Water Commission was established with Commissioners from each country, with a moderately reliable mechanism for the peaceful resolution of water-related conflicts.
vii. The treaty has prevented India from cutting off the water supply to Pakistan on an ad-hoc basis, even in the face of political pressures.

Weaknesses and Pitfalls

i. The Indus Water Treaty is not considered the first best option from the perspective of both countries. Pakistan was allocated 75% of the water, as opposed to 90% of irrigated land, violating the principle of appreciable harm. India's perspective is that the 75% allocation of water to Pakistan violates the principle of equitable utilization.
ii. Pakistan had to forego the entire perennial flow of fresh waters from the eastern rivers (24 MAF), which it historically used for irrigation. Storages are not substitutes for perennial flow, as they have a limited lifespan. Pakistan is already facing the effects of silting in its major reservoirs and canals.
iii. The IWT lacks a strong enforcement mechanism, and therefore is influenced by the regional balance of power. In the case of disagreement, differences are to be resolved bilaterally through the Permanent Indus Commission, and upon failure, the matter is to be referred to the International Court of Arbitration. The World Bank is the guarantor of the IWT; however, its role is only as a conflict solver. The guarantor relies on the riparian to report any issue related to illegal intervention in river flows. However, there is no definite way of knowing if illegal intervention really occurred, or if it is merely a case of low seasonal flows due to climate variability.
iv. Pakistan is particularly concerned regarding two Indian projects: Baglihar and Kishenganga hydroelectric dams. Both projects have become emotive issues for Pakistan, as there is a perception that India can affect the timing and flow of water into Pakistan using these structures.
v. Every now and then, there's a commotion in India about repealing the IWT as a comeback to terrorism incidents blamed on Pakistan. In 2016, India reviewed the working of the Indus Water Treaty, linking it with cross-border terrorism. "Blood and water cannot flow concurrently," PM Narendra Modi stated after the Uri attack, indicating to Pakistan that such terrorist incidents would lead to India rethinking its stance on the IWT.

Impact On Water Security

Water security may be defined as the allocation rules that ensure adequate water availability or a nation's ability to protect its inhabitants from the adverse effects of water shortages. In the context of transboundary waters, like in the case of India and Pakistan, countries have defined water security as securely attaining specific quantities of water every year.

The Indus River System is a lifeline for Pakistan, and nature has endowed the country with plenty of fresh water. However, despite having the world's largest glaciers and five rivers covering the country's plains, Pakistan is among the world's most water-stressed countries. According to the Pakistan Council of Research in Water Resources, Pakistan became a water-stressed country in 2005 and is likely to become water-scarce by 2025. The growing population and rapid urbanization are major factors in the five-fold decrease in per capita water availability, from 5229 cusecs in 1947 to under 1000 cusecs today. Adverse climatic conditions like heatwaves and erratic monsoon patterns are also taking their toll on glaciers, which are melting fast. Furthermore, water management has become wasteful and inefficient, especially due to the expansion of tube-well irrigation and the use of traditional techniques of flood irrigation over modern and efficient irrigation techniques.

The Indus water basin is very sensitive to climate change impacts, as a large part of its water flow is derived from melting glaciers. This has resulted in changes in hydrology patterns, flooding in some years, and water scarcity in others. The IWT was negotiated in 1960, and there is no mention of tackling the impact of climate change. Trust in the treaty and its utility is being eroded due to the climate change phenomenon. It lacks guidelines to address issues related to climate change and basin sustainability, which require an integrated approach for their resolution.

The treaty grants Pakistan unrestricted access to the water of three western rivers, and India non-consumptive access to the three eastern rivers. Pakistan's interest has been to ensure continued access to water from these rivers. Around 90% of Pakistan's food and 65% of its population depend on agriculture around the Indus Basin. If, at any stage, this water was to be cut off or even reduced, the impacts on agriculture, human consumption, and water security in Pakistan would be catastrophic. The treaty was instrumental in granting assured water supply to Pakistan from the three rivers, and water security initially improved after the construction of water storage facilities as an outcome of the IWT. However, taking advantage of this provision, India initiated the construction of controversial water projects such as the Baglihar, Kishenganga dams, and Wooller Barrage, which undermine the spirit of the IWT. This appears to be an increasing manipulation of the provisions of the

IWT by India to cover its growing water and energy demands. The approach to water management, with a primary focus on dispute resolution under the IWT rather than cooperation, has challenged the overall water security of the region. The treaty does not provide a roadmap for both countries regarding actions to take during times of increased water demand. The growing water demand and scarce supplies have now made this a flashpoint for future conflicts between the two nuclear-armed riparians.

Impact On Flood Management

The treaty provided for Permanent Indus Water Commissioners for both sides to coordinate in respect of water levels in the Indus River system. As explained previously, information sharing on water flow levels takes place regularly, and this frequency increases during floods. With climate change, there is a need to review and recast this treaty in the light of cooperative water use and excess water management during floods. The recast treaty may provide for the diversion of excess flood water in the three western rivers toward Sutlej and Beas, which can be used for storage in Indian reservoirs on these rivers, and India may utilize it for its consumption. The reservoirs on the Indian side have enough capacity to store water deluges of up to 2010 flood levels. On average, these storages are filled up to around 50-55%, and even during the rain outburst of 2010, these reservoirs were filled up to 76% capacity (Irshad, 2022). India reported little or no damages in 2010 in comparison to the catastrophe that hit Pakistan. Similarly, during water-scarce months in Pakistan, water can be obtained from Indian reservoirs, on terms of mutual benefit. Water may be treated as a tradable commodity, and a ledger or water registry may be maintained to account for transboundary water movement.

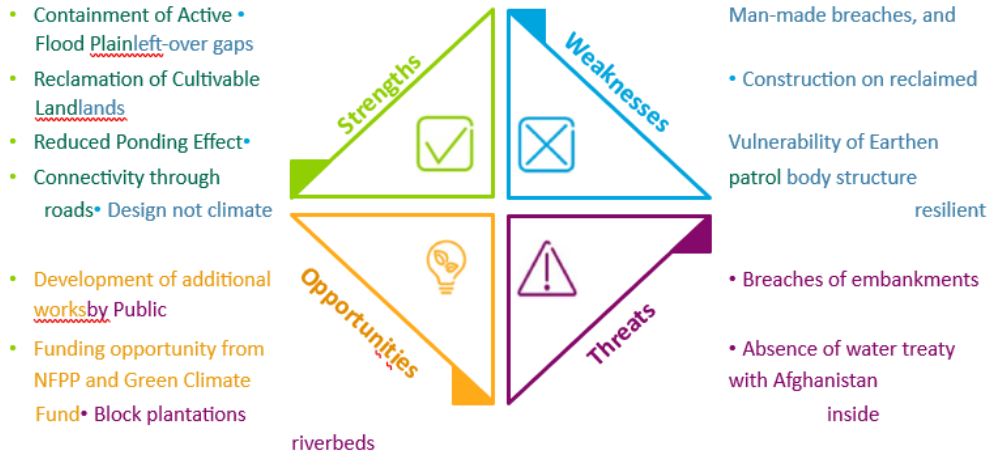
Dispute Resolution

From the perspective of humanitarian security and economic considerations, the Indus water basin is more crucial to Pakistan than to India. According to BATNA/WATNA Negotiation theory, a negotiated settlement is possible when there is an overlap between both parties' range of acceptable outcomes – i.e., the Zone of Possible Agreement (ZOPA). If the range of outcomes from both parties is large, it is easier to reach an agreement. However, in the current context, a major barrier to negotiations is the small range of possible outcomes acceptable to both parties. An effective negotiation strategy is to develop a larger range of possible outcomes by focusing on each party's interests and not positions and identifying an overlap in each party's ZOPA to advance negotiations.

To address mutual disputes, Article IX of the IWT talks about mechanisms to settle questions, differences, and disputes over hydro infrastructure projects.

Unfortunately, at many times, the provisions to resolve disputes have been used to halt the other's project. Successful negotiations will help establish a strong foundation for building a sustainable transboundary water management institution. The structural inflexibility of the Treaty does not encourage the riparian states to collaborate and build mutual trust for the common good. Instead of contemplating abrogation or finding faults with the IWT, both states can explore avenues for mutual benefits. Article VII of the Treaty talks about 'future cooperation' and conducting joint studies and engineering works to benefit the people living in the catchment area of the Indus, which has not been utilized to its full potential.

SWOT-EETH Analysis of Embankments Along Indus River



Strengths

1. **Containment of Active Flood Plain:** The embankment now defines the active flood plain, containing the river's spread and defining its boundary. It has played an instrumental role in reducing the spread and severity of flooding. The lower geographical spread and reduction in damage occurring in 2022 corroborate this strength of the embankment.
2. **Reclamation of Cultivable Land:** The construction of the embankment has reclaimed around 42,747 acres of cultivable land, enabling cropping on this reclaimed land.
3. **Reduced Ponding Effect:** Due to the construction of embankments on both sides, the floodwater does not get stagnant in the form of ponds – the "ponding effect." The presence of walls on both sides increases water velocity, thereby enabling quicker drainage of floodwaters.
4. **Connectivity through Patrol Roads:** Canal patrol roads are constructed atop wider portions of the embankment, thereby providing connectivity to the populations on the sides.

These strengths can be enhanced by building climate change-resilient embankments at the remaining vulnerable portions of the river. Furthermore, subsequent development funding may be utilized to raise the height of these embankments in light of the latest high water mark levels recorded.

Weaknesses

1. **Man-Made Breaches and Gaps:** Despite the construction of a lengthy embankment, gaps still exist, either due to land disputes or because of uncovered tributary openings. Moreover, man-made breaches by the local population also weaken the strength and effectiveness of this flood

protection infrastructure.

2. **Construction on Reclaimed Lands:** With the construction of the embankment, different structures have cropped up in the reclaimed land, in violation of river laws. This makes them susceptible to damage, even during moderate flooding.
3. **Vulnerability in High Floods:** This embankment is an earth-filled structure with stone pelleting on its face. With repeated flooding, the facing of the embankment is vulnerable to damage, which may expose the underlying earthen body.
4. **Non-Incorporation of Climate Change Resilience in Existing Design:** This embankment was planned and constructed soon after the 2010 floods, and at that time, the elements of disaster resilience were not incorporated into the design. Vulnerability due to rapidly changing climatic conditions has increased since then.

These weaknesses can be eliminated through a mix of legal and administrative measures. Legal measures to prevent construction in active flood plains and reclaimed lands include restoring the institution of canal magistrates and enforcing river laws using mechanisms provided in the removal of encroachment legislation. Administrative measures include improving the designs of embankments by incorporating elements of climate change resilience.

Opportunities

1. **Development of Additional Works:** There is an opportunity to construct additional works of 58 km, raising the height of the existing wall up to 24 feet, and strengthening the embankment to make it adaptable to climate change.
2. **Funding Opportunity from NFPP and Green Climate Fund:** There is now an increased focus on the water sector and flood mitigation. The 4th NFPP provides an opportunity to access funding for additional associated works on this embankment. Similarly, with increased donor interest, there is an opportunity to access resources from the funding pipeline of the $100 billion global Green Climate Fund.

The pipeline of projects to be proposed for funding under the $100 billion global Green Climate Fund is expected to open for Pakistan in 2024. For this purpose, the Asian Development Bank and United Nations Development Programme are assisting governments in developing sound project proposals to secure maximum funding. We need to take advantage of this opportunity and dedicate departmental wisdom to the task to secure maximum grant financing for Pakistan.

Threats

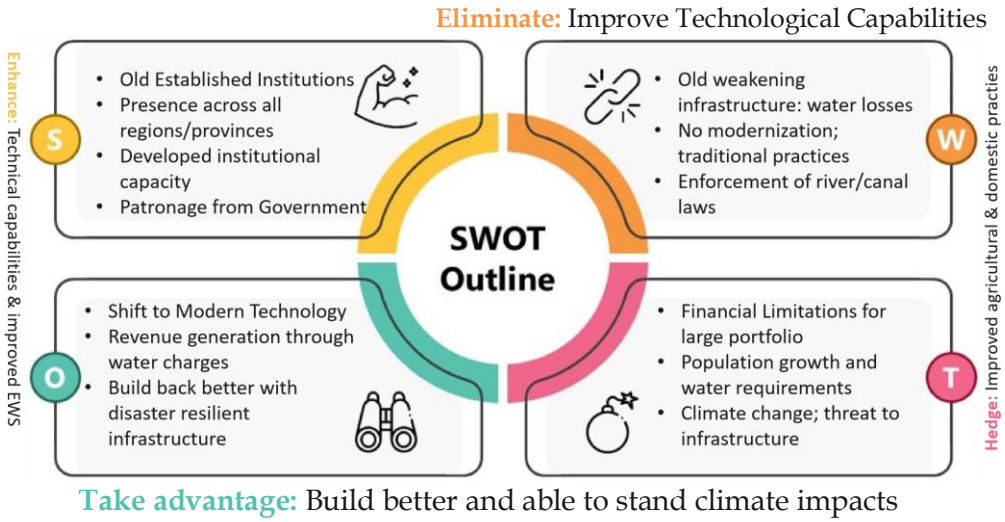
1. **Breaches of Embankment by the Public:** The local population tends to breach the embankment to address their local issues, such as accessing grazing areas or cattle movement. Any small gap is likely to provide an

opening for water to flow into adjacent lands.

2. **Absence of a Water Treaty with Afghanistan:** Unlike with India, there is no water accord or transboundary water treaty with Afghanistan. Any deluge in the River Kabul cannot be effectively addressed without coordination with Afghanistan.
3. **Block Plantations Inside Riverbed:** Recently, there has been an increased focus on block plantations in and around riverbeds, where public land and an easy supply of water are available. These plantations constrict water flow, thereby increasing the chances of water spilling over the embankment.

The threats can be mitigated by modifying national and provincial tree plantation programs to avoid block plantations inside active flood plains. Instead, linear plantations along riverbanks should be encouraged. This will result in the dual benefit of stabilizing the reclaimed land and embankments, while developing a natural barrier to prevent water from spilling over into adjacent settlements.

SWOT-EETH Analysis Of Provincial Irrigation Deptts



Strengths

1. **Old Established Organizations:** Almost all the provincial irrigation departments (PIDs) are long-established, pre-partition organizations with strong legal foundations. These organizations have established systems, practices, and organizational cultures, which enable them to execute large water sector infrastructure projects successfully.
2. **Countrywide Presence:** All federating units have functioning departments of hydrology and irrigation. These departments provide province-wide geographic coverage of most water bodies, a presence of

irrigation staff and outposts for information gathering and regulation, and other infrastructure for water management.

3. **Developed Institutional Capacity:** As long-established organizations, PIDs have developed their institutional capacity over time. Most of the organizations are well-resourced with qualified personnel and physical assets. These departments have long institutional memory, archived repositories of historical records dating back up to 100 years, and institutional practices are deeply ingrained in their organizational culture.
4. **Patronage from Governments:** Irrigation departments usually receive priority in the allocation of development funds. In KP, the allocated share for the water sector was 8% in the 2021-22 ADP (Rs. 16.5 billion) and 16% of the 2021-22 PSDP (Rs. 90.5 billion). Furthermore, irrigation, being indispensable for agriculture and human consumption, often receives strong support from legislators and governments, ensuring ownership of irrigation department projects and issues.

The strengths of PIDs can be enhanced by leveraging government patronage to augment their technical capabilities through a complete and gradual transformation from manual data collection practices to digital early warning systems. In addition to developing new structures, an adequate share of development funding should be allocated toward the continual maintenance and strengthening of older existing infrastructure.

Weaknesses

1. **Old Weakening Infrastructure:** Much of Pakistan's irrigation infrastructure has exceeded its useful life and is weakening after enduring repeated flooding over decades. Additionally, due to canal breaches, silting of dams and barrages, and weak enforcement capabilities of PIDs, inefficiencies have crept into the distribution network, reducing its storage and diversion capacity. This limits its ability to control flood deluges.
2. **Slow Pace of Modernization:** PIDs are still employing traditional practices for water management. Hydrology data is still being collected by human gauge readers at 137 gauge-reading stations and communicated using ad-hoc telecommunication methods, without any real-time radio network. This affects the reliability of data, which is prone to human error. Most canal closures and diversions are manually operated, and major canals are unlined, resulting in water losses of up to 50%.
3. **Enforcement of Water Laws:** Since the abolition of canal magistracy, the

enforcement of water laws, primarily the Rivers Ordinance of 2002 and the Canal & Drainage Act of 1873, has weakened. Encroachments have cropped up in river basins, and water bodies are being constricted, especially in mountainous areas.

The existing weaknesses of PIDs can be addressed by embracing technology. Procurement of modern digital equipment and software systems for asset management, process re-engineering, and data collation, as planned under the 4th NFPP, is a step in this direction. The restoration of the institution of canal magistracy will empower PIDs to enforce canal and drainage laws and prevent encroachments.

Opportunities

1. **Shift to Modern Technologies:** With increasing water requirements due to population growth, there is an ever-growing need to improve the efficiency of the water distribution network. This can be achieved through the adoption of modern technologies, such as replacing manual gauge readers with telemetry-based Early Warning Systems (EWS), and gradually replacing old manual canal gates with hydraulic electro-mechanical gates.
2. **Revenue Generation through Water Charges:** Currently, most operational and developmental expenditure on the water sector is funded through public sources, with very little revenue generation from internal sources. The FoDP has recommended increasing the current rate of Rs. 120/acre to at least Rs. 1500/acre. This would generate an annual revenue of Rs. 60 billion, which can be used for the rehabilitation and improvement of irrigation infrastructure without burdening public budgets. Other avenues, such as a cess on sand excavation and commercial activities around rivers, could also generate additional revenue.
3. **Build Back Better Damaged Infrastructure:** Recent floods have caused widespread damage to water infrastructure, estimated at Rs. 168 billion across the country. This presents an opportunity to rebuild the damaged and dilapidated infrastructure using new, disaster-resilient designs that incorporate climate adaptation elements.

While flood disasters have debilitating impacts on irrigation infrastructure, PIDs can take advantage of this opportunity to rebuild damaged structures with resilience in mind. Furthermore, the entire flood protection regime is currently funded through public resources, which presents an opportunity to treat water as a service and commodity, charging service fees to help fund these works.

Threats

1. **Financial Limitations for a Large Portfolio:** The need to rebuild the damaged infrastructure across the country stands at a staggering Rs. 168 billion (PDNA, 2022). Furthermore, according to the 4th NFPP, an additional investment of Rs. 178 billion is required to execute the proposed flood protection works and non-structural measures. Fiscal resources are finite, and without a workable revenue generation plan, it will be difficult to meet such costs through public sector funding alone.
2. **Population Growth and Increasing Water Requirements:** With an ever-increasing population, water requirements are rising, while water availability per capita is simultaneously decreasing. This will place enormous stress on the available water resources and the irrigation infrastructure. PIDs need to collaborate with agriculture departments to introduce modern water-conserving techniques such as drip irrigation, land leveling, rainwater harvesting, and watercourse lining.
3. **Climate Change and Threat to Infrastructure:** Climate change is a real and growing threat, likely to trigger floods with increasing frequency and intensity. The weak and dilapidated irrigation infrastructure is at increased risk, as it is the primary structure exposed to flood deluges.

The looming threat of water scarcity can be mitigated by introducing modern agricultural practices, such as drip irrigation, land leveling, and watercourse lining, while improving water consumption habits among the population. Responsibility toward the environment and the sustainable use of natural resources must be the foremost strategy to counteract the impacts of climate change.

Gap Analysis

Based on our study and the analysis of institutions, flood protection works, and coordination mechanisms, a gap analysis has been conducted across four dimensions: organizations, direction, process, distribution and spread, and technology:

Area under Consideration	Organizations involved in management of water flows	
Specific Area under Consideration	Coordination mechanism between federal, provincial and district level government agencies towards management of water flows generally and during floods	
Desired State	**Current State**	**Action Steps**
- FFC to be the lead coordinating agency for management of floods countrywide - All agencies incl. IRSA, NDMA, and WAPDA to operate under the supervisory umbrella of FFC during flood season - Broad based composition of FFC, represented by all provinces, relevant organizations, and headed by Federal Minister for Water	- Multiple agencies with scattered responsibilities and overlapping of functions - FFC only with a passive role in flood management: digression from stated role - RMCs with ultimate decisionmaking authority to control water discharge at reservoirs - Collection/Compilation of hydrology and rainfall data fragmented amongst four levels of organizations - Sharing of minimal required information on water levels by India through PIWC.	- Legislation to effect the changes in composition, and role of FFC - Updation of guidelines/SOPs of RMCs - Mass community awareness drives for populations residing close to active flood plains. Rs. 30 million allocation in 4th NFPP for flood related workshops. - Development of integrated software system for sharing of real time information amongst agencies - Rs. 1.3 billion allocations under 4th NFPP for capacity building of institutions engaged in flood management - Rs. 50 million allocation for training

Resources - Integrated data management from all provincial irrigation deptts, and EWS of WAPDA, PMD, and PIWC		of computer staff of PIDs, WAPDA

Area under Consideration	Business Process: Geographic distribution and effectiveness of flood protection works	
Specific Area under Consideration	Embankments in the Indus River System, including Kabul and Swat Rivers, their spread, need, and their role in minimizing damages to human settlements	
Desired State	**Current State**	**Action Steps**
- Planned construction of embankments and other flood protection works to cover other vulnerable areas	- 6,820 km of embankments built around major rivers in Pakistan - 352 km of embankments in KP	- Construction of 582 schemes worth Rs. 91 billion proposed under 4th NFPP - Construction of flood management structures across hill torrents costing
- Extension of Nowshera embankment by further 58 km, totalling 163 km - Standardized disaster resilient designs for embankments - Flood valve gates at all 23 tributaries falling into main rivers	- Arbitrary determined height of 6 feet above high water marks - Varying designs and strengths, owing to construction over different periods of time - Existing length of Nowshera embankment = 105 km - 3 flood valve gates installed.	- Rs. 26.3 billion under 4th NFPP - Wall raising from existing 20 feet to 24 feet. - Strengthening of existing embankment through climate resilient design. Project planned for *Rs. 14 billion*. In first phase, water carrying capacity to be increased till 320,000 cusecs

Increased water carrying capacity of river Kabul from present 281,000 cusecs to 350,000 cusecs		- Project worth Rs. 71 million for installation of 20 remaining gates

Area under Consideration	Business direction of Indus Water Treaty	
Specific Area under Consideration	Indus Water Treaty, and its impacts on water security and flood management for both riparians, and establishing similar arrangements with Afghanistan	
Desired State	**Current State**	**Action Steps**

- Cooperation between India and Pakistan on water flow management, preventing adverse impacts on communities from both sides - Conservation and development of water resource in Indus River Basin. - Fighting the effects of Climate Change - Dependable and transparent dispute resolution mechanism	- The treaty approaches water management through the lens of dispute prevention and resolution than mutual collaboration - Adversarial rather than supportive relationship between riparians - Water Security of both states under stress - Weak enforcement mechanism, and moderately strong dispute resolution mechanism	- IWT to be reviewed, renegotiated, and recast between riparians - Third part assessment of demands and capacities on sides of the border - Joint monitoring, forecasting, and collaborative early warning system by sharing rainfall data at catchment areas, weather prediction for mutual benefit - Access to barrage/reservoir level, and periodic seasonal visits of Indus Commissioners - Setting up of Water Registry/Ledger and nominating a neutral guarantor - As a first step, commencement of
		negotiations with Afghan government for sharing of hydrology information. - Mutually agree on environmental protection measures, and water conservation approaches

Area under Consideration	Technology employed in Early Warning Systems
Specific Area under Consideration	Deployment of technology-based solutions for collection of hydrology data, weather information and its dissemination in real time

Desired State	Current State	Action Steps
- Country wide coverage of digital telemetry based real time Early Warning System - Accurate prediction of floods - Unified data compilation and issuance of flood advisories	- Old radars, and manual data collection systems - Hydrology data collection partially through manual gauge stations, and partially through telemetry systems - Incompatibility between different systems - Data collected/compiled from multiple sources and organizations - Current density of observatories lower than WMO standards	- Upgradation of existing radars of PMD - Installation of 27 no telemetric rain gauges - Establishment of four more flood early warning centers. - Improvement of density by installation of 39 no. radio sounding stations. - Cost allocation of Rs. 4.2 bn made in 4th NFPP - Inclusion of catchment area upstream Tarbela dam. - Rs. 300 mn reserved for metrological studies

Conclusion

Recurring floods in Pakistan have debilitating impacts on the economy and the lives of its people, which over time have necessitated the presence of specialized institutions to manage various aspects of flood management. These institutions actively coordinate on these aspects, particularly regarding water flow management, and the collection and sharing of information for flood forecasting. We observe that there is overlap in the mandates and practices of these institutions, along with the generation of multiple advisories and predictions by them. It is also observed that information is gathered by many institutions simultaneously through multiple and often

mutually incompatible methods, ranging from manual gauge reading to digital telemetry solutions. This renders these forecasts susceptible to inaccuracies and delays.

Additionally, both federal and provincial governments have made significant investments in flood protection infrastructure; however, there is still a vast need for further investments in vulnerable areas. Climate change has further accentuated this need. These investments have yielded positive returns in terms of minimizing both human and material losses. The embankment around the River Kabul, in particular, has surpassed value-for-money calculations in its first operational test during the 2022 floods. Finally, we note that the Indus Water Treaty, concluded nearly six decades ago, initially improved the water security of the country. However, due to the ever-increasing demand for water against dwindling supplies, and the treaty's limited scope of viewing water distribution solely from the lens of dispute resolution, the treaty in its present form has outlived its utility, necessitating its revision to improve water security and flood management for both riparians.

Recommendations

In pursuance of the Pareto Principle, the following recommendations are offered to address key issues identified through different analyses carried out above, along with their Logical Framework Matrices:

1. To reduce the overlap between the mandates of different organizations coordinating on the control of water flows during the flood season, it is proposed that decision-making on this aspect be integrated at the Federal Flood Commission (FFC), giving it the role of the lead agency during floods, in contrast to the existing fragmentation.
2. Explore alternative methods of water management during floods. The current focus is on building walls against water flow. An alternative could be channeling this excess water through barrages and outfall drains.
3. As we have witnessed, extreme weather conditions, specifically flooding, in Pakistan are becoming a recurring phenomenon. To adapt and mitigate such events, we need to invest in climate-resilient infrastructure. Currently, we have constructed 6,820 km of flood embankments along the entire Indus River Basin with varying designs and specifications. The 4th NFPP provides an implementation plan to strengthen the current embankments and further develop flood protection infrastructure. Given the emergent needs for flood mitigation, federal and provincial governments need to allocate at least 10% of their development portfolio for the cause, as recommended by the National Water Policy of 2018.

4. Arbitrations on the Kishanganga project in India recommended the appointment of a neutral expert to assess the design flaws. Pakistan has so far resisted this suggestion and vows to approach the International Court of Justice against the arbitration. However, the suggestion of a neutral expert should be accepted, as any other adjudicating forum is likely to issue findings before deciding on our petition.
5. As previously highlighted, the Indus Water Treaty needs to be recast into an agreement for cooperation between Pakistan and India on the issues of climate change and addressing growing water scarcity. Viewing the IWT through the lens of dispute resolution has rendered the treaty only partially effective in the wake of growing challenges.
6. There is a need to develop an integrated Early Warning System (EWS), with geographic density as per World Meteorological Standards (WMO), as recognized by the FFC in its 4th NFPP. At present, multiple agencies collecting identical data result in inaccuracies and delays. The proposed system should rely on interoperable telemetry tools, feeding data in real time onto an internet-enabled portal that can be accessed by all stakeholders. A relevant example to emulate is the Flood Damage Assessment Portal established by the Performance Management & Reforms Unit in Peshawar.
7. At present, there is resistance to charging water fees from consumers, and political will is lacking. The entire irrigation and flood protection infrastructure is developed and maintained through only public funds or international loans. Water needs to be treated like any other service and commodity (such as electricity or gas) and should be adequately charged to recover some of the operational costs and bring sustainability to the investment plan. The FoDP suggests that Rs. 60 billion in revenue could be generated alone by revising the water rate to Rs. 1,500 per acre per year, up from the existing Rs. 120 per acre. The total portfolio recommended for construction in the 4th NFPP is Rs. 194 billion, which could be met from the revenues of just three years.

Problem: Lack of coherent coordination among agencies responsible for water flow management					
Risks and Assumptions	**Input**	**Activities**	**Outputs**	**Outcomes**	**Impact**
Political power dynamics can compromise consensus Multiple agencies with scattered responsibilities and overlapping of functions FFC only with a passive role in flood management: digression from stated role	Political capital and will Training of Staff Research study to optimize the coordination model	Legislation to effect the changes in composition, and role of FFC Updating of guidelines/SOPs of RMCs Development of online data portal linking up relevant agencies	All agencies incl. IRSA, NDMA, and WAPDA to operate under the supervisory umbrella of FFC during flood season Broad based composition of FFC, represented by all provinces and relevant organizations, to be headed by Federal Minister for Water Resources Integrated data management from all public agencies	Improved Coordination mechanism between federal, provincial and district level government agencies for water flow management Unit of command to decide on water flow management	Timely decision making enabling reduction in debilitating impacts of floods

Problem: Minimal water charges on domestic usage and agriculture					
Risks and Assumptions	**Input**	**Activities**	**Outputs**	**Outcomes**	**Impact**
No political will Lack of robust collection mechanisms for water charges (*abianas*) Resistance by the public and farmers	Political will and capital Stakeholder management Mapping of water users digitially	Revision of necessary legislation and government policies Metering of water like electricity and gas in large cities Introduction of new water rates for irrigations	Generation of sustainable revenues through water charges	Incentivize to conserve water Improved public investment in flood protection through revenue generations	Creating of a cycle of sustainable public investment and revenue generation leading to better adaptation and mitigation of floods

Problem: Lack of proper utilization of Indus Water Treaty for cross-border coordination in event of floods and addressing water security of the region					
Risks and Assumptions	**Input**	**Activities**	**Outputs**	**Outcomes**	**Impact**
Politically sensitive negotiations Agreements subject to mutual consensus and international guarantors External factors like wars and terrorism can derail cooperation Lack of trust between countries	Political will and capital Technical Human Resources Stakeholder Management Negotiation	Take up the pending disputes as per India's request to Neutral Expert for decisions Discussion to revisit the treaty between the two commissioners	Implementation of Kishenganga Decision in 2013 Process of appointment of neutral expert begins A recast treaty with elements of addressing water scarcity and effects of climate change.	Improved crossborder water management Cooperation to address issues of water excess during flood season, and water scarcity in dry season	Improved water security for Pakistan allowing for better utilization of water and related information through the cooperation

Problem: Incompatibility of water related data between different entities and lack of integrated usage of technology to gather data on water levels					
Risks and Assumptions	**Input**	**Activities**	**Outputs**	**Outcomes**	**Impact**
Asymmetric uptake and understanding of technological solutions; Hydrology data collection partially through manual, and partially through telemetry systems Old radars Traditional methods of data collection by PID makes data unreliable	Political will and capital Financial Resources. Allocation of Rs. 4.2 bn for equipment in 4th NFPP Rs. 300 mn for metrological studies Stakeholder management Trainings	Upgradation of existing radars of PMD Installation of 27 no telemetric rain gauges Establishment of four additional flood early warning centres Installation of 39 no. radio sounding stations Inclusion of catchment area upstream Tarbela dam	Accurate forecasting through upgraded radar systems Improved rain and water flow measurements Accurate and timely early warnings Improvement of density of weather stations increasing the accuracy of weather models	Improved technological solutions for realtime collection and dissemination of data on hydrology and weather, enabling lead time to disaster response agenices	Better response and coordination in managing the disaster

Problem: Development of climate resilient flood protection Infrastructure to manage flooding impacts					
Risks and Assumptions	**Input**	**Activities**	**Outputs**	**Outcomes**	**Impact**
Availability of fiscal resources Existing embankments could be weak & would necessitate reconstruction Breaches of embankments by local public Continued encroachments in river basins, and water bodies	Financial Resources (Rs. 194 bn, PSDP) (Rs. 14 Bn, ADP) Rs. 71 Mn for Flood gates Technical Human resources Planning Capabilities	Construction of 582 schemes proposed under 4th NFPP Construction of flood management structures across hill torrents under 4th NFPP Strengthening of existing embankments through climate resilient design Installation of 20 remaining flood valve gates	Flood embankments at additional 58 Km around Kabul River Flood management structures across hill torrents worth Rs. 26.3 Bn Robust and climate resilient embankments Increased water carrying capacity till 320,000 cusecs	Strengthened embankments on the Indus River System, including Kabul and Swat Rivers, as a flood protection measure	Better protection from devastating impacts of floods, saving previous lives, crops and public infrastructure

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Critical Evaluation of Evacuation Drives and Related Security Issues during the Recent Floods

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Abstract:

The 2022 floods in Khyber Pakhtunkhwa (KP), Pakistan, resulted in widespread devastation, affecting approximately 33 million people, with significant loss of life and property. Despite the coordinated efforts of the Provincial Disaster Management Authority (PDMA), Rescue 1122, and local police, evacuation and rescue operations faced critical challenges, including poor planning, inadequate early warning systems, and resource limitations. These deficiencies contributed to 311 deaths and 381 injuries in KP. The study highlights the lack of proactive preparedness and the unequal distribution of resources among districts, which exacerbated the crisis. Moreover, security concerns during evacuation, resistance from affected populations, and gaps in governance were significant obstacles. This paper recommends both short-term measures, such as improved early warning systems and resource allocation, and long-term solutions, including merging disaster response agencies and establishing dedicated storage facilities for relief items.

Key words: *Floods, Evacuation, Disaster Management, Early Warning Systems, Khyber Pakhtunkhwa*

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Introduction

From June to August 2022, torrential rains and a combination of riverine, urban, and flash flooding led to an unprecedented disaster in Pakistan. According to the National Disaster Management Authority (NDMA), around 33 million people, or one in seven, have been affected by the floods, including nearly 8 million displaced. The floods have claimed the lives of more than 1,700 people, one-third of whom were children (MOPD&SI, 2022).

Disaster management in KP has organized structures in the form of PDMA, Rescue 1122, and the Police. In emergency cases, the authorities concerned evacuate the population from damaged or vulnerable areas and transfer them to more secure locations to temporarily shelter them until all restoration has been completed. However, evacuation and rescue processes may vary depending on the place, time, nature, type, and magnitude of the disasters, as well as the degree of danger to life and property. To ensure the success of these two processes, there must be full cooperation between the population and the authorities concerned.

Historically, evacuation has been the conventional approach to flood safety. However, evidence presented in this paper suggests that safe evacuation or movement in flood-hit areas has also encountered numerous obstacles. These can be characterized by poor planning, weak early warning systems, capacity issues, lack of preparedness, security-related concerns, and, above all, resistance from people to leave their belongings. Despite these challenges, the concerned departments made every effort to secure human lives and minimize losses. For those who were stranded in flood-hit areas, rescue operations were carried out with the collaborative efforts of Rescue 1122, PDMA, and District Administration.

Statement of the Problem

Evacuation during disasters like floods is of paramount importance for safeguarding human lives and property. However, in developing countries like Pakistan, many precious lives and properties are lost during floods. Therefore, it becomes imperative to critically examine the evacuation efforts and related security issues, particularly during the recent floods of 2022 in KP, and to provide recommendations for effective rescue and evacuation operations in the future.

Scope of the Research

This study aims to analyze the existing policy framework regarding the evacuation drive, particularly during the 2022 floods in KP in general, and in flood-hit districts in particular (Charsada, D.I. Khan, Nowshera, Swat, and Tank). It will evaluate the mandate, capacity, preparedness, and the role played by the Police, Rescue 1122, and the District Administration during the evacuation drive. The study will also analyze international best practices regarding flood evacuation. After applying analytical tools, a way forward will be proposed to improve the management of rescue and evacuation activities during floods.

Literature Review

Recent flash floods in Pakistan were due to climate change, and such floods are expected to become much more frequent in the future. The floods generate economic, environmental, and social effects that need to be mitigated by addressing the floods and preparing methodologies for the evacuation of people and movable property from affected areas. The evacuation planning for floods aims to minimize fatalities and material losses. Crucially, this type of planning requires a well-defined, optimal evacuation policy for people and households within flood hazard areas. In addition, evacuation modeling is particularly important for authorities, planners, and other experts managing the evacuation process, as it allows for the relocation of evacuees to safe zones (Stefańska, 2022).

Evacuations are always costly for communities, and that cost should be included in a balanced flood risk management assessment. Additionally, it is necessary to roughly calculate the duration of the evacuation operation, which may be estimated by considering the time needed to warn the population in the area, the time required to move vehicles along the road, a firm prediction of flood intensity, the time needed to mobilize resources, and the time a community will take to comprehend and respond to the warning. The estimated time for each of these activities in the evacuation operation can be determined by experience, test exercises, or sampling (Stephen, 2010).

In the context of previous earthquake and flood disasters in Pakistan, the federal government established the National Disaster Management Authority under the NDMA Act of 2010. Subsequently, as per the provisions of the NDMA Act, the provincial governments established Provincial Disaster Management Authorities under their respective PDMA Acts with the objective of countering disasters (NDMA, 2010).

Research Methodology

For this study, qualitative research methods have been used, relying on both primary and secondary data. For primary data collection, personal interviews with government officials were conducted. An online evacuation and security survey was conducted with 39 affectees (Annex-A), and another survey on security-related issues was completed by 97 affectees (Annex-B). Moreover, a survey on capacity and preparedness was carried out with 23 government officers from PDMA, Rescue 1122, and District Administration Departments (Annex-C). Secondary data was collected through internet sources. However, no data could be acquired from the Police, as they have not maintained any data on rescue and evacuation activities.

Organization of the Report

This study is divided into four sections. The introduction is followed by the statement of the problem, scope of the research, review of literature, and research methodology. Section I explains the situational analysis and identifies legal and institutional provisions and policy gaps that hamper the capacity and preparedness of the stakeholders. Section II critically examines the performance of various institutions during the 2022 floods. Section III outlines some of the world's best practices and lessons learned. Section IV analyzes the results of surveys conducted online, followed by the conclusion and recommendations.

Critical Analysis

In KP province, seventeen (17) districts were calamity hit during recent floods, around 4350490 populations was directly affected, having 306 human losses including Male-149, Female-41 and Children-116, 369 injuries were reported (Male-156, Female-79, and Children-134), 21328 livestock losses and 91463 HHs damages, in which 37525 HHs were Fully-damaged (FD) and 53938 HHs were Partially damaged (PD). Moreover, 1,575 KM of road infrastructure has been inundated, 107 bridges collapsed in the floods (Isl22).

Legal Analysis

Critical Analysis of NDMA Act, 2010

The National Disaster Management Act, 2010 provides legal foundation to all disaster management activities. Main sections of the NDMA Act relevant to preparedness, rescue and evacuation are highlighted and critically evaluated as under:

Relevant Section	Description	Critical Analysis
16 (2) (e)	Evaluate preparedness at all governmental or non-governmental levels to respond to disaster and to enhance preparedness.	✓ No periodic evaluation of preparedness of departments ✓ No evaluation of lessons learnt
16 (2)(h)	Promote general education, awareness and community training for disaster management	✓ No public awareness campaigns regarding disaster mitigation are carried out at governmental level ✓ Mock exercise was carried out only at Nowshera, Otherwise no community training is imparted at all.
16 (2)(k)	Examine the construction in the area and if it is of the opinion that the standards laid down have not been followed, it may direct for following the same to secure compliance of such standards	✓ Weak regulatory mechanism in place. ✓ The concerned govt organs like TMA, LGs don't take cognizance of illegal buildings, construction in the vulnerable areas. ✓ Wash away of Honey Moon Hotel in Kalam is a glaring example of violation of this provision.
17(2)	The Provincial governments are bound to prepare Provincial Disaster Management Plans	✓ Contingency plans are prepared in black and white at provincial and district levels. However, these plans are not implemented in true letter and spirit. ✓ There is no third party validation to check whether the guidelines of contingency plans were followed or not.
17 (3)(a-f)	States regarding, deification of vulnerabilities, preventive measures, capacity building and preparedness of departments	✓ For all practical purposes no preventive measures are taken in advance of monsoon floods. For instance, every district contingency plan provides for clearance and encroachment removal from all major drains and nullahs in the district. However, drains and nullahs are not at all cleared before monsoon.

		✓ Encroachments are not removed timely from rivers, canal banks. ✓ Although NIDM is mandated to provide capacity building trainings on disaster management at district level. However, it was revealed during this research activity that not even a single training was received by any of the officer of district administration/Rescue 1122/Police for disaster management.
17 (4)	The provincial plans shall be reviewed and updated annually.	✓ It is followed.
18 (1)	Each Provincial Government shall, as soon as may be after issue of notification under sub section 1 of section 13, by notification in the official gazette, establish a District Disaster Management Authority for every District	✓ This provision of NDMA Act provides for establishment of District Disaster Management Authority for every district. Whereas, the PDMA has set up only make shift/ad-hoc arrangement in the form of DDMUs and additional charge is given to ACs, under the administrative control of DC. Moreover, no financial autonomy has been provided to DDMUs.
18(2)	Composition of DDMA Committee was elaborated	✓ Since no DDMA has been established so far, therefore this provision has not been fulfilled at all.
20 (2)(k)	Set up, maintain, review and upgrade the mechanism for early warnings and dissemination of proper information to public.	✓ Existing telemetries are not sufficient to effectively and accurately generate alerts for flood emergency.
20 (2)(p)	Establish stock piles of relief and rescue material or ensure preparedness to make such materials available at the short notice.	✓ Standardized warehouses are not established at provincial/district levels. ✓ Centralized purchasing of relief material at provincial level hinders the effective preparedness at district level. ✓ Districts can only buy relief material once emergency is declared.

PDMA Rules of Business 2013:

The Rules of Business of PDMA 2013 are framed in pursuance of NDMA Act 2010. A critical analysis astonishingly revealed that;

i. PDMA- ROB are silent on the vital areas of rescue and evacuation.
ii. No Provincial Act is framed yet for PDMA and relief department of KP. PDMA and all the allied DDMUs are functioning under PDMA-ROB.
iii. The Rule 9 (2) (h) states the role of Office of Media and Public Relations, however, it is less focused on awareness to masses regarding the disaster management.
iv. Rule 10 (1)(i) states decision of provincial authority is mandatory regarding expenditures out of provincial disaster management fund and other resources of provincial authority. However, the efficiency and effectiveness of any rescue operation is highly hampered because of this provision in the ROB.

The Rule 9 (2)(c) pertains to relief, operations and coordination wing. Major responsibilities of this wing are as follows;

i. Provincial emergency operation center and early warning
ii. Warehouse and frequently stockpiling needed emergency relief goods
iii. Identification of frequently needed relief items
iv. Coordination with national authorities, line departments and NGOs
v. Preparation of plans (provincial plans and contingency plans)
vi. Coordination and provision of relief to disaster affecters
vii. Camp management

Critical Analysis of the KP-Rules of Business of PDMA, 2013

NDMA Act 2010	ROB-PDMA 2013
Section-18 (1) states, " Each Provincial Government **shall**, **as soon as** may be after issue of notification under sub-section (1) of section (13), by notification in the Official Gazette, **establish a District Disaster Management Authority** for **every** District"	Rule (3) states, "The Provincial Authority **may**, where government **so directs**, establish **Divisional** and **District** offices at such places **as may be required**.

Institutional Analysis

ToR (a) Carry out situational analysis, capacity and preparedness of Police, Rescue 1122 and district administration for evacuation and emergency security issues in situations like recent floods in KP

ToR (b) Carry out critical analysis of the role played by Police, Rescue 1122 and district administration in providing security to the people and protecting their properties in floods hit areas in KP.

Mandate, Preparedness and Role Played by District Administration

Mandate

- Preparation of contingency plans in consultation with all stakeholders with the assistance of DDMU
- Announcement and dissemination of flood alerts
- Coordination with all stakeholders regarding operational activities during emergency
- Establishment of emergency control room
- Supervision of rescue operations and evacuation of the flood affecters
- Provision of financial and other support to Resuce-1122
- Identification of suitable sites, establishment and management of relief camps
- Provision of relief items (FI and NFI) at camp sites
- Ensure security of relief camps

Capacity & Preparedness of District Administration

Relief Items	Tents	Blankets	Mattress	Quilts	Search lights	Mosquito Nets	De-watering Pumps
All Districts	6968	10401	3463	9397	641	8691	20

Source: Moonsoon Contingency Plan Report of KP, 2022

Position of Relief Items in flood hit Districts in KP

Districts	Tents	Blankets	Mattress	Quilts	Search Lights	Mosquito Nets	De-watering Pumps
Nowshera	98	97	80	0	0	0	0
Charsada	822	24	0	0	60	400	0
Swat	400	0	400	500	0	400	0
D.I. Khan	435	947	474	0	60	2060	0

Tank	140	90	88	0	0	250	0

Source: Moonsoon Contingency Plan Report of KP, 2022

Financial Preparedness-Funds Position

PDMA had placed requisite funds at the disposal of all DCs for untoward emergency during the monsoon season. The total available fund with the districts was Rs. 392.69 Million. Breakup of funds is given below;

Position of Relief Fund in flood hit Districts of KP

Districts	Available Funds (Rs Million)
Nowshera	0.125
Charsada	2.97
Swat	26.99
D.I. Khan	19.96
Tank	19.40

Source: Moonsoon Contingency Plan Report of KP, 2022

Role Played by District Administration during Floods:

Rescue and evacuation Activities in KP

Activity	Numbers
No. of people rescued	69775
No. of people evacuated	406538
No. of people displaced	674318
No. of deaths	311
No. of people injured	381

Source: PMRU-KP Database

Rescue and evacuation Activities in flood hit Districts of KP

Districts	No. of people rescued	No. of people evacuated	No. of people displaced	No. of people injured	Total deaths
Nowshera	20925	67917	62678	0	0
Charsada	21300	183000	183000	21	1
Swat	2481	14000	3220	28	34
D.I. Khan	13500	40000	180000	85	41
Tank	1300	5000	200000		4

Source: PMRU-KP Database

Establishment of relief camps in flood hit Districts of KP

Districts	No. of Relief Camps
Nowshehra	77
Charsadda	32
Swat	10
D.I. Khan	14
Tank	02

Source: Concerned DC Offices

Evacuation of Tourists

3000 tourists were evacuated from Kalam through heli and 27 sorties were conducted.

Mandate, Preparedness and Role Played by Rescue-1122

Mandate

Rescue-1122 provides emergency services in the following areas

i. Pre-hospital medical services
ii. Fire- fighting services
iii. Search and rescue services
iv. Water borne search and rescue

Capacity & Preparedness of Rescue-1122

Capacity of Rescue 1122 at Provincial Level-KP

Equipment	Total
Fiber Rescue boats	52
OBM 75 HP, OBM 40 HP	51
Water rescue Van	13
Life Jackets	972
De-watering pumps	32
SCUBA Sets	53
Life Rings	441
OBM Machine	24
Inflatable boats	72

Swimming suits	138
Search Lights	196
Rescue Vehicles	18
Recovery Vehicles	11
Rescue Ambulances	172
Health Ambulances	329
Generators	54
Water Bowser	41
Masting Tower	16
Excavators	9
Dumper	5

Source: Rescue-1122 Headquarters

Capacity of Rescue 1122 at flood hit Districts of KP

Equipment	Charsada	Swat	Nowshera	D.I. Khan	Tank
Fiber Rescue boats	5	3	5	4	0
OBM 75 HP, OBM 40 HP	5	4	4	5	0
Water rescue Van	1	2	2	1	0
Life Jackets	100	100	12	24	6
De-watering pumps	1	1	2	0	0
SCUBA Sets	3	4	4	4	1
Life Rings	20	50	50	4	4
OBM Machine	2	4	2	1	0
Inflatable boats	3	5	5	4	1
Swimming suits	50	15	10	2	0
Search Lights	20	10	10	0	0
Rescue Vehicles	1	1	1	1	0

Recovery Vehicles	0	1	0	1	0
Rescue Ambulances	1	16	8	9	4
Generators	3	6	4	1	1
Water Bowser	5	3	3	2	0
Masting Tower	1	1	1	1	0
Excavators	1	1	0	0	0
Dumper	1	0	0	0	0

Source: Rescue-1122 Headquarters

Role Played by Rescue-1122 during Floods

People rescued & de-watering activities at Provincial Level

Activity	Numbers
No. of people rescued	2125
De watering of Houses	569
De- watering of Markets	69
De-Watering of Bazars	198

Source: Rescue-1122 Headquarters

People rescued & de-watering activities at flood hit Districts of KP

Districts	No. of people rescued	De- watering		
		Houses	Markets	Shops
Nowshera	32	15	5	2
Charsada	128	45	8	3
Swat	636	22	03	29
D.I. Khan	320	65	12	57
Tank	120	50	2	20

Source: Rescue-1122 Headquarters

Mandate, Preparedness, and Role Played by Police

Mandate

- To enhance the effectiveness and timely response to emergencies by adopting result-oriented strategies and coordinating with all stakeholders, especially DDMUs, ensuring timely liaison.
- To inform the inhabitants of flood-affected areas through local police via wireless communication, mobile phones, alarm systems, police mobile patrols, and announcements in mosques.
- To adopt precautionary measures for the protection of affected people, particularly regarding evacuation.
- To ensure the security of relief camps.
- To provide security to NGOs/INGOs in their respective areas during the rehabilitation process.

Capacity & Preparedness of Police

Being a disciplined professional organization, the police were well-equipped and prepared for disaster management during the floods. The police department carried out all the tasks and responsibilities assigned to them by the district administration. The police had sufficient machinery and vehicles at their disposal, such as motor transports, vans, buses, and forklifts, which were used for evacuation purposes during the floods. Good coordination with the district administration, local knowledge, and the professionalism of the police department played an instrumental role in managing the flood evacuation process.

Role Played by Police during Floods

- Maintained law and order and alerted police personnel for rescue services.
- Shifted the rescued/affected people to hospitals.
- Provided easy access to rescue and relief personnel/vehicles.
- Diverted traffic to alternate routes and prohibited overloaded vehicles.
- Ensured the security of NGO and INGO staff.
- Deployed a separate strength of police for the evacuation process.
- Provided appropriate security to relief camps.
- Assisted during immediate rescue, relief, and evacuation operations.

Best Practices in the World

People's Republic of China

During flood emergencies, the Flood Control and Drought Relief Headquarters (FCDHs) take command of flood operations, flood emergency response, and post-flood recovery (Kobayashi, 2012). FCDH is very effective in planning and implementing flood control structural works and developing flood forecasting. The effective flood response is based on:
(a) Effective coordination among all agencies involved in emergency response activities, coordinated by the Ministry of Emergency, which dictates the success of any emergency response operation, guaranteeing minimum overlap of roles and responsibilities and maximum effective utilization of available resources. A focal agency is deployed as the principal coordinating body.
(b) Effective logistics management, which is critical in any disaster situation, helps quickly identify the resources needed, such as the response team, equipment, and commodities, and mobilize and transport people to the right place at the right time. Two major elements to make this happen are:

- **Time assessment and deployment list:** A prioritized list of the most critical resource requirements developed in advance of an event.
- **Movement coordination:** Acquiring transportation services and coordinating the flow of resources in and around the flooded area using the prioritized list; continuously reporting on the movement of all transported resources into, within, and out of the flood area; monitoring the flood's effect on transportation systems and resolving route or destination issues. The level of responsiveness of the community: The more aware the community is of the risks and actions to be taken, the more effective and significant the impact of the emergency response will be.

United States of America

The Federal Emergency Management Agency (FEMA), working under the U.S. Department of Homeland Security, is responsible for programs that take action before and after a disaster to identify risks and reduce injuries, loss of property, and recovery time (FEMA, 2022).

Key activities in flood emergency response are:

Flood monitoring

enables up-to-the-minute flood information at the local level, equipping rescue teams with the tools for efficient execution of real-time emergency operations.

Forecasting and early warning dissemination

generates warning messages that are appropriate and easily understood by the community and the officials performing response activities. These messages are formulated from the real-time situation.

Evacuation operations:

Time is a crucial factor during the evacuation of people to safe areas. Local authorities evacuate areas based on the early warning and latest flood situation. Priority and special care are given to evacuating people who depend on others for mobility due to physical, economic, or social/cultural reasons, such as the elderly, handicapped, and children.

Safe Area and Temporary Shelter Management:

To offer safe areas to flood-affected individuals, prior identification of high-ground areas is regarded as one of the most important activities. Local disaster management authorities manage the transportation of tents, tarpaulins, mobile houses, food, and drinking water to safe areas.

Search and Rescue Operations:

The S&R team is guided by a single command structure, with priority given to the highest vulnerability areas, where rescue posts are established. S&R equipment, such as boats, ropes, floating tubes, and life jackets, is always available.

Australia

National Emergency Management Australia (NEMA) is an Australian government executive agency that helps those affected by natural disasters. It is an agency of the Department of Home Affairs. Its responsibilities span disaster risk reduction, critical incident planning, disaster preparedness, and recovery, as well as crisis and security management (NEMA, 2022). NEMA provides informed oversight and guidance, staying constantly connected with local communities to help them respond and recover.

It prepares flood emergency plans, advocates for communities to remain prepared during emergencies, and guides them on how to recover. NEMA staff across Australia coordinates with communities, shares lessons learned, provides situational awareness, tracks trends in disasters, raises awareness of government services, and gathers community ideas and concepts to inform strategic policy and planning (EMV, 2022). Monitoring and operational coordination include early warning systems, evacuation plans, disaster communications, and public education. The response includes the rehabilitation of affected communities to safer places, quick action in the supply of goods and services like medicine, food, and water, which helps in a quick recovery and limited loss after a disaster.

Lessons Learned from Best Practices

Various benchmarks can be derived from the best practices studied during the exercise to reduce injuries, loss of property, and recovery time during floods. All three countries have developed efficient and accurate flood forecasting, monitoring, and early warning systems that should be replicated in our system. Moreover, effective coordination and logistics movement should be prioritized to avoid overlapping duties/responsibilities and ensure the timely mobilization of response teams, equipment, and commodities. Time is a crucial factor during evacuation, with special care given to the elderly and handicapped. The prior identification of safe areas for temporary refuge during floods should be followed. The community's awareness of the risks they face regarding floods and the actions to be taken is vital for an effective emergency response.

Analysis

ToR (c) Carry out SWOT-EETH analysis of the government structures mandated to evacuate the stranded people and provide optimal security to flood affecters.

SWOT Analysis

Strengths	➢ Strong coordination among stakeholders ➢ Establishment of control room at DC Office ➢ Availability of Contingency plan at District level ➢ Strong ambulance network with 1122 ➢ Established outreach of Rescue 1122 ➢ Effective role of police in mobilizing the masses for evacuation
Weaknesses	➢ Non establishment of DDMA in light of NDMA Act 2010 ➢ PDMA- ROB are silent on the vital areas of rescue and evacuation ➢ No Provincial Disaster Management Act is in place ➢ Lack of evacuation and rescue related equipment's ➢ Non removal of encroachments from river banks, canals and roads ➢ No drive for cleaning of major drains before floods ➢ Poor working of municipals committees at tehsil and district level ➢ No designated flood wings at district levels ➢ No capacity building trainings for rescue staff ➢ No helicopter service is available for rescue ➢ Very Limited boats were available for rescue ➢ Less focus on mobilizing the local communities ➢ Mock exercises were not held ➢ No alternate way of communication due to network failures ➢ No transportation vehicles were available for livestock evacuation ➢ Weak security provisions at the evacuated villages ➢ Less media awareness campaign

Opportunities	➢ Utilization of advanced technologies for rescue and evacuation drive ➢ Organizing the passionate volunteers at UC and VC level ➢ Support of NDMA regarding capacity building and other resources ➢ Inclusion of Pak Army support in the contingency plan ➢ Extension of Resuce-1122 services at all tehsil levels
Threats	➢ Climate change and global warming ➢ Unplanned urban sprawling ➢ Encroachment at river banks ➢ Political interference ➢ No provision of relief funds and relief items on need basis

EETH Analysis

Enhancing the Strengths	➢ Enhancing the effectiveness of control room by including Army representation ➢ Effective implementation of Contingency plan at District level ➢ Increasing number of ambulances at vulnerable districts ➢ Extending and enhancing the outreach of Rescue 1122 ➢ Extending proper mandate of security related issues to police in the contingency plans
Eliminating the Weaknesses	➢ PDMA Act need to be framed with clearly defined roles and responsibilities of stakeholders ➢ DDMA must be established ➢ PDMA- ROB need to be amended to include areas of rescue and evacuation ➢ Provision of required funds/ rescue and evacuation related equipments ➢ Proper cleaning of choked drains and removal of encroachments before moonsoon ➢ Proper trainings of diving and other flood related rescue/evacuation operations ➢ Ensure availability of two heli and sufficient boats, remote control life buoy for rescue activities ➢ Carry out mock exercises, mobilize local communities, proper evacuation and transportation arrangements
Taking Advantage of Opportunities	➢ Use of latest rescue and evacuation technologies ➢ Volunteer force will be available in emergency ➢ Effective coordination and timely response ➢ Adopting best practices in rescue/evacuation areas
Hedging against Threats	➢ Forestation drive ➢ New dwellings plans must be approved by concerned authorities

	➢ Strengthening institutions

GAP Analysis

GAP ANALYSIS		
Area under Consideration	**Legal Gaps**	
Desired State	**Current State**	**Action Taken**
➢ PDMA Act ➢ Establishing full-fledged District Disaster Management Authorities at every district	➢ No PDMA Act ➢ DDMUs with weak mandate and less resources	➢ Provincial Assembly to pass PDMA Act with mandatory provision to establish DDMA
Area under Consideration	**Resources Gap**	
Desired State	**Current State**	**Action Taken**
➢ Helicopters at disposal of PDMA for rescue operations ➢ Availability of required amount of boats, tents and life jackets at disposal of district administration ➢ Large vehicles for transportation of humans and livestock	➢ Helicopters were not available with PDMA for rescue operation ➢ Districts faced shortage of boats, life jackets and tents ➢ Shortage of Large vehicle	➢ Helicopters be purchased by PDMA as soon as possible ➢ Boats, tents and life jackets be purchased ➢ Large vehicles be purchased and placed at disposal of rescue and relief operation teams for disaster activities
Area under Consideration	**Technological Gap**	
Desired State	**Current State**	**Action Taken**
➢ Around 300 telemetries must be installed for early warning system	➢ There are below 30 telemetries installed at present ➢ No system in place at present	➢ Acquisition of required telemetries ➢ To design an application for

➢ Rescue teams should be enable to trace the exact location (coordinates) of people in need of evacuation		evacuation and rescue help
➢ Availability of Real time data (meteorological and hydrological observations) for informed decision making	➢ Conventional means are used for calculating the riverine flood time	➢ DC office must have access of GIS mapping of floods from SUPARCO for real time calculation
➢ Established places like raised platforms near vulnerable villages for safety of humans and livestock at time of crisis	➢ At present there is no such system in place	➢ Develop consensus of stakeholders on the proposal and if agreed, provide funds for the same
➢ Standardized warehousing	➢ Warehouses are made on make shift arrangements	➢ Preparation of PC-Is for construction of standardized warehouses especially at vulnerable districts
➢ Acquire latest technological tools for recue and evacuation activities	➢ Absence of state of the art technologies like remote control life buoy etc	➢ Purchase latest technological tools and train human resource who can operate that technologies

Challenges during Rescue and Evacuation

After carrying out research and critically analyzing the data and applying analytical tools, following issues and challenges were highlighted for effective operations of rescue and evacuation activities during recent floods.

- Mock exercises were not carried out except Nowshera
- Enough boats were not available
- No heli was available at all
- Lack of professional divers
- Required telemetries were not available
- Lack of machinery and heavy vehicles
- No prior announcement was made in many districts
- Evacuation of livestock was a serious issue
- Absence of state of the art warehouses
- Poor medical treatments especially for snake bite and dengue
- Poor performance of civil defense department
- Relief camps were not established at suitable places e.g. Charsada
- Lack of seriousness on part of many district administrations towards weather alerts issued by PDMA prior to the flood

Conclusion

From the aforementioned discourse, it is concluded that the district administration, 1122, and police did their best to cope with the recent floods of 2022 in KP. However, due to serious gaps and issues in the context of evacuation, 311 deaths and 381 injuries occurred in KP. Apart from Nowshera, the rest of the districts were not prepared in advance and showed a reactive approach instead of a proactive approach to the flood. Deficiencies in vital resources such as early warning systems, boats, heavy vehicles, divers, helicopters, etc., placed limitations on the capacity of the district administrations to evacuate as many people as possible from the flood. Gaps in the distribution of resources among districts were also observed. Politically important districts, closer to the provincial capital, were given preference over peripheral districts. District Disaster Management Authorities have not yet been established by PDMA in line with the provisions of the NDMA Act. Similarly, several security lapses were identified when a public survey was conducted in the flood-affected districts. The survey results revealed that a significant number of people were not satisfied with the security of their homes and belongings when they were evacuated to relief camps. In a nutshell, the evacuation aspect of disaster management has been less attended to by the government, as evidenced by the fact that in PDMA Rules of Business, there is not a single mention of evacuation.

Recommendations

Short Term Measures

- Contingency plan should be made on scientific basis using the Geographical Information System to identify most flood prone areas and to ascertain safe / feasible places for establishment of relief camps.
- Keeping in view the requirement of the Districts, proper funds, flood related rescue / evacuation equipment should be provided immediately after formulation of monsoon contingency plan.
- Effective early warning system should be installed on River Indus, River Swat and River Kabul to quantify the magnitude of floods and issue flood alerts to the concerned authorities for better management.

Logical Framework based on 80/20 Principle for Effective Early Warning System by Installing Telemetries

Assumption and Risk	Resources / Inputs	Activities	Outputs	Outcomes	Impact
• Lack of future foresightedness • Financial Constraints • Consensus of stakeholders is not reached to install new telemetries • Lack of awareness • Political will	• Purchase and install desired telemetries	• Analyzing post flood assessment reports • Training of human resource	• Efficient early warning system in place	• Improved and efficient service delivery with regard to evacuation and relief operations during floods	• To save the life and property of people and minimize damages during disasters like floods

Medium Term Recommendations

- Recruitment of divers in all districts, purchase of latest technological boats /remote control lifebuoy as well as cleanliness / removal of encroachment from all drains and rivers should be ensured before monsoon
- Formulation of PDMA Act at the earliest entailing early warning, rescue and evacuation mechanism in detail
- Under this Act DDMA should be constituted in every district

Logical Framework based on 80/20 Principle for Establishment of DDMA

Assumption and Risk	Resources / Inputs	Activities	Outputs	Outcomes	Impact
• Lack of Administrative will • Lack of Political will • Financial Constraint	• Human Resources • Finances • Equipment • Building	• Recruitment • Trainings and capacity buildings • Workshops • Technical Trainings	• Fully functional DDMA in every district with trained staff and equipment	• Quick, efficicient and improved disaster management	• To save the life and property of people and minimize damages during disasters like floods and earthquackes

Long Term Recommendations

- Proper mechanism for purchase of required rescue and evacuation items in time of emergency should be laid down to avoid any delay in the operation
- Merger of Civil Defense with Rescue 1122 or DDMU so as to organize and train thousands of volunteers in all districts
- Construction of standard warehouses in all districts for safe custody of rescue and relief items to avoid damages

Logical Framework based on 80/20 Principle for Construction of Standardized Warehousing

Assumption and Risk	Resources / Inputs	Activities	Outputs	Outcomes	Impact
• Less priority • Financial Constraint	• Finances • Land • Building	• Construction of Building	• Standardized warehouse	• Safe custody of relief items	• Minimal damages to relief items • Timely availability of relief items during disaster • Savings for government kitty

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Critical Evaluation of Mitigation Measures and Disaster Management Practices During Recent Floods

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Abstract:

This study explores the institutionalization of Disaster Mitigation and Management (DM&M) in Pakistan, highlighting the country's vulnerability to natural disasters through statistical evidence. It examines the historical evolution of DM&M institutions, dividing the analysis into pre-2005 and post-2005 periods, with a focus on challenges, gaps, and issues within the institutional framework. The research utilizes both primary (interviews with officials and experts) and secondary (policies, legislation, research literature) data. Findings reveal a lack of proactive DM&M strategies since 1947, with a reactive approach remaining the main challenge. The study identifies overlapping institutional mandates, poor coordination, and capacity issues in financial, technical, and human resources. It offers policy recommendations for a more effective, efficient DM&M framework, especially post-18th amendment, and advocates for institutional reforms at national and provincial levels.

Key words:

Disaster Mitigation, Institutional Framework, Vulnerability, Coordination, Policy Recommendations

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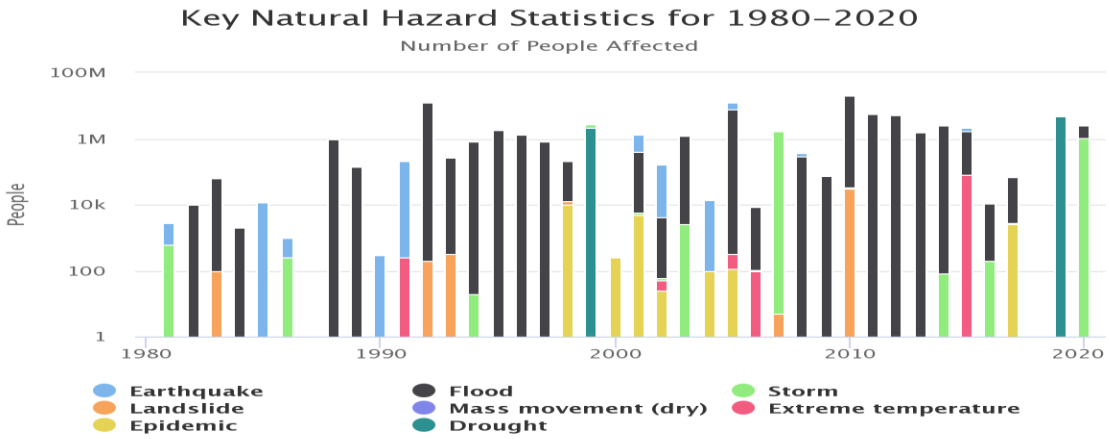
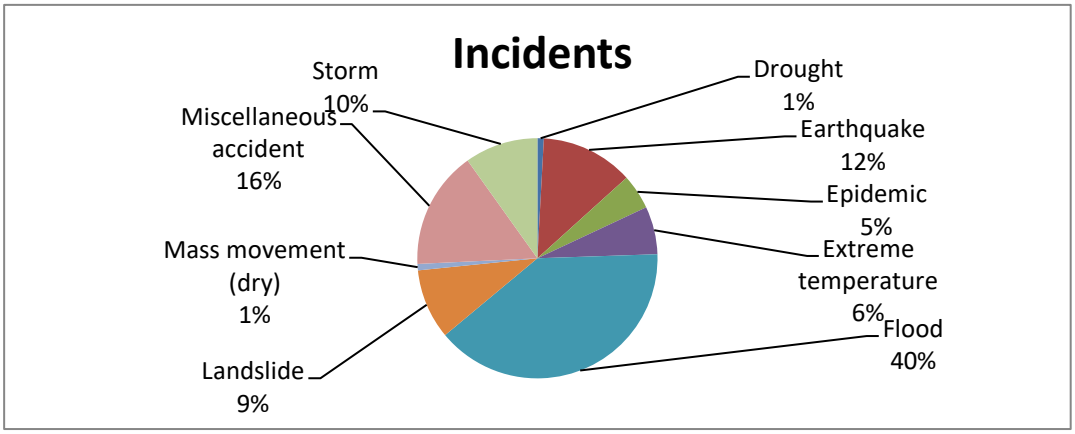
Introduction

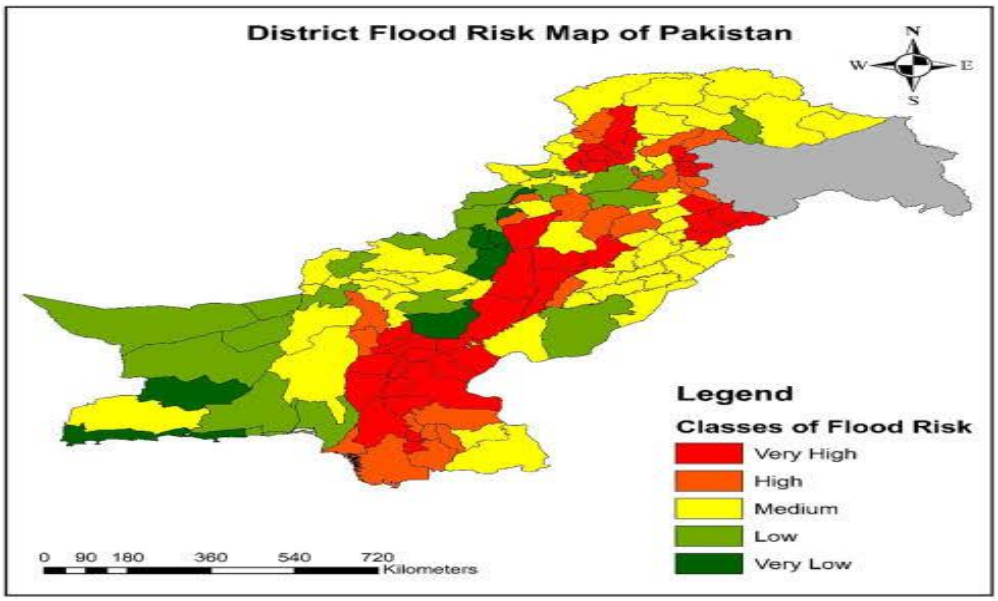
Pakistan is one of the highest disaster-risk countries in the world. The high rate of multidimensional poverty is the main determinant of Pakistan's disaster vulnerability. According to the Inform Risk Index, Pakistan was ranked 18th out of 191 countries in 2019 (World Bank, 2020). The vulnerability risk is particularly determined by the country's exposure to natural calamities like earthquakes and the risk of internal conflicts such as terrorism. Natural hazard statistics from the period 1947 to 2020 outline Pakistan's disaster profile. More than 200 natural disaster events resulted in the loss of 84.6 million human lives. Of these 84.6 million casualties, 67 million were caused by floods. The bar and pie charts below provide a more detailed and clearer picture of the disaster history of Pakistan from 1980 to 2020 (World Bank, 2020).





Flood Vulnerability Profile of Pakistan

For the past 20 years, Pakistan has consistently ranked among the top 10 most vulnerable countries on the Climate Risk Index, with 10,000 fatalities due to climate-related disasters and financial losses amounting to about $4 billion from 173 extreme weather events (Siddiqui, 2022). Pakistan has a long history of floods. Figure 3 shows the map highlighting the flood-vulnerable areas of Pakistan and the track of the flood wave along the Indus River. The country has witnessed almost 19 major flood events, resulting in a cumulative flooding of over 594,700 km², with 166,075 villages affected and total direct cumulative losses amounting to about US $30 billion, which led to the loss of 10,668 precious lives in the past 60 years (Shah et al., 2020).



Recent Floods

Between June and August 2022, torrential rains and a combination of riverine, urban, and flash flooding led to an unprecedented disaster in Pakistan. According to official reports, around 33 million people—that is, one in seven— have been affected by the floods, including nearly 8 million displaced. The floods have taken the lives of more than 1,700 people, one-third of which were children (NDMA, 2022). Rain-induced floods, accelerated glacial melt, and resulting landslides devastated millions of homes and key infrastructure, submerging entire villages and destroying livelihoods. Preliminary estimates suggest that, as a direct consequence of the floods, the national poverty rate will increase by 3.7 to 4.0 percentage points, pushing between 8.4 and 9.1 million people into poverty (World Bank, 2022).

Problem Statement

Flood is a constant phenomenon in various countries including Pakistan. The phenomenon is further aggravated by global warming resulting into melting of glaciers which causes floods in Pakistan frequently. There is an immense need to better understand the sensitivity of the issue at the earliest keeping in view the drastic repercussions as evident by the recent floods in Pakistan. However, despite the lofty claims by the concerned authorities and departments that they were well prepared to tackle the calamity, the loss of life and property could not be iron out successfully. Research is, therefore, required to explore the current imbroglio being faced by Pakistan in the wake of floods and also to recommend a pragmatic way forward for mitigation measures by the concerned departments and disaster management authorities.

Scope of Study

The scope of this research work is limited to the critical evaluation of mitigation measures and floods management practices during recent floods and to conduct the institutional analyses of those institutions which play a role in mitigation of the impacts of floods. It will cover the institutional analysis, financial, administrative and policy matters pertinent to departments working on floods control. The group will also critically evaluate the gaps among the stakeholders and will thereby suggest the way forward overcome those deficiencies observed by the group.

Literature Review

One of the significant reasons for the sluggish industrialization in Pakistan is the prolonged absence of a dedicated industrial policy. Consequently, the roles such a policy would typically fulfill are being managed through other public sector policies related to investment, trade, and monetary matters. The SMEDA Act of 1998 was established to regulate small and medium enterprises (SMEs) by the federal government, followed by Vision 2025 (Burki, 2008). An SME policy was formulated in 2007, which has since been amended and is pending cabinet approval. The 18th Constitutional Amendment devolved Part I of the Federal Legislative List, including the industrial sector, to the provinces, transferring industrial affairs to provincial governments (MOIP, 2021). Frequent changes in government are a major contributor to policy uncertainty in Pakistan. Moreover, past governments have often implemented ad-hoc industrial policies in reaction to crises (Kemal, 2008). The conflict between federal and provincial industrial policies has further complicated the achievement of desired outcomes in the industrial sector (Burki, 2008). The Pakistan Business Council advocates for a "Make-in-Pakistan" initiative to drive industrial growth, leveraging Pakistan's domestic market of over 200 million consumers to develop scale and competitiveness, eventually addressing global demand (PBC, 2018).

Research Methodology

This study is descriptive and analytical in nature. Data has been collected from both Primary and Secondary sources. Secondary sources include disaster related laws and policies and organizations in Pakistan, and research literature published in various national/international journals. In quest of Primary data, semi-structured interviews with government officials and experts were conducted.

Literature Review

According to the study by Lubna Rafiq & Thomas Blaschke, approximately 6% of the total area of Pakistan is in high-risk zones, while 30% is in medium risk zones. Only 27% is considered low risk and 7% very low risk. While, approximately 2% of total population live high risk zones, 18% in moderated risk zones, whereas 38% of the population is in low-risk zones. Only 28% of the population lives in very low risk areas (Rafiq & Blaschke, 2012).

The research community in Pakistan has done lot of work to study various aspects of flood management in Pakistan. This has created a good wealth of knowledge on flood management. Mr. Muhammad Atiq Ur Rehman Tariq and Mr. Nick van de Giesen in their research article title 'Floods and flood management in Pakistan' has thoroughly analyzed the institutional framework of flood management in Pakistan (Tariq & Giesen, 2011). In the present study, various research and technical reports and papers related to flood management studies and published by different academic, research and consulting institutions which were consulted for carrying out the current research work.

INSTITUTIONAL FRAMEWORK

Pakistan has been facing multilateral issues and challenges since independence. Natural calamities are one of them. Before 2005, the institutional framework for disaster management revolved around flood management. No practical steps were taken at the institutional level for flood mitigation measures. At that time, Pakistan was dominated by a mindset that was reactive in nature, and all the preparedness was centered around how to respond.

Institutional Analysis – Pre-2005 Era

Pakistan Meteorological Department

The PMD, established in 1947, is an attached department of the Aviation Division, Cabinet Secretariat. It is a technical and service department and provides services mainly in the fields of meteorology, hydrology, and seismology. In addition, it has various specialized units and centers. FFD is responsible for operational hydrology (flood monitoring/forecasting) in the country and issues all types of flood forecasts and warnings across the country to different stakeholders, government functionaries, and disaster management agencies (PMD, 2000).

Directorate General of Civil Defence

The Directorate General of Civil Defence was established under the Civil Defence Act, 1952, to secure civil defence and regulate all matters related thereto. Realizing the lacunae existing in the Act, it was amended in 1993 so that its jurisdiction was extended to remedial measures against both natural and man-made disasters. The Directorate was the dominant organization responsible for responding to disasters until 1970. Currently, the subject of civil defence is being transferred to E&RS 1122.

West Pakistan National Calamities (Prevention & Relief) Act

The West Pakistan National Calamities (Prevention & Relief) Act was promulgated in 1958 to ensure the restoration and maintenance of areas affected by calamities, both man-made and natural, and to control and provide relief for the same. According to Section 4(1), "The Relief Commissioner shall, with respect to the calamity-affected area, take such steps as he may deem necessary in order to maintain order, prevent, check, or control the calamity, reduce the extent and severity thereof, or provide immediate relief to the victims of the calamity in the affected area."

Water and Power Development Authority

WAPDA was established in 1958 to coordinate and give unified direction to the development of schemes in the water and power sectors. According to Section 8 (2)(iii) of the WAPDA Act 1958, "The Authority may frame a scheme or schemes for a province or any part thereof providing for flood management." Additionally, WAPDA plays a leading role in providing hydrological data from the entire river network in Pakistan. The real-time transmission of data from the telemetry system, which is extremely important for flood warnings, is the responsibility of WAPDA. The operation of major reservoirs, which plays a significant role in mitigating floods, is also WAPDA's responsibility.

Pakistan Commission for Indus Waters

In follow-up to the Indus Water Treaty of 1960, an agreement was signed between India and Pakistan in 1989 through their respective PCIW, which includes provisions to share river flow data considered important for flood forecasting in Pakistan. PCIW receives the Indian data normally once a day. The data is then passed on to the FFD, Lahore, for preparation and issuance of flood forecasts to concerned organizations. The frequency of data reception is increased to every six hours, and even to hourly, in case of a severe flood situation (Awan, 2003).

Emergency Relief Cell

The ERC was established in 1971 with a mandate to support relief and provide compensation to calamity-hit areas. The national disaster plan in 1974, created by the Federal Emergency Relief Cell, was the first plan that envisaged procedures, organizational structures, responding agencies, and monitoring relief operations. Unfortunately, the plan never materialized beyond the paper on which it was written (Zaidi, 2012).

Federal Flood Commission

The FFC was established through a resolution on January 4, 1977, to manage flood-related issues across Pakistan. The Commission was mandated to take only those steps which were necessary for mitigating the effects and impacts of floods. Responsibilities assigned to the Commission included the preparation of National Flood Protection Plans, improvement of the flood forecasting system, standardization of specifications and designs in the field of flood protection, and undertaking research programs for flood control and protection.

Institutional Analysis – Post-2005 Era

All legislations and policies pertaining to disaster management made prior to 2005 could not be proactive and responsive unless they were linked together. Consequently, after the 2005 earthquake, the institutionalization of disaster management and mitigation (DM&M) was completely transformed, resulting in the creation of new entities and the formulation of new plans and policies.

NDMA Act, 2010

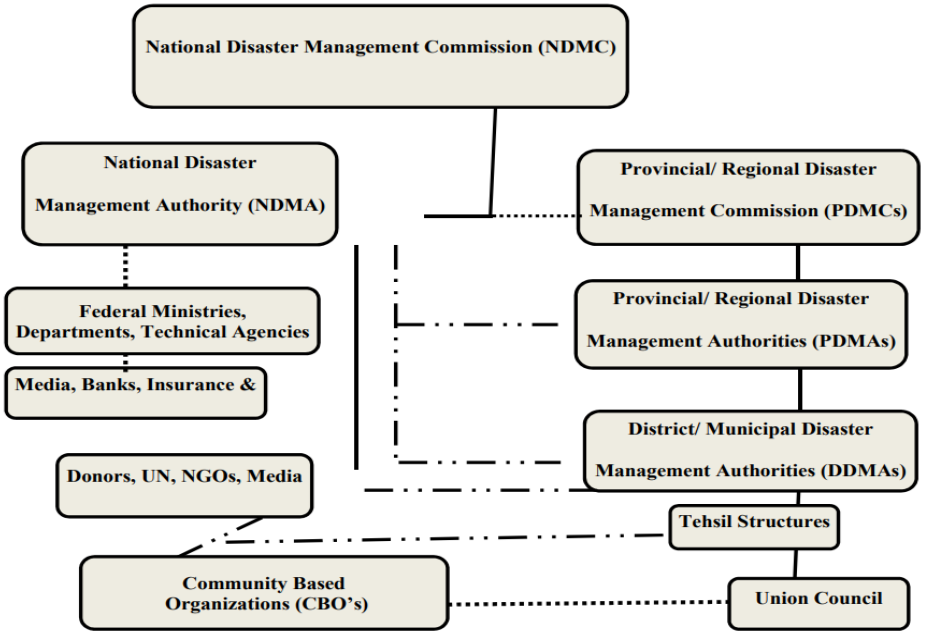
Pakistan's pre-2005 institutional framework was inadequate to deal with the consequences of the massive earthquake of 2005. Therefore, the Government took pragmatic initiatives to establish an effective institutional framework for DM&M in Pakistan. NDMC & NDMA were established in 2006. Initially, NDMA was enacted as a presidential ordinance known as NDMO, 2006 (NDMA, 2010). Later, another massive disaster, the 2010 floods, led to the approval of the same ordinance as an Act of Parliament in 2010. Realizing the expediency of an effective DM&M system after the devastating event of the 2010 floods, the NDMA Act was approved by Parliament on August 11, 2010. It deals with the establishment, functions, and powers of the statutory administrative agency known as NDMA.

National Disaster Management Authority

The legal foundation of the NDMA Act, 2010, lies in the resolution passed by all provincial assemblies under Article 144 of the Constitution of Pakistan, which allows Parliament to regulate NDMA to overcome unforeseen situations (NDRMF, 2010). The table below depicts the hierarchy of the new

framework tasked with mitigating and preventing the devastating impacts of natural disasters:

District & Local Disaster Management Authorities



DDMAs are chaired by the head of district council and comprise of DCO, DPO and EDO (Health) and other district level officers. It is responsible for formulation, implementation and Coordination of national and provincial DM&M polices and plans at district level. Local authorities under DDMA are mandated to ensure the trained human resource, availability of the relevant resources at time of disaster or disaster threat, buildings codes to be followed in the area of their jurisdiction and carry out all other pre and post disaster activities.

National Institute of Disaster Management

NDMA Act also provided for the creation of a NIDM, which was formally established in February 2010. The Institute's mission is to work as a learning center for government officials, the private sector, media, NGOs and community organizations in order to develop policy guidelines and enhance capacity building through research and training. The institute also aims to develop a national database of disaster management policies, prevention mechanisms and mitigation measures.

National Disaster Response Plan

NDRP is a document prepared by the NDMA and approved by the NDMC. It is to be reviewed annually and outlines the measures to be taken for the prevention and mitigation of disasters, for integrating mitigation measures in development plans, and upgrading preparedness for disasters and defining role and responsibilities of line ministries to be implemented throughout the country.

It also defines the roles and responsibilities to different ministries and divisions of the federal government.

NDMF & PDMF

Federal and Provincial Governments shall constitute NDMF & PDMF, which shall be financed by proposed budget allocation, grants, loans, aids and donations etc.

Provincial Irrigation Departments

At present, PIDs are mainly responsible for operation and maintenance of the irrigation system. Since floods in Pakistan follow a 10-year cycle of wet and dry spells, there is almost a memory lapse during dry spells with very little maintenance of flood protection works making them vulnerable when suddenly wet cycle begins. Actually, this is main problem with various flood mitigation and management departments that they don't devise detailed plans during null days before calamity knock at the door. Therefore, the intensity of floods each time hit hard the country due to lack of preparedness.

Comparative Analysis

At the end, keeping in view the whole process of institutionalization of DM&M in Pakistan, a comparison of key disaster related laws has been presented in a table below. This help in a way of understanding the laws by comparing that what are their main focus, how they co-relate with each other and in which way they are overlapping.

Table-1: A Comparison of key Disaster Related Laws

Issue	NDMA Act 2010	West Pakistan National Calamities	Civil Defence Act 1952

		(Prevention and Relief) Act 1958	
Disaster	"disaster means a catastrophe or calamity in an affected area, arising from natural or man – made causes or by accident which results in substantial loss of life or human suffering or damage to, destruction of property"	Whenever the province of … or any part thereof is affected or threatened by flood, famine, locust or any other pest, hailstorm, fire, epidemic or any other calamity which in the opinion of the government warrants action.	Includes following in situation warrants action: Any form of hostile attack by foreign power Natural or man – made disaster in peace time
Disaster Management	Managing the complete disaster spectrum including: Preparedness Response Recovery Reconstruction	Maintenance and restoration of order in area affected by certain calamity and for the prevention and control of and relief against flood, famine, locust or any other pest, hailstorm, fire epidemic or any other calamity.	Defining the civilian population against enemy attack.
Key Institution	NDMA (Prime Minister Secretariat) PDMA, DDMA	Relief Commissioner (Senior Member Board of Revenue) Section 3A	Civil Defence Department working, working under Home Department. At district the responsibility rests with DCO
Government Body	National Disaster Management Council	Provincial Government/ Chief Secretary	Home Department
Field Organization/ Office	District Management Authority	DCO	Civil Defence Department under DCO
DRM Framework	Provides a comprehensive DRM framework encompassing all key areas (Mitigation, Preparation, Response, recovery, Reconstruction)	Focus on relief, multi hazard DM approach. Provides vertical configuration with the little coordination	Capacity building, first aid administration, fire fighting, search and Rescue. An operational discount in Civil Defence operations in the province.
Integration of Disaster Response	Coordinated disaster response through its established inter – tier linkage	-	-
Declaration of Disaster	-	Declaration of Calamity is done by	-

		the provincial government	

SWOT Analysis

Table-2: SWOT Analysis of Institutional Framework	
Strengths	Weaknesses
1. National Disaster Risk Management Framework (NDRMF) 2007 provides legal framework to NDMA to act as Central Coordination Agency. 2. NDRMF 2007 provides legal framework for Strengthening Institutional Arrangements for risk reduction. 3. NDRMF 2007 provides legal framework for awareness and capacity building for reducing vulnerability of communities. 4. NDM Act 2010 provides Legal Framework for establishment of disaster management authorities at three (3) tiers at federal, provincial and district levels. 5. National Disaster Response Plan (NDRP) measure for prevention and mitigation of disaster to be reviewed annually. 6. NDRP defines roles and responsibilities of line ministries and divisions. 7. Properly defined limit for "Lay Off Land" of 200 feet for construction of building on river/tributaries sides in KP River Protection Ordinance 2002. 8. Properly defined limit of 1500 feet for "Provincial Control Area" where no construction or development activities shall be taken in KP River Protection Ordinance 2002.	1. Lack of Comprehensive Flood Policy/Laws by federal and provincial governments. 2. Lack of proper disaster mitigation planning at policy level 3. Lack of effective formulation of flood management strategies 4. Lack of integrated flood management. 5. Lack of inclusion of stakeholders while formulating laws/policies. 6. Lack of interest for construction and development of water reservoirs 7. Lack of decentralization of authority for infrastructure development. 8. Lack of desilting of streams & flood water ways on regular basis. 9. Lack of financial resources. 10. Lack of capacity building and human resource management.
Opportunities	**Threats**
1. Best disaster mitigation practices in the world. 2. Agriculture crop insurance policies 3. Use of latest social media applications.	1. High vulnerability to Climate changes. 2. Lack of vision and seriousness on the part of politician and bureaucracy.

4. Policy formulation for resolving water disputes with regard to infrastructure development. 5. Policy formulation for installation of flood detection system 6. Continuity of afforestation policies and programmers. 7. Sustainable policy for construction of dams and reservoirs. 8. Procurement of modern state of the art technologies. 9. NGO's & Charity Organizations for fund raising. 10. Development of river's sides into public picnic resorts	3. Political uncertainty effecting the continuation of policies. 4. Lack of political will for long term planning for infrastructure development 5. Point scoring game on the part of various political government. 6. Continues decrease in forest cover due to legal and illegal harvesting of forests. 7. Deteriorating national economic indicators.

EETH Analysis

Table-2: EETH Analysis of Institutional Framework	
Strengths	Weaknesses
1. National Disaster Risk Management Framework (NDRMF) 2007 provides legal framework to NDMA to act as Central Coordination Agency. 2. NDRMF 2007 provides legal framework for Strengthening Institutional Arrangements for risk reduction. 3. NDRMF 2007 provides legal framework for awareness and capacity building for reducing vulnerability of communities. 4. NDM Act 2010 provides Legal Framework for establishment of disaster management authorities at three (3) tiers at federal, provincial and district levels. 5. National Disaster Response Plan (NDRP) measure for prevention and mitigation of disaster to be reviewed annually. 6. NDRP defines roles and responsibilities of line ministries and divisions. 7. Properly defined limit for "Lay Off Land" of 200 feet for construction of building on river/tributaries sides in KP River Protection Ordinance 2002.	1. Lack of Comprehensive Flood Policy/Laws by federal and provincial governments. 2. Lack of proper disaster mitigation planning at policy level 3. Lack of effective formulation of flood management strategies 4. Lack of integrated flood management. 5. Lack of inclusion of stakeholders while formulating laws/policies. 6. Lack of interest for construction and development of water reservoirs 7. Lack of decentralization of authority for infrastructure development. 8. Lack of desilting of streams & flood water ways on regular basis. 9. Lack of financial resources. 10. Lack of capacity building and human resource management.

8. Properly defined limit of 1500 feet for "Provincial Control Area" where no construction or development activities shall be taken in KP River Protection Ordinance 2002. 9. Dissemination of Information	
Opportunities	**Threats**
1. Best disaster mitigation practices in the world. 2. Agriculture crop insurance policies 3. Use of latest social media applications. 4. Policy formulation for resolving water disputes with regard to infrastructure development. 5. Policy formulation for installation of flood detection system 6. Continuity of afforestation policies and programmes. 7. Sustainable policy for construction of dams and reservoirs. 8. Procurement of modern state of the art technologies. 9. NGO's & Charity Organizations for fund raising. 10. Development of river's sides into public picnic resorts	1. High vulnerability to Climate changes. 2. Lack of vision and seriousness on the part of politician and bureaucracy. 3. Political uncertainty effecting the continuation of policies. 4. Lack of political will for long term planning for infrastructure development 5. Point scoring game on the part of various political government. 6. Continues decrease in forest cover due to legal and illegal harvesting of forests. 7. Deteriorating national economic indicators.

ISSUES & CHALLENGES

Gap Analysis

The disaster risk management system in Pakistan is facing multiple issues and gaps. One such issue is governance, which includes a multiplicity of institutions with overlapping or conflicting jurisdictions and poor formal linkage and coordination between key line agencies and departments, leading to gaps in the legal framework. There are also issues related to institutional, technological, and human resource capacity.

Reactive Approach

The prime challenge is the reactive mindset at both the policymaking and societal levels. Enforcement of disaster management and mitigation (DM&M) and emergency response must be the principal agenda in Pakistan to deal with disasters. Although a proactive approach has been designed to address

DM&M in the post-2005 era, a reactive approach still exists at the federal, provincial, and district levels, with a primary focus on relief. The situation is even worse at the district level, which is the key point, as it acts as a bridge between the government and the general public. At the district level, the subject is handled by the Assistant Commissioner (AC) Headquarters, who is not a specialized officer to deal with calamities.

Lack of Vulnerability & Risk Assessment

Vulnerability and risk assessments are core tools that combine all scientific data relating to calamities and local vulnerabilities in each geographic location. Pakistan does not have any such arrangements for vulnerability and risk assessment at the federal, provincial, and district levels. Vulnerability and risk assessments for different geographic zones are of utmost importance for policymakers to devise integrated policies, plans, and strategies. There is a lack of a standardized methodology for risk assessments, as well as very limited collaboration among technical agencies. A Vulnerability Atlas of Pakistan needs to be prepared to include hazard maps indicating the location of various hazards with zonation of risk levels (e.g., low, moderate, and severe). The Atlas will also indicate the location of key settlements in hazard-prone areas. The Atlas should be published and disseminated widely to stakeholders at all levels.

Overlapping Mandates

Currently, a number of institutions and organizations with different aspects of managing disasters are functioning. The post-2005 institutional framework has also failed to address the issue of overlapping or conflicting jurisdictions of various DM&M-related organizations. However, it is also an established fact that these organizations are often mandated with overlapping responsibilities and functions, which creates confusion. This overlapping exists at all three levels:

- **National Level**:
    - The National Calamities (Prevention and Relief) Act, 1958, is entrusted with a wide range of responsibilities, such as maintaining, restoring order, preventing and controlling, or providing relief in the affected areas.
    - On the other hand, the Rules of Business, 1973, clearly lay out that disaster relief shall be dealt with by ERC, which was established under the Cabinet Division.
    - Another important legal instrument in this regard is the Civil Defence Act, 1952 (amended in 1993).
    - NCMC is an organization that works under the Ministry of Interior. The cell functions as a control room, operating around

the clock to prepare reports and obtain information on crises/emergencies.

- **Provincial Level**:

  Overlapping organizations also exist at the provincial level, similar to the federal level, creating uncertainty and confusion regarding roles and responsibilities.

- **District Level**:

  Overlapping is also observed at the district level, where DDMUs, District Civil Defence, ERS-1122, and the fire brigade under TMA are working with the same mandate.

Lack of Formal Coordination

Although a national platform has been constituted, disaster management currently suffers from poor communication and duplication issues. The institutional framework does not provide any defined procedure for formal coordination among various organizations. The NDMA Act, 2010, fails to identify and define the relationship between key disaster-related institutions.

The prevailing disaster management law fails to establish tangible linkages for a harmonized response strategy. At the district level, departments like Civil Defence, ERS-1122, and the fire brigade have no direct linkages to coordinate with each other. They coordinate through the Deputy Commissioner (DC), which is a lengthy channel, especially when it comes to emergencies. At the provincial level, the PDMA entails horizontal coordination with the relevant provincial line departments and district administration. However, no such coordination exists at the operational level.

Weak Financial Framework

An advanced and well-established institutional mechanism is a prerequisite for active disaster preparedness and response, where the availability of sufficient financial resources is of paramount importance. Unfortunately, the financial framework for DM&M is very unstable and poorly implemented. NDMF and PDMF have been established, which shall be financed by the federal and provincial governments, grants, aids, loans, and donations.

The key issue with the financial framework is that, as per the Rules of Business, 1973, the Finance Division can only transfer disaster funds to ERC, Cabinet Division, which spends this money on procurement of relief goods in accordance with their relief-oriented mandate, instead of spending on mitigation and preparedness. So, no development funds are given to NDMA,

except for non-development funds. Even at the provincial level, figures show that the relief expenditure in Balochistan, Sindh, and KPK is higher than expenditures on preparedness. This explicitly reveals the practice of the old reactive approach in public financing, despite the establishment of a new institutional framework.

Lack of Institutional Capacity

The deficiency of institutional capacities and expertise is also a major challenge to implementing the policies and plans in letter and spirit, especially at the local level. According to the NDMA Annual Report 2011, many districts still lack DDMUs to steer all disaster management activities across different sectors, despite notifications throughout the country. The existing DDMUs lack human, material, and financial resources to undertake disaster management activities. The local departments' personnel lack the requisite professional knowledge, skills, resources, and equipment to plan or respond to the impending challenges of disaster risks with a scientific approach. DM&M, being a nascent field in Pakistan, therefore, faces a dearth of skilled human resources.

Lack of Comprehensive Flood Policy

Currently, Pakistan does not have an approved national flood policy. Pakistan's draft flood policy seems to consist of a plan rather than a policy. Also, Pakistan's current draft flood policy does not consider glacial lake outburst floods. Pakistan lacks a policy, strategy, and plan specifically dealing with flash floods. A comprehensive flood policy must consider land-use zoning, floodplain management, watershed management, environmental protection, forestation, and water storage development.

Flood Infrastructure Issues

The oldest structures are in poor condition due to a lack of adequate maintenance. Partial implementation of flood works due to delays in approval, funding, and construction, and poor maintenance due to inadequate funds, is common.

There has been no change in the design of embankments for the last few decades. In Pakistan, reservoirs are primarily used for irrigation water storage and hydropower generation, with flood control being only a third consideration.

Conclusion

The recent floods in Pakistan that caused tremendous loss in terms of human lives and property. It established that current flood management mechanism in Pakistan is inadequate and reactive in approach. The present flood mechanism focuses on only flood control and relief measures. It does not concentrate on flood mitigation and management in an integrated manner. The climate change has intensified the vulnerability and flood risks. The situation demands for development of a sound flood mitigation and management system. Though currently, a number of flood management and mitigation measures exist in Pakistan, but these measures have not enhanced the prospects of Pakistan in terms of sound flood management system. Currently, Pakistan faces the challenges of lack of comprehensive flood policy, planning and laws, lack of institutional capacity and coordination, inadequate flood and drainage infrastructure with poor operation and maintenance, lack of improved flood forecasting and early warning system, poor flood preparedness and lack of integrated flood management strategy. Pakistan also lacks in a comprehensive understanding of the Indus Basin hydrology affected by the climate change impacts that include changes in intensities and frequencies of monsoonal rainfall and rapid glacial melting and retreat.

In the aftermath of recent floods, Pakistan can no longer afford to do business as usual. In order to ensure effective and sustainable flood management, Pakistan should improve its flood policy, planning and legislation, enhance institutional capacity, develop new and improve existing flood and drainage infrastructure with improved operation and maintenance, improve watershed management, continue improving flood forecasting and early warning system, improve flood preparedness, enhance community participation, and develop and implement integrated flood management strategy. Pakistan also needs to conduct research to gain an insight into climate change impacts on hydrology of the Indus Basin.

Recommendations

Recommendations have been categorized into short, medium and long term measures:

Short Term Measures

Controlling Global Warming & Climate Change

- Take measures to control the release of carbon dioxide by vehicles, factories etc., through strict implementation of laws and imposing penalties to prevent the excessive smoke producing vehicles to be on road especially diesel consuming vehicles like buses, trucks, rickshas etc. District govt & Traffic department shall come up with stringent laws and their implementation in letter and spirit to detect such vehicles by using modern gadgets and by imposing heavy fines
- Provide electricity and gas to the people living below poverty line by gradual raising the standard of population so that to avoid burning of wood for cooking & heating
- Prevent excessive deforestation. Forest department need to play a very active role in this regard. An App may be developed whereby Forest dept seek permission for cutting a single tree from main Hqd. along with geo-location of forest and replacement of plant with new sapling.

Establishment of Watershed

- Establish Watershed Management Departments/Agencies with the relevant provincial Governments like GB, AJ&K, Baluchistan and KP through necessary legislation. WAPDA has to take the lead since it would require small dams and will produce hydropower too
- Re-forestation, soil conservation and improvement in land use in the watersheds should be promoted. Forest department to take proactive role like billion trees initiative which will not only control soil erosion but also will have positive impact on climate

Revision of SOPs for Operation of Major Reservoirs

- Existing reservoir operational rules (SOPs) for Mangla and Tarbela needs to be further reviewed particularly for Tarbela in the light of 2010 and 2014 floods to ensure efficient control of floods in order to provide maximum relief to downstream areas

Flood Protection Works

- Repairing, strengthening and up-gradation of existing flood protection works need to be carried out on immediate basis through provincial resources to protect the population and infrastructure against flood threat. The need for new flood protection works have been identified along with cost provision and federal agencies/government should arrange funding for their design and construction as per implementation schedule of NFPP-IV.

Forestation Project					
Assumption Risk	**Resource Input**	**Activities**	**Out-put**	**Out-comes**	**Impact**
• Many new saplings go wasted • Protection & care of new saplings • Fight against extreme weather	• Managing financial resources • Acquiring better quality saplings • Trained labor for plantation	• HRM • Acquiring/allocation of land • Plantation process	Forest	Forestation will help to control soil erosion	It will mitigate the negative impacts & severity of climate change

Medium Term Measures

Rehabilitation & Capacity Enhancement of Barrages/Bridges

- Rehabilitation and capacity enhancement of barrages and bridges needs special attention for their immediate execution. Necessary provisions for their studies and implementation have been made in the current NFPP-IV.

Flood Forecasting and Warning Systems

- The real-time simulation method uses forecast data to simulate flooding processes and determine the consequences of heavy rainfall patterns in real-time. Therefore, the hydro-numeric model is fed with forecast rain data to calculate the transient flow processes live and with the maximum possible computing speed. Subsequently the calculated flood hazard variables (water depth and velocity) are processed by the GIS-Model to determine the flood risks in a second step. Therefore, a damage potential analysis is carried out based on existing geodata and with the help of systematic semi-automated GIS process techniques.

Installation of Real-Time Warning System

Assumption Risk	Resource Input	Activities	Out-put	Out-comes	Impact
• Financial constraints • NOC complications • Resistance to change • Import issue	• Lack of technical experts • Financial resources • Approach to market abroad	• Managing HR • Installation of Equipment • Construction facility for the system	Modern & Advanced disaster forecast system	System will provide real time info for early preparedness	It will mitigate the damages caused by the floods

Institutional Capacity Building

Capacity building and training of FFC, PIDs, NDMA, PDMAs, PMD, and WAPDA dealing with floods is recommended on priority basis.

Floodplain Policies and Legislation

'River Act' for the rivers floodplains has been formulated during current NFPP-IV studies keeping relevant stakeholders on board and there is strong need to carry out necessary legislation at provincial as well as well federal level. Provinces may modify it according to their requirements, from river to river. There is strong need to implement the 'River Act' in its real sense and spirit for removing encroachments, permanent settlements and undue developments in the floodplains so that flood damages can be reduced.

Floodplain Mapping and Zoning other than Indus River and its Tributaries

There is strong need to investigate the requirement of Floodplain Mapping and Zoning in the areas other than Indus River and its tributaries. These areas may include floodplains of rivers and major streams/Nullahs in Punjab, Khyber Pakhtunkhwa and Baluchistan. For this purpose, provincial governments should carry out necessary investigations and studies at their own resources.

Community Awareness and Preparedness

PIDs, NDMA, PDMA, DDMA and district management etc., should play active role through workshops, electronic and print media to create awareness in flood prone communities for preparing them to fight against floods and its after affects, awareness about encroachments and un-planned developments in floodplain areas resulting huge damages to their lives and property.

Long Term Measures

Construction of Dams and Storages

- Major reservoirs need to be investigated and constructed on priority basis to preserve the flood water to substantiate irrigation flows and controlled releases to check seawater intrusion. Construction and operation of reservoirs is under WAPDA jurisdictions and need Federal government's attention for necessary approvals, settlement of political and technical issues with the provinces and arrangement of funds.
- Analyses indicate that small damshave substantial potential in mitigating flood peaks from their respective catchments. It is recommended to consider various small dams in KPK, AJ&K, Punjab and Baluchistan for cumulative impact on flood mitigation. The pre-feasibility/feasibility studies on these dams may be taken-up by the provinces at their own resources.

Construction of Dams					
Assumption Risk	**Resource Input**	**Activities**	**Output**	**Out-comes**	**Impact**
• Financial constraints • Time taking process • Political will • Resistance to change • Inter-provincial issues • Donor's issue • Land-acquisition	• Management for execution • Financial resources • Human capital	• Availability of machinery • Placing/Arranging site plans • Construction process • Opening of site office	Functional Dam	Will store extra water & produce hydropower	Mitigate disaster caused by floods & provide green energy

Breaching Sections at Barrages/Bridges and Flood Escape Channels

- It is strongly **recommended that irrigation department** must conduct a comprehensive study of all existing breaching sections to ascertain their effectiveness and possible flow paths, flow depths, velocities and inundation extents of breach flood flows.
- Adequate conveyance capacity within the river and urban channels needs to be restored by removing bottle necks and encroachments which hampers the smooth flow of water and causes floods.

Management of Environmental Problems

- Although rules are made by the concerned departments however, there is a **need of proper implementation through check and balance** by a third party to preserve eco-friendly environment without any of interference, political or otherwise
- **Awareness and trainings to community** to strengthen resilience from gross root at academic institutions to educate and sensitize masses about issues related to disasters in general and floods in particular
- **Institutional framework for environmental issues** to involve all the stakeholders (PIDs, NDMA, PDMA, District Administration) for better planning and execution of plans made for environmental resilience
- **Explore all possible means of gathering the financial resources** required for flood management from commercial activity in the river areas, property tax collected from the flood protected commercial establishments, proceeds of sand excavation leases, proceeds of sale / auction of timber collected from river

Plan Implementation and Third-Party Verification

- The scale and magnitude of proposed investments in flood sector requires **comprehensive monitoring of activities related to funding arrangements, distributions of funds and plan implementation** as per priorities. For this particular objective, a steering committee is proposed which will guide on implementation of priorities based on short term and long term needs in flood management across the country.
- Besides guidelines on priorities, one of the objectives of steering committee would be **monitoring of various projects under plan implementation stage**. To ensure transparency and efficient utilization of funds, third party verification is proposed.
- It will provide important feedback on performance of plan implementation by evaluating activities through certain benchmarks and monitoring indicators.

- It will also assure objectives of integrated flood management through structural and non-structural interventions.

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Critical Evaluation of Human Settlements and Encroachment of Waterways/River Beds and its Impact During Recent Floods

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Abstract:

Flood vulnerability in Pakistan, especially in Khyber Pakhtunkhwa, is influenced by both natural factors and human activities. Proximity to rivers, monsoon rains, and glacier melting contribute to flooding, while human-induced issues, such as encroachments on riverbanks, urbanization, and mismanagement, exacerbate the situation. The growing population in floodplains reduces the carrying capacity of rivers, increasing flood risks. In Khyber Pakhtunkhwa, human settlements along rivers like Indus, Kabul, and Swat have disturbed the natural flow of waterways, leading to environmental imbalances. The 2022 floods highlighted the consequences of unchecked encroachment, poor governance, and institutional inefficiencies. Addressing this issue requires a coordinated approach, including stricter enforcement of river protection laws, floodplain zoning, and the integration of advanced technologies such as GIS and satellite mapping. Additionally, a unified body for flood risk management, along with active community involvement, is crucial for long-term flood mitigation and reducing economic and human losses from future disasters.

Key words: *Flood vulnerability, encroachment, urbanization, Khyber Pakhtunkhwa, flood management.*

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Introduction

The vulnerability of floods to any geographical area depends on social, economic, physical, and environmental changes in the context of regional and global phenomena such as climate change. In Pakistan, the causes of floods include the location of affected areas near rivers, monsoon rains, and the heavy melting of snow and glaciers. Additionally, human-intensifying factors such as mismanagement and encroachments are considered major reasons behind the flood's destruction, affecting both plains and fragile mountains. The physical features of floods are highly diversified and largely affect the local climate.

Due to human settlement and encroachment, the following have become major threats to urban flooding:

i. Nullah Lai width reduces to 23-35 meters from 35-50 meters in Rawalpindi.
ii. Kabul River reduces its width by more than 50% near Nowshera city and surrounding areas.
iii. Encroachment in the natural waterways on the left bank of the Indus River in the lower part of Sindh is a major cause of delayed (from 4-5 days to 2-3 months) discharge of flood and storm water.
iv. Gujar Nullah Karachi width reduces to 15 feet from 100 feet.
v. In four nullahs of Karachi, 13,441 houses and 2,948 commercial structures have been built within a decade.
vi. A 60% population growth has been observed in the last decade over the bed of the Ravi River.

Like the rest of the country, the province of Khyber Pakhtunkhwa is also susceptible to floods due to its physiographic and climatic conditions. In Khyber Pakhtunkhwa, water is an extensively available natural resource. The Indus, Kabul, Swat, Panjkora, Kunhar, Chitral, Bara, Kalpani, Kohat Toi, Kurrum, Tochi, and Gomal are prominent rivers flowing in the province, providing ample supply for drinking, irrigation, and power generation. The province's population is growing at a rate of 2.6% per annum. As the population grows, the demand for food, shelter, and other infrastructure increases. Intensive land utilization in active floodplains is a critical issue. The population is continuously encroaching towards rivers for agriculture or infrastructure expansion, reducing the channel's carrying capacity and increasing the risk of floods. During the 2022 flood, human encroachment contributed significantly to intensifying flood characteristics.

The dynamics of poverty, urbanization, and the widening development gap between the rich and poor in a developing country like Pakistan contribute to challenges in structuring social spaces, where encroachments are an ever-present phenomenon. Encroachment is both a cause and consequence of underdevelopment, indicative of low (and even declining) development. Human settlements and growing urbanization in the past few decades in Khyber Pakhtunkhwa, particularly along the banks of the Indus, Kabul, and Swat rivers, have disrupted waterway flow. People are extending their residences into floodplains, disturbing the environment and ecosystem. This imbalance has led to various disasters, such as climate change and floods, resulting in colossal economic loss and threats to human life. In Pakistan, urbanization occurs in two forms: recognized urbanization, where people migrate from rural to urban areas, and unorganized urbanization, which is driven by high population growth rates and ad-hoc settlement patterns in informal systems.

A critical evaluation of government departments reveals the underlying reasons for unchecked encroachment. The government is "paying the price for years of delays in addressing the problem." Corruption, mismanagement of the country's water resources, lack of necessary infrastructure, and weak governance have fueled the crisis, affecting the poorest and middle class the hardest. One of the most glaring institutional failures in the wake of recent flash floods in Khyber Pakhtunkhwa has been the unabated and unchecked encroachment on riverbanks, exacerbated by illegal human settlements. There is no single body responsible for managing flood risk due to legal and institutional gaps, coupled with mismanagement and loose administrative coordination (Kordana & Słyś, 2020). A collaborative and integrative mechanism is laid down in the legal and institutional framework to cope with flood management.

In Swat and Dir Valleys, the locations where people construct their houses pose a challenge and increasing vulnerability. Most houses are built in areas exposed to high flood risk. Through several joint anti-encroachment operations carried out by the Irrigation Department, TMA, and District Administration Swat, most of the encroachments/obstructions have been removed since August 2020, and the floodplain has been vacated for the unobstructed passage of floodwaters.

Community involvement in the planning and design of urban settlement environments is a new alternative for bridging the gap between government, planners, and the community. With the active role of the community, a sense of belonging will be created, leading to increased motivation to maintain and improve the environment.

Problem Statement

Floods are not meant to be stopped; rather, they have to be regulated and channelized. The greatest human civilizations inhabited river basins due to fertile land. With the outburst of population and irregular urbanization, increased demographic pressures and economic activity forced people to move to floodplains, resulting in increased flood damages. A developing country like Pakistan presents a bleak picture of immense damages incurred whenever floods occur. In KP, the communities are facing a trade-off between the benefits and hazards of living in and around floodplains/flood-prone areas. The recent flood of 2022 exposed the illegal encroachments that were criminally neglected by the concerned authorities due to corruption and poor management, resulting in massive losses to life and property. This study will analyze how flood hazards can be reduced through proper management, planned mitigation, and preparedness measures undertaken along riverbanks and waterways.

Scope of Study

The river networks in Khyber Pakhtunkhwa are vulnerable to flooding stress due to the construction of human settlements and encroachments. The scope of the study is to examine the massive destruction caused by the obstruction resulting from illegal settlements in the river network. The impact of such phenomena is expected to worsen due to climate change. This study will help policymakers reduce human and economic vulnerabilities caused by encroachment and identify the most appropriate course of action.

Research Methodology

This study reviews the case studies, policies, current status, barriers, opportunities and operational data available at online and with different department of Khyber Pakhtunkhwa, i.e Irrigation Department, EPA, DC Swat and Mansehra related to policy formulation and planning on encroachment and human settlement on river beds and waterways. This study relies on exploratory research methods like secondary data available with various stakeholders.

The quantitative data collected in this study is analyzed using in-depth critical approach to extract answers and propositions.

Research Questions:

This study intends to:

1. Assess the impacts of flooding due to encroachment and human settlement.
2. Investigate the economic vulnerability in the province of Khyber Pakhtunkhwa before and after flood 2022.
3. To identify the quantum of role that unplanned urbanization has in the river encroachment. Narrow down the data gap that exists for generation of a global sustainable developmental plan.

Encroachment:

According to the Khyber Pakhtunkhwa River Protection Ordinance 2002, Encroachment means;

i. construction of any structures or buildings, permanent or temporary, within the area specified in clause (a) of sub-section (1) of section 3, and includes such structures or buildings, existing in the said area, the owners whereof do not provide proper septic tanks and a soaking pit or an alternate arrangement acceptable to the Authorized Officer; or

ii. construction of building, house, hotel or any other permanent structure within the area specified in subsection (2) of section 4 without making the arrangement referred to in clause (i) above;

Types of human settlement in Pakistan

1. Human settlement on the bed of seasonal rivers and waterways specially in big cities.
2. Culture of Kachi Abadi's to grab govt.
3. No proactive approach of highway's project consultants. Inadequate capacity of crossing bridges of Local, Provincial and national High ways major reason of agricultural and Abadi's loss. Bridge crossing for river located between Peshawar and Mardan at motorway M-1 is an example.

Critical Evaluation

Flood Commission Inquiry Report 2010

The Flood Commission was formalized under the directions of the suo-motu of the Supreme Court of Pakistan in 2010 to investigate the matter of breaches in dykes and unauthorized diversion of floodwaters by influential people to protect their lands. The Flood Inquiry Commission submitted its 200-page final report to the Supreme Court. Some of the key points of that report are (PDNA, 2022):

Key Points:

a. The negligence of the Irrigation departments of Sindh and Balochistan caused a colossal loss of Rs 855 billion to the national economy during the devastating floods of 2010.
b. 1,600 people lost their lives, and thousands were injured. Almost 4.5 million people lost their jobs, mostly in the farming sector. An estimated 20 million people became internally displaced persons (IDPs), and 7 million students were deprived of their academic sessions.
c. Encroachments contributed to obstructions in the flow of water, resulting in flooding in many areas.
d. Illegal encroachments, including thousands of 'katcha' lands by local influential, were leased out at nominal charges, resulting in the erection of private bunds. Local and provincial governments were involved in encouraging illegal acts that promoted encroachments.
e. Major damages were caused due to the lack of maintenance and repair of river embankments, canals, and obstructions created by major highways/motorways constructed by the Irrigation department and the National Highway Authority (NHA) across the country.
f. The delay in the Munda Dam caused damages downstream in Charsadda, Peshawar, and Nowshera districts, as well as at Munda Headwork's.
g. Encroachments in riverbeds and areas around irrigation facilities caused major havoc in Swat and other parts of the country.

Concluding Remarks:

(i) No pre-disaster structural framework or administrative network was adopted.
(ii) The 2010 flood fully exposed the illegal encroachments, which had been allowed to go unchecked by the concerned authorities due to negligence, corruption, and poor management, resulting in massive losses to life and property. Extensive encroachments in the floodplain were identified by most as one of the key factors responsible for obstructing the natural river flows. These issues are as follows:

a. Thousands of acres of "Katcha" lands were illegally encroached upon by local influentials or leased out at nominal charges, resulting in the erection of private bunds. Construction of houses and other built-up properties was allowed along riverbanks and canals. Similarly, encroachments on acquired lands in pond areas of barrages have aggravated flood hazards.
b. The major reason for the inundation of agricultural lands and abadis on the northern side of the Peshawar-Islamabad Motorway (M1) was the inadequate capacity of crossing bridges meant for the drainage of flood flows in rivers located between Peshawar and Mardan. The natural flow of water has been blocked due to numerous encroachments in most waterways caused by unplanned and illegal constructions.
c. In the Commission's view, this is a symptom of policy failure, not a disease: successive governments have failed to develop and implement town planning as an integral and unavoidable instrument of state policy, under which need-oriented provisions should have been made to meet the residential requirements of the growing population, rather than promoting affordability-driven expansions.

(iii) The Commission recommended that all illegally constructed structures on government lands, which had been destroyed by the recent floods, should not be allowed to be re-erected.

Types of Floods:

1. **Flash Flood:** Fast-moving waters that sweep everything in their path. They are caused by heavy rainfall or rapid snow thaw (Kunhar River, Chitral River, Hill torrents).

2. **Riverine Flood:** Caused by gradual riverbank overflows resulting from extensive rainfall over an extended period of time. These floods rarely result in loss of life but cause immense economic damage (Kabul River, Swat River (lower reaches), Kurram River).
3. **Urban Floods:** Occur when the drainage system fails to absorb the water from heavy rain (lower reaches of Bara River and Budni River).

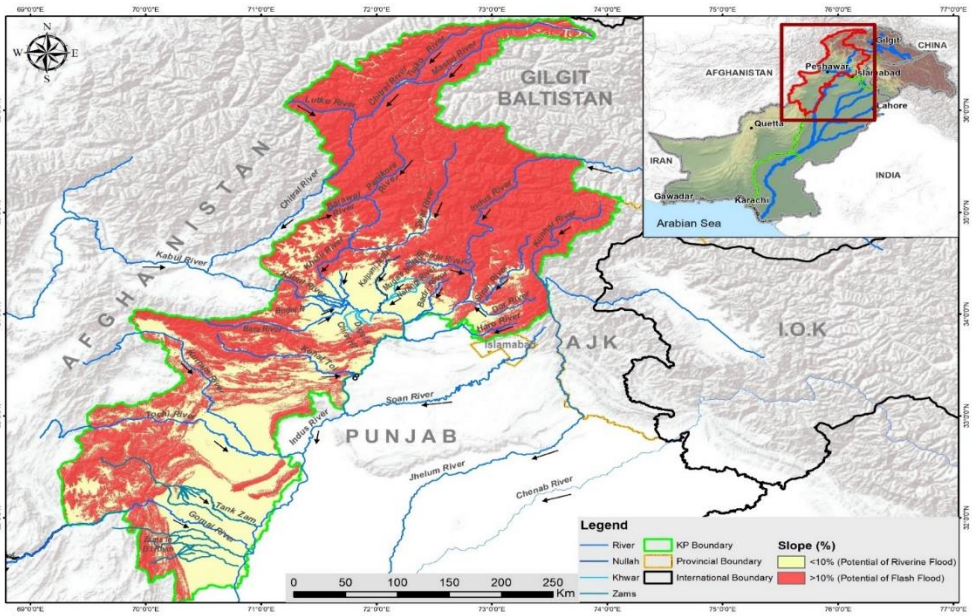


Figure: Flash and Riverine Flood Hazard Map

Legal Framework of Different Departments

The institutions responsible to check the encroachments and illegal human settlements are knitted with a set of different legal framework. The main features of these Acts *khyber pakhtunkhwa river protection ordinance, 2002*) are highlighted as under;

The KP River Protection Ordinance, 2002, Amendment Act, 2014

Keys Features of the Act:

1. It covers land use and zoning plans and building control regulations for catchment area of rivers (Clause 3, 4 and 5 of the Act).

2. Proper arrangements for the construction in 200 feet area along the river have been given. Powers to seal any building given to the authorized officers Section 16 provides for the bar of jurisdiction to civil courts.

3. NOC from irrigation department in the Amended Act.

4. Environmental protection Agency is constituted under the aegis of this act. Section 11, 12, 13 and 15 pertain to Prohibition of certain discharge or emissions, strategic environmental assessment, environmental examination and impact assessment and handling of hazardous substances respectively.
5. Under the Act, Rivers like Shalam, Naguman, Kabul and Bara have been notified.

Critical Analysis:

1. No minimum limits for prohibition of constructions have been specified.
2. Powers of trial and punishment thereof given to civil courts instead of civil magistrate.
3. Except Dalas Drain, all other Nullahs and khwar like Naray khwar, budhni nullah, shahi khwar, sheena, sufaid sand and Malankandeer, janjali, arabanoo, peer bala and achini not notified.
4. The act also does not cover the infrastructure built before the said act.
5. River beds mostly fall in private properties of Malakand and Hazara region, wherein this Act is silent about such arrangements.

The KP Removal of Anti Encroachment Act 1977

1. It covers identification and removal of encroachments on all kinds of public properties (Section 3 to 8 of the Act).
2. Summery trial and non-cognizance by any court
3. Exclusive jurisdiction of tribunal to decide cases of public property having powers of a civil court.

Environmental protection Agency Act 2014

1. Section 11, 12, 13 and 15 pertain to Prohibition of certain discharge or emissions, strategic environmental assessment, environmental examination and impact assessment and handling of hazardous substances(*Khyber-Pakhtunkhwa-Environmental Protection-Act, 2014*).

KP Land-use and Building Control Act, 2021

1. The DG of the Authority to ensure development of master plans, district land use plans of all districts and to ensure their implementation.

2. The District land-use planning and management committee headed by DC is to make district development master plan and to conduct a survey for categorization of land classes into:

    a. Residential, commercial, industrial, forest, mining, agriculture.

    b. Water bodies, area prone to natural hazards, mixed land etc.

3. Enforcement and penalties include:

    a. Power to seal building/structure and to attach an area for violation of Act, rules and regulations.

    b. Application of code of criminal procedure, 1998.

    c. Offences cognizable and non-bailable.

    d. No cognizance by any other court.

The Punjab Canal & Drainage Act 1873

1. Mainly covers use of water for public purposes.

2. Construction and maintenance of canal system.

3. Water rates and recovery.

4. Section 5 of part II authorizes the provincial government to notify any Nullah, drain, river and stream for public purposes

5. The Cancal inspector has been given magisterial power for demolition of any property under river bed and canal.

6. Canal and river are defined under same category.

Acts of the local Authorities

Different Acts of the local authorities are enacted providing provision to building regulations and having independent boards to tackle issues at their areas in lieu of building code violation. Some of them are GDA Act 2020, KDA Act 2020.

Institutional Framework

Roles and Responsibilities of Various Departments in Khyber Pakhtunkhwa:

Flood management is a multifunctional process involving a number of organizations. The roles and responsibilities of various departments/organizations are crucial in the overall management. This section provides information on the existing roles and responsibilities of various departments in addressing encroachment and human settlement issues in riverbeds and waterways:

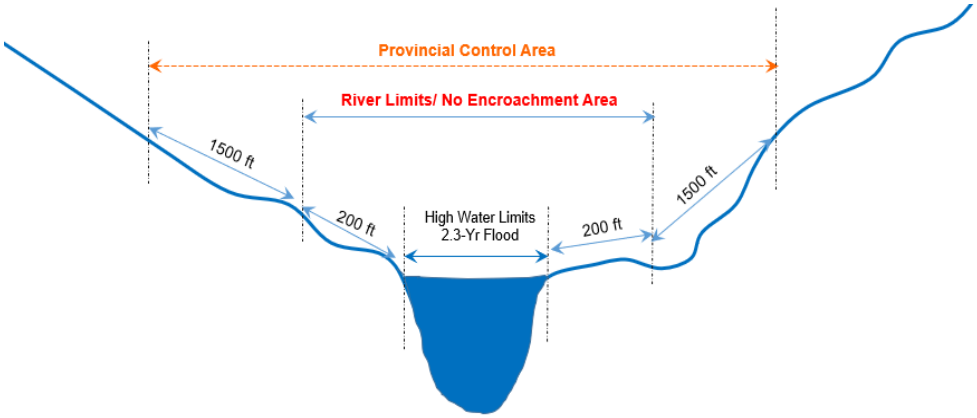
1. **Provincial Irrigation Department, Khyber Pakhtunkhwa**
   i. The Provincial Irrigation Department plays a vital role in pre- and post-flood situations. The department, in close liaison with Provincial Disaster Management Authorities, provides information about the flood situation in the rivers flowing in KP Province.
   ii. The Irrigation Department of Khyber Pakhtunkhwa is responsible for monitoring structures present in riverbeds under provincial control. All planned development must consider its implications on flood/risk.
   iii. The role of the Irrigation Department is primary in protecting, maintaining, and preserving the waterways, canals, and riversides. An NOC from the Irrigation Department is mandatory if any construction is to take place in the area adjoining the riverside.
2. **Provincial Revenue Department (through Deputy Commissioner), Khyber Pakhtunkhwa**: The Revenue Department has the mandate to take action based on the intimation from the Irrigation Department under The Khyber Pakhtunkhwa Anti-Encroachment Act of 1977.
   ii. It enforces the law to eliminate encroachment and any illegal activities taking place in the vicinity of water channels or riversides.
3. **Provincial Environment Department, Khyber Pakhtunkhwa**
   i. The Department of Environment, Forests, and Wildlife is responsible for checking the feasibility of any construction, keeping in view the protection and conservation of the habitat.
   ii. It is also responsible for the prevention and control of pollution in the water-adjacent areas.
4. **Provincial Local Area Authorities/TMAs, Khyber Pakhtunkhwa**
   i. The local municipal body assumes primacy in evaluating construction projects.
   ii. It assesses feasibility from both technical and sanitation perspectives.

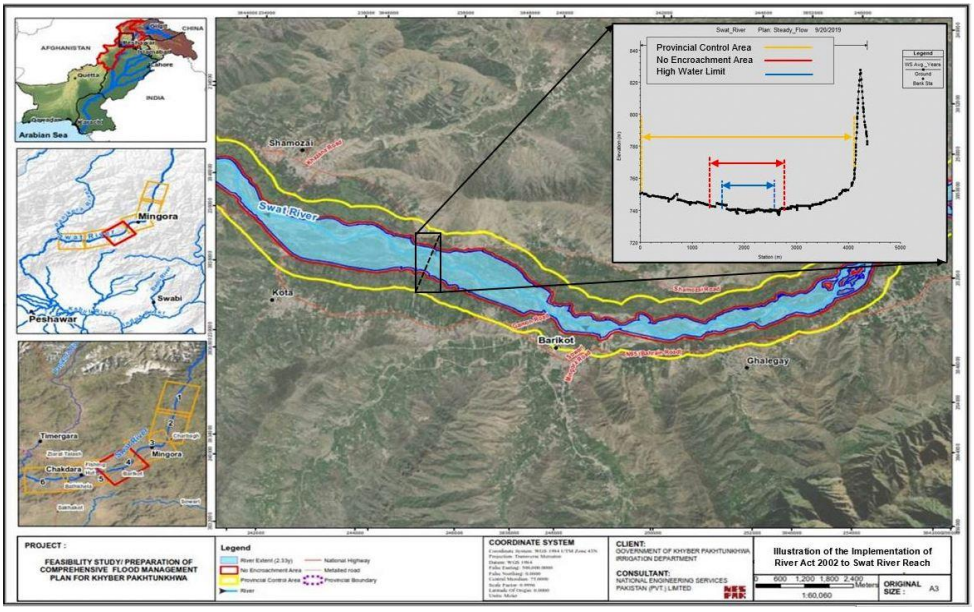
iii. The local municipal body is the authority that approves building plans. No structure can be built without its NOC.

Critical Evaluation of Government Offices in KP

Apart from legal and institutional frameworks, the rampant encroachment on the sides of the Swat River presents a bleak scenario, especially in the context of recent floods. The following points should be considered to identify the loopholes and grey areas in the system that have contributed to mismanagement and weak administration:

- The River Protection Act of 2014 is generalized and lacks specificity regarding the execution body or officer. The term "authorized officer" is not explicitly defined, leaving uncertainty about who will initiate anti-encroachment actions. The Irrigation Department investigates encroachments and informs the Revenue Department, but laxity and delayed action create opportunities for encroachers.
- The zoning plan of the catchment area is not clearly defined. Generalized zoning without specific details enables illegal activities that may lead to encroachment.
- The Act defines the "provincial control area" as being 1,500 feet away from the 200-foot high-water limit. This provision does not account for the presence of private properties within this limit.
- No patrolling mechanism exists along the riverbed, which allows encroachers to carry out illegal activities.
- Despite the immunity provided by the Act, court interventions remain unhindered, delaying the process.
- There is a lack of technology, GIS, and Geo-Mapping of the riverbeds and waterways.
- After the devolution plan, magisterial powers were removed from the DC, hindering forceful action, with thousands of cases pending in lower courts.
- According to the Ordinance Clause, the "high water limit" refers to the uppermost water level attained by rivers during peak flows in the usual flood season, as demarcated on-site and notified. The area up to 1,500 feet, starting from 200 feet, is measured along the slope (layoff land) beyond the high-water limits on either side of the rivers or their tributaries and is known as the Provincial Control Area.

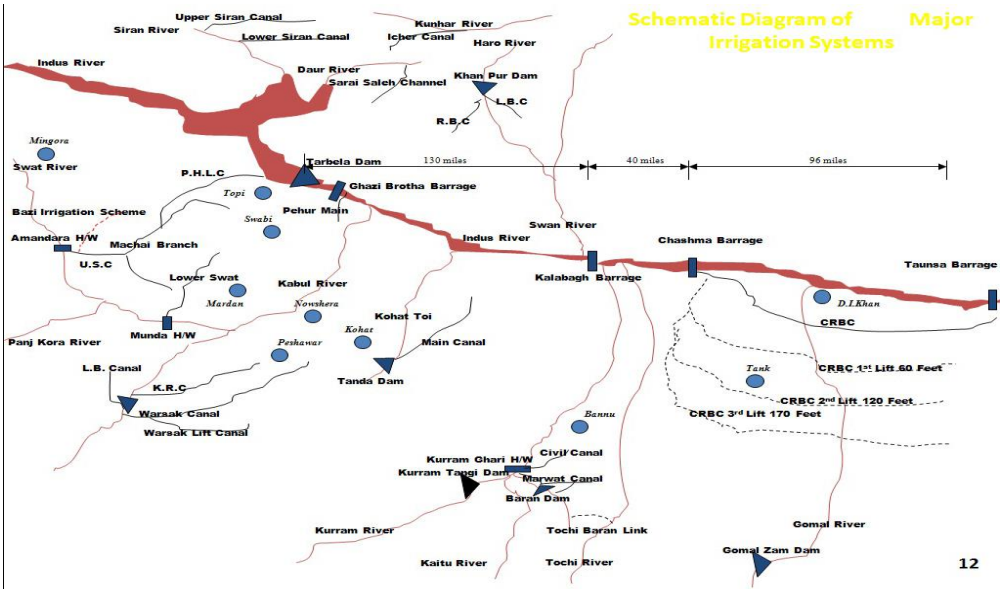

Provincial Control Area
River Limits/ No Encroachment Area
1500 ft
200 ft
High Water Limits
2.3-Yr Flood
200 ft
1500 ft


Provincial Control Area
No Encroachment Area
High Water Limit
Shamozai
Swat River
Kotkay
Barikot
Ghalegay
Mingora
Swabi
Peshawar
Timergara
Chakdara
PROJECT :
FEASIBILITY STUDY/ PREPARATION OF COMPREHENSIVE FLOOD MANAGEMENT PLAN FOR KHYBER PAKHTUNKHWA
Legend
COORDINATE SYSTEM
CLIENT:
GOVERNMENT OF KHYBER PAKHTUNKHWA
IRRIGATION DEPARTMENT
CONSULTANT:
NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT.) LIMITED
Illustration of the Implementation of River Act 2002 to Swat River Reach
1:60,060
ORIGINAL SIZE : A3

Situational Analysis

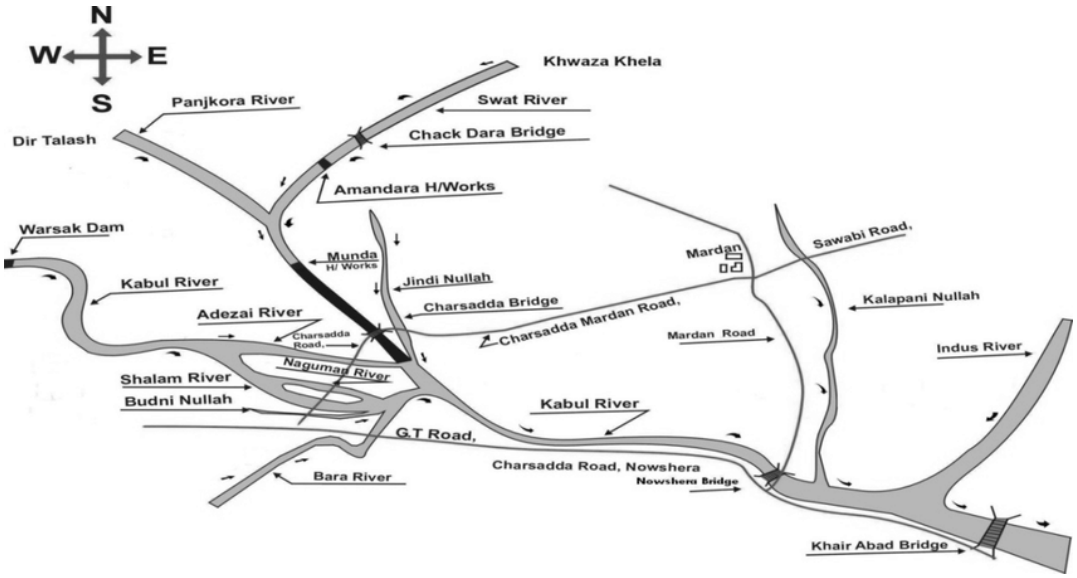
Many of the rivers in Khyber Pakhtunkhwa are fed by numerous small waterways and streams. The tributary valleys of the Swat, Kabul, and Kunhar rivers form significant physical features of the Indus River. A large number of streams are snow-fed and flow from higher elevations. The Swat and Kunhar rivers were already flowing in their courses before the mountains assumed their present form. In other words, the rivers are older than the mountains they traverse. As the mountains began to form through folding, contortion, and upheaval of the rock beds, the old rivers maintained their channels with greater erosional force, resulting in deep transverse gorges.

In the Swat and Dir Valleys, the locations where people construct their houses present a challenge and increase vulnerability. Most houses are constructed in areas exposed to high flood risk. The floodplains of the Swat and Panjkora Rivers have been illegally encroached upon, either by the local population or by government infrastructure, with the justification of low-cost land.



The Swat River starts from the Kalam Valley in Swat Kohistan, at the confluence of two main tributaries: Ushu (Mahodand Lake, 38 km from Kalam) and Utror (or Gabral, 17 kilometers north of Kalam). The confluence of the Ushu and Gabral rivers at Kalam Bazar forms the Swat River. It then runs downstream in a narrow gorge up to Baghdheri, then to Babozai, Barikot, and all the way to Chakdara, covering a length of about 160 km.

Main Tributaries of the Swat River: Jalband, Utror, Dahmaka, Shahoo, Matiltan, Kando Kadam, Chamgarai, Torwal, Ramait, Mankyal, Daral, Gurnai, Najva, Beshigram, Chail, Dabargay, Shagram, Shankoo, Tirat, Darilai, Barwai Khwar, Haroonai Khwar, Hazara Khwar, Malooch Khwargai, Sigram Khwar, Kanju Khwar, Kotlai Khwar, Ningwalai, and Dherai Khwar.



Encroachment in Water Ways & River Beds- KP Province					
S.No	**District**	**No of Waterway**	**Total Areas (Kanals)**	**Area Encroached (Kanals**	**Percentage %**
1	Abbotabad	1283	17553	125	0.7
2	Swat	42	33599	148	0.4
3	Kohat	38	4258	4258	100
4	Mansehra	02	9084	17	0.2
5	Malakand	02	5.7	5.7	100
6	Hangu	52	2662	1992	74.8

Identification of Encroachments and Their Removal

i. Using the available revenue record, 99 encroachments were identified in July 2019 along the Swat River.
ii. In several joint anti-encroachment operations carried out by the Irrigation Department, TMA, and District Administration Swat, most of the encroachments/obstructions have been removed from August 2020 to date, and the floodplain has been vacated for the passage of unobstructed floodwater.
iii. Some of the encroachments could not be removed due to litigation cases, which are under trial in various courts.

Before Flood 2022

1. The River Protection Act of 2014 deals with encroachments along the riverbanks.
2. Riverbank demarcation and identification of encroachments are done by the Irrigation Department.
3. In compliance with the Chief Justice's directives, the Irrigation Department hired the services of NESPAK to identify river boundaries based on flood modeling.
   a. The NESPAK survey is currently ongoing along the Swat River. According to XEN Irrigation Mr. Suleman, the riverbed survey from Ayub Bridge to Landakay is complete. However, some areas in Upper Swat and image processing are pending and are expected to be completed by the end of December 2022.
4. The District Administration has provided complete support to the Irrigation Department and their survey teams.
5. During the past two and a half years, more than 120 permanent encroachments have been removed along the riverbed.
6. The District Judiciary has issued stay orders in 16 anti-encroachment court cases.

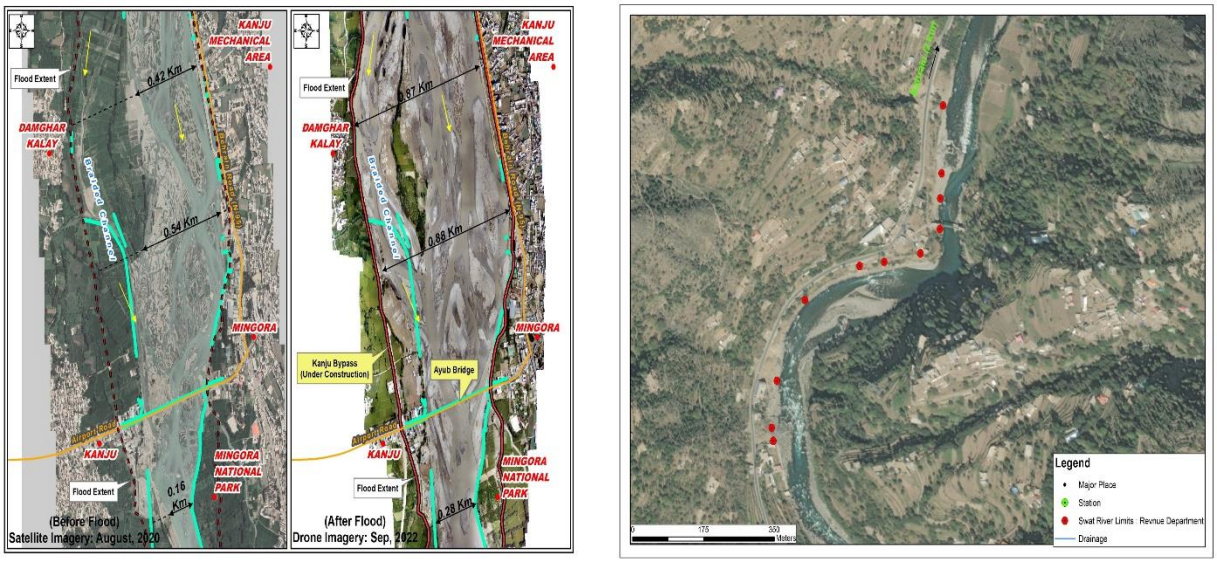
The removal of encroachments is carried out in phases by the committee constituted by the Commissioner of Malakand Division, headed by the Deputy Commissioner of Swat. The updated status of the anti-encroachment operations is as follows:
a. In the first phase, 30 encroachments/obstructions were removed from the floodplain of the Swat River in the Kalam area of District Swat. The operation was carried out from 12th to 14th August 2020.
b. In the second phase, 12 encroachments/obstructions were removed from the floodplain of the Swat River in the Madyan and Bahrain areas of District Swat.

c. In the third phase, identified encroachments from Fizaghatt to Landakay were removed from the floodplain. The operation took place on 14th June 2021, and 27 encroachments/obstructions were demolished.

After Flood 2022

1. After the flood of 2022, most of the encroached infrastructure around the riverbed has been washed away.
2. The future of the Bahrain Bazaar, Madyan Bazaar hotels, and Kalam hotels needs to be decided, along with the possible political backlash.
3. Some important government sector infrastructures that fall under the category of river encroachment are:
   i. Daral Khwar Power House, residential accommodations, offices, and hospital
   ii. Bahrain Masjid
   iii. Police Rest House, Fizagat
   iv. Tableeghi Markaz, Barikot
   v. Police Training Institute
   vi. Shamshan Ghat, Barikot
4. **Detailed Design and Construction Supervision of Flood Mitigation Structures Leading to the Rehabilitation of Swat River**
   i. River geometry and flood modeling activities were at an advanced stage from Kalam to Landakay before the flood of 2022.
   ii. The flood on 26th August 2022 changed the river morphology, and a fresh survey and modeling need to be carried out for the updated river state.
   iii. The flood in the Swat River in 2022 reached 246,000 ft^3/sec at Khazakhela. The flood of 2010 was 175,000 ft^3/sec.
   iv. River slope of the Swat River: Kalam to Khazakhela (1:70), Khazakhela to Ayub Bridge (1:175), and Ayub Bridge to Chakdara/Batkhela (1:300).
   v. Data acquisition through drone from Khazakhela to Ayub Bridge is in progress; data processing is ongoing.
   vi. Marking of high-water limits, demarcation of floodplains, and the 200-ft limits from the high-water mark of the Swat and Panjkora Rivers are in progress under NESPAK consultants.
   vii. In the Swat and Dir Valleys, the locations where people construct their houses present a challenge and increase vulnerability. Most houses are constructed in areas exposed to high flood risk. The floodplains of the Swat and Panjkora Rivers have been illegally encroached upon, either by the local population or by government infrastructure, with the justification of low-cost land.

Course of River Bed Changes by Flood 2022



Swat River, of extents at upstream of Ayub Bridge, Mingora

PESTEL Analysis

The strategic analysis helps understand how the different government offices in Khyber Pakhtunkhwa can be affected by external factors, which are then used to develop strategies to mitigate or eliminate their impact on operations. This framework analyzes only external factors influencing the different departments involved in carrying out activities related to riverbed and waterways protection. It will ensure that all external influences are factored into the revised strategy. This analysis helps develop procedures for future strategies. The PESTLE (Political, Economic, Social, Technological, Legal, and Environmental) analysis would be applied to identify the key issues for the implementation of sustainable systems. A list of issues included in the PESTLE analysis is as follows:

Political Issues

1. The culture of Kachi Abadis (informal settlements) to grab government land.
2. Provincial and national highways are major reasons for agricultural and settlement losses. For example, the bridge crossing the river located between Peshawar and Mardan on the motorway M-1.
3. Negligence of the Irrigation Departments of Sindh and Balochistan caused a colossal loss of Rs. 855 billion to the national economy during the devastating floods of 2010.

4. Illegal encroachment by thousands of 'katcha' (temporary) settlements, often by local influentials, who lease out the land at nominal charges, resulting in the erection of private bunds. The local and provincial governments have been involved in encouraging illegal acts, promoting encroachments. Successive governments have failed to develop and execute town planning as an integral and unavoidable part of state policy.

Economic Issues

1. 1,600 people lost their lives, and thousands were injured. Almost 4.5 million people lost their jobs, mostly in the farming sector. An estimated 20 million people became internally displaced persons (IDPs), and 7 million students were deprived of their academic session.
2. The devastating floods of 2010 caused a loss of Rs. 855 billion to the national economy, mostly in Sindh, due to the non-affordability of housing. Millions of people settled on riverbeds and open areas for decades without regulations.

Social Issues

1. Readiness for cooperation between sectors is poor due to economic and affordability issues, which have driven people to settle in areas not owned by anyone, with the connivance of government departments.
2. The level of awareness concerning the use of sustainable water management systems is rare, where low literacy rates, coupled with lack of awareness, make it easier for people to fall into such traps.

Technological Issues

1. No rules have been made, nor skills developed, to use technologies like GIS and geo-mapping for regular updates.
2. Interlinkages between academia and departments for conducting proper studies in UET and the Disaster Management Department have not been developed.
3. A data bank backed by GIS and geo-mapping, with linkages to all departments, is not available.

Legal Issues

1. The River Protection Act of 2002 contains some ambiguous clauses and does not fix responsibilities either on the EPA or the Irrigation Department.

2. The scope of regulations in the field of cooperation between the Environment Department, Environmental Protection Agency, local governments, district governments, and scientific centers is missing.
3. The cohesion and stability of legal provisions concerning waterways management are weak.
4. The Anti-Encroachment Act of 1977 and its amendments in 2021 are ambiguous regarding the responsibilities of the authorized officer.

Environmental Issues

1. The level of legal protection for the environment and natural resources in the government sector, such as the mandatory NOC from the EPA, is not applied to commercial or private activities.
2. In the River Protection Act, there is no clear mention of the EPA's role before issuing any such NOC.

SWOT Analysis

SWOT analysis focuses on Strengths and Weaknesses in the internal environment and Opportunities and Threats in the external environment. It helps to determine where we stand within the organizations. This tool is applied on irrigation department internal environment and others as external factors.

Strength

1. Act (river & anti-encroachment) promulgated
2. Presence of technical field formation
3. Encroachment ministerial power is with DC under law coverage under the anti-encroachment act

Weakness

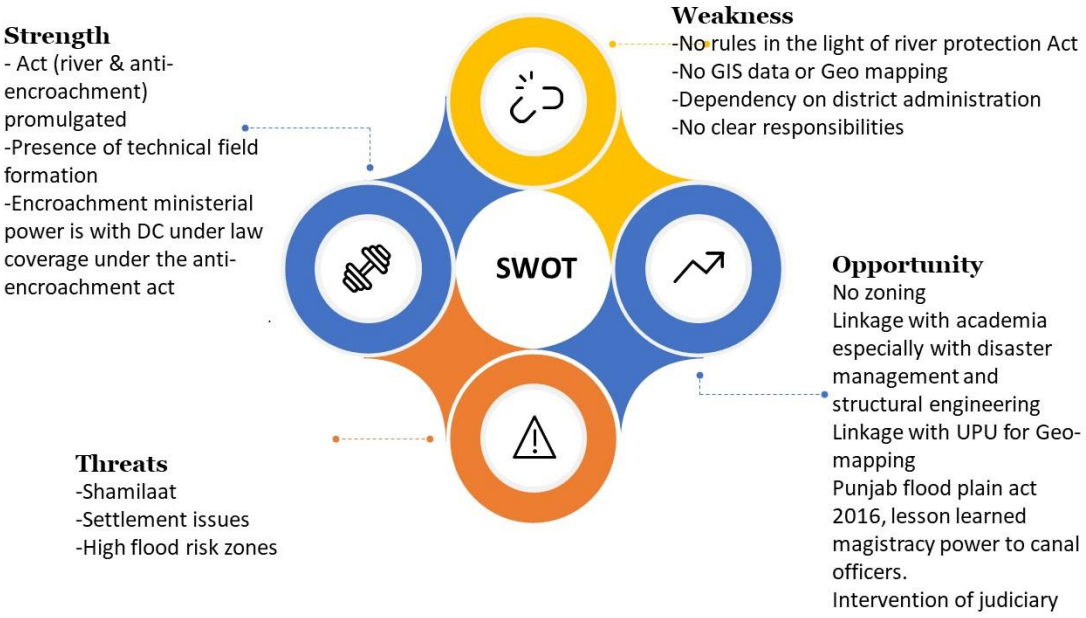
1. No rules in the light of river protection Act
2. -No GIS data or Geo mapping
3. -Dependency on district administration
4. -No clear responsibilities

Opportunity

1. No zoning
2. Linkage with academia especially with disaster management and structural engineering
3. Linkage with UPU for Geo-mapping
4. Punjab flood plain act 2016, lesson learned magistracy power to canal officers.
5. Intervention of judiciary

Threats

1. Shamilaat
2. Settlement issues
3. High flood risk zones



Impact analysis

Pakistan is in the midst of a humanitarian crisis caused by massive flooding in one-third of its territory. Over 33 million people have been displaced, one-seventh has lost their homes and the mortality count is over 1,300. Pakistan is facing an estimated PKR 4.7 trillion ($20 billion) worth of damages and possibly more in a base case scenario, as data continues coming in through organizations involved in rescue and rehabilitation. This amount consists of damages to the crops, houses, livestock and other infrastructure.

The government expects GDP growth to be 2% against a target of 5% and inflation to be around 20% (in August it stood at 27.3 per cent, the highest in 47 years) on an annual average basis. The reduction in river bed and waterways due to the encroachment of the river by constructing houses and other infrastructure has significantly reduced natural water flows through channels and water velocity, resulting in water logging problems during the monsoon season and a water crisis during the summer and winter seasons. A morphological change in the channel resulting from siltation or encroachment will result in changes in the channel's elevation and slope, thus creating havoc in flash floods. Due to these above reasons, the direct and indirect tangible impacts of recent floods at Khyber Pakhtunkhwa are:

Direct Tangible

1. 50 hotels and 150 restaurants and motels were destroyed.
2. 700 hotels, motels, inns and restaurants completely inundated.
3. Road between Bahrain and Kalam worth 10 billion destroyed

Indirect Tangibles

1. 25 billion losses to the infrastructure (river side hotels).
2. 70 billion losses in tourism.
3. 50,000 people lost job (30,000 direct and 20,000 indirect).
4. 65 deaths and 109 injured.
5. 5384 people hospitalized due to water borne diseases.

GAP Analysis

S. No	Current state	Desired state	Gap Description	Action required
01	Post event activism of concern Departments Post Crisis Management	Forward looking and risk aware resilience approach	• No flood risk management and preemptive mechanism	• Establishment of FRM authority with the mandate to equip the HR with modern education of FRM and capacity building
02	Fragmented legal framework	Clear and unified legal/operational mechanism	• River Protection Act 2014 identifies encroachment but cannot remove it • No rules formulated • Authorized officer is not defined • Pendency before judicial magistrate • No clear role define in rule of business and Act about jurisdiction	• Single authority of encroachment identification & removal be given to Irrigation Deptt • Rules need to be notified immediately • Authorized officer be clearly defined and be given powers of executive magistrate for enforcement • Appellate Tribunal clause needs to be inserted in Act • Rules of business need to be amended with clear roles & responsibilities
03	No zoning plan /rules on river sides 200 ft flat rule Clear definition of Waterways	Strict demarcation and bifurcation of zones on river sides	• Provincial control area of 1500 ft includes private lands • Katcha is allowed for the land owner in this area which often turns into stable construction	Flood plain zoning explicitly defining: • No development zone • Regulated zone • Free zone for development
04		Integrating flood plain encroachment data with technology	Lack of updated encroachment data on river sides. No GIS and Geo Mapping. • Human surveillance mechanism adopted.	Determining the level of both endogenous and exogenous risk entails the development of set of indicators that can provide reliable information about the level and type of management risk exposure

Conclusion

The human settlement and encroachment on river sides and waterways in Pakistan and especially in Khyber Pakhuntkhwa is decades old issue which is criminally neglected by all concerned Government departments. It requires the integrated public service mechanism with advanced technological tools to avoid the repeated catastrophe posed by floods on regular intervals. Therefore, streamlining the legal framework backed by cohesive institutional harmony at implementation level must be revamped and enforced to safeguard human life and economic losses in Khyber Pakhtunkhwa and provide a window of opportunity for the growing sector of tourism.

Recommendation

1. **Single Body with Powers of Encroachment Identification & Removal on River Sides**

   a. Presently, multiple departments are involved:

   - **Irrigation Department**: Custodian of rivers and waterways in terms of record-keeping and maintenance under the KP River Protection Act 2014.
   - **District Administration**: Empowered to remove encroachments under the KP Anti-Encroachment Act 1977.
   - **River Act**: Mostly pertains to ecology and aquatic life of the river.

   b. What needs to be done:

   - Rules of Business for the Irrigation, Environment, and Revenue Departments in terms of River Protection need to be notified, with clear identification of functions and responsibilities.
   - The authorized officer shall be specifically mentioned in the River Protection Act, with job descriptions.
   - The power to seal and impose fines needs to be mentioned in the Act, along with a schedule of violations.

2. **Rules Need to Be Notified Immediately**

   a. Rules under the KP River Protection Act 2014 should be formulated and notified immediately.

   b. Under these rules, proper regulations should be made, delegating powers to field officers of the Irrigation Department for speedy disposal of business.

   c. Similar to the Punjab Flood Plain Regulations Act 2016, a River/Canal Officer should be notified, with powers of executive magistracy in terms of River Act violations.

3. **Appellate Tribunal Body**

   a. To address civil court, stay issues, an Appellate Tribunal Body should be notified.

4. **Flood Plain Zoning**

   a. Bifurcation of urban and rural flood risk level zones:
   Spatial overlay analysis in GIS software can align the highest-risk and high-risk areas with living spaces in the existing territorial spatial planning zones. The classification of flood prevention levels and structural adjustment of living spaces will help link zoning regulations with human development activities and strengthen the resilience of river-network cities to cope with flood risk.

   b. Human settlement flood resilience spatial zoning should range from low to high:

   - Human settlement control zone
   - Human settlement restriction zone
   - Human settlement buffer zone
   - Human settlement construction zone

   c. Theoretical basis and decision support for the site selection of human settlement construction:

   - Human settlement expansion zone
   - No development zone

5. **EngineeringSolutions**

a. The concept of resilience originated from engineering and indicates an object's ability to return to its original state after being subjected to an external force. In contrast to engineering resilience, ecological resilience emphasizes the ability to survive in any state, allowing for fluctuations in existing mechanisms.

b. Specific building regulations:

- Currently, uniform building bylaws are adopted by local area authorities:
  - In Malakand Region: Upper Swat Development Authority
  - In Hazara Region: GDA, KDA Building Bylaws

c. What needs to be done:

- Specific building bylaws need to be formulated, considering structural and soil investigations.
- Hard Rock, Medium Rock, and Soft Rock classification
- Structure stability testing laboratories
- Piling in mountainous regions with clear seismic and morphological assessments

e. The emerging urban planning technologies, such as big data, cloud computing, artificial intelligence, and mobile internet, are constantly evolving and putting forward new requirements for flood risk management in river-network cities. Therefore, the future of river-network cities should focus on urban public safety technology as the core, through interdisciplinary technology-driven construction.

6. **A Data Bank Backed with GIS and Geo Mapping, with Linkages to All Departments**

   a. Data bank updating on a yearly basis:

   - Sync with Google Inc.
   - Mobile app application with real-time data updates.
   - Construction of a flood risk assessment model for river-network cities: Exploring the natural and social flood risk influencing factors of river-network cities will provide a data basis for improving urban flood resilience, compensate for the lack of disaster prevention topics in traditional urban planning, and offer technical prerequisites for optimal responses to human settlements.

7. **Land Settlement**

   a. Much of the land in the Malakand region along rivers and waterways is disputed.

   b. Land settlement issues, including land computerization and settlement laws, should be resolved.

   c. High-risk areas should be prioritized, with special compensation provided to existing landowners to settle the issue.

8. **Vigilance Cell / Monitoring Mechanism**

   a. Off-the-shelf solutions:

   - Drone technology for river demarcation, as done in India.
   - River and waterway marking using AI and satellite spatial images.

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Critical evaluation and comparative analysis of Civil Society Organizations

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Abstract:

Between June and August 2022, Pakistan faced catastrophic flooding caused by heavy rains and a combination of riverine, urban, and flash flooding, resulting in an unprecedented disaster. The National Disaster Management Authority (NDMA) reported that around 33 million people were affected, with nearly 8 million displaced, and over 1,739 lives lost. The frequency of such floods has been increasing in recent decades. Civil Society Organizations (CSOs) played a vital role in disaster relief, particularly in the rescue and recovery phases. This qualitative study investigates how CSOs contributed to flood-affected areas, revealing that their response time was generally quicker than that of the government. However, their involvement in the mitigation and rehabilitation phases remains limited. The findings of this study are valuable for policymakers, NGOs/INGOs, Civil Society, and all stakeholders engaged in disaster management, risk reduction, and long-term recovery planning.

Key words:

Civil Society Organizations, Floods, Disaster Management, Rescue and Recovery, Pakistan

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Introduction

Pakistan is listed in 7th position in Climate Change Risk (CCR) and has suffered extreme weather events in the past, continuously facing catastrophic occurrences (Kreft et al., 2016). For decades, Pakistan has witnessed serious and catastrophic events, and the frequency of these disasters has slowed the pace of socioeconomic development in the country. Since the recent floods in June 2022, federal and provincial authorities have been working tirelessly to manage ongoing relief efforts across the country, in collaboration with local, national, and international partners. The scale of the disaster is unprecedented in Pakistan, surpassing the damage caused by the 2010 floods. Government institutions, CSOs/NGOs/INGOs all participated in the emergency response to cope with this disaster. The country, already facing economic issues, political instability, poor governance, and security challenges, is finding it difficult to deal with this calamity effectively. Pakistan has faced several disasters in the last two decades. To meet the urgent humanitarian needs arising from these disasters, CSOs, especially non-governmental organizations (NGOs), have played a major role in providing disaster relief. However, the role of Civil Society has not been fully recognized and acknowledged. Therefore, it is crucial to understand the pattern and nature of the help provided and identify gaps in coordination among different stakeholders to counter and mitigate disaster risks and ensure timely relief for those affected.

Problem Statement

The role of CSOs in sustainable development, vibrant democratic culture, and natural calamities has been recognized by intellectuals and international development agencies. In developing countries like Pakistan, CSOs have predominantly gained significant attention, especially in natural calamities and floods and as an instrument for public involvement and participation. However, the question emerges about the efficacy of CSOs and whether or not they have succeeded in realizing their objectives of effective service delivery.

Therefore, a study is proposed as how to enhance the role of these organizations in mitigating the hazards of natural calamities and help the victims by providing timely relief by better coordination among stakeholders.

Scope of Study

The scope of the study is limited to critical evaluation and comparative analysis of CSOs in KP. The study will probe into the situational and institutional analysis of CSOs and the issues faced by CSOs during flood operations.

The coordination mechanism and the institutional/ legal gaps will be analyzed in this research. The study will recommend the way forward for the improvement of the working environment and coordination of CSOs in the province for risk mitigation and timely relief to flood-affected people.

Literature Review

The world has faced significant social, environmental, and economic transformation in recent decades due to disasters and floods, which have brought both negative and positive impacts. Sometimes, they lead to growth, sustainability, and development (Faulkner, 2001; UNDP, 2005). However, most of the time, they cause disruption and destabilization in socio-environmental systems, reflecting the negative impacts. The future major challenge is climate change, and Pakistan is among the most vulnerable nations likely to face disasters. One major cause of flood devastation is demographic changes (Hussain & Junaid, 2013). The population and the proportion of people living in flood-prone river basins have increased by 114%. The recent floods have caused significant devastation in Pakistan, reinforcing the motive given by donors for supporting Civil Society. A strong Civil Society will demand a more democratically accountable and transparent state, leading to sustainable good governance (Vasilescu, Khan, & Khan, 2008). Worldwide, CSOs often collaborate with government institutions and other stakeholders to manage catastrophic events. When a disaster occurs, measures are taken immediately to counter it.

Research Methodology

The research is purely Qualitative in nature. Secondary data has been collected and examined thoroughly. Secondary data include a literature review, field visits, and online material.
An unstructured questionnaire along with PESTLE, SWOT, EETH, GAP and Institutional Analysis has been applied.

Situational Analysis

As per government data, since 1950, Pakistan has not been a stranger to intense floods. Pakistan is among the top 10 countries at the highest risk of natural disasters, according to the world's risk index, but the country has never taken disaster management seriously. There is a lack of political will, and there are many lacunas and weak institutional frameworks related to disaster management in our country. That's why an analysis of these institutions is required to point out deficiencies and weaknesses in the system.

PESTLE Analysis

POLITICAL:

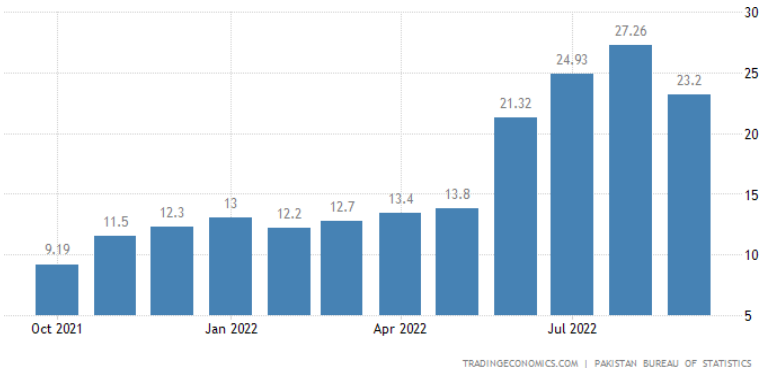
Political interest is aligned with hard infrastructure—roads and buildings—as these are tangible and noticeable, at the cost of ignoring disaster management.

- There is no demand for disaster management as a priority.
- Political instability is rampant in Pakistan, leading to policy discontinuity.

ECONOMIC:

Low Financial Aid: The country's recent appeals for help have not received the desired response, with the United Nations declaring, as of October 12 (Gul, 2022), that it had only received $90 million of the $816 million it requested to assist Pakistan's flood recovery efforts.
High Inflation Rate: Inflation is regarded as regressive taxation against the poor, resulting in higher consumer prices.

This is a primary factor pushing vulnerable people into poverty. The inflation rate in Pakistan was almost 23.2% in September 2022.



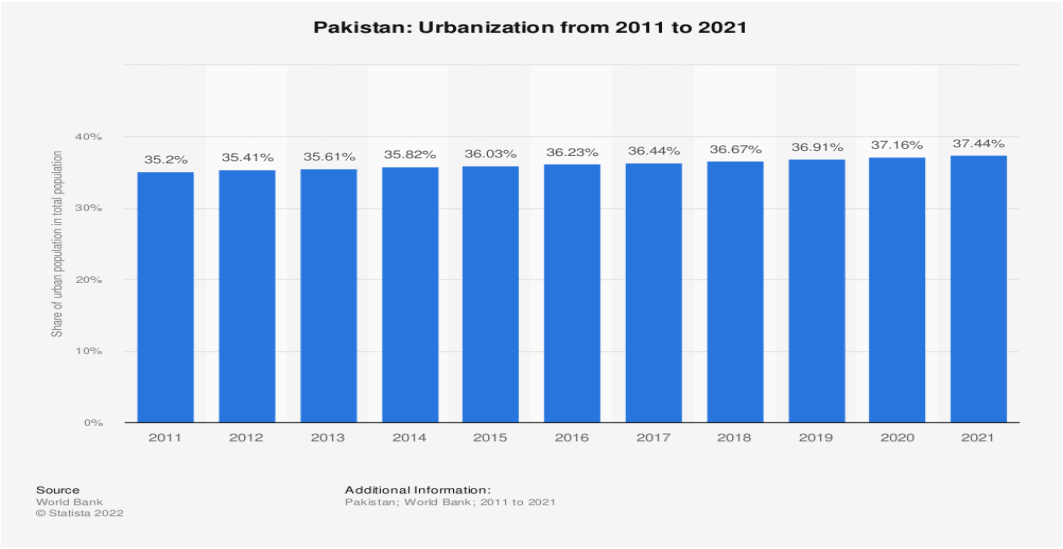
World Financial Crunch and Impact On Pakistan: The government's ability to finance its response from domestic resources has been constrained by the world economic crisis and the need to stick to IMF conditions.

Social:

Corruption increases income inequality which leads to poverty. In the corruption perception index 2021, Pakistan is ranked at 140/180 in the world.

High population growth traps individuals, communities, and entire countries in poverty.

Urbanization leads to class division and low standards of living. The low population density in a particular area exerts balanced load on the resources and utility infrastructure. In Pakistan urbanization rate was 37.44% in 2021.



IDPs and Refugees:

The safe return of IDPs and refugees including illegal immigrants results in a decreased burden on cities and improved living standards.
Conflict & Violence Category-5.1million IDPs from 2008-2021(IDMC)v
Disaster Category-16.6 million IDPs from 2008-2021
Recent Floods- 7.2 million IDPs (Reported by Internal Displacement Monitoring Centre)
1.7 million total refugees in Pakistan in 2022(UNHCR)

Technological:

- Absence of MIS leading to un-informed decisions and poor coordination.
- Lack of research and development activities
- Over-dependency on foreign countries in the technological sphere
- Non-utilization of Information and communication technology

Legal:

- Over-regulation: Pakistan is over-regulated in terms of laws and policies while dealing with CSOs/NGOs.
- Weak implementation of laws and policies:
- The implementation mechanism of laws and policies in Pakistanis is too weak.

Overlapping of Laws and Jurisdictions of State Institutions:

CSOs find it very hard to go through these cumbersome and complicated procedures and effective service delivery by these organizations is discouraged.

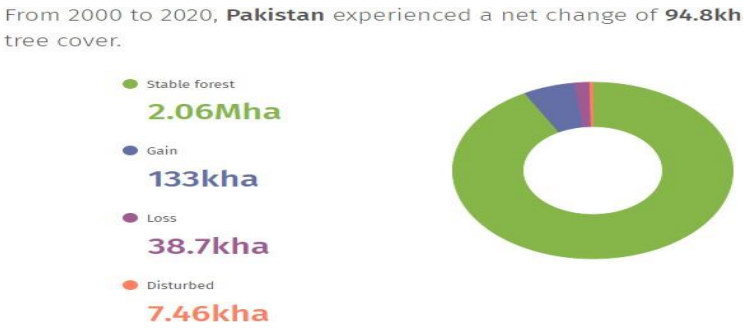
Environmental:

high risk of natural disasters

Pakistan is among the top 10 countries at the highest risk of natural disasters, as per the World Risk Index. Pakistan is also suffering and sustaining heavy losses due to global climate change in the shape of natural calamities and floods.

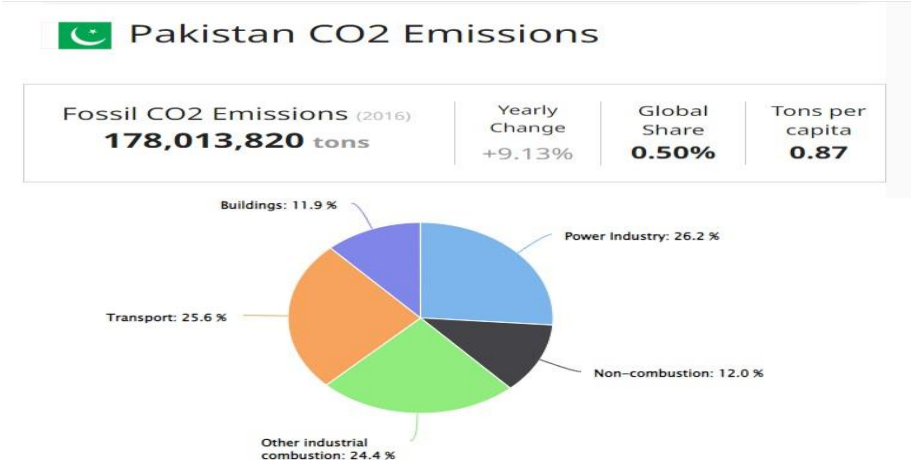
Deforestation:

In Pakistan from 2001-2021, 4.6% of total tree-covered loss occurred resulting in 3.56 metric tons of CO2 emission in the environment



CARBON EMISSION AND POLLUTION:

Carbon emissions in Pakistan is likely to rise 300% by 2030 (umer, 2018). The following data shows the increased emission level of CO2 globally and in Pakistan leading to natural catastrophes and floods.



Legal and Institutional Analysis

In June 2018, Pakistan was placed on the grey list of the Financial Action Taskforce (FATF)and provided with a 27-point action plan. Out of the 40 recommendations issued by the FATF, Recommendation Eight deals with CSOs/NPOs. To comply with these recommendations, the Government of Pakistan, including all provincial governments and all legislatures have overhauled the non-profit laws' rules, regulations, and policies.

Relevant Section	Description	Critical Analysis
N/A	Management information system as a tool for effective and informed decision making	• Lack of Management Information System (MIS) is one of the major reasons resulting in poor service delivery of NDMA during natural calamities
Sec-6(2) (g) of NDMA, Act 2010	To take measures for the prevention of disaster or the mitigation or preparedness and capacity building for dealing with disaster situations.	• No measures for prevention and mitigation of disaster • No capacity building to deal with disaster and mitigation measures
Sec-9 (a) of NDMA Act, 2010	Implementation, coordination, and monitoring during disasters	• Lack of coordination with PDMAs, DDMUs and monitoring process
Sec-9 (c)	Implement, coordinate and monitor the implementation of National Policy	• Weak implementation of National Policy and lack of coordination and monitoring mechanism
Sec-9 (e)	Provision of necessary technical assistance to Provincial Governments and Provincial Authorities for preparing their disaster management	• Non-provision of technical support to Provincial governments and PDMAs

Sec-14 (2) (g)	No review of progress by provincial governments and no guidelines and directions for these departments and PDMAs	• To review measures being taken for mitigation, capacity building, and preparedness by Provincial Governments and issue guidelines and directions

Provincial disaster Management Authority

Relevant Section	Description	Critical Analysis
N/A	Management information system as a tool for effective and informed decision making	● Lack of Management Information System (MIS) is one of the major reasons resulting in poor service delivery by Provincial Departments and CSOs/NGOs during disasters
Sec-9(2c-iv)	Coordination with National Authority, line departments, DDMUs, INGOS/NGOs and Humanitarian Agencies for disaster management and preparedness	● Lack of coordination with CSOs/INGOS/NGOs resulting in poor disaster preparedness and management
Sec-9 (2c-vi)	Provision of technical support to DDMUs and Local Authorities for effective handling of disasters	● Non- provision of technical support to these Units and Authorities resulting in poor performance during floods and disasters
Sec-9 (2e-ii)	Monitoring and evaluation of projects by the NGOs and INGOs working in the province	● Weak Monitoring and Evaluation mechanism of the projects resulting in poor performance and poor mitigation measures

District Disaster Management Units (DDMUS)

Relevant Section	Description	Critical Analysis
Sec-20(2-b) of NDMA Act, 2010	Co-ordinate and monitor the implementation of the National Policy, Provincial Policy, National Plan, Provincial Plan and District Plan	• Lack of coordination, monitoring and implementation mechanism resulting in poor performance of DDMUs
Sec-20(2-c)	To ensure that the areas in the district vulnerable to disasters are identified and measures for the prevention of disasters and the mitigation of its effects are undertaken by the departments of the Government at the district level as well as by the local authorities	● Absence of Monitoring and Evaluation Mechanism for effective service delivery at district, provincial and local level during natural calamities

Sec-20(2-r)	To encourage the involvement of non- governmental organizations and voluntary social-welfare institutions working at the grass roots level in the district for disaster management	• DDMUs plays a passive role in involving these NGOs/NPOs at gross root level during disasters

CIVIL SOCIETY ORGANIZATIONS

PRIMARY LAWS FOR REGISTRATION OF CSOs/NGOs/NPO

The following table list is the primary laws applicable to CSOs/NPOs in Pakistan and their geographical jurisdiction (Malik, october,2021)

Sr. No.	Title	Region
a.	Trust Act 2020	Separate in each province and ICT
b.	Societies Registration Act 1860 (SRA 1860)	Punjab, Sindh, ICT, and KP
c.	Voluntary Social Welfare Agencies (Registration and Control Ordinance) 1961 (VSWA Ordinance1961)	Punjab, Sindh, ICT, and KP
d.	Baluchistan Charities (Registration, Regulation, and Facilitation) Act, 2019 (BCRA 2019)	Baluchistan only
e.	Companies Act, 2017 (CA 2017)	Federal (Applicable in all provinces)
f.	NDMA Act, 2010	Federal and all provinces
g.	KP PDMA Rules of Business, 2013	KP

Cooperation and Coordination at the District Level:

All local NGOs are registered with the Directorate of Social Welfare Department, Khyber Pakhtunkhwa. The Directorate of Industries Department, Khyber Pakhtunkhwa, registers Literary Societies and Trusts. The local NGOs are supervised by the District Officer of Social Welfare at the district level.

Cooperation and Coordination at the Provincial Level:

All humanitarian-based international NGOs are registered with the Provincial Disaster Management Authority (PDMA) of the Relief and Rehabilitation Department.

During an emergency situation, the NGOs contact the Relief Department/PDMA for further facilitation and provision of security in the affected districts.

International NGOs wishing to work on development projects in any district during a disaster are supervised by the Planning and Development Department of Khyber Pakhtunkhwa, which leads the execution of work/schemes for INGOs.

Similarly, the Health Department and Agriculture Department supervise the activities of INGOs when they wish to work in the health or agriculture sectors, respectively, during a disaster.

Cooperation and Coordination at the Federal Level:

All INGOs are registered with the Ministry of Interior (MOI) at the federal level after proper verification. Local NGOs are registered with the Ministry of Economic Affairs at the federal level after obtaining contracts from INGOs as implementing partners for any project.

During a national disaster, the National Disaster Management Authority (NDMA) plays a leading role at the federal level and develops a national policy for any disaster. NDMA issues instructions to all provincial governments/PDMAs for the implementation of the national policy regarding disasters and calamities. The provincial government/PDMA further communicates the federal government's instructions to district administrations for implementing the national policy regarding disasters.

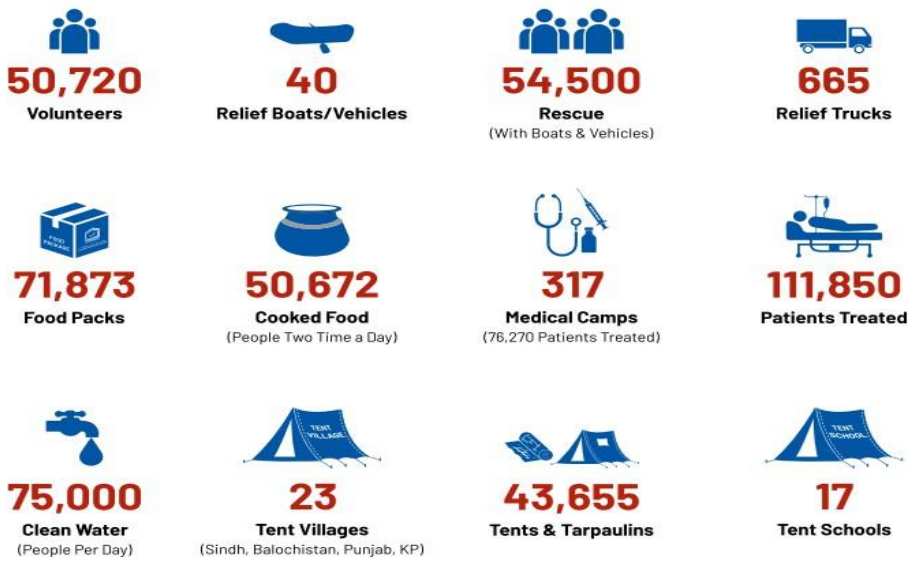
Role Played by Different CSOS in Recent Floods

Civil Society Organization's Response

The civil society response has been timely, significant and, for many, the only aid received. The contribution by the leading CSOs in KP are summarized below:

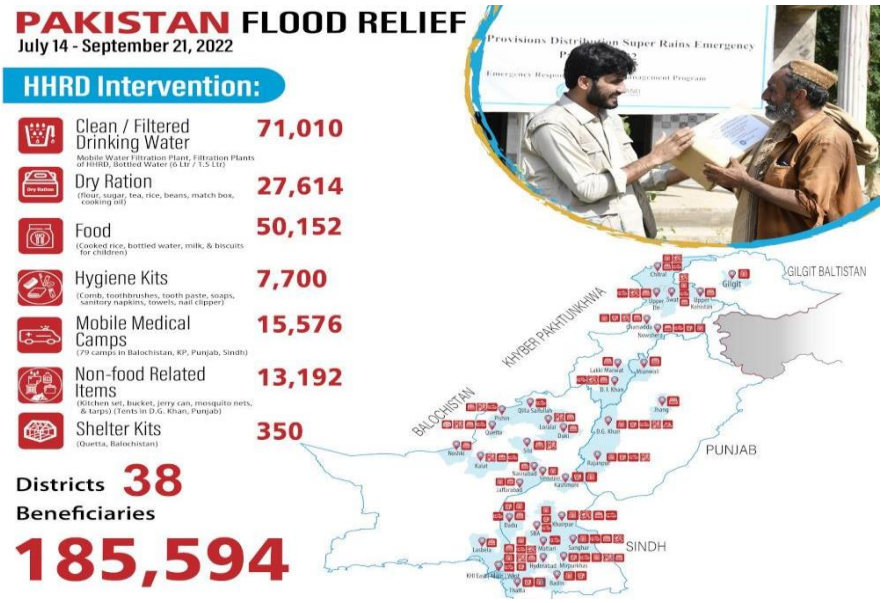
Alkhidmat Foundation:

Alkhidmat Foundation has set up temporary tent villages in the affected areas. Where medical facilities are being provided with continuous supply of two meals a day and clean water. While the work of delivering dry ration to the villages in flood water is also going on. Details of relief activities of AlKhidmat Foundation is given below.



Helping Hand:

HHRD is a global humanitarian relief and development organization responding to human sufferings in emergency and disaster situations around the world. In addition to our emergency relief efforts in natural or man-made disasters, we also work on long term relief and development programs. HHRD has been registered as an International NGO in Pakistan since 2005



Qatar Charity:

QC strive for a "Decent Life with Dignity for all". QC works in solidarity with the poor and vulnerable communities, government institutions, civil society organizations, private businesses and others to secure a decent life with dignity for poor, excluded, and vulnerable people in the country. Over the years, QCP gradually expanded its work to include humanitarian and development programs. QCP's growth in Pakistan is a success story in itself. Starting from a few million rupees, only in the year 2019, QCP spent over $ 7.2 million on projects to help the most vulnerable and needy across all provinces of Pakistan.

Operational Presence:

In Pakistan, alongside its country office in Islamabad, Qatar Charity Pakistan (QCP) has 07 district (field) offices and presence in 22 districts across all provinces and regions of the country. Details of relief activities by QCP is given below:

FLOOD RESPONSE 2022:
Qatar Charity - (Field Office Peshawar - KP)
Flood Response - Pakistan 2022, Relief Items (Food, Tents and NFIs) Progress

S.#	District	Location/UC	Dated	Target			Achievement			Balance			Remarks
				Food Packages	Tents	Hygiene Kits	Food Packages	Tents	Hygiene Kits	Food Packages	Tents	Hygiene Kits	
1	Nowshera	Mohib Banda, Banda Ismail Khan	1-Sep-22	250	-	-	250	-	-	-	-	-	
		Camp Karoona	7-Sep-22	350	40	40	350	40	40	-	-	-	
		Katcha Ghari	8-Sep-22	200	35	35	200	35	35	-	-	-	
	(District Nowshera) Sub - Total			**800**	**75**	**75**	**800**	**75**	**75**				**100 % Target achieved**
2	Charsadda	UC Turnab	31-Aug-22	250	-	-	250	-	-	-	-	-	
		Shahbara	9-Sep-22	550	40	40	550	40	40	-	-	-	
		Hasara	9-Sep-22	300	35	35	300	35	35	-	-	-	
	(District Charsadda) Sub - Total			**1,100**	**75**	**75**	**1,100**	**75**	**75**				**100 % Target achieved**
3	DI Khan	**Tehsil Draban: UC Gira Esa Khail, Kikri:** (Kohawar, Zarkani, Kot Esa Khan, Ghari Mureed Shah, Dholka, Ghandi Esa, Mochi wall, Ghara Maida etc)	23-24, Sep 2022	600	600	600	600	600	600	-	-	-	
		Tehsil Draban: UC Buki, Choudwan: (Kot Mosa, Chandi Babbar, Kori Hoat, Pori Jamal, Dera nahar, Ghari Khunzada, Ghara Abdullah etc)	25, Sep 2022	500	-	-	500	-	-	-	-	-	
	(District DI Khan)			**1,1**	**600**	**600**	**1,100**	**600**	**600**	**-**	**-**	**-**	**100 % Target**

	Sub - Total			**00**									**achieved**
4	**Swat**	Bahrain	9-Sep-22	300	120	150	300	120	150	-	-	-	
		Madyan, Beshigram, Tirat	12-Sep-22	300	-	-	300	-	-	-	-	-	
		Madyan, Beshigram, Tirat	13-Sep-22	300	-	-	300	-	-	-	-	-	
		Tehsil Mata & Mangora (Landi Kas, Takhta Band, Gwali Rah, Rodingar,	06 - 07 Oct 22	800	180	-	800	180	-	-	-	-	
	(District Swat) Sub - Total			**1,700**	**300**	**150**	**1,700**	**300**	**150**	**-**	**-**	**-**	**100 % Target achieved**
Grand Total				**4,700**	**1,050**	**900**	**4,700**	**1,050**	**900**	**-**	**-**	**-**	**100 % Target achieved**

HELVETAS:

HELVETAS is implemented projects in the fields of forestry, agriculture, water, environment & climate change, non-formal education, disaster risk reduction and skill development in Pakistan.

Geographical Presence:

Geographically it is working in KP and Punjab. Some nationwide projects were also implemented in the fields of agriculture, forestry, building capacity of national NGOs and policy related initiatives. Engagements of HELVETAS is given below.

District wise detail

Packages

Package/District	DIK	Tank	Quetta	Chaman	Pishin	Killa Abdullah	Dera Murad Jamali	Total
A. Food hampers	100	100	334	400	300	300		**1,534**
B. NFIs	333	333	334	300	300	300		**2,000**
C. Hygiene/dignity kits	333	333	334	300	300	300		**2,000**
D. Winterization	100	100	250	250	250	250		**1,200**
E. Water Filtration Units	4	4	4	4	5	4		**25**
F. Water Trucking	40	80	0	0	0	0		**120**
G. Medicines for HCFs	3	2	0	0	0	0		**5**
H. Medical camps	5	5	5	5	5	5		**30**
I. Wheat seed	1000	200	0	0	1019	799	500	**3518**

Beneficiaries (Persons)

Package/District	DIK	Tank	Quetta	Chaman	Pishin	Killa Abdullah	Dera Murad Jamali	Total
A. Food hampers	900	900	3006	3600	2700	2700		**13806**
B. NFIs	2997	2997	3006	2700	2700	2700		**17100**
C. Hygiene/dignity kits	2997	2997	3006	2700	2700	2700		**17100**
D. Winterization	900	900	2250	2250	2250	2250		**10800**
E. Water Filtration Units	4000	4000	4000	4000	5000	4000		**25000**
F. Water Trucking	28800	57600	0	0	0	0		**86400**
G. Medicines for HCFs	9000	6000	0	0	0	0		**15000**
H. Medical camps	1000	1000	1000	1000	1000	1000		**6000**
I. Wheat seed	9000	1800	0	0	9171	7191	4500	**31662**
								222,868
						Households		**24,763**

District wise detail
Packages

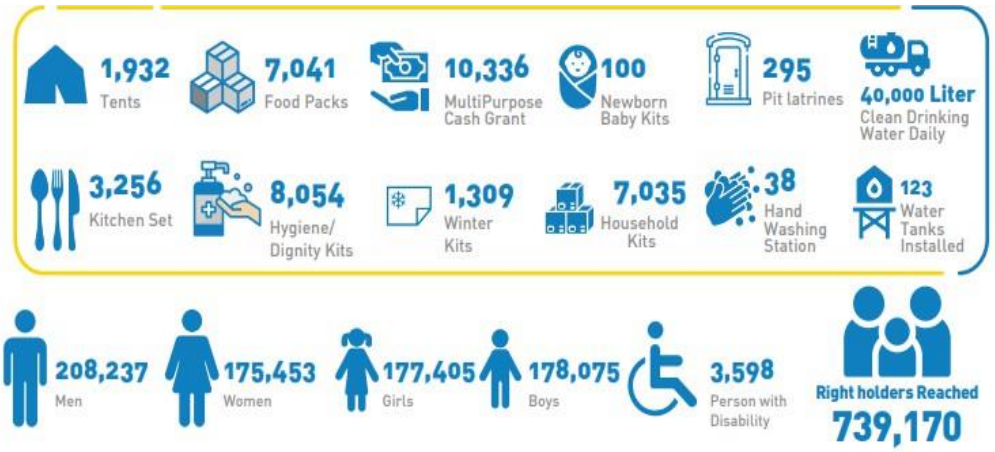
Package/District	Chitral	Dir Upper	Swat	Kohistan	Total
A. Food hampers	700	650	650	2000	4000
B. NFIs	400	350	350		1100
C. Hygiene/dignity kits	400	350	350		1100
D. Winterization	400	350	350		1100
E. Water Filtration Units	4	4	4		12
F. Medicines for HCFs	8	7	7		22

Beneficiaries (Persons)

Package/District	CHITRAL	Dir Upper	Swat	Kohistan	Total
A. Food hampers	6300	5850	5850	18000	36000
B. NFIs	3600	3150	3150		9900
C. Hygiene/dignity kits	3600	3150	3150		9900
D. Winterization	3600	3150	3150		9900
E. Water filtration units	4000	4000	4000		12000
F. Medicine for BHUs	24000	21000	21000	18000	84000
					161,700
				Households	**17,967**

Islamic Relief:

Islamic relief was the first humanitarian organization that responded to the disaster that hit the people of Pakistan since 3rd of august in the areas including Nushki, SohbatPur and Quetta in Balochistan, District Tank, Nowshera, Charsadda and DI Khan in Khyber Pakhtunkhwa and in Malir, Karachi, Thatta, Dadu, Qamber Shahdad Kot and Mirpur Khas, Sindh, distributing tents, food packs, drinking water, tarpaulin sheets, hygiene kits, multipurpose CASH grant and Kitchen sets to around 739,170 people, including 386,312.



Collaboration of Islamic Relief and UNDP:

Islamic Relief and UNDP have joined hands for helping the people who have suffered huge losses in the recent floods. The partnership will create income opportunities for households affected by floods & support the construction of community.

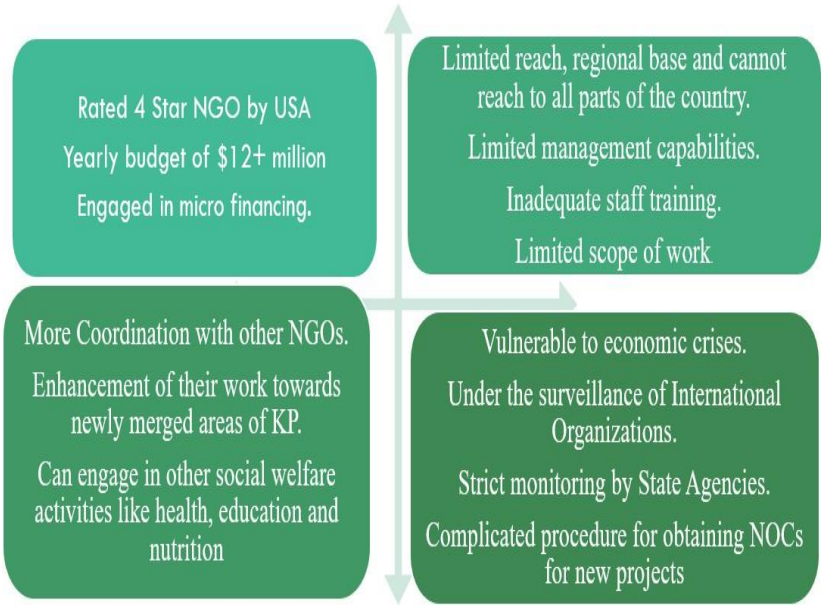
Early Recovery and Rehabilitation:

The early recovery period of the floods has gradually started in the most prone areas, especially for the health and hygiene, food security, safety and shelter, protection and safeguarding, of the affected.

SWOT Analysis

Alkhidmat Foundation:

Helping Hand:



Qatar Charity:

Helvetas:

Independent dev Org, European based

Working in 29 countries in Africa, Asia, Latin America and Eastern Europe.

Engaged in development projects as well as an emergency response after disasters

limited to certain areas and sectors for humanitarian activity.

Lack of coordination between volunteers and local people in natural calamities.

Slow process for international actors to collaborate.

presence in developed countries,

fund raising for natural calamities can easily be made.

Pakistan ranked 8th in Climate change countries, this aspect can be utilizing for awareness among large charity organization for their support to Pakistan.

Administrative and legal constraints regarding issuance of NOCs.

FATF obligations.

Fund transfers from abroad are subject to scrutiny by western countries.

Security issues to the staff in some remote

EETH Analysis

Enhancement of Strengths

HELVETAS can enhance its strength by diversifying its network.

In addition to developmental activities, micro financing and agriculture related activities will be beneficial for poverty alleviation.

Elimination of **Weaknesses**

It should extend its activities to more remote areas for better service delivery.

Local Govt. system should be strengthened for better coordination between community and volunteers.

Sensitization to international donors regarding effects of climate change and challenges faces by the country.

Take advantage of **Opportunities**

By good service delivery and transparency HELVETAS can generate more funds from international donor agencies.

Awareness among developed countries regarding effects of climate change on their economies for fund generation

Hedge of **Threats**

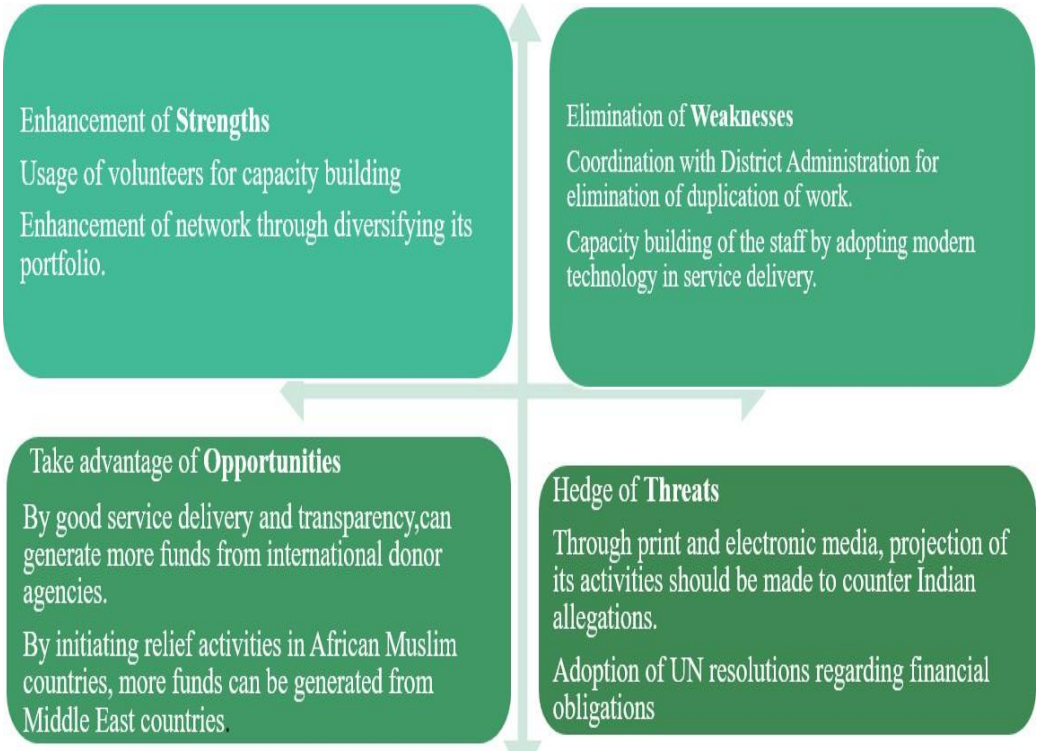
The relevant departments should be coordinated for elimination of constraints in obtaining NOC and sensitization for adoption of E-NOC system.

Security protection from LEA.s

12/4/2022

Qatar Charity Pakistan:

Al Khidmat Foundation:



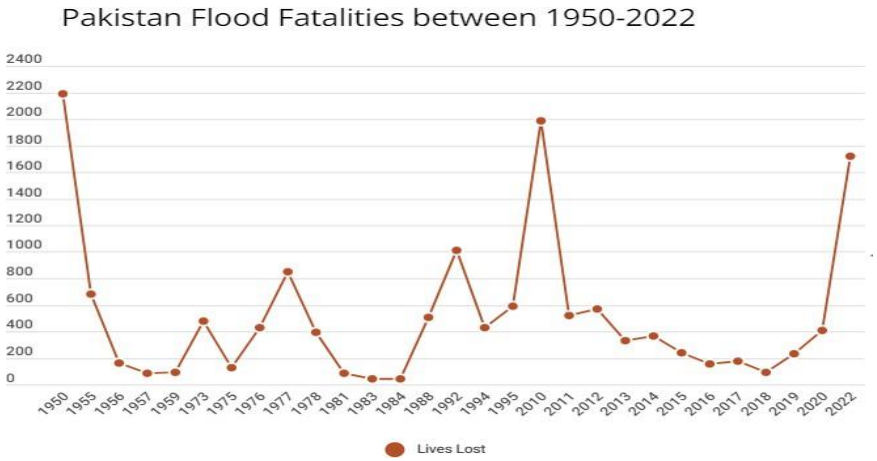
Helping Hands:

GAP Analysis

Issues and Challenges

Past Experiences with No Lessons Learned:

Almost half of the total deaths caused by floods in Pakistan since 1950 came between 2010 and 2022. But still we are not ready to tackle such calamities and learn any lesson.



Reactive approach:

After the 2010 floods, the country established the NDMA at the federal level and a Provincial Disaster Management Authority (PDMA) in each of province for early preparedness and minimizing loss. similarly, National Disaster Risk Reduction Policy in 2013 and Ministry of Climate Change in 2017 was formed. It lacks proactive

Disaster management as low priority:

Pakistan is among the 10 countries at the highest risk of natural disasters, as per the World Risk Index,. The country has never taken disaster management as a serious matter.

Lack of Political Will:

Political interest is aligned with hard infrastructure; roads, buildings, as these are tangible and noticeable. It is easier to get votes on that basis.

Lack of technical capacity:

For disaster management, lack of technical capacity is just one problem.

Disaster-resilient infrastructure:

Along with the need of investing and focusing on research and policies, disaster- resilient infrastructure is also missing which is an important aspect to minimize risk for the future.

The Climate Crisis and Justice:

Pakistan's grievances over the climate crisis are legitimate. The developed nations contributed the most to the heat-trapping emissions and thus these richer nations should pay the developing world for climate damage.

Low Financial aid:

The country's recent appeals for help have not had the desired response, with the United Nations declaring as of October 12, 2022 that it had only received $90 million of the $816 million it requested to help assist Pakistan's flood recovery efforts

Issues Related to CSOS:

Strict Legal Framework: The state apparatus is stifling CSOs/NGOs in the wake of FATF demands for actions against these organizations to counter terror financing and implement stringent laws for regulation.

Absence of Ease of doing Business: International NGOs being foreign entities, have to sign agreements with the federal government each time they intend to fund any projects in Pakistan.

Delays in Processes: Signing of agreements is delayed so much that the funds available for the concerned projects are lapsed.

Lack of facilitation: The government provides no facilities to counter delays or refusals in agreements.

Hurdles in Operations: Intelligence operatives create many hurdles for CSOs in the implementation of projects by asking hostile questions and issuing aggressive instructions.

project-to-project Approvals: Seeking project-to-project permissions from the federal government is a cumbersome task.

Shut Shop Policy: demanding Non-provision certificate regarding foreign funding by the registration authorities is a shut shop policy.

Religious organization as a collateral damage: Many religious organizations and charities, including some that have been banned by the government, are registered under the same law with NGOs.

Conclusion

Civil Society Organization plays a vital role in risk mitigation and is relief activities during natural calamities. A vibrant and well-coordinated government machinery enhances their role in timely provision of relief and rehabilitation. Lack of coordination, weak implementation of policies, shut-shop government procedures discourage these organizations to actively participate during these disasters. Economic crisis, political instability, law and order situation and corruption further aggravate this sorrow state of affairs. The Civil Society has a great potential to help disaster victims. There is nothing wrong in a government critique on the efficiency and effectiveness of NGOs as agents of change and development. Asphyxiating them, however, will certainly not make us a better country or a better society.

Recommendations

Short Term:

- Relaxation of procedure for registration and issuance of MOU to INGOs, by Federal and Provincial Governments, for enhancing ease of business.
- Federal and Provincial Governments need to adopt and inter-link all relevant departments including LEAs with Management Information System (MIS) for effective coordination, pertaining to timely processing of registration and issuance of MOUs / NOCs to INGOs/NGOs.
- All CSOs be placed under control of one administrative department in a province, preferably Social Welfare Department, for effective coordination and monitoring of their activities and to avoid doubling of projects in an area.

Medium Term:

- Government of Pakistan needs to hold conferences on climate change through foreign missions abroad to sensitize the International Community about vulnerability of Pakistan to climate change and to attract the foreign donors for investment in climate sector.
- Capacity of Local Government institutions, regarding natural calamities, needs to be increased for effective implementation and monitoring of CSOs projects.
- Law and order situation needs to be improved, by strengthening the security agencies especially in newly merged areas, to provide peaceful environment to the donor agencies.

Long Term:

- Disaster Management Departments i.e. NDMA/ PDMAs may be strengthened by providing essential equipment i.e. boats, shelter houses, helicopter service, technical manpower etc. which are required during natural calamities/ disasters.
- Disaster Management courses should be included in the curriculum at secondary and higher education level for awareness and preparedness regarding the natural calamities and disasters.

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Critical Evaluation of Agriculture Damages and Food Security Issues in The Context of Recent Floods

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KJPP

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Abstract:

Agriculture is the largest sector of the economy, contributing 24% of GDP, and supports the livelihoods of both urban and rural populations. It plays a critical role in economic growth, food security, job creation, and poverty reduction. The recent floods, particularly in Sindh Province, have severely impacted agriculture, with standing crops destroyed due to prolonged water stagnation. An estimated 2 million acres of land, or 80% of the country's agricultural area, have been affected. This disaster has resulted in significant financial losses and food insecurity, especially due to damage to wheat crops, which are essential for household consumption. Although relief efforts were initiated, better coordination between federal and provincial governments could have alleviated the situation further. Key issues, including inadequate flood mitigation strategies, poor infrastructure maintenance, and lack of water storage solutions, highlight systemic gaps. The post-flood rehabilitation phase is underway, aiming to address these shortcomings.

Key words:

Agriculture, Flood Damage, Food Security, Relief Coordination, Rehabilitation

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Introduction

Recent floods, caused by unprecedented rainfall, have severely affected the entire country, resulting in the loss of hundreds of lives, property, infrastructure, livestock, and damage to the agricultural sector. Agricultural land inundated by flooding is expected to have long-term humanitarian and economic impacts in Pakistan. The devastation has affected over 33 million citizens, caused billions of dollars in losses, and severely damaged cash crops like rice, sugar, cotton, and wheat. Flooding has destroyed vast areas of agricultural land across all provinces. The country could soon face food shortages if thousands of acres of cropland are not restored. With over one-third of the country submerged under water, the damage to agricultural land has surpassed 2 million acres of crops and orchards, as reported by the United Nations.

In 2018, Pakistan introduced its first National Food Security Policy, aiming to increase food availability, accessibility, and sustainability by making the agriculture sector more productive, modern, and climate-resilient. According to the 18th Amendment, providing food security is the responsibility of the Federal Government, while agriculture, livestock, and dairy remain under provincial control. Pakistan, an agriculture-based country, generates 23% of its GDP from agriculture and related sectors, yet 80% of this sector has been damaged by the current floods.

Moreover, alarm bells were already ringing as 40% of the population faced chronic food insecurity before the monsoon. Pakistan ranks 99th out of 121 countries on the Global Hunger Index. Even before the floods, 38 million people were facing moderate to severe food insecurity, with many, especially women and children, going to bed hungry. According to the WHO, 18% of children in Pakistan are clinically malnourished. More than 1.1 million livestock have been reported as killed, including around 500,000 in Baluchistan, 428,000 in Sindh, 205,100 in Punjab, and 6,600 in Khyber Pakhtunkhwa. The FAO estimates that approximately 9.4 million acres of crop area in Pakistan were potentially inundated in August, with 4.8 million acres in Sindh, 2.7 million acres in Punjab, 1.2 million acres in Baluchistan, and 714,000 acres in Khyber Pakhtunkhwa.

Statement of the Problem

The agriculture sector is one of the major contributors to Pakistan's GDP, accounting for approximately a quarter of the total, making it a key component of the country's food security. Heavily reliant on weather, climate, land, and water for its ability to thrive, agriculture is particularly vulnerable to natural disasters. The 2022 floods have highlighted Pakistan's high vulnerability to climate change. Already ranked among the countries vulnerable to hunger, Pakistan now faces a severe food security crisis as a result of the damages to its agricultural sector caused by the recent floods. This type of vulnerability requires an in-depth evaluation of the economic and production losses, the arising food security issues, and an analysis of the performance of both federal and provincial governments, comparing them with global best practices and identifying gaps. This study will also offer plausible recommendations to address the challenges faced during the recent floods.

Scope and Significance

This study aims to assess the damages associated with agriculture-related departments and evaluate the flood response plans adopted at both federal and provincial levels. The study will develop a comprehensive strategy for the restoration and rehabilitation of the agriculture sector to ensure food security, revitalize livelihoods, restore services provided by agriculture departments in flood-affected areas, and develop future resilience plans for flood-prone districts with damaged infrastructure. The study will focus on the impacts of the recent floods in Khyber Pakhtunkhwa Province.

Literature Review

The literature on this topic, including articles, journals, magazines, research papers, and newspaper clippings available on various websites, was useful in the research process. Data were also collected from various Federal and KP departments. The roles and functions of these departments, along with their coordination at inter-departmental and intra-departmental levels, were analyzed in the context of the recent floods.
The assessment of damages to Pakistan's agricultural sector, conducted by the Ministry of Planning in collaboration with international agencies like the United Nations, the European Union, and the World Bank, was reviewed. Articles detailing the damage to various sectors and its impact on the national economy were also examined.

Federal and provincial contingency plans were studied to identify any gaps. An article by Muhammad Tariq-ul-Islam (2018) on how local governments cope with disasters in Bangladesh was studied to understand best practices used in other countries to handle emergency situations. Bangladesh has developed a centralized disaster management system that operates down to the level of tehsil and municipal committees.

The Consultative Group for International Agricultural Research (CGIAR), an international research organization, studies various methods for food security worldwide. The farming practices researched to enhance agricultural productivity, particularly flood-based farming systems practiced in Sub-Saharan African countries like Ethiopia, were explored for their potential application in Pakistan to improve productivity and reduce food scarcity.

Research Methodology

For this study, qualitative research methods were used, relying on secondary data. Qualitative analysis was conducted using various analytical techniques, including situational analysis, gap analysis, comparative analysis, and SWOT-EETH analysis. Secondary data was obtained through online articles, journals, and other documents available on the internet, as well as through visits to concerned offices by the group leader and members.

Organization of the Report

This study is divided into six sections. The introduction is followed by the statement of the problem, scope of the study, literature review, and methodology. Section I explains the situational analysis and preparedness of agriculture-related departments at the federal and KP provincial levels. Section II discusses the effectiveness and efficiency of the coordination mechanisms at both federal and provincial levels. Section III compares some of the best practices around the world and the lessons learned. Section IV details the economic losses, production losses, and food security issues. Section V contains the gap analysis and SWOT analysis to address the impact of calamities on the agriculture sector in KP. Section VI provides the conclusions, along with pragmatic recommendations and a log-frame matrix to propose practical and viable solutions to the issues and problems.

Situational Analysis and Preparedness

The recent floods in Pakistan have caused extensive damage to the agricultural sector, with over one-third of the country submerged under water. The total damage to agricultural land is estimated at over 2 million acres of crops and orchards, while approximately 0.8 million livestock have perished.

The devastation has impacted more than 33 million citizens and resulted in losses amounting to billions of dollars. Crops accounted for 82% of the total damage and losses in the sector, followed by livestock at 17%, and fisheries/aquaculture at 1%. Sindh and Baluchistan are the hardest-hit provinces, contributing 72% and 21%, respectively, to the total registered damage, followed by Khyber Pakhtunkhwa (KP) and Punjab.

The destruction of crops, livestock, and aquaculture infrastructure has led to the temporary collapse of livelihoods, employment, and agriculture-related income, as well as a potential decline in the exports of key crops such as cotton and sugarcane. Flood protection infrastructures, irrigation channels, and drainage systems were the most affected, with damages amounting to 36% and 32% respectively, followed by drainage systems at 14%, and dams, headworks, and weirs at 9%. Other supporting infrastructure accounted for 8% of the total damage. Overall, irrigation water supply systems, including canals and dams, suffered 41% of the total damage. If these issues are not addressed, crop production in the coming seasons will be severely impacted.

China has emerged as a major importer of Pakistani rice, especially lower-grade, broken rice for use as animal feed. In the first four months of 2022, China imported 350,000 tons of Pakistani rice, a 163% increase from the previous year. This damage to Pakistan's crops coincides with drought conditions in China, threatening half of that country's rice crop, and expected declines in rice production in India, the world's largest rice exporter. Other buyers of Pakistani rice include Malaysia, East African countries, and Saudi Arabia.

In Khyber Pakhtunkhwa, 25 districts were affected, with 32 types of crops destroyed by the recent floods, causing losses worth Rs. 16,171.48 million (Pakistani rupees). A total of 121,640 acres were damaged, and 384 government and private hatcheries were washed away by the flood. Additionally, the Water Management Department suffered damages to water courses and channels worth Rs. 967.33 million, with 1,311 water courses and channels destroyed. Soil and water conservation efforts also sustained damages amounting to Rs. 155.97 million.

Federal Agriculture Related Departments and their Functions

Ministry	Departments	Functions
Ministry of Agriculture & Food Security	National Agriculture Research Council (NARC)	Undertake, aid, promote and coordinate agricultural research
	Agriculture Policy Institute (API)	Conduct studies on emerging policy issues and periodically examine, processing, storage, and marketing costs of agricultural commodities
	Department of Plant Protection	Standardization and import of pesticides, Aerial Spray, Plant Quarantine & Locust Control
	Plant Breeder's Rights Registry	To ensure availability of high quality seeds and planting material to the farmers & development of new plant varieties
	Pakistan Agriculture Storage & Services Corporation (PASSCO)	To facilitate the Federal government in its quest to ensure National Food security by maintaining strategic reserves of different food grain commodities, providing same to deficit provinces/areas and Armed Forces
	Federal Water Management Cell (FWM)	Federal Water Management Cell (FWMC) deals with all the matters related to irrigation water management and agriculture mechanization.
	Fisheries development Board	To plan, promote facilitate and coordinate with private sector for accelerated development of and investment in the fisheries sector in Pakistan.
	Pakistan Oil Seed Department (POSD)	Seed Purity Laboratory performs the post check analysis of seed testing
	Economic Wing	
	Pakistan Centre Cotton Committee	
	National Fertilizer Development Centre (NFDC)	To provide objective and comprehensive advice to all levels of Government, to the fertilizer industry and to other parties as may be relevant, on all matters related in any way to the fertilizer sector of Pakistan and its relations with the international fertilizer community.

KP Province Agriculture Related Departments and their Functions

Department	Directorate	Functions
Agriculture Department/KP	Directorate of Agriculture Research	Development of new varieties of Crops, Fruits and Vegetables. Development of economical & sustainable production technologies for Crops, Fruits and Vegetables to increase productivity per unit area.

	Directorate of Agriculture Extension	Distribution and sale of pesticides, renewal of pesticides licenses, distribution and sale of fertilizer, Renewal of fertilizer licenses
	Directorate of On-Farm Water Management	Conduct feasibility studies of potential Projects, plan Water Management strategies for conservation of scarce available water resources
	Directorate of Agriculture Engineering	1. Augmentation of irrigation water supplies by the installation of Tube -wells/Dug- wells, Solar Pumping Machinery on Open-wells/Dug-wells/Tube-wells for productivity enhancement, Construction of Irrigation Structures in Rod Kohi areas of KP, to help the irrigation Department in the de-siltation of Canals
	Directorate of Crops Reporting Services(Extension)	Estimation of District wise area and production under all Crops grown in the Province and to release 1st, 2nd and Final Crops Estimates periodically both in Kharif and Rabi seasons
	Directorate of Soil Conservation	Soil Survey, comprehensive inventory of soil resources of the Province of Khyber Pakhtunkhwa and their proper utilization
	Directorate of Livestock and Dairy Development Research	Conduct Research for the control, prevention & eradication of Livestock & Poultry diseases
	Directorate of Fisheries	Preparation of regulatory measures and policies for the development, conservation and management of fisheries in the province.
	Directorate of Livestock & Dairy Development(Extension)	Establishment of veterinary health institutions and mobile veterinary clinics and keeping them in functional order
Food Department	Directorate of Food	Ensuring Food Security, Quality, Regulations of sugar mills, flour mills, wheat quota distribution, Procurement of wheat and other commodities
Irrigation Department/ KP	Chief Engineer/North Chief Engineer/South Director General/Small Dams	Approval of irrigational developmental schemes like construction of small dams, maintenance and repair of drains etc.
Relief, Rehabilitation &	Provincial Disaster Management Authority (PDMA)	Coordination with the NDMA on Relief activities, Planning for preventive and proactive

Settlement Department/KP		measures against disasters, relief and compensation to the affectees
	Rescue 1122	Responding to emergencies through a comprehensive and Communication Management System
	Civil Defence	Basic Civil Defence Training to general public (Firefighting, First Aid & Rescue Service) and bringing volunteers in disasters.

Response of Federal Government and International Agencies to the Flood-hit Areas in KP Regarding Agriculture-related Services

Federal Government Response:

The Federal Government of Pakistan established the National Flood Response and Coordination Center (NFRCC) to facilitate a coordinated multi-agency response in collaboration with the National Disaster Management Authority (NDMA). The government set up camps for populations displaced by the floods and provided cash assistance to those affected. Provincial governments were encouraged to redirect development funds toward flood relief efforts. Additionally, several fundraising agencies were verified, including those on platforms like GoFundMe, to support relief activities.

International Responses:

On August 30, 2022, the United Nations issued a Flash Humanitarian Appeal requesting $160 million to support the "Pakistan 2022 Floods Response," with 37% of the funds raised to date. The appeal highlighted that 5.2 million people urgently needed humanitarian aid, including food, water, sanitation, emergency education, health support, and protection. Separate funding appeals were launched by international relief agencies, and international financial institutions pledged funds for Pakistan's disaster relief and development, with the majority of assistance coming from the World Bank.

U.S. Response to Pakistan's Floods:

In mid-August 2022, the U.S. Ambassador to Pakistan issued a disaster declaration, and on September 2, the U.S. Agency for International Development (USAID) deployed a Disaster Assistance Response Team to assess the flood's impact. A Response Management Team based in Washington, D.C., coordinated U.S. government flood response efforts.

As of September 22, the U.S. government had provided over $48 million in humanitarian assistance, including support for food, safe water, sanitation and hygiene improvements, financial help, and shelter assistance.Of this, $20 million was announced by USAID Administrator Power in Islamabad on September 9.

Preparedness and Response of KP Province

KP Government Response

The Khyber Pakhtunkhwa (KP) Government conducted a comprehensive damage assessment in the agricultural sector through district administration in coordination with district agricultural offices. The primary objectives of the flood response were to devise a comprehensive strategy for the restoration and rehabilitation of the agriculture sector, ensure food security, reinstate agricultural services in flood-affected areas, and develop a resilience plan for future floods in flood-prone districts with damaged infrastructure.

i. Restoration Activities

During the recent floods, the Agriculture Department of KP played a crucial role by providing agricultural machinery to district administration for evacuating affected populations and protecting agricultural land. The Livestock Directorate set up 38 veterinary medical camps and 17 mobile veterinary clinics for the treatment of sick animals. Additionally, the Livestock Department distributed 33,400 kg of animal feed to livestock farmers and vaccinated 173,811 animals against various diseases in the region.

ii. Khyber Pakhtunkhwa Flood Response Plan 2022

The agriculture sector in KP, which employs nearly 40% of the workforce in the country, is particularly vulnerable to climate change. Extremely agriculture-dependent districts in the province face not only the loss of livelihoods but also increased food insecurity among the poorest households. To address these issues, a well-coordinated response strategy, including financial planning, has been developed by the Agriculture Department.

iii. Financial Plan

In the first year, the Agriculture Department will identify the costs associated with damaged public infrastructure and initiate the tendering process for civil works. The proposed budget for the first year is PKR 277.061 million, with an additional PKR 646.485 million allocated for the second year to complete all civil works.

This funding will be sourced through intra-sectoral re-appropriation within the Department. Additionally, approximately PKR 3 billion has been committed by the World Bank, with an approved work plan already in place. The Provincial Relief Department has committed PKR 19,100 million to compensate citizens for losses of crops and livestock.

Source of Financing	Amount (Rs. In million)
Intra sectoral re-appropriation from ADP allocation 2022-23	1000
World Bank funding from Khyber Pakhtunkhwa Irrigated Agriculture Improvement Project (KPIAIP)	3460
Relief Department compensation fund for crops & livestock losses	19,100
Total	23,500

iv. Re-appropriation:

The Agriculture Department will mobilize PKR 1,000 million through intra-sectoral re-appropriation to repair damages and cover the estimated PKR 923.5 million of damage to public infrastructure.

v. Implementation Plan:

The Department proposes the rehabilitation of public sector infrastructure over a two-year period, allocating PKR 1,000 million through intra-sectoral re-appropriation. Additionally, the Department has approved a work plan for the World Bank's commitment of approximately PKR 3 billion. The implementation will be overseen by a strict monitoring mechanism to ensure proper identification of sites and beneficiaries. The compensation packages for crops and livestock will be based on the Department's damage assessment.

FY	Activity Description	Expected Expenditure
2022-23	Preparation of DCEs, Tendering, Civil Work	30%
2023-24	Completion of Remaining Civil Work	70%

vi. Monitoring and Evaluation Plan:

A three-tiered monitoring system will be established to track the progress of the work and ensure quality control. The provincial-level Planning & Development (P&D) department, along with the departmental monitoring cell and respective district field formations, will oversee all rehabilitation

schemes. Monthly progress review meetings will be held under the chairmanship of the administrative secretary, while departmental progress review meetings will occur weekly. The results of these reviews will be presented during the monthly meeting at the secretariat level.

vii. Sector Resilience Plan:

Given the impacts of climate change on the agricultural sector, the Agriculture Department of KP has proposed flood strategies to mitigate the effects of climate change on agriculture and its subsectors in the province. Agriculture is vital to the country's economic growth, food security, employment generation, and poverty alleviation, particularly in rural areas. It contributes 23% to the GDP and employs approximately 38.5% of the labor force. More than 65-70% of the population relies on agriculture for their livelihood. However, agricultural productivity is being hindered by shrinking arable land, climate change, water shortages, and the large-scale shift of population and labor from rural to urban areas. To increase agricultural productivity, adopting new approaches is essential.

Critical Evaluation of effectiveness and efficiency of coordination mechanism both at federal and provincial level

Coordination between NDMA and PDMA/KP

The National Disaster Management Authority (NDMA) operates under Clause 9(a) and 9(b) of the National Disaster Management (NDM) Act of 2010, handling the full spectrum of disaster management (DM) activities in the PR3 paradigm—Preparedness, Response, Recovery, and Rehabilitation. NDMA issues directions and guidelines, as well as early warnings to federal and provincial departments and DM agencies, ensuring mitigation measures are taken for potential disaster risks. Additionally, the authority formulates contingency plans and issues yearly monsoon warnings.

The National Disaster Management Plan (NDMP) 2013-2022 is comprehensive, encompassing all disaster interventions. In 2019, the National Disaster Response Plan was introduced to provide broad guidelines for response activities. Every year, NDMA prepares a Monsoon Contingency Plan based on analysis from the Pakistan Meteorological Department (PMD) and the projected effects of climate change. This plan outlines explicit guidelines for all disaster management tiers and stakeholders to mitigate potential hazards, prepare for various scenarios, and respond effectively to monsoon-related events.

In the 2022 National Monsoon Contingency Plan, lessons from the 2021 monsoon were incorporated. The plan maps available resources, identifies the need for additional resources, and establishes a clear coordination mechanism for effective responses. NDMA works with all stakeholders, holding strategic coordination meetings to enhance collaboration with the United Nations and other humanitarian organizations.

As per the 18th Amendment, food security is the responsibility of the Federal Government. The Pakistan Agricultural Storage and Services Corporation (PASSCO) supports the KP Government by providing wheat as needed. KP places orders of approximately 0.2 million tons per request to meet the annual provincial wheat requirement of around 3.6 million tons.

The Pakistan Agricultural Research Council (PARC) plays a vital role in promoting and coordinating agricultural research across Pakistan. Its mandate includes conducting strategic research on national and provincial agricultural priorities and addressing emerging challenges. PARC also facilitates agricultural enterprises, supports provincial research systems, and provides services in germplasm conservation and supply.

Pre-Flood Coordination between Federal and KP Government

The Federal Government has been instrumental in constructing 24 small dams across KP, with a total storage capacity of 7,508 acre-feet and an irrigable command area of 49,523 acres. Notably, Pezu Dam (Lakki Marwat), Khattak Bandhan Dam (Kohat), and Makh Banda (Karak) were constructed by the Federal Government, while 21 other dams have been developed in collaboration with both the federal and provincial governments.

Additionally, seven medium-sized dams, including Bara Dam (Khyber), Tank Zaam (Tank), and others, are under construction or in the design phase. These dams, with a storage capacity of 520,884 acre-feet, will provide irrigation to 171,748 acres and generate 31.5 MW of power.

Inter-Departmental Coordination

The office of the Deputy Commissioner (DC) serves as the central hub for flood-related activities in each district. The DC coordinates with all line departments, including agriculture, to prepare contingency plans. In times of disaster, various departments, such as Agriculture Engineering, play a crucial role. For instance, the Agriculture Engineering Department provides excavators and tractors to farmers for land reclamation.

Additionally, departments such as C&W (Communication and Works), Public Health, Irrigation, and Local Government have been vital in assisting farmers during recent floods, providing necessary resources and support.

Role of Federal and Provincial Agriculture-related Departments in Flood Emergencies

Role at Federal Level

National Flood Response and Coordination Center (NFRCC)

The Federal Government established the National Flood Response and Coordination Center (NFRCC) after the 2022 floods to facilitate a multi-agency response in coordination with the National Disaster Management Authority (NDMA).

National Disaster Management Authority (NDMA)

NDMA organizes the assessment of damages and the volume of relief required. It coordinates with provinces and concerned departments to prepare for emergency response and mobilizes resources. NDMA also prepares a transition plan from relief to recovery programs.

Federal Flood Commission (FFC)

The Federal Flood Commission Implements Flood Risk Mitigation Projects, which include flood protection works as well as improvements in flood forecasting and warning systems. It is an affiliated organization of the Pakistan Meteorological Department (PMD), which disseminates warnings and river flow updates to relevant national, provincial, and district governments, as well as national response agencies, especially during the monsoon season.

Pakistan Meteorological Department (PMD)

PMD has a broad mandate that supports agro-based economic activities, air and maritime traffic safety, disaster mitigation efforts, and disseminating weather forecasts to NDMA, FFC, PDMAs, etc., along with flood information on a daily basis during the flood season.

Ministry of Water & Power

The Ministry is responsible for overall flood management and impact mitigation efforts through its attached departments (FFC, WAPDA, PCIW, IRSA). The ministry deals with monitoring preventive measures and allocating resources for flood protection works.

Ministry of National Food Security & Research (MONFSR)

The Ministry of National Food Security & Research is responsible for policy formulation, economic coordination, and planning in the fields of food grain and agriculture. This includes the procurement of food grains, fertilizers, price stabilization of agricultural products, international liaison, and economic studies to frame agricultural policies. The following organizations work under MONFSR:

- National Agriculture Research Council (NARC)
- Agriculture Policy Institute (API)
- Department of Plant Protection
- Plant Breeder's Rights Registry
- Federal Water Management Cell (FWM)
- Fisheries Development Board
- Economic Wing
- Pakistan Centre Cotton Committee
- National Fertilizer Development Centre (NFDC)
- Pakistan Agriculture Storage & Services Corporation (PASSCO)

These organizations help facilitate the Federal Government's efforts to ensure national food security by maintaining strategic reserves of various food grain commodities, providing supplies to deficit provinces/areas, and supporting the Armed Forces.

Role at Provincial Level

Relief, Rehabilitation & Settlement Department (RR&SD)

RR&SD is tasked with formulating policies, strategies, and guidelines for relief, rehabilitation, and emergency activities, which are then implemented through PDMA, Rescue 1122, and Civil Defence.

Provincial Disaster Management Authority (PDMA/KP)

PDMA's role is to coordinate efforts in tackling any emergency situation in the province. PMD/FFD provides early warnings of approaching weather systems, which are then communicated to all relevant parties by PDMA. In case of any shortfall in meeting humanitarian needs, PDMA assists by providing the required stocks. If the disaster exceeds the capacity of PDMA, NDMA is requested to provide additional stocks from national reserves. PDMA coordinates with PMD, FFC, Federal Agencies, District Disaster Management Units (DDMUs), and Line Departments for managing the entire spectrum of provincial disaster responses.

Coordination with Line Departments

PDMA facilitates horizontal coordination with relevant Provincial Line Departments and Headquarters Engineers-11 Corps. Vertical coordination with District Administration is also essential for effective early warnings, preparedness, and rescue and relief efforts at the district level.

Irrigation Department

The Irrigation Department is responsible for constructing and maintaining irrigation infrastructure in the district. It carries out detailed vulnerability assessments of irrigation infrastructure, rivers, streams, nullahs, and other waterways. The department monitors erosion of river/canal/nullah embankments and conducts necessary reinforcements and repairs. It also continuously monitors water flow and designates an emergency information officer to liaise with DEOC and PEOC during preparedness and response stages.

Agriculture and Livestock Department

Agriculture and livestock are the main sources of livelihood in rural areas. The Agriculture Department conducts detailed assessments of district flood-prone areas, reviews past disaster events, and identifies potential diseases affecting crops and livestock. The department also assesses the capacity of agricultural extension services and identifies gaps in staff, stock, and facilities. It establishes emergency response bases near vulnerable areas and follows PDMA advisories, including precautions for farmers during wheat harvesting and ensuring the safety of livestock. The following directorates fall under the Agriculture Department:

- Directorate of Livestock and Dairy Extension
- Directorate of Agriculture Research
- Directorate of Agriculture Extension

- Directorate of On-Farm Water Management
- Directorate of Agriculture Engineering
- Directorate of Fisheries
- Directorate of Crops Reporting Services (Extension)
- Directorate of Soil Conservation
- Directorate of Livestock and Dairy Development Research

Food Department

The Food Department is responsible for maintaining adequate food stocks in the district and regulating markets to ensure the availability of food items with the required quality and approved rates. It ensures food security, quality control, and regulation of sugar mills, flour mills, wheat quota distribution, procurement of wheat, and other commodities.

World Best Practices Regarding the Role of Agriculture-related Departments in Flood Emergencies (USA Model)

Bangladesh National Disaster Management Mechanism

- In Bangladesh, the National Disaster Management Commission operates directly under the control of the Prime Minister.
- There is an Inter-Ministerial Disaster Management Committee, headed by the Federal Minister for the Ministry of Disaster Management.
- The National Management Advisory Committee (NDMAC), comprising an experienced chairman and 8 members of parliament, is also involved. The chairman is selected by the Prime Minister.
- The National Platform for Disaster Risk Reduction (NPDRR) is led by the Federal Secretary, followed by the Director General and respective District Disaster Management.
- Other key committees include the Earthquake Preparedness & Awareness Committee (FPAC).
- The District Disaster Management Committee is chaired by the respective Deputy Commissioners.
- The Upazila Disaster Management Committee is headed by the Upazila Chairman.
- The Union Disaster Management Committee (UDMC) is chaired by Union Parishad members.
- The Pourashva Disaster Management Committee is led by the Mayor.
- The City Corporation Disaster Management Committee (CCDMC) is managed by the Mayor of the respective city.

Ethiopian Model of Flood-based Farming

While floods are often viewed as harmful and destructive, they can also have positive impacts and provide benefits for both people and nature. In sub-Saharan Africa, approximately 25 million hectares are already being irrigated using floods in various ways, benefiting about 50 million people who practice flood-based farming. Key elements of flood-based farming in Ethiopia and sub-Saharan Africa include:

1. **Water Distribution**: Floods can vary in intensity, duration, and unpredictability. Improving water distribution through control structures helps reduce erosion, waterlogging, and other risks.
2. **Field Water Management**: Techniques like dikes and soil bunds can protect fields from unexpected floods, while drainage ditches channel excess water away from fields.
3. **Groundwater Use**: Many areas where flood-based farming is practiced have shallow groundwater, which can be accessed through low-cost technologies like hand-drilled tube wells, treadle pumps, and solar-powered pumps.
4. **Agronomic Practices**: Introducing improved crop varieties, such as fast-growing floating rice varieties, which are grown in areas like Mali and Myanmar, can help increase productivity in flood-based farming systems.
5. **Floodplain Agriculture**: This is the most common type of flood-based farming in sub-Saharan Africa, where either receding or rising floodwaters provide water for crop cultivation.
6. **Spate Irrigation**: Floodwater from mountain catchments is diverted from normally dry riverbeds and spread over large areas for irrigation, improvement of grazing areas, filling of drinking water ponds, and groundwater recharge.
7. **Inundation Canals**: These are situated next to rivers or floodplains and are fed by water when rivers rise. The canals are then used to divert the water to nearby farmland.
8. **Depression Agriculture**: Shallow depressions are filled when the groundwater level rises on a seasonal basis. They provide enough moisture to support grazing in the dry season and crops grown without irrigation.

Evaluation of Economic Loss & Food Security Issues in the Context of the Flood

Economic Loss

Agriculture constitutes the largest sector of our economy. The majority of the population is directly or indirectly dependent on this sector. It contributes about 24 percent of Gross Domestic Product (GDP), accounts for half of the employed labor force, and is the largest source of foreign exchange earnings. It feeds both rural and urban populations. The agriculture sector is indispensable to the country's economic growth, food security, employment generation, and poverty alleviation, particularly at the rural and urban levels.

Economic Losses of Key Commercial Crops

Sindh is the province most affected by floods in terms of damage and losses to agriculture. It is estimated that the major kharif crops – rice, cotton, and sugarcane – lost 80%, 88%, and 61% of their forecasted production, respectively. These three crops alone suffered direct losses of USD 1.30 billion. There is a high likelihood of significant unreported losses in the production of other crops and livestock in the affected districts. The economic losses in agriculture extend beyond the estimated direct losses to crop production and livestock. Direct damages and losses to agricultural tools and machinery, infrastructure on farms and rural areas, and trees are likely to exacerbate the economic losses further. The indirect costs, such as draining and land rehabilitation, increased transportation costs due to damaged roads and infrastructure, losses in successive crops due to waterlogging, delays in sowing, and government rehabilitation and compensation efforts, are expected to have deeper and long-term impacts on Pakistan's agriculture.

	Sindh	**Punjab**	**KP**	**Baluchistan**	**Total**
Damages	280		16.171	20.387	640
1. Crops (Rice, Sugar, Maize, Vegetables, Fruits)					
2. Livestock	2.795		4.667		144
3. Water Management Damages			2.991		153
Total (Rs. in Billion)	282.5		19.265	20.4	937

Production Loss

	Damages		**Sind**	**Punjab**	**KP**	**Baluch**	**Total**
Crops	Total Area (Acre)		7.0		61147		
	Rice	Qty (MMT)	1.9			20.387	
		Value (Rs Billion)	116.745		1.541		
	Sugar / Maize	Qty (MMT)	10.5				
		Value (Rs Billion)	58.695		1.509		
	Cotton	Qty (MMT)	3.1				
		Value (Rs Billion)	104.275		-		
	Vegetable, Fruit)	Qty (MMT)					
		Value (Rs Billion)			9.514		
Live Stock		Value (Rs Billion)	2.795		3.711		
Water Management		Value (Rs Billion)			2.991		
			282.5		19.265	20.4	

Production Loss in KP Province

Crop	**Total Acreage**	**Damage Area**	**Production loss (Tones)**	**Estimated Financial Losses (Rs.) Million**
Maize	338061	29528	237211	1533.87
Rice	102487	20118	17825	1641.40
Tomato	8529	3797	17978	1842.29
Sugarcane	248006	42661	809663	2294.03
Vegetables	38543	5477	81942	1548.29

Fruits	21533	1053	2425	1143.60
Fruit Orchards	10808	860	296	891.89
Orchards	41540	1356	9067	1464.77
Fodder	28015	5373	438365	743.42
Cotton	2090	788	16	103.95
Mong Bean	3509	1764	10	42.34
Sesamum	1275	484	45	33.21
Date Orchards	3290	2860	371	2507.34
Wheat	8350	1568	3222	18.56
Potato	17994	2439	1494	92.54
Chillies	451	193	338	39.55
Sunflower	1681	245	201	13.41
Coriander	145	55	50	12.60
Total (Tons)			1,620,519	15967.06

Total Damages and Funds Gap (KP)

Damages (Millions)	**Intra-departmental Re-appropriation (Millions)**	**Donors' Commitment (Millions)**	**Gap (Millions)**
23,500	1,000	3,460	19,040

Food Scarcity

Pakistan is facing a crippling shortage of wheat after the devastating floods induced by record-breaking monsoon rainfalls damaged the crop in large quantities. Reports indicate that 300,000 tons of stored wheat were completely wasted due to the recent floods in Rajanpur and Fazilpur districts, causing a loss of billions of rupees. As a result, flour prices have skyrocketed, creating difficulties for citizens already burdened by the highest inflation.

According to a report by the Ministry of National Food Security and Research (MNFSR), the total losses to crops across the country have exceeded Rs. 320 billion. The report highlights that 2,845,046 acres of cropland in Sindh have either been completely or partially damaged. Khyber Pakhtunkhwa has lost 14,397 acres, and Balochistan has lost 108,295 acres. However, the extent of the damage in Punjab has not been revealed in the report.

Projected Wheat Requirement/Demand for 2022-23

Province/Territory	**Population (Million)**	**Consumption/Demand (Million Tons)**
Punjab	121.4	13.96
Sindh	52.8	6.007
KP	39.18	4.53

Baluchistan	13.62	1.57
Islamabad	2.20	0.253
AJK	4.79	0.550
GB	1.69	0.194
RFG's	1.529	0.175
Seed & Feed		1.5
Strategic Reserves		2.0
Grand Total		**30.739**
Net Production		26.39
Net Shortage		4.349
Carry Forward (2021-22)		2.048
Import Received (2022)		0.926
Provisional Shortage		**1.423**

Gap Analysis

Gap Analysis in the areas described in Section I to IV

i. Despite being the fifth richest country in water resources, Pakistan is estimated to be losing 13 million cusecs of water every year from its rivers into the sea, due to the lack of enough reservoirs or dams to store water.

ii. Owing to traditional methods of cultivation and harvesting, Pakistan has a low yield per acre. The average crop yield in Pakistan is just a quarter of that in advanced countries.

iii. There is no unified policy for disaster management in Pakistan.

iv. Disasters are often exploited for political purposes, leading to the suffering of the general public, who are the end-users.

v. The Agriculture Department lacks the authorization to spend budget funds in emergencies.

vi. Politicians are not involved in disaster management committees, so there is a lack of political vision, resulting in a lack of interest and proper attention to disaster management.

vii. The Agriculture Department does not possess modern machinery to assist farmers during disasters, except for a few excavators.

viii. There are no committees at the Tehsil and Union Council levels to address disaster-related issues.

ix. Surprisingly, the Irrigation (Flood) Department does not have a single boat in D.I. Khan District, indicating a lack of resources.

x. The C&W, KPHA, and NHA show little regard for natural water flow paths while designing and constructing roads and highways, leading to water submerging crops.

xi. Drains are full of weeds, which hampers the smooth flow of floodwater, resulting in crop damage.

xii. There is a lack of inter-departmental coordination between Agriculture, Irrigation, and CRBC, which exacerbates the flood impact on crops.

xiii. Surprisingly, Punjab has not conducted any assessment regarding flood damages to agriculture.

xiv. A large portion of land is owned by feudal lords, and the farmers working on the land are tenants. This situation of insecure land tenure neither encourages hard work nor attracts capital investment.

xv. Waterlogging and salinity are increasing day by day, and no effective measures have been taken to control them. The storage capacity of dams is decreasing due to the accumulation of mud at their basins, reducing the water availability per acre. As a result, farmers are increasingly relying on tube wells for irrigation, which worsens the salinity problem in parts of Punjab and Sindh.

xvi. The price policy for crops is weak. For example, sugarcane in Punjab is sold for 200 Rs. per 40 kilograms, which is then purchased and stockpiled by industrialists in their stores, reducing market prices.

xvii. The irrigation system of Pakistan needs improvement, as around 67% of the land is irrigated by canals. Modern irrigation techniques, such as drip and sprinkler irrigation, could solve many of the irrigation issues in Pakistan.

xviii. The government must embark on a crash program to build small dams. These dams would play a crucial role in improving land fertility, thus increasing per-acre yield.

Stakeholder Analysis

The key stakeholders in Pakistan's agriculture sector include:

1. **Government of Pakistan**: The government has the responsibility to develop policies, allocate budgets, and manage agricultural resources and disaster responses.
2. **Farmers**: They are the main producers, facing challenges like low yields, water scarcity, and lack of support during disasters. The majority are from the lower middle class.
3. **Public**: As the end-users of agricultural products, the public is affected by food security issues, inflation, and price hikes in essential food items.

Key Issues:

- Pakistan is recognized as an agricultural country, but its agricultural sector has one of the lowest growth rates.
- The budget allocated to agriculture is insufficient for research and extension.
- 95% of farmers belong to the lower middle class, using traditional farming methods.
- Illegal housing societies are taking over agricultural land, reducing farming areas.
- Public interest in agriculture is declining due to the energy crisis, low profits, and high labor costs in the sector.
- Farmers are in search of bumper crops, but this is often unrealistic, given the current conditions.

PESTLE Analysis

Political

Effective leadership and political acumen can drive significant progress in the agriculture sector. Strong governance and the implementation of disaster management policies can improve the sector's resilience and sustainability.

Economic

Agriculture requires relatively low investment compared to other sectors, making it accessible to many people. However, the sector needs better support and investment to improve productivity and infrastructure.

Social

Agriculture plays a crucial role in enhancing food security, which, in turn, improves public prosperity and social welfare. The sector has the potential to provide employment and alleviate poverty, especially in rural areas.

Technological

Adopting advanced farming technology can save time, increase productivity, and improve the overall growth of the sector. The use of modern irrigation systems, drones for monitoring, and automated machinery can significantly boost efficiency.

Legal

Although laws and regulations for the agricultural setup exist, their enforcement and execution are weak. There is a need for stricter implementation of these laws, particularly regarding land ownership, water rights, and environmental regulations.

Environmental

Farming, when practiced sustainably, benefits the environment by absorbing carbon emissions, enhancing soil health, and maintaining biodiversity. However, improper agricultural practices, such as overuse of pesticides and water, can lead to environmental degradation. Proper management of water resources and soil conservation techniques are vital to preserving the environment while maintaining agricultural productivity.

SWOT-EETH Analysis

SWOT_EETH Analysis of Agriculture Sector at Federal Level

Strengths	**Enhancing Strengths**
i. Controlling Authority ii. Strong Administration iii. Competent Staff iv. Foreign Loans v. Legal Cover	i. Proactive Approach ii. Accountability iii. Self-dependency iv. Meaningful involvement v. Needs more reforms
Weaknesses	**Eliminate Weaknesses**

i. Extended AOR ii. Political Instability iii. Provincial Autonomy iv. Weak Agriculture Policies v. Old Canal System	i. Seriousness in dealing the issue ii. Political maturity iii. Food security at Federal level iv. Needs strong decision v. Reconstruction/rehabilitation of canal
Opportunities	**Taking Advantage of Opportunities**
i. Best use of flood water ii. FAO involvement iii. Rescheduling of Foreign loans iv. NDMA v. NFRCC	i. Proper mechanism be initiated ii. To get benefit of it iii. Exploit the economic facility iv. NDMA be strengthened v. NFRCC be involved
Threats	**Hedge Threats**
i. Climate Change ii. Plain Areas iii. Small Scale Farming iv. No positive response from Foreign Donors v. Indian Control on rivers	i. Implementation of PEPA Act-1997 ii. Drains be constructed/ maintained iii. Chamber of Commerce involvement iv. Self-Reliance v. Construction of dams and small dams

SWOT-EETH Analysis of Agriculture Sector of KP

Strengths	**Enhancing Strengths**
i. Sufficient Human Resource ii. PDMA iii. District Administration iv. Legal Cover	i. Capacity Building ii. Sources be increased iii. ADC relief be increased iv. Reforms may be brought in laws for agriculture
Weaknesses	**Eliminate Weaknesses**
i. Encroachments on rivers/ drains ii. Food security dependence iii. Uncultivable lands iv. Housing colonies v. Traditional form of harvesting	i. Strong anti-encroachment drive ii. Surety from Punjab iii. Dams should be completed iv. Action against illegal housing society and ban on it v. Awareness about modern harvesting-tunnel forming
Opportunities	**Taking Advantage of Opportunities**
i. D.I Khan a Food Basket ii. Tea Plantation on mountains iii. Feasible for dams iv. Water abundance	i. KP Economic Zone be started soon ii. Hazara region may be exploited iii. Prioritized dams be constructed like Kurram Tangi dam iv. Proper use of it
Threats	**Hedge Threats**
i. Law and order situation ii. Soil erosion iii. Land sliding iv. Meager economy	i. Needs settlement ii. Protection bund iii. Tree Plantation iv. Federal Support

Conclusions

Agriculture constitutes the largest sector of our economy, contributing 24% to GDP. The majority of the population is directly or indirectly dependent on this sector, which feeds both the rural and urban populations. The agricultural sector is indispensable to the country's economic growth, food security, employment generation, and poverty alleviation, particularly at the rural and urban levels.

The recent floods have severely damaged the agriculture sector across the entire country, especially in Sindh Province, resulting in significant losses to standing crops. This situation has created a food security crisis, particularly in Sindh, due to stagnant water remaining for a prolonged period. The country has faced a financial loss of Rs. 800 billion and is also experiencing food scarcity due to the damage to wheat crops and stocks, which contribute to 90% of household consumption. A well-planned, integrated preparedness mechanism and coordinated efforts could have minimized the impact.

In KP and Balochistan, the agricultural sector was damaged due to flash floods in plain areas. Drains and canals have not been cleared for the last 15 years. This time, the response from foreign donors was not up to the mark. Political rivalry between the federal government and the provinces resulted in a low level of coordination.

While floods are often framed as harmful and destructive, they also have many positive impacts and provide benefits for both people and nature. In Sub-Saharan Africa, an estimated 25 million hectares have already been irrigated with floodwaters, and it can be assumed that 50 million people directly benefit from flood-based farming.

Recommendations

Short Term

i. The wheat stock system should be improved.
ii. Cess/royalty funds may be diverted to the agriculture sector for the rehabilitation and reconstruction of water channels and roads for transportation of crops like sugarcane.
iii. The Flood Early Warning System needs to be upgraded immediately to include catchment areas, update existing river and floodplain geometry, study radar calibrations, enhance the reliability of Quantitative Precipitation Forecasts (QPF) through meteorological studies, and train meteorological professionals.
iv. Ensure adequate conveyance capacity within drains/water channels by removing weeds and encroachments from the embankments.
v. The PPRA Rules of Exemption from tendering in the case of emergencies may also be applied to the agriculture sector in the event of floods.

Long Term

i. Develop an incentive program to preserve, increase, or improve climate-resilient agricultural land.
ii. Identify, create, or reallocate resources to develop educational materials and technical bulletins on climate change preparedness and adaptation for the agricultural sector.
iii. Implement flood-based farming systems. There are six ways to increase productivity: 1. Water distribution, 2. Field water management, 3. Groundwater use, 4. Agronomic practices, 5. Multi-functional use, 6. Internal governance.
iv. Ensure early approval of required funds for the rehabilitation of agriculture infrastructure damaged by floods.
v. Construct small dams to mitigate floods and prevent future flash flooding.
vi. Repair, strengthen, and upgrade existing flood protection works on an immediate basis to protect the population and infrastructure from flood threats.
vii. Pool agricultural machinery, especially tractors, trolleys, and implements, for the evacuation and shifting of people, livestock, grain stock, and luggage.
viii. Develop provincial zoning for livestock farming/rearing based on flood resilience.
ix. Promote intensive social tree plantation, desilting, and cleaning of watercourses.

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Critical Study of Al-Nino Effect, Monsson Phenomenon and Environmental Damages in The Context of Climate Change in Pakistan

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Abstract:

Pakistan, ranked as the eighth most vulnerable country to climate change, faces significant ecological and meteorological challenges despite contributing minimally to global greenhouse gas emissions. The nation experiences extreme weather patterns, including severe flooding, erratic rainfall, and high summer temperatures, impacting its agricultural sector, which constitutes 21% of the GDP. Climate change-related disasters, like the 2022 floods, have resulted in immense economic losses, pushing millions below the poverty line. Pakistan's climate response includes a National Climate Change Policy (NCCP 2012), yet its implementation remains inadequate, especially concerning mitigation and adaptation strategies. Despite opportunities from international climate financing mechanisms like the Paris Accord and the $100 billion Green Climate Fund, Pakistan struggles to leverage these resources effectively due to institutional and policy gaps. This study explores Pakistan's climate change policies, institutional frameworks post-18th Constitutional Amendment, and disaster management strategies, emphasizing the need for robust action to integrate climate change into national development and financial planning.

Key words:

Climate Change, Pakistan, Greenhouse Gas Emissions, Climate Finance, Agricultural Impact

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Introduction

Pakistan's vulnerability to climate change impacts is well documented and acknowledged. The Intergovernmental Panel on Climate Change Synthesis Report of 2014 pointed to an increase in global temperatures of 4°C, contrary to initial estimates of about 3.5°C until 2100, entailing serious consequences for the survival of both humans and other species. Pakistan is the eighth most vulnerable country to climate change, and its contribution to Greenhouse Gases (GHG) accounts for 0.5-0.8 percent, according to various reports such as the Intergovernmental Panel for Climate Change (IPCC) Report 2004-05. Despite low carbon emissions, Pakistan's ecological and meteorological diversity directly exposes it to climate-driven threats in the form of floods, erratic rainfall, and extreme temperatures rising to 50°C in summer. The total loss in terms of GDP was seven percent, which is slightly less than the country's total tax revenues between 1998-2012. Similarly, the flood in 2022 caused a loss of almost $30 billion, requiring about $16 billion for rehabilitation and resettlement. According to a World Bank report, in the wake of the post-flood scenario, around 9 million people have fallen below the poverty line (Bank, 2022). In Pakistan, agriculture contributes almost 21% to the state GDP, employs half of the country's labor force, and relies on river waters for 80% of irrigated land. More than half of the rural population depends on agriculture for their livelihood and survival. Agriculture-dependent countries like Pakistan are the most affected by climate change. Climate change poses a serious threat to sustainable economic growth, for which Pakistan requires long-term commitment and strategies for integrating climate change into mainstream policy frameworks. Given Pakistan's economic vulnerabilities and financial constraints, climate financing is a risky business and requires financial resources to implement mitigation and adaptation measures to control environmental degradation without affecting economic growth. The Paris Accord of 2015 presents a unique opportunity for Pakistan to tap into much-needed climate-related financing from the $100 billion commitment made by the developed world to developing countries, which is conditioned upon submitting quantifiable and measurable actions in the form of INDCs every five years to qualify for international grants. Pakistan's performance on this account has been patchy and lukewarm, given the policy and institutional challenges that evolved for climate change at both federal and provincial levels after the 18th Amendment of 2010, which shifted the balance of power towards provinces in the domain of climate change (Change, 2004).

Statement of the Problem

Pakistan's contribution to global carbon emissions is arguably low compared to other developing countries in the region; however, its ecological diversity makes it the 8th most vulnerable state to face the vagaries of climate change with serious socio-economic implications.

Pakistan has developed an elaborate climate change regime and was among the first few states to enact the National Climate Change Policy (NCCP 2012) with a full-fledged Ministry of Climate Change in 2013. However, its performance is far from satisfactory in the context of mitigation and adaptation measures. Therefore, it is crucial to understand that despite the global opportunities and initiatives available in the form of the $100 billion "Green Climate Fund," Pakistan has not been able to capitalize on such avenues. This necessitates a deeper understanding of the climate change discourse from normative, operational, and structural levels.

Scope and Significance of the Study

This paper aims to highlight the policy and institutional framework at both the federal and provincial levels related to climate change in the context of the 18th Constitutional Amendment of 2010 and its impact on environmental issues between the federation and provincial units. Moreover, it will also reflect on the existing operational apparatus related to climate-induced disaster management, such as floods, at both the federal and provincial levels. In addition, it will examine the prospects of various initiatives by the Khyber Pakhtunkhwa Government in the context of climate change mitigation and adaptation measures.

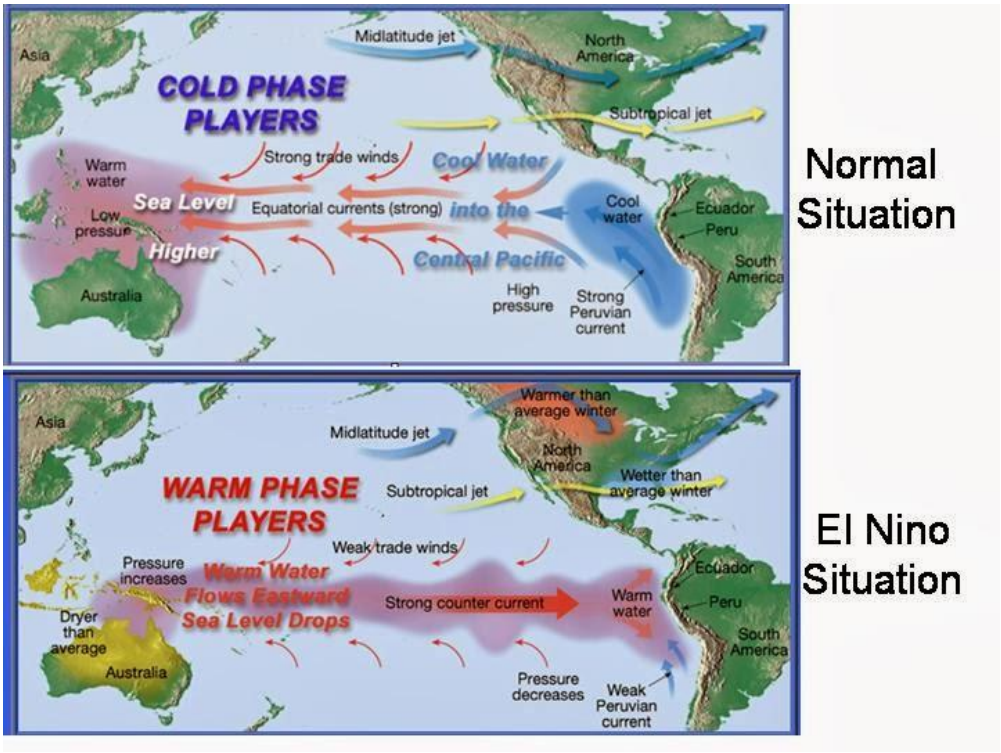
Methodology

The study employs both quantitative and qualitative methods. Secondary data has been obtained from published reports of the UNDP, ADB, Government of Khyber Pakhtunkhwa, research papers, and internet sources. Furthermore, quantitative data has been obtained using purposive sampling through structured questionnaires to elicit public perceptions about climate change.

El-Nino & La Nina

The terms El Niño and La Niña refer to Pacific Ocean weather phenomena that oscillate temperatures back and forth from warm to cooler and vice versa. El Niño refers to the warming of the central and eastern tropical Pacific, whereas La Niña is the reverse phenomenon, where the trade winds pick up speed and warm water in the eastern Pacific moves towards the western side of the Pacific. El Niño and La Niña events last nine to twelve months, but at times can extend for years. However, on average, El Niño and La Niña events occur every two to seven years. The combined effect of both El Niño and La Niña generates weather changes all across the globe, also known as ENSO (http://www.vagaries.in/2014/02/el-nino-la-nina.html, n.d.).

Figure-1
El Nino Situation



ENSO in Pakistan

Monsoon enters Pakistan from two different sides. The first is the southeastern wind that travels from the Bay of Bengal, entering Pakistan through India along the foothills of the Himalayas, resulting in the northeastern parts of the country receiving the monsoon. The second pathway is through the Arabian Sea, where moist, rain-carrying south-western winds enter Pakistan. The southeastern region of Pakistan receives rainfall from these wind currents.

Pakistan's precipitation and temperature changes are very complex. It experiences some unique and diversified climatic patterns throughout the year. In the extreme north, the minimum temperature can drop as low as -25°C, while in the southern sandy desert areas, summer temperatures can rise as high as 55°C. Seasonal forecasts suggest that Pakistan is expected to experience an extended winter season, with most parts of the country facing low temperatures until spring. Due to the low intensity of cyclogenesis over the Bay of Bengal during ENSO, the monsoon system is weak, dissipating before reaching Pakistan, resulting in the country receiving less-than-normal monsoon rainfall during the year. On the other hand, La Niña causes higher-than-normal rainfall due to stronger cyclogenesis activity in the Bay of Bengal as sea surface temperatures rise.

In 1998, Pakistan recorded heavy snowfall in mountainous areas and rainfall in Punjab, followed by four years of drought in the lower parts of the country. Another minor El Niño event occurred in 2009, which resulted in droughts followed by the devastating flood in the country during 2010 (Zuhaib Anwar).

Situational Analysis of Climate Change on Various Sectors

The following is the situational analysis of the effects of climate change on various thematic groups, as well as strategies for translating the National Climate Change Policy (NCCP) into Provincial Climate Change Policy (PCCP). The proposed actions are based on the Climate Change Policy, the competency of relevant government institutions, and the resources available for their implementation (Environmental Protection Agency, 2022).

Water Sector

Water is one of the most crucial sectors affected by climate change. The Indus Basin is among the largest irrigation systems in the world and is largely dependent on precipitation, glaciers, and snowmelt. Groundwater contributes around 48% of the surface water available at the canal head of the irrigation system. In Pakistan, current water utilization is as follows: agriculture - 92%, industry - 3%, and domestic & infrastructure - 5%. In the future, water demand will increase due to socioeconomic development and population growth. River flows are heavily dependent on seasonal and annual variability, where the highest flows are almost double the lowest flows, and total flows during the kharif season are five times greater than rabi season flows.

Analyses of river flows show a decreasing trend in annual water flow. The annual variability of river flows is more pronounced in the downstream Kotri Barrage, where in a normal year, the annual flow decreases from 77.3 MAF to 39.2 MAF. This decline in flow has serious implications for the Indus Delta regions, such as Hyderabad, Thatta, and Badin, where seawater intrudes into agricultural lands, destroying both the agricultural system and the groundwater drinking quality (Bank A. D., 2015).

Water Distribution

River	% of Indus Flow		Summer	Winter	Summer Source	Winter Source
Indus	44		86	14	Snow, glacial melt & monsoon	Rainfall
Chenab	19		83	17	Snow, glacial melt & monsoon	Rainfall
Jehlum	16		78	22	Mainly snow melt & monsoon	Rainfall
Kabul	16		82	18	Snow or glacial melt	Rainfall
Others	5		-	-	-	-

Water stress has a disproportionate impact on food security and agriculture in Khyber Pakhtunkhwa (KP). The province of KP contains around 7.67 percent of Pakistan's total cultivable area, and more than half of this land depends on rain-fed agriculture. As a result, a decline in water supplies could have a severe spillover effect, not just in KP but also in adjacent provinces.

Agriculture Sector

Agriculture is a vital sector of economic growth and contributes almost 21% to the country's GDP. The majority of the population is directly or indirectly dependent on this sector. It contributes about 24 percent of GDP and accounts for half of the employed labor force, being the largest source of foreign exchange earnings. Crops are categorized into two seasons: Rabi and Kharif. Wheat is the major Rabi crop, and cotton is the major Kharif crop. Crops are highly sensitive to the amount of water available and temperature variability. It is estimated that with a rise in temperature (+0.5°C–2°C), agricultural productivity will decrease by around 8%–10% by 2040 (Bank A. D., 2015).

Length of Growing Season (Days)

Region	**Northern Pakistan**	**Southern Pakistan**
	Mountainous (Humid)	Plains (Semiarid)
Baseline	246	161
Temperature Increase 1	232	155
Temperature Increase 2	221	149
Temperature Increase 3	211	144
Temperature Increase 4	202	138
Temperature Increase 5	194	133

The agriculture sector in KP is plagued by various issues. The strain on natural resources is increasing due to urbanization, the scarcity of uncultivated land, and the ineffectiveness of the existing irrigation system. Approximately 20% of cultivable land is uncultivated, and a large portion of this uncultivated land is prone to land degradation (waterlogging and salinity), urbanization, and inefficient water usage. The use of fertilizers and pesticides should not be excessive in order to increase agricultural productivity.

Livestock

In Pakistan, the livestock sector contributes 56.3% of agricultural sector output and 11.8% to the national GDP, supporting more than 8 million rural families directly involved in raising livestock.

The emissions from this sector make up a large part of the total emissions from the agricultural sector of Pakistan. A general assumption is that due to increases in temperature, droughts, and floods, meadows and cropping lands will decrease, ultimately reducing land productivity and decreasing the quality and quantity of fodder. However, very little evidence is available in the literature on how climate change affects the world's dairy and livestock systems.

Rangelands and livestock in KP complement each other and play an important role in the rural economy. The provision of veterinary services is a challenge, hampered by a lack of staff, equipment, drugs, and farmer awareness, as well as the seasonal relocation of animals to inaccessible locations (Environmental Protection Agency, 2022).

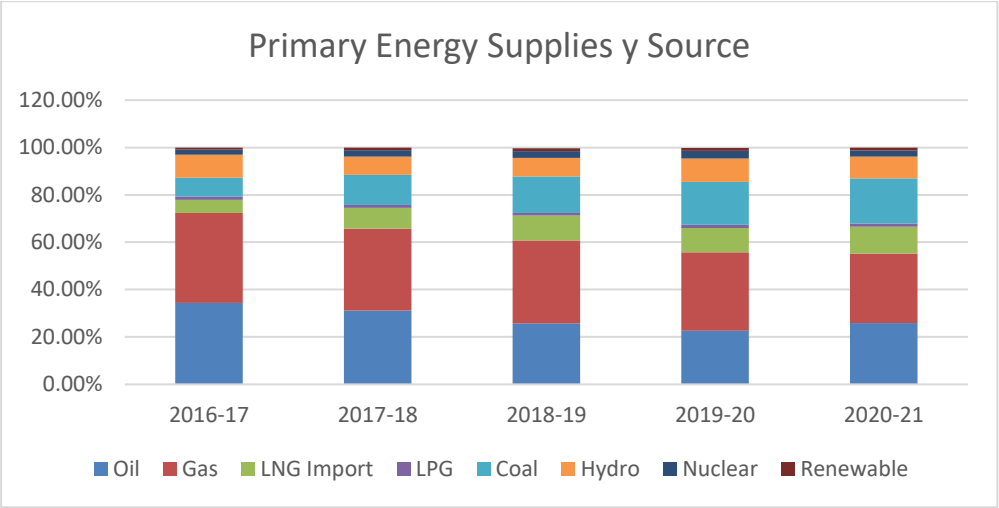
The majority of fish are found in rivers, natural ponds, and lakes. Climate change causes variations in the flow of water in rivers and other bodies of water, which directly impacts the fisheries sector.

Energy

The energy sector is a major contributor to climate change through its high GHG emissions in Pakistan and is also sensitive to its impacts. It is predicted that economic growth and changing consumption patterns, including rising demand for air conditioning in the summer months, will likely increase energy demand and consequently GHG emissions. With climate change in the future, the energy sector will largely be affected by extreme weather events such as flooding, storm surges, and drought, which will affect energy sources and the supply and distribution infrastructure. Pakistan's water resources are at severe risk due to climate change. Currently, hydropower resources supply about 30% of the country's electricity.

The most likely impact of global warming is the recession of Himalayan glaciers, which are the largest source of freshwater supply in the country. Uncertain water resources will reduce the reliability of the hydroelectric supply, which is a key provider of the country's power sector, leading to reduced reliability of the whole electricity generation system. Variations in water supply will be further aggravated by increased sedimentation of major reservoirs.

The primary sources of energy in the country are gas (29.3%), oil (25.9%), hydropower (9.2%), coal (19%), and nuclear energy (2.6%) as of 2020-21 (Figure-I). Pakistan is the largest consumer of gas in the region and has the sixth-largest coal reserves in the world. However, energy dependency on gas and oil is high compared to coal (Pakistan, 2021).


Primary Energy Supplies y Source
120.00%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
2016-17
2017-18
2018-19
2019-20
2020-21
Oil
Gas
LNG Import
LPG
Coal
Hydro
Nuclear
Renewable

Urban Infrastructure Services

The impact of climate change on urban infrastructure is considered to be due to changes in parameters related to weather or climate, either in magnitude or duration, as a result of climate change. These include changes in temperature (either maximum or minimum), precipitation causing heavy floods, frequency and intensity of storms, and sea level rise. In Pakistan, past experiences show that infrastructure located in areas exposed to such events or near climate-sensitive features such as rivers, coastal areas, storm tracks, or arid areas is at risk from extreme weather events. Normally, urban infrastructure services are interdependent, and the failure of services in one infrastructure often results in disruptions to other connected urban services. Climate change may increase the frequency of such disruptions in the coming decades (Environmental Protection Agency, 2022).

Forestry

Forests are an important natural resource, specifically in the context of rural livelihoods. They provide timber, fuelwood, food, habitat for wildlife, and various important ecosystem services, such as mitigating carbon dioxide. The forest area in Pakistan is 4.19 million hectares, representing 5% of the total land area. The Indus Delta alone supports 97% of the total mangrove forests. It is predicted that most of the anticipated impacts of climate change, such as changes in temperature and precipitation, and the increasing frequency and intensity of extreme events, will affect the forest severely, threatening biodiversity status and soil quality.

Climate change has an impact on forests both directly and indirectly. Climate change affects not just forest production and growth, but it is also associated with an increase in the number of forest disturbances. Carbon dioxide levels in the atmosphere, precipitation, and temperature are all important factors influencing forest productivity. Storms, droughts, and decreased tree health are some of the forest disturbances that influence forest productivity and tree species distribution.

Transport

The transport industry is responsible for the country's economic development because it accounts for 10% of the total national GDP and 11% of economic activity in KP. The transportation sector, in addition to contributing to the economy, is a major generator of GHG emissions. There is an urgent need for the Government of KP to investigate

alternative modes of transportation and ways to improve the existing transportation sector, such as the Peshawar BRT project and the introduction of electric vehicles.

Global Dimension of Climate Change Discourse

The year 2015 was marked by two landslide global initiatives on climate change, which culminated in the Paris Agreement, signed by 196 states, as well as the signing of the Sustainable Development Goals for 2030. The agreement came after the shocking increase in global temperature, making 2015 the warmest year recorded in human history since the dawn of the industrial revolution, touching the 1°C milestone with serious implications for developing countries, including Pakistan. In the Paris Accord, the developed world promised to allocate $100 billion to the Green Climate Fund for developing countries to reduce greenhouse gas emissions by 60% by 2050 through mitigation and adaptation measures, reflected in their INDCs. An INDC is a document that sets out a country's non-binding intentions to reduce greenhouse gas (GHG) emissions and the steps or financing needed to take such mitigation or adaptation measures (UNDP, 2015).

The Development of Pakistan's INDC

COP21

The Paris Accord of 2015 came as a great diplomatic success for global action to save the world from the catastrophic effects of climate change by limiting global warming to 1.5%. However, there has been a disconnect between the Paris Agreement and Pakistan's first Intended Nationally Determined Contributions (INDC) at COP21 in 2015. It came as a shocking surprise when Pakistan submitted a much-delayed, only one-page long, 350-word "Zero Draft" prepared by the Ministry of Climate Change (MoCC) and a confidential draft by technical experts. However, both drafts were utter disappointments and failed to make any quantitative or qualitative commitments to mitigate and/or adapt to climate change. Secondly, there was no multi-sectoral and stakeholder consensus, except for a few officials from the MoCC and technical experts funded by international donors (UNDP, 2015). In contrast, Vietnam and Kenya submitted their INDCs after attaining a broad-based multi-sectoral and stakeholder consensus across the national and subnational levels. Thirdly, Zimbabwe and Afghanistan were able to submit quantitative mitigation measures, even if they were conditional. Fourthly, Pakistan failed to spell out its investment requirements for mitigation and adaptation, and its assumptions were

based on other countries' forecasting of macro-level investments, such as in LSM and transport, even though it could have been done easily by the Finance Division if it had coordinated with the MoCC, thus squandering a fair chance to plead its case for tapping this crucial investment to fight climate threats.

The government has cited two reasons for this failure: first, that any intention for mitigation might not be legally binding, and second, that data reliability of mitigation measures is another issue. However, both arguments are logically wanting. If they had submitted the zero draft as the final draft after fine-tuning it on the pattern of other states like Sri Lanka, Bangladesh, and Afghanistan—states that also faced similar issues—they could have submitted coherent stances, citing their own reasons for failure due to data issues and domestic priorities that would determine their climate change commitments. The unfortunate reality is that the world does not wait for laggards: you snooze, you lose. And Pakistan had done just that (Bank A. D., 2015).

COMPARISON OF INDC								
GDP/capital ($)	Country	Base Level	Reduction Target	Target Year	Sectors	Sector-wise measures	Vulnerab-ility	International financing needs
1,596	India	2005	33% - 35% (contingent on Article 3.1 & 4.7)	2030	Not Specified	Specified without GHG or USD amounts	Detailed mention, justifies development	International finance needs to be finalized later, preliminary estimates equal $2.5 trillion
1,443	Ghana	2010	15% (BAU) (unconditional), additional 30% (conditional on international support)	2025-2030	Energy, industrial processes and product use, agriculture, waste	Specified with USD amounts but without GHG	Passing reference	$16 billion
1,358	Kenya	N/A	30% (BAU)	2030	Same as above	Specified without GHG or USD amounts	Passing reference	$40 billion for mitigation and adaptation across sectors
1,334	Pakistan - Submitted draft	None	None	None	Potentially all sectors	Not specified	None mentioned	None mentioned
1,334	Pakistan - Zero draft	N/A	37% on energy supply, 22% energy demand, 8% transportation, 5.5% agri and forestry (BAU)	2030	Energy demand/supply, agriculture and forestry, transport	Specified without GHG or USD amounts	Detailed mention	None mentioned. No explicit mention of conditionality but implicitly based on Article 4.1
1,334	Pakistan - Confidential draft	2012	Option 1: 10% (5% unconditional, 5% conditional) Option 2: 18% (5% unconditional, 13% conditional) Option 3: 18% (conditional)	2030	Energy (including transportation) and agriculture	Specified without GHG or USD amounts	Detailed mention	USD amount not mentioned but conditional reductions are subject to external financial support, technology transfer and capacity building

After having lost this opportunity in COP21, Pakistan sought assistance from multilateral institutions for Climate Public Expenditures and Institutional Review (CPEIR), and the first such review was conducted by the KP government in collaboration with UNDP. They formulated the Climate Change Financial Framework (CCFF) in 2018 with the sole purpose of revamping the State's Public Financial Management while mainstreaming climate change in budgetary allocations, both at the federal and provincial levels across various departments. This was done to reflect mitigation and adaptation measures in quantifiable numbers, which would determine the provision of international grants. After much delay, Pakistan was finally able to submit its INDCs for COP27 in 2021.

Analysis of COP27 (Egypt)

As per the INDCs submitted to COP21, Pakistan made a voluntary commitment to reduce 50% of carbon emissions by 2030. This means delinking economic growth from hydrocarbon-dependent industries and

sectors to renewable sources of energy. For this, Pakistan requires almost $15 billion for mitigation and $11 billion for adaptation every year, excluding GHG mitigation from the agriculture sector (Tribune, 2021).

Given Pakistan's economic indicators, raising such revenues annually is impractical for two obvious reasons:

1. Binding agreements with IPPs without renegotiation force Pakistan to pay despite surplus power, leading to the issue of circular debt.
2. The second phase of CPEC focuses on investment in agriculture and industrialization through specialized economic zones.

The Paris Accord 2015 was a unique opportunity for climate financing in Pakistan; however, given the lukewarm and patchy understanding of the climate change discourse in the context of COP21 and COP27 at the national level, it compels us to understand the climate change institutional framework in Pakistan, particularly in the context of the 18th Amendment of 2010, which fundamentally altered the power relationship between the federation and provinces after the devolution of 47 subjects, especially environment and ecology in the context of climate change and entering into Multilateral Environmental Agreements (MEAs).

Climate Governance after the 18th Amendment in Pakistan

Pakistan is a signatory to a number of MEAs, including the Rio Declaration, UNFCCC, Kyoto Protocol, and the Paris Agreement. It has passed a National Climate Change Policy in 2012 and enacted the Pakistan Climate Change Act in 2017. Provincial governments are considered key actors in national adaptation and mitigation measures, and the lack of coordination between the Federation and the Provinces seriously challenges these measures. A brief constitutional history will help us understand the evolution of environmental law and the impact of the 18th Amendment of 2010 on the climate change regime between the federation and provinces (Bank A. D., 2015).

Brief Constitutional History - Pakistan

The first Constitution, promulgated in 1956, proposed a federal form of government and the distribution of powers and functions between the federal and provincial governments into three lists: Federal, Concurrent, and Provincial. Article 108 provides that the Federal Government can exercise full powers on any matter related to MEAs, whether or not provided in the Federal or Concurrent list. However, the 1973 Constitution, as it was before the 18th Amendment, abolished the provincial list and retained the federal and concurrent lists, where the federation could legislate on subjects enumerated in both lists, and provincial governments were vested with residuary powers to legislate on matters pertaining to the concurrent list and any matter not mentioned in both lists. Moreover, the 1973 Constitution, unlike Article 108 of the 1956 Constitution, did not give the Federal

Government specific powers to implement provisions of MEAs in the provincial domain, except as provided in the Rules of Business of 1973, where the federation could legislate on MEAs only with the approval of the Prime Minister (WWF - ILO, 2018).

The 18th Amendment devolved considerable powers to the provinces by abolishing the Concurrent Legislative List. Under the present Constitution, Parliament can make laws only on subjects enumerated in the Federal Legislative List, or with extra-territorial jurisdiction, or if requested to do so by a resolution passed by any Provincial Assembly. Neither environmental pollution, ecology, nor climate change is enumerated in the Federal Legislative List. However, they remain subject to a number of MEAs. Entries 3 and 32 of the Federal Legislative List allow Parliament to make laws regarding the implementation of treaties and agreements with other countries and "international treaties, conventions, and agreements." But the 18th Amendment leaves unclear how far the Federation's power to implement an MEA allows it to enact legislation where the subject matter of the MEA is in the provincial domain—that is, where the subject matter of the MEA is not enumerated in the Federal Legislative List. This lack of clarity can be illustrated in the way provinces have exercised their newly expanded powers of legislation concerning devolved subjects like environmental pollution and ecology. Each province has passed its own environmental protection laws and conferred powers to implement the specified MEAs in their respective domains. The resulting situation is that the Federal Government and three of the four provincial governments have the power to implement the same MEAs. In 2014, the Government of Punjab made the Punjab Biosafety Rules, 2014, leading to parallel regimes for regulating GMOs, such as the Biosafety Committee at the federal level (UNDP, 2015).

Review of the Present Climate Governance Framework

The 18th Amendment of 2010 led to the abolition of the Ministry of Environment in 2011 and the devolution or reallocation of its responsibilities to the provinces or various federal institutions. It is notable that the National Climate Change Policy was passed at the time of the 18th Amendment when many of the Federation's responsibilities for climate governance were being devolved to the provinces. Post-18th Amendment, the Climate Change Division was established in 2011, and then it was elevated to a full-fledged Ministry of Climate Change in 2013. However, it was again downgraded to a division in 2014, which was elevated to a ministry again in 2015. It enacted its first Climate Change Act in 2017. The current responsibilities and mandate of the Ministry of Climate Change, as assigned by the Rules of Business, are given below:

1. Pakistan Environmental Protection Council;
2. Pakistan Environmental Protection Agency;
3. Pakistan Environmental Planning and Architectural Consultants Limited (PEPAC);

4. Global Environmental Impact Study Centre, Islamabad;
5. National policy, plans, strategies, and programs regarding disaster management, environmental protection, preservation, pollution, ecology, forestry, wildlife, biodiversity, climate change, and desertification;
6. Coordination, monitoring, and implementation of environmental agreements with other countries, international agencies, and forums;
7. Policy formulation, coordination, and reporting of human settlements, including urban water supply, sewerage, and drainage.

It can be observed that the Ministry of Climate Change's responsibility with respect to climate change is limited to national policies and disaster management, while crucial operational arms of national disaster, such as NDMA, operate independently and provide no policy coordination with provinces. This is particularly glaring as many of the legislative subjects within the domain of climate change have been devolved to the provinces in light of the 18th Amendment. In 2013, it is interesting to note that while Pakistan was ratifying the Paris Accord in 2016, there was no Climate Change Act, which was only enacted in 2017 (Alam, 2019).

Pakistan Climate Change Act, 2017

The Act envisages a Pakistan Climate Change Council for coordination between the federation and provinces and the Pakistan Climate Change Authority, which has yet to be established or notified, with no rules of business. This has created a coordination vacuum between the federation and provinces on developing a unified approach to climate change, thus inhibiting mitigation and adaptation measures where the main focus is on immediate disaster management, relief, and rehabilitation, rather than addressing the long-term challenges posed by climate change.

Interestingly, the provisions of this Act are deemed to override "anything inconsistent in any other law for the time being in force" and also empower the Federal Government to make rules for implementing the provisions of MEAs related to climate change specified in its Schedule. This Schedule mentions the UNFCCC, Kyoto Protocol, Paris Agreement, and "any other agreement relating to climate change to which Pakistan is a party." However, to date, no rules to implement any of the listed MEAs have been notified (Pakistan G. o., 2017).

Sub-National Climate Governance

As in the case of the Federal Government, provincial Rules of Business allocate the business of government at the sub-national, provincial level. The abolition of the Concurrent Legislative List pursuant to the 18th Amendment expanded the legislative responsibilities of provincial governments to include, among other things, environmental pollution and ecology. Since the subject of "climate change" is not mentioned in the Federal Legislative List, provinces have executive and legislative competence to take action on these subjects, make policies, and enact legislation. All the provinces have enacted

their own provincial environmental legislation after the 18th Amendment (Alam, 2019).

GAPS in Constitutional Provisions

As can be seen, these Rules of Business do not explicitly allocate any responsibility over climate change to the Environment Protection Department. However, responsibility over the administration of the Punjab Environmental Protection Act, 1997, does include the power to propose rules for the implementation of the MEAs listed in the Schedule to the Act, which includes the Kyoto Protocol as one of the MEAs that the Government of Punjab can frame rules to implement.

It is also pointed out that a number of energy, food, water, and biodiversity issues are mentioned in the responsibilities of various departments, illustrating the point that climate change is perhaps not a discrete subject to be confined to one department, but an issue that must be embedded in and responded to by all departments at the sub-national level.

In *Asghar Leghari vs. Federation of Pakistan*, the Lahore High Court recognized "climate change [as] a defining challenge of our time," which was a "clarion call for the protection of the fundamental rights of the citizens of Pakistan." In doing so, the Court also recognized that "existing environmental jurisprudence has to be fashioned to meet the needs of something more urgent and overpowering, i.e., climate change." The Court constituted a Climate Change Commission with the objective of effectively implementing the National Climate Change Policy, 2012, and the Framework for Implementation of the Climate Change Policy. It is pointed out that the mandate of the Commission was in relation to the Province of Punjab, and the Commission was able to force the Punjab Government to draft the Climate Change Act in 2017. Additionally, it oversaw ADP projects, where out of 734 initiatives, progress was shown in 144 priority areas due to Judicial Activism (*Asghar Leghari vs. Federation of Pakistan*, 2015).

CURRENT STATUS	GAPS
Article 143 of the Constitution gives the Federal Government the authority to act as the focal point for fulfilling international obligations on global environmental protocols and agreements.	In the absence of proper coordination and oversight, it is unlikely that these policies and acts will be successfully implemented due to the devolution of environment and ecology to the provinces after the 18th Amendment in 2010.
Entries 3 and 32 of the Federal Legislative List allow Parliament to make laws regarding the implementation of treaties and agreements with other countries and "international treaties, conventions, and agreements."	But the 18th Amendment leaves unclear just how far the Federation's power to implement an MEA allows it to enact legislation when the subject matter of the MEA has not been enumerated in the Federal Legislative List.

Except Sindh, the provinces have conferred onto their respective provincial governments the power to implement the specified MEAs. The resulting position is that the Federal Government and three of the four provincial governments have the power to implement the same MEAs.	In 2014, the Government of Punjab made the Punjab Biosafety Rules, 2014, resulting in parallel regimes for the regulation of genetically modified organisms (GMOs) in Pakistan.
In Sui Southern Gas Company Limited vs. Federation of Pakistan, the Supreme Court of Pakistan ruled in favor of upholding the legislative powers of the Federal Government to the extent of MEAs while interpreting entries No. 3 and 32 of the Federal Legislative List.	In Asghar Leghari vs. Federation of Pakistan, the Lahore High Court recognized "climate change [as] a defining challenge of our time," which was a "clarion call for the protection of fundamental rights of the citizens of Pakistan."
The 18th Amendment of 2010 resulted in the abolition of the Ministry of Environment in 2011 and the devolution or reallocation of its responsibilities, as set out in the Federal Government Rules of Business, to the provinces or various federal institutions.	It is notable that the National Climate Change Policy was passed at the time of the 18th Amendment when many of the Federation's responsibilities for climate governance were being devolved to the provinces.
The provisions of the Pakistan Climate Change Act, 2017 are deemed to override "anything inconsistent in any other law for the time being in force" and also empower the Federal Government to make rules for implementing the provisions of MEAs relating to climate change specified in its Schedule. This Schedule mentions the UNFCCC, Kyoto Protocol, Paris Agreement, and "any other agreement relating to climate change to which Pakistan is a party."	However, to date, no rules to implement any of the listed MEAs have been notified.
Article 270AA(6) of the Constitution states that notwithstanding the omission of the Concurrent List by the 18th Amendment, all laws with respect to any of the matters enumerated in the said List and in force immediately before the commencement of the 18th	The Supreme Court of Pakistan named Shehla Zia against WAPDA. The decision by the Court pointed out that the right to life of a citizen is to provide citizens with a healthy environment free from pollution. This case was a foundational stone

Amendment shall continue to remain in force until altered, repealed, or amended by the competent authority.	for environmental jurisprudence in the country (Shehla Zia vs WAPDA, 1994).

GAPS at Inter-Provincial Level

Punjab	KP	Sindh	Balochistan
The Punjab Government Rules of Business were updated in 2011 at the time of the 18th Amendment and have remained unchanged and unamended. However, responsibility over the administration of the Punjab Environmental Protection Act, 1997, does include the power to propose rules for the implementation of the MEAs such as the Kyoto Protocol.	The Khyber Pakhtunkhwa Assembly passed the Khyber Pakhtunkhwa Environmental Protection Act in 2014. Under this Act, the Government of Khyber Pakhtunkhwa has the power to make laws to implement the MEAs listed in its Schedule. The Schedule to the Act lists 19 MEAs, including the UNFCCC and Kyoto Protocol. However, to date, no rules to implement any of the MEAs provided for in the Schedule have been made.	The Sindh Assembly passed the Sindh Environmental Protection Act in 2014. The Act does not give the Government of Sindh the power to implement any MEAs, except for providing inter-provincial and fed-provincial coordination.	The Balochistan Assembly passed the Balochistan Environmental Protection Act in 2014. Under this Act, the Government of Balochistan may make rules to implement MEAs listed in its Schedule. The Schedule contains 30 MEAs, including the Rio Declaration, UNFCCC, and Kyoto Protocol. However, to date, no rules to implement any of the MEAs have been made by the Government of Balochistan.

SWOT Analysis of NCCP in Respect of Floods

Strengths	Weaknesses
- Stormwater catchment to reduce flood risk	- Lacks realistic and comprehensive backing for establishing goals and objectives.
- Glacier Lake Outburst Floods (GLOF) risk reduction project study	- The policy is not based on empirical research (such as protection of glaciers in view of military conflict).

- The policy provides clear guideline direction to provincial governments	- There is no financial allocation for adaptation.
- Provides mechanisms for implementation strategies for action plans	- Absence of formulation and enforcement of river floodplain regulations and laws.
- Integration of sectoral policies with climate change policy	- No statistical background or achievable measures indicated.
- Provides mechanisms to enhance human & institutional capacity	- Stakeholders' identification is opportunistic rather than systematic in terms of the scope of various interest groups that need to be consulted.
- Provides initiatives for aquifer recharge mechanisms	- There is no clarity as to who the real stakeholders are.
- GIS mapping of flood embankments for flood management	- The document does not address the concerns of any stakeholder or provide appropriate measures for such concerns.
- Establishes local flash flood forecasting & warning systems	- Policy has yet to trigger substantial climate-related finance due to policy and institutional disconnect.
- Provides for real-time exchange of hydrological data in the region	
- Provisions for policy implementation committee	
Opportunities	**Threats**
- MEAs have played a major role in shaping climate change policy and legislation in Pakistan	- The overall institutional landscape on climate change is highly fragmented with involvement from the federal, provincial, private sector, and civil society.
- As a co-chair of the Conference of Parties (COP27), Pakistan may invite donors to assist in flood response and mitigation	- NCCP provides a framework, but there seems to be difficulty in prioritizing it into action.
- Given that the climate change ministry has not fully devolved to the provinces, there remains an opportunity to optimize the capitalization on the skills and competences of multi-level institutions	- Pakistan is experiencing constituency politics, which means that projects are being shaped under the influence of these dynamics.

- The implementation of international agreements and treaties related to environment and climate change	- Allocation of the climate budget is dominated by mitigation at the federal level.
- Collaboration areas in developing more effective systems for forecasting and warning	
- Learning from the best practices in the world	

EETH Analysis in Respect of Floods

Enhancement of Strengths	**Elimination of Weaknesses**
(i) Stormwater can be turned into an opportunity to mitigate water shortage. (ii) Glacier Lake Outburst Floods (GLOF) risk reduction project study may be employed. (iii) In consonance with the policy guidelines, climate change/flood issues may be addressed at the provincial level with the help of the federal government. (iv) An action plan may be devised in light of the implementation strategies. (v) Implementation plan for the integration of sectoral policies with climate change policy. (vi) The policy implementation committee may ensure the following: • Provides mechanisms to enhance human & institutional capacity • Provides initiatives for aquifer recharge mechanisms • GIS mapping of flood embankments for flood management • Establishes local flash flood forecasting & warning systems • Through exchange of real-time hydrological data in the region	(vii) Research-based policy measures may be devised for establishing goals and objectives, as well as for protecting glaciers. (viii) Financial allocation may also be made for adaptation measures. (ix) River floodplain regulations and laws may be formulated. (x) Stakeholders' identification is opportunistic rather than systematic. Various interest groups need to be consulted. (xi) The real stakeholders may be identified.
Taking Advantage of Opportunities	**Hedge Against Threats**
i. MEAs have played a major role in shaping climate change policy and legislation in Pakistan. Funds and technology may also be obtained from international donors.	i. The overall institutional landscape on climate change is highly fragmented with involvement from the federal, provincial, private sector, and civil society.
ii. As a co-chair of the Conference of Parties (COP27), Pakistan may invite donors to assist in flood response and mitigation.	ii. NCCP provides a framework, but there seems to be difficulty in prioritizing it into action.

iii. Given that the climate change ministry has not fully devolved to the provinces, there remains an opportunity to optimize the capitalization on the skills and competences of multi-level institutions.	iii. Pakistan is experiencing constituency politics, which means that projects are being shaped under the influence of these dynamics.
iv. The implementation of international agreements and treaties related to environment and climate change.	iv. Allocation of the climate budget is dominated by mitigation at the federal level.
v. Collaboration areas in developing more effective systems for forecasting and warning.	
vi. Learning from the best practices in the world.	

Climate Change (Situational Analysis)

Anthropogenic emissions of Greenhouse Gases (GHG) have increased since the industrial era, resulting in global warming and large-scale changes in weather patterns, collectively known as "Climate Change." Globally, scientific evidence suggests that Climate Change is responsible for changes in precipitation, increased occurrences of droughts and heat waves, increased intensity and frequency of hurricanes, sea-level rise, and the melting of glaciers and Arctic ice.

Recognizing the risks and vulnerabilities, the UN General Assembly established the 17 Sustainable Development Goals (SDGs) in 2015 to achieve a brighter and more sustainable future for all. Pakistan was the first country to accept the SDGs-2030 agenda through a unanimous resolution of the Pakistani Parliament, which produced Vision 2025, aligned with the SDGs. In addition, to address Climate Change concerns, a legally binding international treaty was signed at the Conference of Parties (COP21) in Paris, known as the Paris Agreement 2015. The treaty's goal is to keep global warming well below 2°C, preferably 1.5°C, compared to pre-industrial levels. Pakistan became a signatory to the Paris Agreement in 2016 and submitted its first Nationally Determined Contributions (NDCs) with the goal of reducing emissions by 20% and taking actions to adapt to the changing climate by 2030.

Greenhouse Gas Emission Profile of Pakistan

Pakistan ranks comparatively low among countries in terms of per capita GHG emissions due to its lower level of development. According to a preliminary projection, the GHG emission levels for Pakistan are expected to increase many times in the coming decades. This is based on the assumption that the GHG emissions intensity for the five main sectors mentioned will

remain essentially the same as during the period from 2020 to 2050. Thus, the projected total GHG emissions of Pakistan, in line with the government's economic growth strategy, will increase by around 7 times by 2050.

Sector	**1994**	**2008**	**2012**	**2020**	**2050**
Energy	86	157	169	358	2685
Agriculture	72	120	165	245	1395
Industrial Processes	13	18	14	26	67
Land Use Change and Forestry	7	9	10	14	38
Wastes	4	6	10	7	15
Total Emissions	**182**	**310**	**368**	**650**	**4200**

According to the national GHG inventory of Pakistan (2011–2012), total GHG emissions were 369 million tons of CO2, with 55% from the energy sector, 38.71% from agriculture and livestock, 4% from industrial processes, and 2.15% from land use change and forestry sectors. The energy and agriculture-livestock sectors alone account for around 90% of the total emissions pool and have thus far remained the biggest emitters of GHGs in 2020 (Bank A. D., 2015).

Impacts of Climate Change in KP

Khyber Pakhtunkhwa Province is located in the northwest of the country and hosts a variety of topographical features. The foothills of the Karakoram, Himalayan, and Hindukush mountain ranges are found primarily in the north of the province, while the southern side is mostly comprised of valley plains, which consist of agricultural land and rangelands. Severe climate conditions exist in the province's northern region, which experiences extremely snowy and cold winters, with high-intensity rainfall, whereas the province's southern region experiences relatively less severe winters, with reasonable rainfall and warmer summers. KP is divided into nine agro-ecological zones based on climate, rainfall, temperature, altitude, soil, and topography (Pakhtunkhwa, 2021). Figure-1 shows the map of the agro-ecological zones of KP.

Climate Change has influenced KP like other regions of Pakistan. Climate Change has caused progressive changes in weather and food production patterns, as well as abrupt and disastrous weather catastrophes such as severe floods caused by high rainfall (2010, 2022), droughts caused by water scarcity and stress, and extended heatwaves. In KP, all of these disastrous events have resulted in the following changes:

- Temperature Changes

- Precipitation Changes
- Changes in Food Production
- Shifting Weather Patterns
- Glacial Melting
- Loss of Biodiversity
- People and Society

The above changes have severely impacted various sectors, including Water Resources, Agriculture, Livestock, Fisheries, Forestry, Wildlife & Biodiversity, Vulnerable Ecosystems, Disaster Preparedness, Public Health, and Energy.

SWOT Analysis of Provincial Departments

The Environment and Forestry, Agriculture, Water & Irrigation, Energy & Power, Relief, Rehabilitation & Settlement, and Communication & Works (Roads & Infrastructure) Departments score highly in climate relevance.

Strengths	**Weaknesses**
• Government ownership • Existence of institutional mechanism • Vibrant regulatory framework • Human resources	• Governance issues • Political influence • Lack of implementation regime • Missing sectoral linkages • Inconsistencies in climate change policies • Climate change literacy/awareness
Opportunities	**Threats**
• Availability of foreign funding for implementation of policies • Adoption of international best practices • Equipping human resources with modern tools • - Tourism potential	• Anthropogenic issues • Recurring natural disasters • Geographic vulnerability • Extreme weather conditions • Population growth • - Increase in sediment flow due to floods and high-intensity rains

Climate-Related Expenditures

KP, like the other three provinces, obtains a major portion of its resources from the Federal Divisible Pool under the paradigm of fiscal federalism followed in Pakistan. The KP budgetary profile is based on the KP Finance Department's publication, the "Annual Budget Statement." A majority of the current expenditure falls under the label of "general public service," which is mainly related to salaries and pensions of provincial employees. It is useful to examine provincial budget financing, as nearly 30 percent of it is spent on development or investment activities.

The geophysical location of KP near three mountain ranges makes it particularly vulnerable to gradually rising temperatures, creating the need for fiscal space for an effective climate response.

The government has also designated a high-level champion for steering the provincial Green Growth Strategy and plans that include attention to climate change response. The methodology and steps involved in selecting climate-related programs and projects in the development budget of KP are similar to those adopted by the Federal Government. Projects in the Environment and Forestry Department, Agriculture, Water & Irrigation, Energy & Power, and Relief & Rehabilitation Department score highly in climate relevance.

The study of development projects executed found that around 15-25% of KP's total provincial development budget is allocated for climate-vulnerable departments. Total climate-related spending in KP has increased from PKR 9.74 billion to PKR 147.189 billion between 2013-14 and 2022-23. Based on the aforementioned profile of the number of climate-related projects and their associated investments, a summary trend analysis of climate-relevant budget allocation in the development budget is presented in Table-1.

Out of a total of 34 departments, the share of climate change budget allocation of expenditures for climate-related tasks was broad for the overall ADP of 2022-23, with water resources at 5.5%, energy & power at 7.6%, agriculture at 3.8%, roads & infrastructure at 16.12%, and urban town planning at 4.09%. The government is executing more projects in water, energy & power, roads, and agriculture (Graph-1). However, with regards to climate budgeting, there is a need to link multi-sectoral planning and budgeting with climate change policy needs, thus making way for clearer tracking of climate change-related budgetary and development implementation investments. Year-wise sectoral projects executed by each department are depicted in Graph-2 (Pakhtunkhwa, Annual Development Plan, 2022).

Table-1 Year-wise Expenditure Allocation

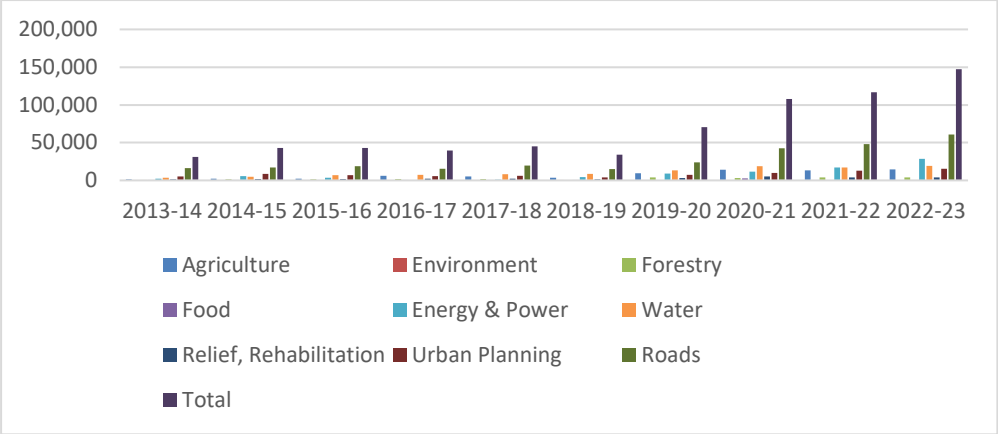
(Rupees in Million)
Project in No.
Share in %

Department	2013-14			2014-15			2015-16			2016-17			2017-18		
	Amount	Projects	Share	Amount	Projects	Share	Amount	Projects	Share	Amount	Projects	Share	Amount	Projects	Share
Agriculture	1,532	51	1.7	2,455	46	1.8	2,468	47	1.4	6217	45	3.9	5,290	39	2.5
Environment	57	11	-	57	10	-	57	8	-	57	7	-	57	4	-
Forestry	569	46	0.6	1,366	47	1.0	1,242	56	0.7	2,007	100	1.29	2,007	41	1.0
Food	500	8	0.4	501	11	0.4	501	11	0.3	732	11	0.5	732	21	0.4
Energy & Power	2,223	28	1.9	5,657	36	4.0	3,749	39	2.1	299	35	0.2	830	45	0.4
Water	3,415	93	2.9	4,737	132	3.4	6,870	203	3.9	7,150	209	4.4	8,352	212	4.0
Relief, Rehabilitation	1,447	6	1.2	2,053	11	1.5	2,053	18	1.2	2,215	23	1.4	2,215	30	1.1
Urban Planning	5,229	20	4.4	8,760	21	6.3	6,985	19	4.91	5587	28	3.5	6,243	30	3.0
Roads	16,176	103	13.7	17,267	231	12.4	19,006	343	10.9	15319	333	9.5	19577	358	9.4
Total	**31,148**	**366**		**42,853**	**545**		**42,931**	**744**		**39,583**	**791**		**45,303**	**780**	

Table-1 Year-wise Expenditure Allocation

(Rupees in Million)
Project in No.
Share in %

Department	2018-19			2019-20			2020-21			2021-22			2022-23		
	Amount	**Projects**	**Share**	**Amount**	**Projects**	**Share**	**Amount**	**Projects**	**Share**	**Amount**	**Projects**	**Share**	**Amount**	**Projects**	**Share**
Agriculture	**3,445**	**40**	**1.9**	**9,510**	**43**	**4.0**	**14,315**	**133**	**4.5**	**13,242**	**135**	**4.18**	**14,645**	**94**	**3.89**
Environment	**446**	**5**	**0.2**	**40**	**3**	**-**	**40**	**4**	**-**	**50**	**3**	**0.02**	**47**	**4**	**0.01**
Forestry	**2,8 66**	**29**	**1.6**	**4,086**	**25**	**1.7**	**3,226**	**51**	**1.0**	**4,017**	**38**	**1.27**	**3,956**	**54**	**1.05**
Food	**472**	**18**	**0.3**	**404**	**10**	**0.2**	**2,706**	**14**	**0.9**	**403**	**11**	**0.13**	**393**	**11**	**0.10**
Energy & Power	**4,222**	**46**	**2.3**	**9,016**	**41**	**3.8**	**11,437**	**75**	**3.6**	**16,897**	**65**	**5.34**	**28,646**	**68**	**7.61**
Water	**8,825**	**176**	**4.9**	**13,261**	**164**	**5.6**	**18,659**	**243**	**5.9**	**17,081**	**223**	**5.4**	**19,386**	**194**	**5.15**
Relief, Rehabilitation	**1,428**	**28**	**0.8**	**2,982**	**30**	**1.3**	**5,042**	**40**	**1.6**	**3,955**	**39**	**1.25**	**4,087**	**43**	**1.09**
Urban Planning	**4,054**	**33**	**2.2**	**7,419**	**35**	**3.10**	**10,021**	**76**	**3.2**	**12,748**	**77**	**4.03**	**15,389**	**81**	**4.09**
Roads	**14,961**	**308**	**8.30**	**23,699**	**313**	**10.0**	**42,341**	**507**	**13.3**	**48,229**	**525**	**15.24**	**60,640**	**515**	**16.12**
Total	**33,962**	**683**		**70,417**	**664**		**107,787**	**1143**		**116,622**	**1116**		**147,189**	**1064**	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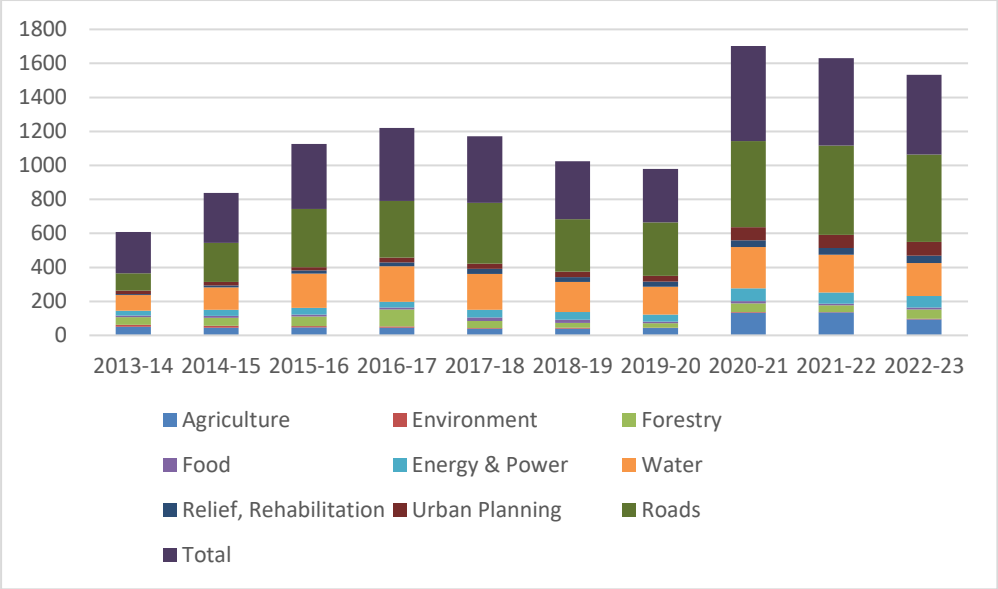
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Agriculture
Environment
Forestry
Food
Energy & Power
Water
Relief, Rehabilitation
Urban Planning
Roads
Total

Climate Change projects executed under the annual development programme of Khyber Pakhtunkhwa during the last 10 years are tabulated as follows:

Financial Year	Project	Cost (Million Rs.)
2013-14	Feasibility Study for Drainage, Sewerage, and Solid Waste Management Plan for DI Khan City	20
	Rehabilitation of Waste Lands through vegetative Treatment in Haripur Forest Division	15
	Establishment of Climate Change Cell for Multilateral Environmental Agreements (MEAs) in EPA, Environment Department, Khyber Pakhtunkhwa.	18
2014-15	Drainage, Sewerage, and Solid Waste Management Plan for D.I.Khan City	13.69
	Hazardous Waste Management through Public-Private Partnership in Khyber Pakhtunkhwa.	20
	Establishment and Strengthening of Climate Change Centre at the University of Agriculture, Peshawar.	17
	Conservation and Improvement of Forest Ecosystems in Hazara	450
	Rehabilitation and Improvement of Natural Resources in Malakand	450
2015-16	Hazardous Waste Management through Public-Private Partnership in Khyber Pakhtunkhwa.	23
	Enhancement of Forest Resource Base in Southern Forest Circle.	416
	Enhancement of Resilience and Livelihood Improvement through Forestry Interventions in Central and Southern Districts of Khyber Pakhtunkhwa.	58.58
	Institute of Climate Change Studies in Khyber Pakhtunkhwa	10
2016-17	Afforestation of Drylands through Rainwater Harvesting in Southern Districts of Khyber Pakhtunkhwa	61

	Remote-Sensing Solution for Forest Change Detection in Khyber Pakhtunkhwa	70
	Establishment of Climate Change Cell for Multilateral Environmental Agreements (MEAs) in EPA, Environment Department, Khyber Pakhtunkhwa.	34
	Billion Trees Afforestation Project in Khyber Pakhtunkhwa (Phase-II)	9,826
2017-18	Development of Sewerage System and Rehabilitation/Construction of Waste Water Treatment Plants in Peshawar.	18,543
	Billion Tree Afforestation Project in Khyber Pakhtunkhwa Phase-III	8,400
2018-19	Rehabilitation of Sewerage / Solid Waste Treatment Plants in Peshawar & Divisional Headquarters	1,000
	Conversion of Waste to Energy Project through WSSP / WSSCs on PPP basis	6,000
2019-20	Introduction of Zigzag Technology in Construction and Operation of Brick Kilns in Khyber Pakhtunkhwa.	20
	10-BTTP Up-Scaling Green Pakistan Program, Revival of Forestry Resources in Khyber Pakhtunkhwa	13,670
	Mitigation of Climate Change effects through raising of plantation in District South Waziristan.	80
2020-21	Safe Disposal of Hospital Infectious Waste in Khyber Pakhtunkhwa.	1,000
	Diversion of Municipal Effluents and Solid Waste Polluting the Major Canals of Peshawar City.	474
	Rehabilitation of Sewerage / Solid Waste Treatment Plants in Peshawar & Divisional Headquarters.	5,000
	Waste Disposal Projects in Major Towns of Khyber Pakhtunkhwa	500
2021-22	Reclamation of Culturable Waste Land and Solarization of Agriculture Tube Wells.	1,000

	Culturable Waste Land Development & Solarization of Existing Agriculture Tube/Open Wells in newly Merged Districts of Khyber Pakhtunkhwa	1,657
	Climate resilience through Horticulture Transactions.	200
2022-23	Diversion of Municipal Effluents and Solid Waste Polluting the Major Canals of Peshawar City.	2,554
	Diversion of Municipal Effluents and Solid Waste Polluting Canals in various Districts of Khyber Pakhtunkhwa	3,000
	Solid Waste Management Plant (Integrated Resource Recovery Centre) at Bahrain, Babuzai, and Mingora District Swat on a Pilot Basis.	100
	Sustainable Productivity Enhancement through Promotion of Climate-Smart and Efficient Mechanized Farming Practices in Khyber Pakhtunkhwa	1,000

Impact Analysis

There has been growing policy attention to climate change issues in KP, as evidenced by the development of a provincial Climate Change Policy, the establishment of the Climate Change Cell, and the launching of the KP Green Growth Initiative. Among the climate adaptation projects, two projects have been analyzed in view of the larger portfolio.

Billion Tree Tsunami Project

The Billion Tree Tsunami Project was launched by the provincial government during FY 2014-15 with initial cost estimates of Rs 1,000 million. Given its importance, social and economic impacts in the surrounding areas, the scope and cost were expanded to Rs 1,912 million. The campaign helped the government fulfill its 348,400-hectare commitment to the Bonn Challenge – a global effort to restore 150 million hectares of deforested and degraded land by 2020, and 350 million hectares by 2030.

The project is naturally restoring a previously deforested landscape, which has assisted in meeting present and future needs and offers multiple benefits for climate adaptation and mitigation. The project has achieved its restoration target through a combination of protected natural regeneration (60%) and planned afforestation (40%). Additionally, it has established 13,000 private tree nurseries, which have already boosted local incomes, generated thousands of green jobs, and empowered unemployed youth and women in the province (source).

Promotion of Climate-Smart and Efficient Mechanized Farming

Khyber Pakhtunkhwa is vulnerable to a range of slow and rapid-onset hazards, including floods, droughts, heat stress, pest and disease outbreaks, avalanches, landslides, glacial lake outbursts, and earthquakes. Projected climatic changes are expected to increase the incidence and severity of many of these hazards, through greater variability in rainfall and higher temperatures. The introduction of improved crop and livestock varieties, integrated pest management, fertility management, and updated agroecological zoning for improved crop suitability have been considered promising interventions to support the agricultural sector. With this motive, the government of Khyber Pakhtunkhwa has launched the project **Sustainable Productivity Enhancement through Promotion of Climate-Smart and Efficient Mechanized Farming Practices**, with an estimated cost of Rs 1,000 million during the current financial year.

International Funding Projects

Scope	**Amount**	**Sponsor**	**Status**
Sustainable Management of Biodiversity in Malakand (Districts Swat and Chitral) (GiZ Assisted)	Rs520	GiZ	Completed
Financing to support upgrading rural roads to provide safe and reliable access in the most vulnerable districts of KP	$300 million	World Bank	Approved on June 9, 2022
Building of 250 engineering structures including dams, ponds, spillways, tree plantation, and drainage to reduce the risk of GLOF in KP and GB	$36.96 million	UNDP	Under GCF

Rich natural resources are seriously threatened by the impacts of climate change and other human interventions, and their loss would severely curtail people's livelihoods. A series of workshops has been held to sensitize stakeholders about agro-biodiversity, ecosystem-based adaptation measures, and a number of the adaptation measures identified, besides establishing value chains for non-timber forest products.

The World Bank has recently approved $300 million in financing to support upgrading rural roads to provide safe and reliable access to schools, health facilities, and markets in the most vulnerable districts of KP province. This will provide safe and affordable transportation to primary and middle schools in remote areas, which have the lowest enrolment and attendance rates.

The project will also improve connectivity to markets and provincial centres to support income generation for rural farmers by reducing transportation costs and travel times.

The melting of the Hindu Kush, Karakoram, and Himalayan glaciers due to rising temperatures has created 3,044 glacial lakes in Gilgit-Baltistan and Khyber Pakhtunkhwa. It is estimated that 33 of these glacial lakes are hazardous and likely to result in glacial lake outburst floods. Such flooding can release millions of cubic metres of water and debris in just a few hours, resulting in the loss of lives, destruction of property and infrastructure, and severe damage to livelihoods. UNDP and the Government of Pakistan are working on a project for early warning systems, engineering structures, and disaster management policies that will reduce the risk, protecting local communities and providing early warning of devastating flood events.

Seeking Financial Assistance: Gap Analysis

Combatting climate change requires consistent policy, planning, and structured systems for budget management and well-developed financing strategies that can leverage existing public spending. At the landmark Paris Climate Conference under the United Nations Framework Convention on Climate Change (UNFCCC) in December 2015, developed countries committed to mobilizing $100 billion per year of additional climate finance. All countries are increasingly compelled to account for how effective their use of international funding available for climate change would be, including through a transparent PFM system that ensures the efficient and transparent use of resources. In the wake of a fragile accounting system and capacity, Pakistan is not capable of seeking financial sponsorship from international donor agencies.

Climate change is not a thematic consideration in planning, and most sectoral policies and strategic action plans remain silent on the issue in the country. Budgeting processes in KP do not allow for systematically tracking and monitoring climate-relevant spending. However, climate change can be better addressed by incorporating it into the province's development plans and budget.

Mostly, expenditures by institutions on different climate change projects show that the volume and pattern of public spending are disintegrated and accounted for in different nomenclatures.

The integration of climate actions and policies in the PFM system can ensure it is adequately addressed through a firm commitment of resources and associated mechanisms to ensure these are used as planned. It may include the development of new processes, tools, and systems to generate data and analysis that can assist policymakers in making more informed decisions to better align climate policy goals with the provincial budget. It will promote measures for increased transparency and accountability in climate spending (Bank A. D., 2015).

In order to integrate and reflect climate change in budgetary control and public finance management, the following key reform measures are proposed:

MTBF Integration	Responsible
- Amend Budget Call Circular and ancillary guidelines to include climate change - Identify one pilot department for integrating climate change in its MTBF and defining relevant outputs - Develop KPIs to reflect climate change responses applicable to selected line departments, and subsequently measure performance against them. FD to facilitate with line departments. Adaptation and mitigation plans when developed, and sector policies, when aligned with climate change, will guide the KPIs.	Finance Department
Institutional Co-ordination	
- Establishment of a Climate Change Finance Unit - Amend the Rules of Business to ensure that implementation of national and provincial climate change policy objectives becomes a function of the line departments	Environment, Finance and P&D Departments
Capacity Building	
- Designate focal persons in each relevant department to steer the climate finance integration process, preferably personnel representing the budget sections - Capacity development of planning and budget officers and climate change focal persons to comply with Budget Call Circular, and guidelines on making project development and appraisal more climate change sensitive.	Environment and Finance departments, with relevant sector departments
Adaptation and Mitigation plans	
- Provincial adaptation and mitigation plans will be developed to incorporate a climate lens in the provincial planning process to ensure that the climate-	Relevant line department

relevant projects are prioritized in line with the objectives as described in both the National Climate Change Policy (NCCP) and the draft provincial climate change policy. - Revise sector policies, strategies and action plans to mainstream and align them with the provincial climate policy and provincial adaptation and mitigation plans	
Project Appraisal & Selection	
Review and/or revise Pro forma (PC-1, PC-II, PC-III & P- IV) and Project Development Manual guidelines to incorporate climate change risk and response measures, and climate finance, to align them with CCFF parameters	Planning & Development Department
Monitoring and Accountability	
- Operationalize a climate budget coding and tracking system within GFMIS - Develop new platforms for engaging with civil society organizations including media to support project formulation, selection, and monitoring	Finance Dept., CGA, AG, P&D

Action Plan to be Employed by the Provincial Government

The province of KP is in the process of formulating policy and legal tools needed to link itself to the global paradigm of SDGs. The 18th amendment empowers the federating units to chalk out their policies and enact legislative tools to assist the province in developing and executing Disaster Risk Reduction (DRR) and climate change mitigation strategies. The policy in hand is an endeavor on the part of the provincial government to overcome the disaster caused by climate change through adaptation and mitigation strategies in line with the National Climate Change Policy 2021. These legislative tools and policies will ensure that climate action is mainstreamed into developmental planning and management, particularly for socially and economically vulnerable communities (Environmental Protection Agency, 2022).

This action plan, exhibited with the Policy, outlines the strategies and measures that will be implemented for the designated sectors in order to incorporate the NCCP 2021 into the PCCP 2022.

The actions are grouped into categories based on the NCCP Framework's objectives as:

- Priority Actions: within 2 years
- Short-term Actions: within 5 years
- Medium-term Actions: within 10 years
- Long-term Actions: within 20 years

Adapting technologies for development or the use of crop varieties with greater heat and drought tolerance, modernizing irrigation infrastructure, employing water-saving technologies, integrated watershed management, reforestation of catchment areas, and construction of additional water storage, diversification of the energy mix (including investment in renewable and small hydropower projects), improved weather forecasting and warning systems, and construction of embankments or river sides are some of the proposed strategies.

The climate change adaptation experience of KP is still in the nascent stage. The PCCP prioritizes adaptation over mitigation efforts for the country with a suggested set of sector-level adaptation measures, which are further prioritized and categorized for short-, medium-, and long-term implementation. These efforts, however, fail to plan out a transition from the current phase of increased climate change awareness and outreach to the development and implementation of adaptation plans, strategies, legislation, and projects at the national, subnational, and local levels. International development partners and donors act as a major force in the country for building momentum for sustainable and climate-resilient development.

Selected adaptation technologies and measures are suggested against the types of risks faced by Pakistan's agriculture, water, energy, and urban infrastructure services sectors. It is worthwhile to note that the success of agricultural adaptation technologies has been found to be heterogeneous across the farming community. What may work in one location, or for one type of crop, may not work for others.

Agriculture

Climate Change Risk	Suggested Adaptation Technologies
Reduced crop production due to heat stress and higher temperatures	Development or use of crop varieties with greater heat and drought tolerance.
Water shortages due to low rainfall and increased evapotranspiration-	Promote the use of efficient irrigation techniques (sprinkler and drip irrigation, etc.); improve the irrigation

induced crop water requirements, particularly in rain-fed dry areas	distribution system and reduce distribution losses; and implement laser land leveling to reduce water wastage.
Erratic, uncertain, and sometimes unseasonal rainfall patterns badly affecting crop production	Promote the use of efficient irrigation techniques (sprinkler and drip irrigation, etc.); improve the irrigation distribution system and reduce distribution losses; and implement laser land leveling to reduce water wastage.
Reduction in available irrigation water due to changing rainfall patterns and increased demand	Improve integrated water management systems, along with required legislation and awareness-raising support.
Decreasing quality and quantity of underground water due to excessive pumping, which is negatively affecting crop productivity and soil fertility	Improve integrated water management systems, along with required legislation and awareness-raising support.
Increased frequency and intensity of extreme climatic events such as flooding, drought, and heat waves, causing extensive damage to agriculture and livestock sectors	Develop an improved multi-hazard early warning system.

Water Sector

Climate Change Risk	**Suggested Adaptation Technologies**
Increasing water shortages due to changing climatic patterns, particularly precipitation and warmer temperatures causing higher evaporation, in addition to increasing demand from the rising population and additional industrial usage	Promote efficient irrigation techniques such as sprinkler and drip irrigation systems; recycle wastewater in urban areas; promote rainwater harvesting; and encourage desalination techniques, particularly in coastal and hyper-arid areas with saline underground water.
Higher water losses in conventional irrigation systems	Promote efficient irrigation techniques such as sprinkler and drip irrigation systems; improve the irrigation distribution system and reduce distribution losses.
Reduction in water storage capacities due to sedimentation	Initiate efforts on integrated watershed management; reforestation of catchment areas; and construction of additional water storage areas.
Increased frequency of extreme climatic events such as floods, droughts, and storms due to the changing climate	Improve the multi-hazard early warning system.
Lack of understanding of how climate change is affecting water availability in the country	Carry out awareness-raising campaigns for both the public and policymakers to create a better understanding of water

	issues and the need to conserve this precious resource.
Increased frequency of flash floods generating huge damage from hill torrents, particularly in hilly areas	Construction of slow-action dams and small storage containers in hilly areas.
Increased saltwater intrusion, particularly in the Indus delta due to reduced freshwater supplies to the area	Improve water management to ensure the required freshwater supplies to the delta area to maintain a healthy ecosystem.

Energy Sector

Climate Change Risk	Suggested Adaptation Technologies
Reduction in water availability for hydropower generation	Diversify the energy mix and make further investments in renewable and small hydropower projects.
Extreme climate events damaging oil, gas, and power infrastructure	Improve weather forecasting and warning systems; retrofit critical energy infrastructure.
Hotter temperatures increase energy demand	Invest in additional energy capacity, preferably in renewable resources.
Warmer air and hotter water temperatures may affect the efficiency of thermal plants	Invest in technology to improve the efficiency of thermal plants in warmer conditions.

Urban Infrastructure Services

Climate Change Risk	Suggested Adaptation Technologies
Heavy rainfall impact on urban drainage systems	Enhance the capacity of urban storm drain channels; develop and promote rain gardens, roof gardens, and bioswales; and make efficient use of water to offset the impacts of severe drought spells in urban areas, particularly in arid regions.
Extreme hydrological events impacting urban potable water supply systems	Improve water supply infrastructure to handle extreme events.
Heavy rainfall-induced landslides in mountain urban centers	Adopt both hard and soft preventive measures to offset the impact of landslides and sea level rise, such as constructing dikes or sea walls, and increasing vegetation cover to minimize landslide threats.

Conclusion

The National Climate Change Policy 2012 mentions Federal and Provincial Climate Change Policy Implementation Committees. However, no such committees have been established at either the Federal or Provincial level. The Pakistan Climate Change Act, 2017 envisions a National Climate Change Authority comprising members from the Provinces. However, the Authority has not yet been notified, nor has its staff or management been appointed. Limited references to Federal/Provincial coordination and interaction on climate governance remain confined to the paper on which it is printed.

The National Climate Change Policy 2012 mentions Federal and Provincial Climate Change Policy Implementation Committees. However, no such committees have been established at either the Federal or Provincial level. The Pakistan Climate Change Act, 2017 envisions a National Climate Change Authority comprising members from the Provinces. However, the Authority has not yet been notified, nor has its staff or management been appointed. Rules as provided under Sec. 17 have also not been notified to date, despite the lapse of five years, nor has the Climate Change Fund been established. Furthermore, the Council, as stipulated in the Act, has recently been notified, apparently to showcase at COP27.

The Provincial Government is empowered to implement MEAs by notifying rules in the official Gazette. However, there is no evidence of this to date from either forum. Despite the differing capacities of the Provinces to roll out climate change-related initiatives, no Province has yet exercised its Constitutional right to request Parliament to pass a Federal law related to this aspect of climate change. Since the regulatory framework remained silent on the environment, it was the Judiciary that intervened and defined a clean environment and water as basic human rights. Pakistan is not the only federation to experience this issue. A case study of Canada implementing international agreements in coordination with its provinces is a referral case to be emulated by Pakistan—an example of cooperative federalism.

Coordination on climate change among the Federation and the Provinces has not materialized despite provisions in the Policy. Primary data, obtained through purposive sampling, indicates that the most vulnerable economic sector is agriculture, and the most affected class is the one involved in the agriculture sector.

Recommendations

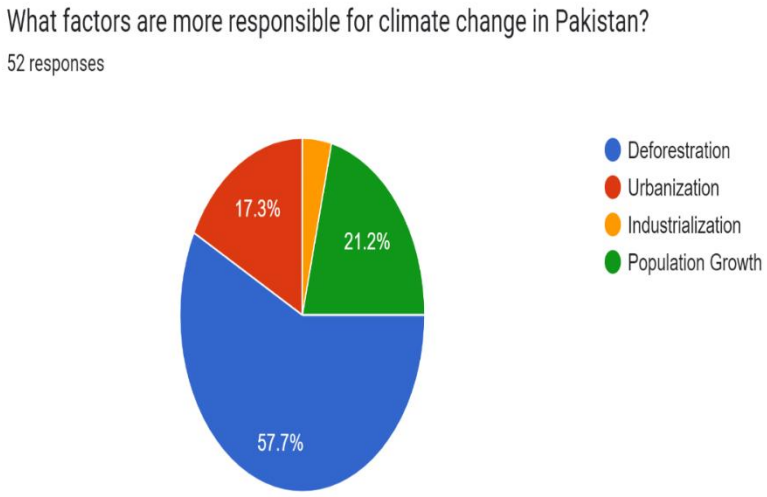
The measures taken by Pakistan regarding mitigation and adaptation for climate change need significant improvement to become a success story. There are numerous factors associated with their non-implementation. Firstly, the government has not been able to mainstream the concept of climate change (CC) and educate the public that the threat is real. Secondly, the government has not been able to fund the mitigation and adaptation measures due to financial constraints. Thirdly, the departments do not have the capacity to implement these measures. Fourthly, the provinces have not accorded due priority to these measures, resulting in the absence of ownership and, ultimately, ineffective implementation. Fifth, the provincial departments have not been able to deliver due to the socio-economic conditions of the masses and political interference. Keeping in view Alfred Pareto's 80/20 rule, the following areas have been identified while making recommendations. These are essentially the 20% of the whole picture but would result in achieving the remaining 80% if acted upon properly. These recommendations are as follows:

1. The subject of climate change may be assigned to a specific department and agency, as the existing Rules of Business, Government of Khyber Pakhtunkhwa, do not clearly allocate it to a specific department or agency. Relief, Rehabilitation & Settlement or Environment departments are more relevant to the subject and may be considered for the purpose. Suitable amendments in the RoB may be enacted.
2. The mandate of the EPA and PDMA may be reviewed in the Secretaries Committee Meeting held under the Chairmanship of the Chief Secretary, Khyber Pakhtunkhwa, to include the subject of climate change, or another specialized agency may be created for the purpose.
3. Climate change is a cross-cutting issue and needs integrated efforts from different government departments at both federal and provincial levels. It is, therefore, necessary to establish a high-level platform under the KP Chief Secretary or Chief Minister to steer the response to climate challenges.
4. Separate technical working committees, including DRM specialists, meteorologists, and relevant experts on climate change, may be notified to work on three key areas: climate-resilient infrastructure, climate-resilient agriculture, and climate-resilient development, to provide recommendations. The recommendations of the technical working committees will be presented to the high-level forum for approval.
5. Monitoring of decisions made by the high-level forum may be assigned to the PMRU under the Chief Secretary's Office, Government of Khyber Pakhtunkhwa.

6. Awareness programs for communities, corporate, and public sector organizations on climate change via media, academia, and Corporate Social Responsibility (CSRs).
7. Specialized training and seminars for government functionaries may be arranged to develop their capacity on climate resilience and other relevant aspects of climate change.
8. Climate-resilient design standards for public and private sector infrastructure may be prepared to mitigate the effects of threats posed by climate vulnerability.
9. The current laws governing the control of unauthorized construction of buildings in river basins need to be reviewed for an integrated response to the challenges.
10. Arrangements should be made to establish a sufficient number of weather stations and gauges to measure discharge in streams and rivers.
11. An Early Warning System (EWS) should be installed at suitable places to assist in early responses to floods or heavy rainfall.
12. Glacier management is another neglected area that has not been assigned to any department in the Rules of Business. Hence, deliberations and workable decisions on this matter are required in the Secretaries Committee meeting.
13. Efficient use of water should be promoted through on-farm water management initiatives.
14. P&DD should develop a checklist for feasibility studies and designs that are climate-inclusive and make it a mandatory part of PC-I.
15. The Forestry, Wildlife, and Environment Department should initiate public awareness and mobilization efforts on climate change challenges, adaptation, and mitigation measures.
16. Establishing departmental climate change cells with research centers and strengthening bilateral coordination between line departments is the need of the hour.

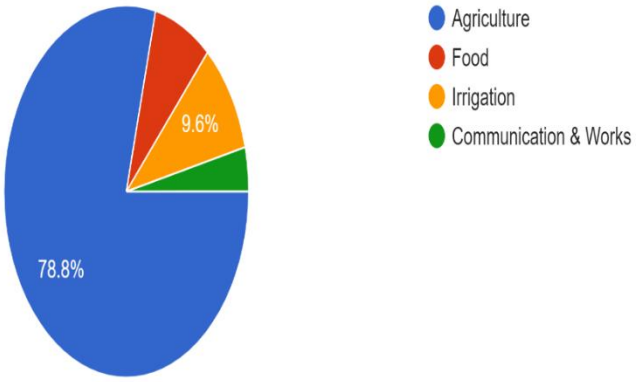
Survey Report

A questionnaire to seek public opinion on climate change was conducted using information technology via Google Forms. The results of the survey are depicted in the following graphs.



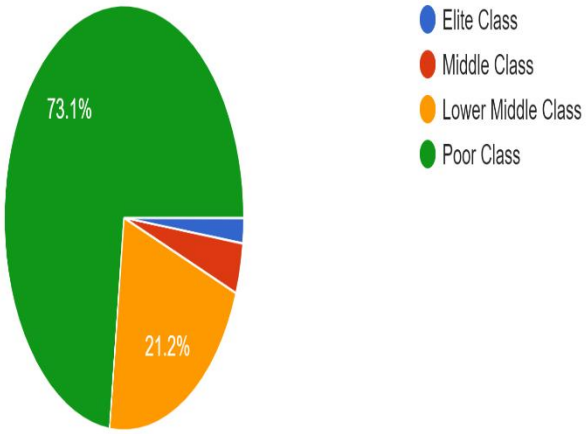
Which sector is the most vulnerable in the context of climate change?

52 responses



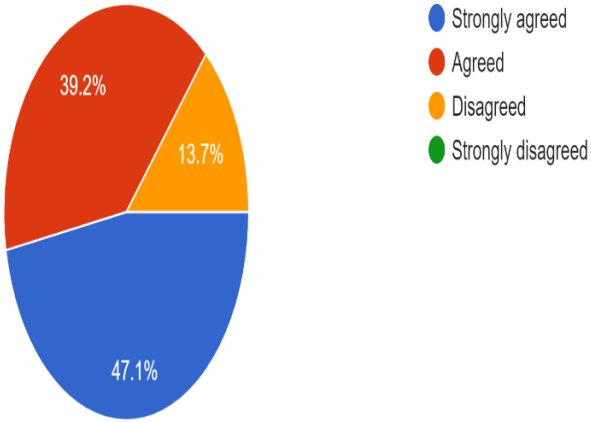
Which Group of individuals is most likely to be affected by climate change

52 responses



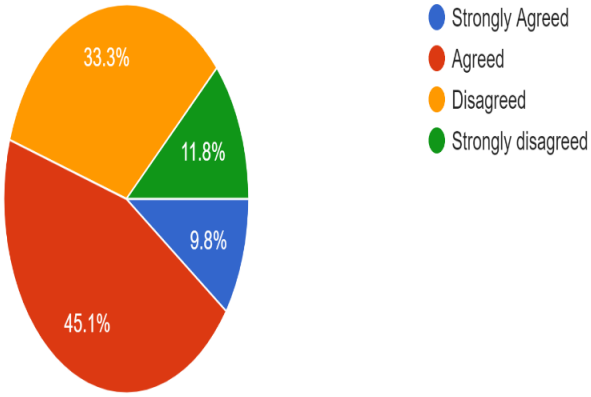
How far is the coordination gap between NGOs and Government responsible for failure to mitigate the hazardous impacts of climate change?

51 responses



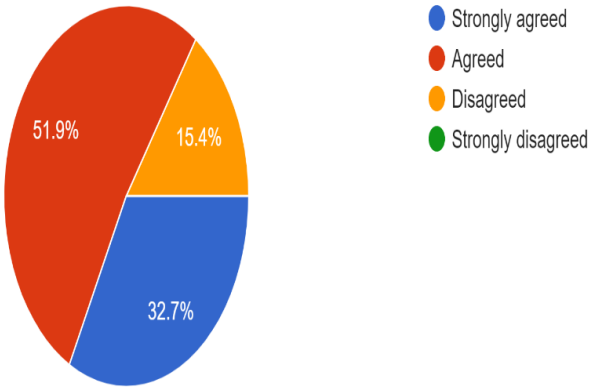
Is the contingency plan by the KP Government adequate to forecast and mitigate the hazardous impacts of climate change?

51 responses



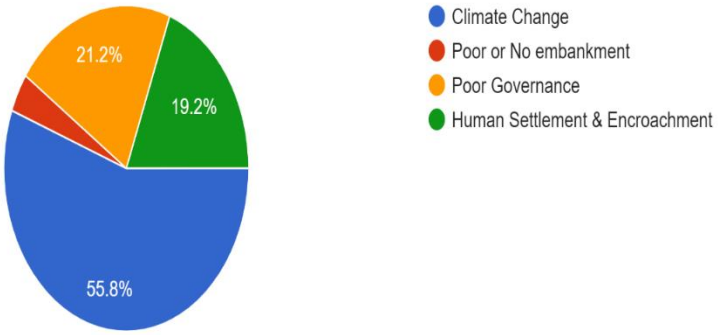
Should the responsibility of the devastating impacts of climate change be attributed to ineffective policies of government?

52 responses



Which one is the most direct cause of floods in Pakistan?

52 responses



	Description	Verifiable/Measurable Indicator	Means of Verification	Important Assumptions
Goal	1. To have a climate resilient Infrastructure, Agriculture and development.	1. Allocation of budgetary resources/ allocation in the Annual Development Plan for Climate Change initiatives	Budget document/ ADP of the government	Will of the government to alleviate the existing plight of Climate change initiatives to make an impact on various sectors
	2. A resilient and healthy environment in KP by absorbing climate change threats through adaptive & imitative measures	2. Clean and green province	2. Improvement in the general health and life expectancy of the public and agriculture growth	2. It is assumed that no extra-ordinary natural calamity hit the province.
Purpose	1.To guard against environmental hazards	1. Better Climate friendly infrastructure Development	1. Public opinion and third-party validation	1. Socio-economic stability and priorities of the political government.
	2. A strong regulatory and institutional framework at provincial level in agreement with the international & national commitments	2. A department with legal and financial mandate having a sound human resource	2. Achievement of measurable and quantifiable imitative and adaptation measures	2. A proactive CSOs, Climate literacy and Political constituency
Outputs	1.To develop a uniform coordination mechanism at Federal & Provincial levels	1.To have a uniform body for enforcement of Climate Change policy	1.Uniform implementation of regulatory regime	1.Uniformity of policy mechanism leads to better realization of Climate change policies
	2. A dedicated department is constituted in KP to deal with the subject of climate change.	2. Service delivery	2. Deliverables are achieved	2. Timely availability of sufficient funds and will
Activities	1. Agreement on ToRs for improving legal/ policy framework of Climate Change	1.Allocation from the Provincial budget for realization, donors funded project and share in the NFC awards	1. Reflection of funds in the ADP	1. Priority of the government to improve Climate change initiatives
	2. Necessary amendments in the provincial rules of business	2. Approved Rules of business	2. Reflection of funds in the ADP	2. Uninterrupted availability of sufficient funds

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Critical analysis of impact of flood on poverty and economic conditions in Pakistan

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Abstract:

The unprecedented flooding in Pakistan during June-August 2022, which affected 33 million people, exacerbated existing poverty and economic challenges. The floods devastated key sectors, including agriculture, infrastructure, and housing, leading to reduced GDP growth and increased inflation. Rural and urban poverty, worsened by the impacts of climate change and multiple concurrent crises, require urgent interventions. Recommendations for poverty reduction focus on improving rural infrastructure, enhancing agricultural productivity, promoting non-farm sectors, and fostering social mobilization. In urban areas, public-private partnerships, labor-intensive industries, and increased education budgets are vital to reduce poverty. Long-term strategies include fostering climate-resilient agriculture, attracting foreign aid, and improving governance through better coordination between federal and provincial governments. These actions aim to mitigate the economic downturn and restore livelihoods, emphasizing the need for effective disaster recovery and sustainable development.

Key words: *Floods, Poverty, Agriculture, Infrastructure, Governance*

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Introduction

Between June and August 2022, torrential rains and a combination of riverine, urban, and flash flooding led to an unprecedented disaster in Pakistan. According to the National Disaster Management Authority (NDMA), around 33 million people—that is, one in seven—have been affected by the floods, including nearly 8 million displaced. The floods have taken the lives of more than 1,700 people, one-third of whom were children. Rain-induced floods, accelerated glacial melt, and resulting landslides devastated millions of homes and key infrastructure, submerging entire villages and destroying livelihoods. As of October 11, 94 districts were declared "calamity-hit," accounting for more than half of all districts in the country. The majority were in the provinces of Balochistan, Sindh, and Khyber Pakhtunkhwa (KP). Out of the 25 poorest districts in the country, 19 were calamity-affected. The 2022 flooding has further exposed underlying institutional and systemic challenges, including poor urban planning and water resource management, lack of systems for infrastructure maintenance, complex governance, structural inequalities, and limited disaster risk reduction capacity. Simultaneous multiple shocks, including natural hazards, COVID-19, rising inflation, an energy crisis, and fiscal challenges, continue to compound the impacts. Underlying political and economic instability is exacerbating the disaster's impacts and undermining the effectiveness of recovery.

Problem Statement

When Pakistan was already facing dreaded economic challenges in the wake of macroeconomic instability slowing down economic growth, the recent floods of 2022 further exposed the state's economic vulnerabilities. The floods not only destroyed physical infrastructure but also washed away a considerable base of agricultural produce, with significant implications for the poorest and most vulnerable strata of society, leading to an increased incidence of poverty and economic impoverishment. The state's inability to mitigate the impacts of natural catastrophes on the socio-economic indicators of society exists at the normative, operational, and structural levels, which need to be investigated in order to ensure sustainable development.

Methodology

This study has adopted a qualitative method. Secondary data in the form of published reports and presentations from respective departments have been analyzed. Further, qualitative data has been obtained using purposive sampling through semi-structured interviews to gather information regarding the complexities in the mitigation and adaptation processes.

Scope of the Study

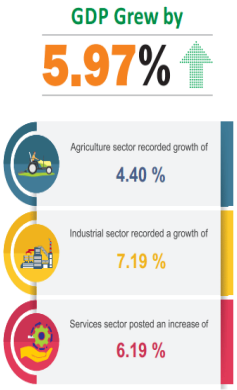
This study is restricted to exploring the impact of the flood on poverty and economic conditions in Pakistan by analyzing the policies and projects of the federal and provincial governments. However, due to a scarcity of time, only limited projects of the federal and provincial governments and their line departments have been analyzed to assess their impact on poverty and the economic conditions of the country.

Situational analysis

Economy Pre-Flood

For FY22, real GDP posted a growth of 5.97 percent on account of 4.40 percent growth in Agriculture, 7.19 percent growth in the Industrial sector, and 6.19 percent growth in the Services sector. For FY22, GDP at current market prices stands at Rs. 66,950 billion showed a growth of 20.0 percent over last year (Rs. 55,796 billion). In the dollar term, it remained at $383 billion.

The per capita income was recorded at $1,798 in FY22 as compared to $1676 in FY 21, which reflects an improvement in prosperity due to the fact that economic growth per person improved.



Prior to the floods, Pakistan's economy was facing difficult economic conditions and undergoing adjustment measures to regain macroeconomic stability. Strong domestic demand, coupled with low productivity growth, high world commodity prices, and the global economic slowdown, contributed to severe external imbalances. The current account deficit consequently reached 4.6 percent of GDP in FY22. The fiscal deficit (excluding grants) was also large at 7.9 percent of GDP in FY22. The large current account and fiscal deficits, together with political and policy uncertainty, contributed to a loss of investor confidence, leading to pressures on the exchange rate, foreign reserves, and domestic prices over late FY22.

Flood Damages

The total damage is estimated at Rs 3.2 Trillion (US$14.9 billion). The sectors that suffered the most damage is housing at PKR 1.2 trillion (US$5.6 billion); agriculture, food, livestock, and fisheries at PKR 800 billion (US$3.7 billion); and transport and communications at PKR 701 billion (US$3.3 billion).
The province wise damages caused by floods is as under:

	Damage	
Region	**(Billion PKR)**	**(Million US$)**
Balochistan	349	1,625
Khyber Pakhtunkhwa	201	935
Punjab	111	515
Sindh	1,948	9,068
Cross-Provincial[12]	587	2,731
Special Regions[13]	7	32
Grand Total	**3,202**	**14,906**

Housing

The 2022 flooding caused widespread destruction of housing and human settlements, resulting in damages worth Rs. 1200 billion. In the 94 calamity-hit districts, approximately 780,000 houses were destroyed, and more than 1.27 million houses were partially damaged. Rural houses were particularly impacted, and the extent of damage incurred to *katcha* houses has been higher than that to *pucca* houses.

Transport and Communications

The main impact in this sector (Rs. 701 billion) has been on roads, railways, bridges, and telecommunications infrastructure. Initial estimates suggest that approximately 8,330 kilometers of roads (about 3.2 percent of total in-service roads) and 3,127 kilometers of railway track (around 40 percent of total in-service railways) have been damaged to various extents due to the floods. The railway sector has been the most impacted, given its large pre-flood maintenance backlog. Telecommunications infrastructure damage includes damage to fiber optic transmission lines, feeder cables, and, in some cases, transmission towers.

Agriculture, Food, Livestock, and Fisheries

The total damage to the above-mentioned sectors is calculated to be 800 billion rupees. Crops contributed to 82 percent of the total damage and losses in the sector, followed by livestock with 17 percent and fisheries/aquaculture with the remaining 1 percent. Around 4.41 million acres of agricultural land have been damaged, and 0.8 million livestock are estimated to have perished. Sindh and Balochistan are the most affected provinces, contributing 72 percent and 21 percent, respectively, to the total value of damage and losses registered in the sector, followed by KP, Punjab, and special regions. The destruction of crops, livestock, and aquaculture infrastructure and assets has resulted in the temporary deterioration of livelihoods, employment, and agriculture-related income, as well as the potential decline of exports of important crops such as cotton and sugarcane.

Water Resources and Irrigation

The damages incurred by Water Resources and Irrigation stand at Rs. 153 billion. Public assets represent 98.5 percent of the total damage, while private assets account for 1.5 percent. Flood protection infrastructure and irrigation channels incurred the most damage at 36 percent and 32 percent, respectively, followed by drainage systems at 14 percent; dams, headworks, and weirs at 9 percent; and other supporting infrastructure at 8 percent. Overall, the irrigation water supply systems (canals and dams) jointly suffered 41 percent

of the total damage, which, if unaddressed, will adversely affect crop production in the coming production seasons. Contingent upon the recovery of the irrigation and drainage systems, especially in Sindh, low wheat production can be anticipated this year, which could lead to food shortages and high food commodity prices. Poor drainage in Sindh will further reduce crop production. In arid areas covering most of Balochistan, damage to irrigation and water storage infrastructure is causing disruption of irrigation services. Losses to crops due to flooding and inadequate irrigation supplies, siltation, and waterlogging are covered by the agriculture sector.

Impact of Flood on Economy

Overall, the decline in GDP as a direct impact of the floods is projected to be around 2.2 percent of FY22 GDP. Among the major sectors, the agriculture sector value added is projected to decline the most at 0.9 percent of FY22 GDP, with floods causing the most losses to cotton, dates, sugarcane, and rice crops. Around 1 million livestock are estimated to have perished. Furthermore, damage in the agricultural sector is expected to have spillover effects on the industry and services sectors. Flood-related cotton losses are expected to weigh on the domestic textile industry, as local cotton constitutes about half of the industry's required cotton input. Textiles account for around one-quarter of total industry output and more than half of goods exports. Similarly, the local food processing and slaughtering industries will be negatively impacted by the expected reduction in food harvests and reduced supply of livestock. Industrial sector value added is consequently expected to shrink by 0.7 percent of FY22 GDP. Similarly, lower agricultural and industrial activity is likely to weigh on wholesale and transportation services activities, which account for around half of the service sector output. In addition, transportation challenges arising from the loss of critical infrastructure, such as roads and bridges, are expected to disrupt supply and further dampen overall economic activity. Services sector value added is consequently projected to decline by 0.6 percent of FY22 GDP.

The agriculture sector is projected to contract for the first time since FY01 due to the floods. An estimated 9.4 million acres of crops are affected, with significant losses to cotton, date, wheat, and rice crops. More than a million livestock are also estimated to have been lost. Industrial activity is expected to slow. Damages in the agricultural sector are expected to spill over onto the industrial sector. Cotton losses are expected to result in shortages, hindering the domestic textile industry's production. Textiles and apparel constitute around a quarter of total industry output and more than half of goods exports. Similarly, local food industries are likely to face challenges due to the reduction in food harvests and livestock.

The services sector is also forecast to be adversely affected. Lower agricultural and industrial activity is likely to weigh on wholesale and transportation services activities, which account for 50 percent of service sector output. Transportation challenges arising from the loss of critical connectivity infrastructure, such as roads and bridges, are expected to disrupt supply and further dampen overall economic activity.

Inflation is projected to increase. The floods have resulted in lower crop and livestock production, leading to temporary food shortages and transitory spikes in food prices. Transportation difficulties have exacerbated these shortages and disrupted domestic supply chains, contributing to broader inflationary pressures and production challenges.

Current account and trade deficits are expected to increase. Flooding is expected to lead to higher goods imports to mitigate temporary shortages of domestically produced goods, such as food and cotton, while exports, particularly rice and textiles, are expected to decrease.

The fiscal deficit is expected to widen. Fiscal expenditures are likely to increase with flood relief, recovery, and rehabilitation efforts, while revenues are expected to be dampened by a contracting tax base, suspension of some food import duties, and slower overall activity. Despite the direct flood effects, the current account deficit is projected to narrow in FY23 after considering slower economic activity and the import management measures. The fiscal deficit is estimated to contract in FY23 when accounting for fiscal consolidation efforts in light of the current economic imbalances.

The 2022 Floods and Pakistan's Exports

Pakistan's exports are likely to be significantly impacted by the floods. The catastrophic floods are expected to negatively impact Pakistan's exports through two main channels: the destruction of crops and connectivity infrastructure. The destruction of crops reduces the supply of rice—which is a key agriculture export—and decreases the availability of cotton, which is a key input into textiles, another major export. In addition, the floods have also led to the destruction of connectivity infrastructure, increasing production costs for exporters and curtailing production. The potential foreign exchange losses resulting from the floods may therefore be substantial, with agriculture accounting for almost a quarter of goods exports, and with textiles and apparel (nearly all cotton-based) accounting for around half of goods exports. In addition, there may be persistent adverse effects on export competitiveness associated with the loss of global market shares.

Effects through the Destruction of Crops

Rice: Exports of rice had reached a historical record of USD 2.5 billion in FY22, up 23 percent from FY21, driven by a 32 percent increase in export quantities. Although the major sowing area for Basmati is Southern Punjab, which is not as severely affected by the floods as Sindh, estimates from the Rice Exporters Association of Pakistan place the rice production losses due to the floods at about 20 percent, contributing to lower rice exports.

Cotton: The estimates of flood-related cotton crop losses range from 11 percent to up to 36 percent. Given current trends in global demand for textiles, the sector can expect to import close to 5 to 5.8 million bales of cotton, an increase in a range from 11 to 28 percent, to mitigate the domestic shortfall. However, smaller-sized mills are particularly reliant on domestic supplies and unable to fully substitute with imports. Accordingly, overall textile production may decline, consequently contributing to lower textile exports.

Effects through Destruction of Connectivity Infrastructure

The floods have also severely affected infrastructure linking the Karachi port to the spinning mills in Punjab, disrupting textile production. With about 70 percent of the spinning mills located in Punjab, and a substantial portion of cotton inputs being imported via the Karachi port, the roads linking the port and the spinning mills are important for the efficient transportation of cotton. The floods have damaged portions of the routes connecting Karachi with Hyderabad, Sukkur, and Lahore. Anecdotal evidence indicates that transportation time is now 4 to 5 times longer, with implications both on transport costs and on truck availability. Interviews with key industry players reveal that up to half of Faisalabad's spinning mills are currently closed due to a combination of factors, including a lack of inputs to process, alleged challenges to obtaining open letters of credit to import machinery or parts, and a reduction in orders.

Pre-Flood Poverty Outlook

The Government of Pakistan has adopted a consumption-based approach to measure poverty, which is calorie- and consumption-based. Absolute poverty is estimated after converting the household consumption level as per recommended nutritional requirements of 2350 calories per person per day and providing an almost equivalent amount for other basic needs. Poverty remained at 21%, with 50 million people below the poverty line.

Post-Flood Prediction

The impact on household welfare will come through at least four channels: (i) loss of household income and employment/livelihoods due to destroyed harvests, killed livestock, or inactivity of businesses; (ii) loss of assets, including homes, livestock, productive equipment, and household durables; (iii) rising food prices due to shortages of food arising from lost food stocks and poor harvests; and (iv) loss of human capital, given the significant threat of disease outbreaks, food shortages, and prolonged school closures, with attendant learning losses. The disaster will have a profound impact on lives and livelihoods. Preliminary estimates of the PDNA suggest that the national poverty rate will increase by 3.7 to 4.0 percentage points, pushing between 8.4 and 9.1 million people into poverty as a direct consequence of the floods. Similarly, multidimensional poverty will increase by 5.9 percentage points, meaning that an additional 1.9 million households will be pushed into non-monetary poverty. Beyond the national average, poverty in Sindh would increase by between 8.9 and 9.7 percentage points, and in Balochistan by between 7.5 and 7.7 percentage points. Moreover, the depth and severity of poverty will increase for households that were already poor prior to the floods. The poverty gap has substantially increased, with the number of extremely poor people living more than 20 percent below the poverty line increasing from 18 to 25–26 million.

Institutional Response

Federal Ministry of Poverty Alleviation and Social Security Nets

BISP

BISP is dedicated to fighting poverty by employing multiple social protection instruments designed to bring a sustainable positive change in the lives of persistently excluded and deprived families. The eradication of poverty and elevating the status of marginalized and underprivileged sections of society, especially women, through the establishment of a comprehensive Social Protection Net. The Program was established through an Act (ACT NO XVIII 2010) of Parliament and works under the executive patronage of the Prime Minister of Pakistan and the chief patronage of the President of Pakistan.

BISP BUDGET

Approved budget for FY -2022-23 = 364.078 million

BISP PROGRAMS

BENAZIR KIFALAT PROGRAMME (UCT)

The Unconditional Cash Transfers (UCT) Program, the core program of BISP, was initiated in 2008. The short-term objective of the program was to cushion the adverse impacts of the food, fuel and financial crisis on the poor, but its broader objective is to meet the redistributive goals of the country by providing a minimum income support package to the chronically poor and those who are more likely to be affected negatively by future economic shocks

BENAZIR TALEEMI WAZAIF

Benazir Taleemi Wazaif is a Conditional Cash Transfer Program for education of children of BISP active Kifalat beneficiaries up to higher secondary level. Through additional cash incentives beneficiaries are motivated to get their children enrolled in schools/colleges and discourage dropout rate by ensuring retention.

BENAZIR NASHONUMA

Pakistan's high rates of malnutrition (40.2% stunting, 28.9% underweight, and 17.7% wasting) are indicative of an on-going child nutrition crisis. Such levels of malnutrition rank Pakistan the second-highest burden country in the region. The first 1,000 days of a child's life are a window of opportunity to lay a strong foundation for later achievements. This timeframe is a period of enormous change characterized by a high degree of plasticity in the child's neurological development. Investments in the early years of life are the foundation of human capital, and human capital is a key driver of economic development in the modern economy.

To address the stunting prevention during the first 1000 days' window of opportunity, BISP has designed a Conditional Cash Transfer intervention to increase the uptake of Health and Nutrition services of its beneficiaries. The design of Nashonuma Program was approved by the Technical Design Committee of the BISP Board and was reviewed by the BISP Board during its 34th meeting.

FLOOD RELIEF CASH ASSISTANCE PROGRAM

Federal Government has increased the amount of Flood Relief Cash Assistance Package from Rs.28bn to Rs.70bn for the flood affected families across the country. The financial assistance of Rs. 25,000 per family is being disbursed through Benazir Income Support Program (BISP) in a transparent manner.

Not only in Balochistan, Sindh, Khyber Pakhtunkhwa and Punjab but now Benazir Income Support Program has also started the disbursement of Rs.25000 to flood affected families of Gilgit Baltistan as well. The aim is to extend the scale of program in order to reach out the maximum population affected by the recent floods for provision of the financial assistance.

FLOOD RELIEF PACKAGE 19 AUGUST 2022 ALL OVER THE COUNTRY

Province	Generated Beneficiary	Generated Amount	Total Withdrawal Beneficiary	Total Withdrawal Amount	Today Count of Withdrawal	Remaining Bene	%age Served
BALOCHISTAN	241,063	6,026,575,000	221,669	5,541,725,000	43	19,394	91.95%
SINDH	1,862,041	46,551,025,000	1,829,529	45,738,225,000	47	32,512	98.25%
KHYBER PAKHTUNKHWA	315,773	7,894,325,000	306,260	7,656,500,000	13	9,513	96.99%
PUNJAB	340,252	8,506,300,000	331,193	8,279,825,000	26	9,059	97.34%
GILGIT BALTISTAN	472	11,800,000	471	11,775,000	1	1	99.79%
Total	2,759,601	68,990,025,000	2,689,122	67,228,050,000	130	70,479	97.45%

BISP PROJECT UNDER MINISTRY OF POVERTY AND ALLEVIATION SOCIAL NETS

SWOT ANALYSIS

STRENGTHS

- SDG No. 1, an international obligation
- Payment transferred directly to the beneficiaries' accounts
- Payment can be made from anywhere, anytime
- Change in the social and financial functionality of women

WEAKNESSES

- 95% of the cash grant beneficiaries find the grants unhelpful in meeting their expenditures
- 50% of beneficiaries complain about corruption in the system when receiving grants
- Increase in dependence on government grants
- Lack of long-term and permanent solutions to the problem
- Support for political party cadres

- Coordination issues among different stakeholders, such as Zakat and Bait ul Mal
- Complex transactions such as ID card registration and enrollment in the ECP voter list, etc.

OPPORTUNITIES

- Expansion of the program
- The data obtained from BISP beneficiaries can be utilized for many other purposes
- These funds can be used for skill development for deserving beneficiaries

THREATS

- Provincial program integration
- Flawed payment system to beneficiaries
- Online financial frauds
- Unawareness among beneficiaries

Pakistan Baitul Mal

Pakistan Bait-ul-Mal (PBM) is an autonomous body constituted in 1991 through an Act of Parliament. The purpose of its creation was to help the poor, not to run the government. PBM has significantly contributed to poverty alleviation through its various projects, including aiding the poor, widows, orphans, patients, and other needy persons, with an emphasis on rehabilitation.

BUDGET

2022-23: Rs 6,040 million

FLOOD RELIEF PROGRAM

Pakistan Bait-ul-Mal (PBM), in collaboration with KSRelief, distributed mosquito kits, tents, and ration bags among flood-affected families worth Rs 50 million.

Pakistan Poverty Alleviation Fund

The Pakistan Poverty Alleviation Fund (PPAF) is the leading institution focused on eliminating poverty in Pakistan.

As one of the largest establishments spending on the poor, PPAF facilitates public-private partnerships with the mutual goal of achieving social and economic change in Pakistan by addressing the multi-dimensional issues of poverty. Established by the Government of Pakistan as an autonomous, not-for-profit company, PPAF began operations in 2000. To date, it is working across 130 districts in the country with 130 partner organizations. PPAF has disbursed USD 2 billion through grants and financial services in various programs targeting vulnerable communities and areas of the country.

BUDGET

FY 2022-23: Rs 2000 million

PPAF's Response to the Floods

- This year, Pakistan received unprecedented rainfall, equivalent to nearly 3 to 5 times the national 30-year average, inundating one-third of the country and causing massive devastation to the lives and livelihoods of the people. PPAF was among the early responders, launching its Emergency Flood Relief Programme with an initial allocation of PKR 250 million in early August. The program aims to meet the immediate needs of the flood-affected population in the poorest communities, improve their coping capacities for early recovery and rehabilitation, and strengthen their resilience to climate-induced disasters. PPAF is assessing the evolving needs in the affected areas to scale up its response for early recovery and rehabilitation. The program will expand its outreach to help these communities with livelihood restoration, construction of damaged houses, rehabilitation of water supply schemes, health facilities, and community infrastructure such as damaged roads and drainage systems.

Pakistan Flood Relief Plan 2022

The Flood Relief Plan (FRP) focuses on the needs of 5.2 million people, with life-saving response activities amounting to USD 160.3 million. These activities cover food security, assistance for agriculture and livestock, shelter and non-food items, nutrition programs, primary health services, protection, water and sanitation, women's health, and education support, as well as shelter for displaced people.

The FRP highlights the main humanitarian needs, the efforts and steps taken by the Government of Pakistan to handle these challenges in collaboration with the UN and other partners, and sets out a well-coordinated and inclusive plan of action to respond to the needs of the affected people. The FRP is holistic, with a multi-sectoral approach covering the thematic clusters of food security and agriculture, health, nutrition, education, protection, shelter and non-food items, water, sanitation, and hygiene. Moreover, Pakistan continues to host more than 3 million Afghans with generosity and compassion. At least 421,000 refugees living in flood-affected areas are included in the FRP.

SEHAT-CARD (HEALTH DEPARTMENT KP)

SWOT ANALYSIS

STRENGTHS

- Universal health coverage bill 2022
- SDG No. 3, an international obligation
- Positive public perception
- Vision 2025
- Concept of a welfare state

WEAKNESSES

- Private hospitals included
- Delayed payments
- Government hospital capacity issues
- Fake cases
- Weak complaint redressed system

OPPORTUNITIES

- WHO financial support
- NGO support, both national and international
- Engagement of the elite/rich class of society

THREATS

- Uncertain economy
- Corruption
- Weak social and political culture
- Bad governance

EETH ANALYSIS

Enhancement of Strengths

- The legal framework can be strengthened with appropriate rules and regulations
- Increase awareness among citizens about the Sehat Card process
- Raise awareness about Sehat Card usage through social and educational institutions

Elimination of Weaknesses

- Strengthen the evaluation and monitoring system for private hospitals
- Eliminate delayed payments through a robust payment system
- Improve government hospital capacity through human resource development and infrastructural improvements

Taking Advantage of Opportunities

- Utilize WHO financial support for sustainable universal health coverage under SDGs
- Acquire NGO support through participation for mutual benefits
- Engage the elite and rich class of society to maximize benefits for the sake of humanity

Hedge The Threats

- Increase the health sector's share by reallocating funds from less important sectors to ensure adequate funding
- Implement a strong payment system to minimize corruption
- Address weak social and political culture through health education, awareness, and involving the political class for this national cause

AGRICULTURE AND LIVESTOCK DEPARTMENT KP

SWOT ANALYSIS

STRENGTHS

- Climatic environments are suitable for all types of crops
- National food security is the government’s aim
- Provides employment for people
- Main provider of subsidies

- Main provider of raw material to the industry

WEAKNESSES

- Lack of mechanical cultivation
- Soft target for floods and pre-flood repairs of Nallahs
- Lack of crop variety with adaptability to climate change
- High urbanization growth

OPPORTUNITIES

- Donor funding
- Research-based farming
- Access to farmers' markets
- Value addition—many uses for one crop

THREATS

- Climate change
- Soil erosion and biodiversity loss
- Sustainability of agricultural programs
- Encroachment on agricultural land
- Crop pests and diseases, particularly locusts

EETH Analysis

Enhancement of Strengths

- Qualified human resources
- Development of irrigation systems
- Modern knowledge of technical farming
- Focus on cash crops/edible oil seeds

Elimination of Weaknesses

- Encourage brainstorming among farmers
- Improve water management, specifically for flood situations
- Minimize urbanization

Taking Advantage of Opportunities

- Seek donor funds
- Adopt crops adaptable to climate change
- Increase research in agriculture

Hedge The Threats

- Mitigate greenhouse gas emissions
- Use climate-resilient crop varieties
- Control crop diseases
- Minimize pesticide use

CSOs

Disasters are overwhelming situations where the local population becomes helpless. As a result, other stakeholders come to the aid of the affected community. These actors include government institutions, local communities, national and international organizations, the affected population, and Civil Society Organizations (CSOs). The role of CSOs is becoming increasingly recognized and acknowledged globally. In cases of floods, CSOs and other NGOs play a critical role in helping flood victims. Below are some of the most important and active Civil Society Organizations:

Alkhidmat

Alkhidmat Foundation Pakistan is one of the leading non-profit organizations, fully dedicated to humanitarian services since 1990. Alkhidmat's workers and volunteers continue to work tirelessly for the relief of affected people across Pakistan and worldwide.

Alkhidmat Foundation has also set up special Disaster Management Cells across the country to ensure immediate rescue and relief facilities in any unfortunate situation. At the earliest stage, these cells have been given the status of an independent department at both central and provincial levels.

Since its establishment, Alkhidmat Disaster Management has been the most visible across the globe during emergencies, disasters, earthquakes, floods, and other crises. Alkhidmat was on the frontlines during the 2005 deadly earthquake, the 2010 floods in Pakistan, and again during the 2022 floods. It provided PKR 10 billion in relief goods and succeeded in saving thousands of lives across the country.

During the 2022 floods, more than 60,000 volunteers participated in relief and rescue work, using rescue vehicles, ambulances, and motorboats in flood-affected areas across the country. Alkhidmat Disaster teams and volunteers provided shelter in Alkhidmat Tent Villages, cooked food at Alkhidmat Kitchens, dry rations by boat, clean drinking water through Mobile Water Filtration Plants, medical aid through Mobile Health Units, and education via Temporary Learning Centers.

They also set up 6 field hospitals in the affected areas, offering general medical check-ups, day care services, maternity services, and free medicines. Hygiene kits containing soap, toothbrushes, toothpaste, cups, first aid medicines, water purification tablets, and sanitary pads for women were also distributed.

Helping Hand

Helping Hand for Relief and Development (HHRD) is a global humanitarian relief and development organization responding to human suffering in emergency and disaster situations around the world. In addition to emergency relief efforts in natural or man-made disasters, HHRD also works on long-term relief and development programs. HHRD has been registered as an International NGO in Pakistan since 2005.

Mission:

HHRD is committed to serving humanity by mobilizing resources for people in need. The organization strives to provide immediate disaster response and effective programs in areas of suffering, for the pleasure of Allah.

Vision:

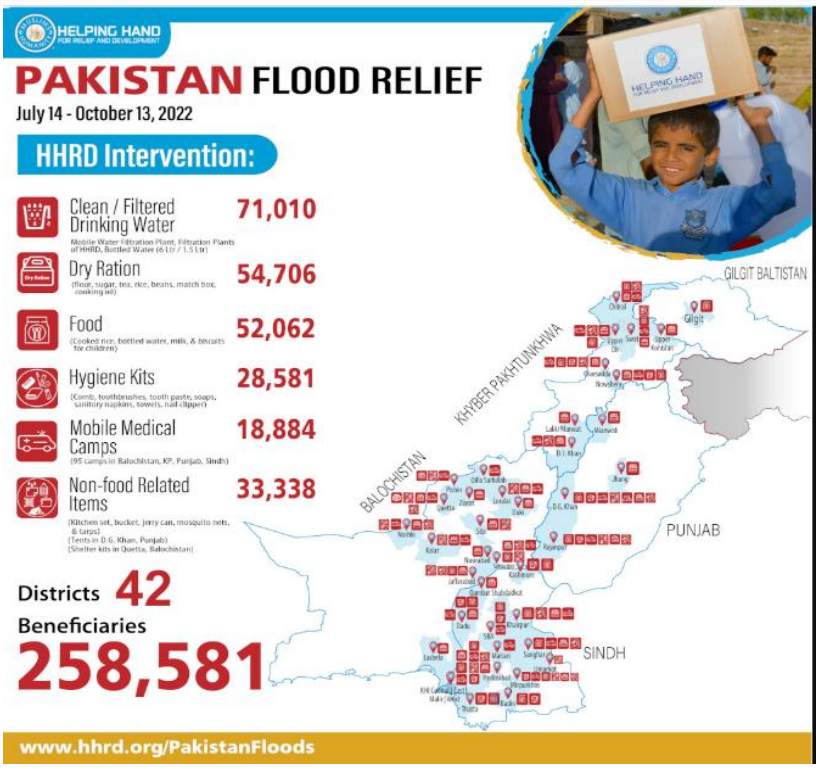
HHRD aims to be a leader in empowering lives, creating opportunities, and strengthening the bond of humanity.

HHRD Serves:

HHRD serves humanity regardless of race, gender, ethnicity, class, location, religion, color, cultural diversity, or social background, with a special focus on countries where the majority of the population lives below the poverty line.

HHRD Works:

HHRD works globally, focusing on countries with populations living below the poverty line. Its partners range from small community support groups to national alliances and international relief organizations.



GAP Analysis

All the federal and provincial departments as mentioned above like NDMA, PDMA and DDMU, Ministry of poverty and alleviation, BISP, Baitul Mal and Pakistan poverty and alleviation fund and all the provincial departments work for the same cause but lack of coordination among federal and provincial governments and also lack of coordination among departments of provincial governments and their policies and projects require a collective and integrated approach of both governments in this regard.

Following is the General GAP Analysis:

Sr.No	Current status	Desired goal	Activity needed
1	Lack of coordination among federal & provincial departments. No uniform Disaster Management poverty alleviation Policy in the country from the national level to the district and community levels.	A strong forum is required to integrate all the activities of Federal & provincial department especially Disaster Management and poverty alleviation Policies from the national level to the district and community level dealing with and disaster management, poverty and economic crises.	A coordination committee at federal level may be notified under the chairmanship of PM comprising of all the chief ministers and Chief secretaries. Pre-flood calamity should be adopted instead of post flood approach.
2	Natural disasters are handled at national level by NDMA and at provincial level by PDMA. However, the disaster management institutions are not yet established at local level	A strong DDMU may be functionalized as per NDMA and PDMA Acts.	A coordination committee at provincial level under the chairmanship of CM and Chief secretary, Commissioner and concerned Secretaries may be notified to deal with issue on priority basis.
3	In the current floods, rescue operation was extremely difficult because of the lack of professional expertise, specialized machineries, equipment and limited internal capacity.	A strong PDMA at provincial level and DDMU at district level with fully equipped experts and professionals of Disaster management experience and procurement and proper Ware houses at Zonal or district level is desired.	Rescue 1122 must strongly coordinate with PDMA for rescue 1122. Trained Experts/professionals of Disaster Management may be recruited on posts of DDMO BS-18 and Zonal or if possible, District Ware houses may be established at Zonal or district level. A procurement specialist may be recruited at PDMA to deal the procurement issues.
4	BISP, BAITUL MAL, ZAKAT AND SEHAT-CARD work for poverty individually.	All must share data regarding beneficiaries in order to avoid duplication.	An integrated digitized system by the federal government/provincial government for transparency.
5	All departments have their own mechanism for identification of beneficiaries.	A unified approached for identification of beneficiaries is desired	A single mechanism for identification of beneficiaries is supposed to be devised Ministry of poverty

6	All departments have different packages for disbursement among beneficiaries	A unified package of all federal and provincial department is desired.	A single package for deserving beneficiaries must be devised by ministry of poverty and alleviation department with consultation of all other federal and provincial departments
7	All the federal and provincial departments, and again different provincial departments in the province follow their own departmental policies and projects regarding poverty alleviation without having integrated consensus on major procedures.	An integrated approach regarding policies and projects towards poverty and economic conditions of the people of all departments (federal & provincial) is desired	A consensus regarding integration of federal and provincial policies and project must be sought through Coordination committee as mentioned at serial no. 1 above

GAP ANALYSIS OF SEHAT-CARD (HEALTH DEPARTMENT)

Sr.No	Current status	Desired status	Activity needed
1	Only to 7.7 million families	Whole poor population	Enhancement of funds
2	Poor capacity of govt hospitals	In all govt hospitals	Development of infrastructure and human resource of govt hospitals
3	Poor complaint registration and redressal system	Up to the satisfaction level of the beneficiaries	The system must be modernized and digitalized.
4	Delayed payments	Smart payment	Robust payment system via proper mechanism
5	Government funded program	Involvement of NGOs	WHO Support

GAP ANALYSIS OF AGRICULTURE AND LIVESTOCK DEPARTMENT

Sr.No	Current status	Desired Status	Activity need
1	Traditional farming	Modern mechanical farming	Awareness through farm centers for farmers
2	Lack of variety of crops	Focus on suitable crops	Those crops which have more adaptability with the environment
3	Urbanization at high pace	More production from agriculture land	Stop mushroom growth of housing societies
4	Majority land is rain fed	Development of irrigation system	Construction of dams

5	Climate change effects the standing crops	Food security	Climate resilient variety seeds should be used
6	Short of funds	Proper funds required	Prioritization of utilization of funds for the sector and involvement of donors as well the Paris agreement
7	Lack of experts in agriculture sector	Research based farming is needed	Incentives to the expert for attraction.

Conclusion

Before the floods the country was already facing severe poverty and economic crises due to corona, Russia-Ukraine war, and energy issues. After the floods, this poverty and economic conditions are going to be aggravated due to severe damages to infrastructure, agriculture sector and housing.

Due to damages done to the above different sectors, the economy which was at 6% have been reduced to 2% and inflation which was at 26% before the flood is going to be increased from this percentage in future due to low production of agricultural products and repair of damaged infra-structure. This will contribute to high inflation rate in future which will ultimately lead to an increase in poverty and aggravate the economic crises coming ahead.

Recommendations

For Reduction of Rural Poverty:

1. Improvement of rural infrastructure and promoting health and education. The primary driver of rural poverty is considered to be the lack of infrastructure and domestic asset acquisition. The rural population's life is directly hampered by the lack of available infrastructure, which includes housing, water access, toilet access, educational institutions, hospitals, markets, road networks, and so forth.
2. Promoting efficient and sustainable agricultural growth to raise the income of small farmers. The living standards and incomes of the rural population, to which most of the poor belong, must be increased. The most effective way to do this is to enhance agricultural productivity through the use of hybrid seeds and the latest mechanization techniques, including livestock. The main instrument that has been used for this purpose is easing the credit constraint and extending commercial bank loans to small farmers.

Over the last five years, bank lending to agriculture, particularly to small farmers, has multiplied manyfold. However, more efforts need to be made in easing the availability of flexible loans to farms and specially to tenants.

3. Creating an enabling environment for the rural non-farm sector to enhance employment and incomes.
4. Improving the effectiveness and governance of rural institutions through decentralization and strengthening local demands.
5. Empowering the poor and protecting the most vulnerable through social mobilization, safety nets, and facilitating access to productive assets for income-generating activities.
6. Creating employment opportunities in rural areas must be a priority. In most cases, migration from rural areas to urban areas is the reason for the rise in poverty in urban areas. The higher wage differential between rural and urban areas and the higher probability of obtaining a job in urban areas drives migration. To reverse migration, it is important to reduce the wage differential.
7. Educating the children of rural areas by increasing the number of schools and giving incentives to the staff.
8. Ensuring basic health facilities. Healthy development must be prioritized, not just physically but also mentally, with a special focus on infrastructure and service delivery of health facilities to pregnant women and children, ensuring their healthy growth to improve the future generations' well-being.
9. A shift of all those facilities provided to urban areas to rural areas is the need of the time, which can improve the poverty level in rural areas. Rural growth centers must be established in order to stop rural-urban migration. These growth centers can help create more job opportunities within the district and can be instrumental in introducing the charm and attraction of urban cities, which is one of the reasons for rural-urban migration. SMEs must also be encouraged, as they can make a valuable contribution not only by generating employment but also by building the capacity of locals.
10. Provision of water for irrigation through tube-wells and the construction of dams wherever possible.
11. The government should provide a plan to CSOs for working in rural areas to provide and promote the basic needs of the people.
12. Provision of subsidized seeds and fertilizers to rural areas. Hence, it is essential to have a dedicated allocation for Rural Development programs.
13. The community may be incentivized regarding tree plantation.
14. Provision of cattle and short-term loans for the development of livestock to the local community.

For Reduction of Urban Poverty:

1. Unemployment is correlated with rural-to-urban migration, which is a major reason for poverty and the lack of job availability in urban centers. This could be controlled through various interventions, such as the creation of rural growth centers in rural districts. Jobs should be created on the basis of a quota, with strict employment policies in the region of birth of the employee.
2. Public-private partnership-based initiatives must be carried out in industries like construction, housing, education, health, and transportation. These industries are interlinked with each other; for example, housing alone supports more than 80 different sectors, providing significant jobs in the labor market. Through this intervention, unemployment can be reduced to some extent. Employment can also be increased by establishing labor-intensive industries. Most of the poor in urban areas are low-skilled and engage in petty services or subsistence activities; hence, labor-intensive industries must be promoted by the state to secure their share.
3. Since budgetary allocation is an important element, the fiscal budget allocation for education, which has only increased slightly each year, has reached just 2.2 percent of the US$ 320 billion economies. Countries like Afghanistan, Tanzania, Vietnam, and India spend more than 4 percent of their GDP on education alone, despite having similar dynamics, and none are considered developed economies. Therefore, it is essential for Pakistan to allocate at least 4-5 percent of the budget specifically for education.
4. Currently, the development of public sector education and its infrastructure is mostly associated with rural development. However, it is equally important for urban development as well. Awareness campaigns must be conducted regularly, not only in rural areas but also in urban districts. The head of the household or the breadwinner is responsible for the upbringing and encouragement of their children. Therefore, awareness campaigns must be rolled out regularly within the community and among household heads to emphasize the importance of education for them and their families.
5. Population explosion is also a significant contributor to both rural and urban poverty. Much more needs to be done to control the birth rate in the region. Since land space is limited, and with each percentage increase in population rate, the demand for food, shelter, and other necessities rises, this leads to a shortfall in resource allocation. Furthermore, this also leads to the concept of diminishing marginal productivity, especially in agriculture, which employs almost 40 percent of the total participatory labor force, leading to reduced wage rates and returns.

6. The minimum wage rate must be significantly increased to at least $180 (Rs. 25,000) per month or $2,160 per capita per annum. Since increasing inflation and dollar price hikes have squeezed the purchasing power of the common man, it is essential that not only inflation be controlled, but also that a justifiable compensatory wage rate is offered, so that it can at least offer some relief and contribute to reducing poverty at the state level. Wage-flooring must also be ensured by the state; the minimum wage rate for a Master's degree or above must not be equivalent to that of a Matric or Intermediate-qualified individual. By creating such wage slabs, this will eventually increase the demand for higher education and encourage longer schooling among the masses to acquire a more remunerative job. This practice needs to be enforced at the state level, both in public and private organizations. This approach will work on a dual basis, as it will not only increase the drive for higher education but also produce a more specialized workforce in the future.

General Recommendations:

From the above analysis, it is concluded that major sectors have been damaged due to the heavy floods this year. However, those sectors that directly contribute to economic growth and poverty alleviation, such as agriculture, irrigation, and health, have been severely impacted.

1. Agriculture is the most important sector contributing significantly to exports; therefore, reallocation of resources from less important sectors towards agriculture is essential.
2. Foreign donors may be attracted to poverty alleviation programs in the agriculture sector.
3. Civil society may be involved in poverty alleviation programs such as BISP, Sehat-Card, Zakat, etc.
4. A proper monitoring system must be devised to monitor and ensure the transparency of poverty alleviation programs.
5. Climate change-resilient crops or seeds are recommended and should be introduced to farmers.
6. The government must keep itself updated and predict future crop demands and accordingly advise farmers to grow those crops annually.
7. Coordination between the federal and provincial governments must be ensured.
8. BISP and other provincial and federal institutions should focus on skill development along with cash disbursement to increase the earning power of the public.

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Health Services and Epidemics in The Context of Recent Floods

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Abstract:

In the aftermath of the 2022 floods, the Health Department adopted a three-pronged strategy to address the crisis: restoring health facilities, coordinating with partners for a collective response, and monitoring disease outbreaks. As a signatory to the International Health Regulations (IHR) 2005, a collective response to outbreaks was necessary, leading to collaboration with organizations like WHO, UNICEF, and ICRC. Health facility clusters were established, and the government's strategy focused on Prevention, Detection, and Response. The department set up Provincial Disease Surveillance and Response Units (PDSRUs) and District Disease Surveillance and Response Units (DDSRUs) under the supervision of the DGHS and Deputy Commissioner. These units aimed to provide rapid action in case of outbreaks. This paper evaluates the operational gaps in health department responses, including monitoring, damage assessment, and surveillance of diseases. It critically examines leadership tenures and response effectiveness, offering conclusions and recommendations for improving health department operations.

Key words:

Flood response, Disease surveillance, Health facilities restoration, Provincial Disease Surveillance Units, Outbreak management

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Introduction

There is a great deal of pressure on the supply of healthcare services in flood-affected communities since epidemics and diseases of all types are frequently caused by floods. Pools of standing water that form as floodwaters subside can serve as mosquito breeding grounds, raising the risk of illnesses like dengue fever and malaria that are spread by the insects. As of September 15, 2022, Sindh province had reported at least 3,830 dengue cases, including 9 fatalities. This indicates that dengue cases in Pakistan had already increased. A rise in malaria, diarrhea, and skin diseases has also been noted by health professionals as a result of the flooding.

In Pakistan, ongoing illness outbreaks such as acute watery diarrhea, dengue fever, malaria, polio, and COVID-19 are worsening, especially in camps and areas where water and sanitation infrastructure has been devastated. Pakistan had already reported 4,531 cases of measles and 15 cases of wild poliovirus in 2022 before the significant rains and consequent flooding. The nationwide polio vaccination program has been hampered in impacted areas due to the rain and flooding (Web, Major Health Risks Unfolding Amid Floods in Pakistan, 2022).

After significant flooding, access to potable water is frequently a serious issue. Sewer backups brought on by flooding can contaminate drinking water and raise the risk of gastroenteritis, while filthy conditions and overcrowding in shelters can make matters worse (Geddes, 2022). Typhoid fever, rotavirus, norovirus, hepatitis A and E, and other illnesses are also linked to flooding incidents. Leptospirosis (Weil's disease), which is spread by coming into contact with rodent urine, can also develop from being submerged in or breathing floodwater, as well as skin or eye disorders.

The potential increase in aquatic illnesses is a major issue as well. In temporary camps, those who have fled the destruction are residing with little to no access to potable water. According to the nonprofit organization Water Aid, in some of Pakistan's most severely affected regions, 50% of all water, sanitation, and hygiene facilities have sustained significant damage, and hundreds of cases of dysentery have already been reported (Khan, Pakistan floods: health crisis of epic proportions. Doctor's Note, 2022).

Oral cholera vaccines and surveillance programs were being established in Pakistan prior to the floods due to an increase in cholera cases, particularly in the Khyber Pakhtunkhwa (KP), Sindh, Punjab, and Balochistan regions. However, many of these have been delayed since the floods hit. People with disabilities may experience a decline in their health due to such disruption (Khan, Pakistan floods: A health crisis of epic proportions, 2022).

The Health Department of KP started responding immediately. The Khyber Pakhtunkhwa government planned a cholera vaccination campaign to prevent the spread of the acute diarrheal infection among flood survivors. Health officials told Dawn that the cholera vaccination plan had been approved, and people would soon begin receiving the oral cholera vaccine free of charge (Yusufzai, 2022).

Even though it might not be as fatal, losing a home, possessions, or one's source of income has a lasting emotional effect. This psychological cost is increased by the economic hardship related to rebuilding. In comparison to the direct health effects of flooding, mental health issues are frequently disregarded and understudied. In close collaboration with the Ministry of National Health Services, Regulations, and Coordination, WHO is stepping up surveillance for cholera, acute watery diarrhea, and other communicable diseases to prevent further spread. In addition, WHO is supplying vital medications and medical supplies to functional health facilities caring for affected communities (Web, Major Health Risks Unfolding Amid Floods in Pakistan, 2022).

There was a considerable gap in access to health services between rural and urban communities even before the current floods. These remote locations have proven challenging to reach. The World Health Organization (WHO) reported that more than 1,400 healthcare facilities had suffered full or partial damage, and that the key healthcare concern was still access to "health facilities, healthcare staff, and necessary medicines and medical supplies" (Khan, Pakistan Floods: A health crisis of epic proportions, 2022).

In the period of nine months, from January 1 to September 27, 2022, a total of 25,932 confirmed dengue cases and 62 deaths were reported in Pakistan, with 74% of these cases reported in September alone. On September 2, 2022, the Health Department of Khyber Pakhtunkhwa reported that waterborne diseases had started spreading in the flood-affected districts of the province, as cases of diarrhea, rashes, chest, and respiratory diseases among residents of the flood-affected areas were on the rise (News, 2022).

After the waterborne diseases, most of the flood-hit districts of Khyber Pakhtunkhwa (KP) were gripped by malaria and dengue, multiplying the miseries of flood victims who are yet to be rehabilitated. This happened despite repeated warnings from experts who had urged the provincial government and health department to take preventive measures (Tribune, 2022).

Problem Statement

Pakistan is a signatory of the IHR, 2005, which warrants a synchronized effort by the member countries. It calls for the development of core facilities in 19 technical areas, broadly divided into three groups: a) Prepare, b) Detect, c) Respond. This framework is applied in every disaster situation. Since Pakistan has subscribed to the IHR, 2005, it must give a befitting response to the international obligation by effectively addressing the crises arising from the flood situation. This is where the concept of the "One Health Approach" assumes international significance. Consequently, two vital pivots, PDSRU/PDSRC and DDSRU/DDSRC, were established. Since floods require a multi-sectoral response and the Health Department alone cannot tackle the situation that ensues from mega floods, a concerted effort was required to address gaps and propose ways for future policy interventions. Our policy paper will revolve around these two hinges, as espoused by the law.

Scope of Study

The policy paper aims to critically evaluate health services and epidemics in the context of the recent floods (2022) in KP. The study duration is from November 28 to December 12, 2022. Information and meetings with the Health Department will be held to gauge the planning, preparedness, and performance of health service delivery and epidemic management during the flood. The study will identify gaps and suggest a way forward for better provision of public health services as per the International Health Regulations, 2005.

Literature Review

One of the significant reasons for the sluggish industrialization in Pakistan is the prolonged absence of a dedicated industrial policy. Consequently, the roles such a policy would typically fulfill are being managed through other public sector policies related to investment, trade, and monetary matters. The SMEDA Act of 1998 was established to regulate small and medium enterprises (SMEs) by the federal government, followed by Vision 2025 (Burki, 2008). An SME policy was formulated in 2007, which has since been amended and is pending cabinet approval. The 18th Constitutional Amendment devolved Part I of the Federal Legislative List, including the industrial sector, to the provinces, transferring industrial affairs to provincial governments (MOIP, 2021). Frequent changes in government are a major contributor to policy uncertainty in Pakistan. Moreover, past governments have often implemented ad-hoc industrial policies in reaction to crises (Kemal, 2008). The conflict between federal and provincial industrial policies has further complicated the achievement of desired outcomes in the industrial sector (Burki, 2008). The Pakistan Business Council advocates for a "Make-in-

Pakistan" initiative to drive industrial growth, leveraging Pakistan's domestic market of over 200 million consumers to develop scale and competitiveness, eventually addressing global demand (PBC, 2018).

Research Methodology

The research method used in this policy paper is both qualitative and quantitative. We have relied on primary data collected from in-depth interviews with officials from the office of the Directorate General Health Services. A number of published research papers, along with newspaper articles, have also been considered.

Impact of Floods 2022

In late August 2022, Pakistan faced the most severe torrential rains, resulting in floods that displaced 33 million people, washed away villages and homes, destroyed infrastructure and standing crops, and damaged schools and health facilities. In KP, the 2022 floods fully damaged 10 health facilities and partially damaged 151. Additionally, 175 LHW health houses were fully damaged, and 331 were partially damaged (DHMIS, 2022). We can draw insights from this regarding the scope of the study and the statement of the problem.

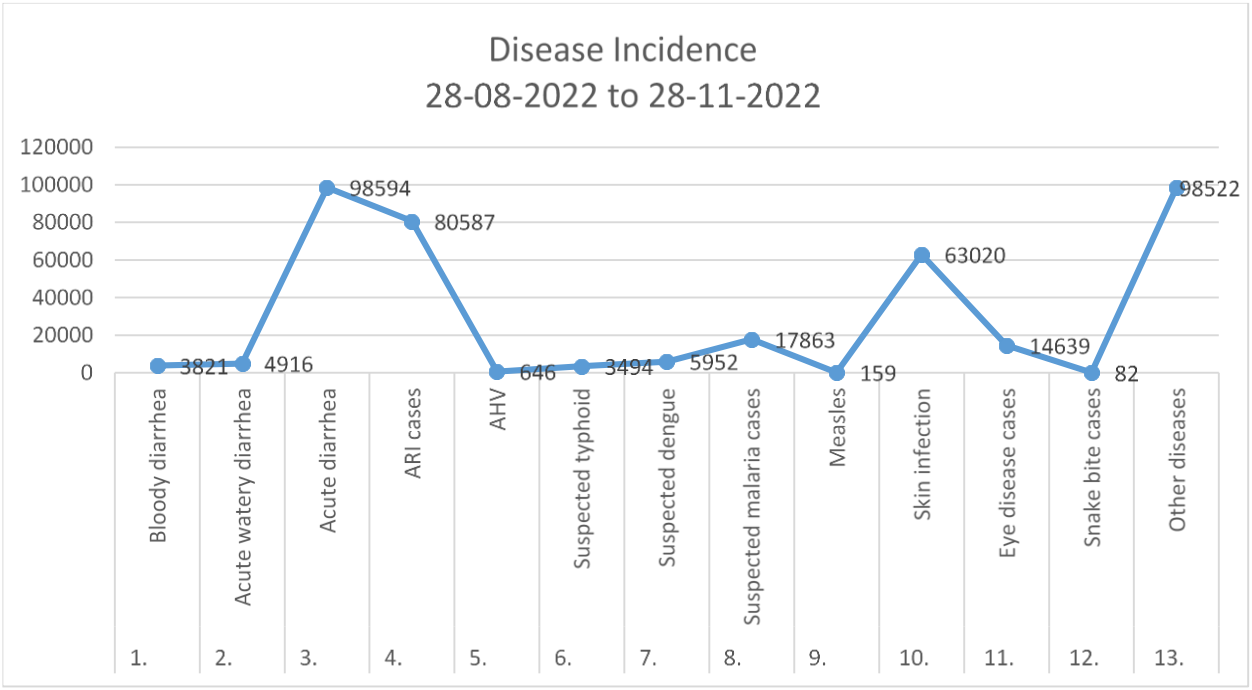
The other significant impact on public health was the outbreak of various diseases among the affected communities, as shown in the table and line graph below:

Table: Detail of Outbreak after 2022 Floods (as of 28-11-2022)

S .No.	Name of Disease	Number of Patients
1.	Bloody diarrhea	3821
2.	Acute watery diarrhea	4916
3.	Acute diarrhea	98594
4.	ARI cases	80587
5.	AHV	646
6.	Suspected typhoid	3494
7.	Suspected dengue	5952

8.	Suspected malaria cases	17863
9.	Measles	159
10.	Skin infection	63020
11.	Eye disease cases	14639
12.	Snake bite cases	82
13.	Other diseases (Body aches, weakness, muscle spasm etc)	98522

(DHMIS, 2022).



Source: IDSRS (Integrated Disease Surveillance Response System), Health Department Government of Khyber Pakhtunkhwa

Response of Health Department

The Health Department took the following steps:

1. Operationalized 24/7 flood emergency control rooms at the DGHS and across affected districts to timely assess and provide robust support to health-related interventions.
2. Emergency was declared by the Health Department through a notification on 1st September 2022, and the procurement process was relaxed.
3. Flood control rooms were established in the DOH office, linked with the DGHS office and line departments in the Deputy Commissioner office. Data was shared daily by the health department with PDMA, and a simultaneous linkage was established with NDMA and NIH.
4. Demand for supplies was generated from the flooded districts. The logistics and supply chain management section, which is at the disposal of the flood control room, kicked in.
5. Mobilized healthcare staff to aid on-ground public health interventions by establishing medical camps across flood-affected districts.
6. The Health Cluster (Health Working Group in the DGHS office), comprising UN agencies like WHO, UNFPA, UNICEF, and INGOs, was activated to identify areas of support and improve coordination to ensure HR deployment, emergency medicine supplies, and logistics support for immediate relief in flood-affected districts.
7. A Google sheet was developed and updated daily, showing the scope of work and work area allocation, thereby tracking the availability of essential medicines and supplies.
8. DGHS diverted 30-40% of the top-up stock toward flood districts, including supplies, medicine, and equipment.
9. Establishment of Mobile Field Health Camps, duly supplied with medicine, equipment, and human resources: doctors, paramedical staff, LHW (Maternal and Neonatal healthcare), and ancillary staff. The number of staff is proportionate to the population of the flooded area.
10. THQ and DHQ staff were strengthened to accommodate referrals.
11. The supply chain management, along with logistics and transport officers, distributed medicines among districts as per demand submitted to the DGHS office.
12. The medicine inventory of flooded districts was submitted to health working groups (INGOs, GIZ, ICRC, MDM, and UN agencies, who help in-kind only) who pledged different relief goods like medicines, transport, equipment, and mobile tent hospitals within timelines given by the DGHS office.

13. Malaria-specific Indus hospitals, an implementing partner of the Global Fund for Malaria, AIDS, and TB, have branches in every district in the form of Frontier Primary Healthcare, working closely with DHO. They use Rapid Diagnostic Kits for Malaria and microscopy.
14. A mass awareness campaign was launched by the DOH and DC regarding malaria and dengue by carrying out fumigation, Insecticidal Residual and larvicidal sprays, and Long-Lasting Insecticidal Bed Nets (LLINs).
15. The Integrated Disease Surveillance and Response system was mobilized at the DG office, with one District Surveillance and Response Unit in each district.
16. Data analysts uploaded disease trends and daily situation reports on DHIS-II, directly connected to the DGHS office, which then consolidated the sheets to measure disease trends and generate daily situation reports for the perusal of all line departments and health working group members, including the Chief Secretary.
17. The Field Epidemiology and Laboratory Training Program worked under PDSRU. They were activated to meet the challenge.
18. Connectivity was established with all stakeholders in the 18 flood-affected districts of KP, and they were made fully resourceful and authorized.
19. Data regarding damaged health facilities was collected, and DNA was carried out on partially, fully, and washed-away health facilities.
20. For the dispensation of health services, a demand was generated by the concerned health officer. The demand generated was uploaded by the data analyst on DHIS-II, directly connected to DGHS.
21. The Health Department created a health cluster (Health Working Group in the DGHS), including all UN agencies, where the DG is the Chairperson, and WHO is the co-chair. UNFPA, USAID, UNICEF, and INGOs also developed a 4 Matrix (who, when, where, what). A Google Sheet was shared on corresponding email addresses and WhatsApp groups with partners. Every partner knew the scope and mandate of the work assigned and the area allocated. The Google Sheet was regularly updated.
22. A National Flood Relief Control Centre (NFRCC) was established at the federal level by the Prime Minister of Pakistan, following the pattern of the COVID-19 NCOC. NFRCC has representatives from the federal and provincial governments and armed forces. It spearheaded flood control activities across the country. DGHS was requested to provide medicines and supplies to the government of Balochistan, as well as services, including four mobile health units with HR and medicines for four districts of Sindh. This was an acknowledgment of the befitting response of the DGHS office to the floods.
23. DGHS, KP extended services to 3,200 patients in four districts of Sindh.

24. Winter, Monsoon, and Heatwave contingency plans have also been chalked out to cater to the future needs of the province.

Health department services are already in place in the form of Provincial Disease Surveillance and Response Units (PDSRU/PDSC) and District Disease Surveillance and Response Units (DDSRU/DDSC). These two units were established in accordance with the provisions of The Khyber Pakhtunkhwa Public Health (Surveillance & Response) Act, 2017. Initially, these units conducted surveys and responded to the emerging situation. Additionally, top-up medicine stocks were available with the department to replenish supplies in the most affected districts by floods.

This policy paper aims to study the response of the health department to the emergency situation, the existing institutional setup, and identify gaps in the provision of health services during the recent floods. After thorough analysis using various analytical techniques, the research group will put forth recommendations for policy decisions by the government, resulting in enhanced public health service delivery before, during, and after natural disasters. The research group has carried out gap analyses in three aspects of the health department to find out gaps and propose ways to bridge them. These three aspects are:

1. Gap analysis of flood epidemics and surveillance.
2. Gap analysis of health services delivery.
3. Gap analysis of disaster needs assessment.

Analysis

Gap Analysis of Flood Epidemics Surveillance

	Current State	Future State	Gap	Actions to close gap
What	Disease Surveillance (PDSRU operational at provincial level and DDSRUs at district level)	Fully functional PDSRU & DDSRUs with one health approach (as per IHR 2005 Requirement)	1. Multi sector involvement 2. Notified Roles & Responsibilities with defined ToRs with measurable KPIs 3. Technical Capacities & support for Core Function 4. Financial Constraints	1. Fully Resourced PDSRU & DDSRU 2. Development and notification of roles, responsibilities with ToR and KPIs 3. Strengthening technical capacity and development of core team in PDSRU & DDSRU
Where	At provincial level and district level	At provincial level and district level	Multi Sectorial coordination	Focal person from all stakeholders with protected tenure for at least 03 years (through administrative decision)
When	Already in place (PDSRU/DDSRU)	3-4 Years	Not fully functional	Agreed upon Administrative, Financial, Political & stakeholders ownership
Who	Public Sector and Partners	Conversion from ADP to regular mode	Health department with Stakeholders	The Cabinet
How	Health to spearhead the process	Resources from the Health Department within 6 Months	By ownership, efficiency and accountability with transparency	Starting from severely flood affected districts

Gap Analysis of Disruption of Public Health Services Delivery

	Current State	Future State	Gap	Actions to close gap
What	Disruption of health service delivery in flood affected districts (Including Immunization, MCH, MNCH, OPD, Family Planning, nutrition and referrals)	Restoration of health services as per notified health care standards (EHSP) under HSS	1. Disruption in routine health services 2. Low accessibility to Health care services, medicine and equipment 3. Absence of purpose-built medicine warehouse	1. Provision of health care service through mobile health units/ camps 2. Reconstruction and Rehabilitation of Health Infrastructure 3. Supply of essential medicines & supplies to flood affected districts

Where	Roles & responsibilities of stakeholders	Well-defined and measurable roles and responsibilities	Well-defined job description of stakeholders	Improving health status of the flood affected population through provision of health service delivery (MCH, MNCH, Immunization, EPI, Nutrition and referrals)
When	Stop gap arrangement already made, essential medicines, vaccines and supplies already provided to flood affected districts	After restoration of health services	Immediate	Linked with rehabilitation and reconstruction of health facilities
Who	Health Department in coordination with C& W, P&D and Finance Department	District and provincial formations	Health department in coordination with stakeholders	Political executive
How	Phased manner, starting from Preparedness, response and reconstruction and rehabilitation.	Subject to availability of financial resources for restoration and rehabilitation of health care delivery services	Ownership of stakeholders and timely decision making	Initial restoration through mobile camps and stop gap arrangements. Restoration of health services by reconstruction of resilient health facilities.

GAP analysis of Damage Need Assessment (DNA)

	Current State	**Future State**	**Gap**	**Actions to close gap**
What	Damaged HF (10 FD, 151 PD, Reconstruction worth ~1.2 bn PKR)	Health infrastructure restoration and rehabilitation of services to pre flood state	Capacity of health dept. to provide public health services hampered	Detailed DNA through C&W or independent consultants based on a comprehensive framework of 4RFs i.e. Resilient, Recovery, Reconst. & Rehab. (Min of Planning, GoP for Donors Conference: BBB approach) Securing funds for reconstruction & Rehab (WB supported HCIP identified, re-appropriation underway, 10 m USD available)

				Partner support and pledges for rehab, UNICEF pledged for rehab in 19 health facilities.
Where	Across KP in Flood affected Districts	Reconstruction of flood resilient HF in flood prone districts	Technical Expertise for construction of resilient to hazards infrastructures in Health Department and decreased dependence on C&W	Amendment of RoB to allow 3rd party for DNA and Rehabilitation to improve quality, compatible with future needs e.g. Prefabricated structures etc.
When	28 Aug - 02nd Sept. 2022 (Health Emergency declared under Epidemic Control and Relief Act 2020 on 1st Sept. 2022). Still in vogue	when futuristic building code is implemented	by executing development project with 03 years throw forward liability	Services Restored, DNA conducted with cost estimation, ensuing processes in action.
Who	Health Department along with stakeholders	in coordination with PDMA, P&D and C&W and with the support of partners	Health Department in coordination with relevant stakeholders	Collective decision by Public, Legal, political leadership
How	In a phased manner from severely affected to least affected districts	PSDP, ADP and donors support, well before the onset of monsoon and after slack season	Effective stakeholders coordination, public dialogue and policy	(Political + Multi-sectorial) commitment

Critical Analysis

A devastating flood struck Khyber Pakhtunkhwa on August 28, 2022, leading to the declaration of an emergency on September 2, 2022. The flooding necessitated coordinated, multi-sectoral interventions. Numerous diseases and epidemics frequently brought on by floods put immediate pressure on the delivery of health services in flood-affected communities. As floodwaters subside, they leave behind pools of stagnant water, which can turn into mosquito breeding grounds, increasing the risk of mosquito-borne illnesses, including dengue fever and malaria. Health officials in Sindh province recorded at least 3,830 cases and 9 deaths from dengue as of September 15, 2022, indicating a spike in dengue cases in Pakistan. Additionally, according to health officials, the flooding has caused an upsurge in skin diseases, diarrhea, and malaria. Current disease outbreaks in Pakistan, including Acute Watery Diarrhea, Dengue Fever, Malaria, Polio, and COVID-19, are becoming more severe, especially in camps and areas with damaged water and sanitation infrastructure.

Before the intense rain and associated flooding, Pakistan had already reported 15 instances of wild poliovirus and 4,531 cases of measles in 2022. In impacted locations, the nationwide polio vaccination program has been hampered by the rain and flooding (Web, 2022). After significant flooding, access to potable water is frequently a serious issue. As a result of flooding, sewers may overflow, contaminating drinking water and raising the risk of gastrointestinal illnesses. Additionally, unsanitary conditions and crowded shelters may exacerbate the situation (Geddes, 2022). Khyber Pakhtunkhwa, Sindh, Punjab, and Balochistan provinces of Pakistan were experiencing an increase in cholera cases prior to the floods. Oral cholera vaccinations and surveillance programs were being established, but many of these were delayed when the floods hit (Khan, 2022). In Khyber Pakhtunkhwa, an emergency was declared on September 1, 2022, under Section 3 of the Khyber Pakhtunkhwa Public Health (Surveillance and Response) Act, 2017, to fill the gap created by the deluge in the delivery of health services as outlined in the Health Sector Five-Year Plan 2018-2023. The emergency declared is still in effect. Epidemics occur frequently globally and will only increase in the future. Where there is risk, there is also an opportunity. We should use our interconnectedness to better prepare, prevent, detect, respond to, and recover from public health events to address the challenges of building multi-sectoral partnerships. UNOCHA-Pakistan brings together humanitarian actors to ensure a coherent response to emergencies. It establishes a framework within which each actor can contribute to the overall response effort. In 2015, member states, partners, and donors requested WHO to establish a strategic partnership for health security: WHO-SPH (World Health Organization Strategic Partnership for Health). The SPH is a one-stop multi-sectoral platform that supports countries in accelerating the implementation of the International Health Regulations (IHR) 2005, thereby strengthening global health security. WHO-SPH offers member states, partners, and donors the opportunity to exchange best practices so that we can combat future epidemics, endemics, and pandemics effectively. Solutions to global health security lie beyond the public health sector, and what is unique about the platform is that it facilitates broad-spectrum collaboration between stakeholders. Moreover, it synergizes efforts between member states, partners, and donors. It enables countries to match their needs and gaps with the priorities of donors and partners. The SPH promotes four pillars of multi-sectoral partnership: a. Leadership b. Networks c. Resources d. Forum

The IHR, 2005, is a legally binding agreement among 196 countries to build the capacity to detect and report potential public health emergencies worldwide. IHR requires that all countries have the ability to detect, assess, report, and respond to public health events. It covers 19 technical areas, which can be broadly divided into three groups: Prepare, Detect, and Respond.

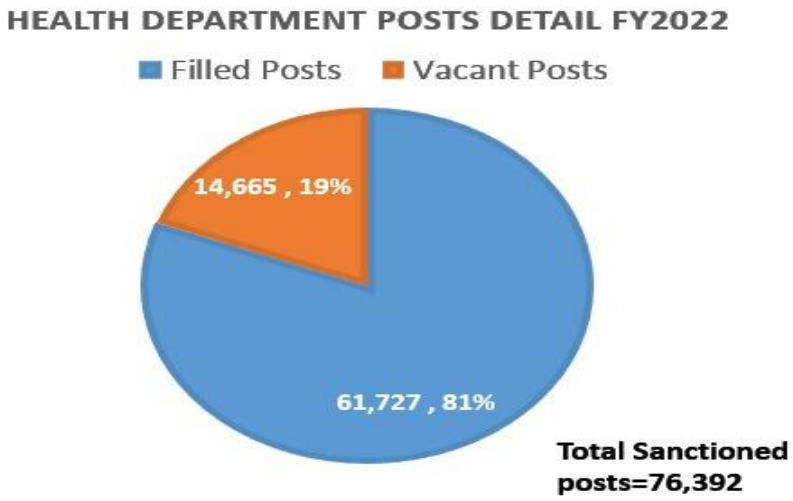
The regulatory framework of IHR calls for a "One Health Approach," embodied within the DDSRU and PDSRU at the district and provincial levels, respectively.

By addressing the shortcomings of the district and provincial response units, a major portion of the public health services delivery outcomes can be improved substantially. In this policy paper, we have applied the Pareto Principle, as bringing all dimensions of the health department into a single policy paper would be a gigantic task, beyond the mandate of our paper. When wants are unlimited and means are limited, we resort to prioritization. This can be achieved by identifying the vital few stakeholders, which in our case are the PDSRU/PDSC and DDSRU/DDSC. If we can address the issues (say 20%) of these two vital stakeholders, it will translate into 80% of the outcomes. For the implementation of IHR and the dispensation of a robust response, the "One Health Approach" is developed in the form of a Provincial Disease Surveillance Centre (PDSC) chaired by the Director of Public Health. At the district level, the District Disease Surveillance Centre (DDSC) is chaired by the Deputy Commissioner concerned. In these centers, all relevant government agencies at the provincial and district levels are represented. They generate a weekly bulletin providing guidance. The One Health Approach is difficult to accomplish in a country like Pakistan since there are no rules governing the formation of a public sector conglomerate at the district and provincial levels. This is the actual hurdle in the way of a coordinated and robust response. These two units, however, generate a weekly bulletin providing guidance. In the aftermath of the 18th Constitutional Amendment, health became a devolved subject. It has its own indigenous flood response mechanism with little or no input from the federal government. The Ministry of National Health Services, Regulation & Coordination has offered the provision of some life-saving medicines through the NDMA, for which lists have been sent via PDMA by the health department. Their response is awaited. A comparative analysis of the 2010 and 2022 floods has been carried out to show the evolution of the health department in tackling natural calamities over the course of a decade.

A comparative analysis between 2010 and 2022 Floods:

S.No.	Floods 2010	Floods 2022
1.	Response was haphazard.	Response was systematic.
2.	No DHMIS-II software available in 2010. Ineffective monitoring of disease trends.	An effective DHMIS-II system in place ensuring efficiency.
3.	Logistics Management & Information System (LMIS) not in place.	LMIS and Inventory management system in place.
4.	No telemetric equipment installed by Irrigation dept. in collaboration with the PDMA	Telemetric equipment installed at different locations along the rivers course to monitor flood water.
5.	No Integrated Disease Surveillance & Response Unit (IDSRU)	Integrated Disease Surveillance & Response Unit (IDSRU) in place in 2022 as per KP Public Health (S&R) Act, 2017.
6.	30-40% top up medicine stock wasn't available in 2010.	Available in DG health office prior to 2022 floods. DG health has centralized procurement from the last 03 years in addition to procurements by the MSs & DOHs. The impetus came from COVID-19.
7.	Health Dept. was a devolved subject operated from Account-4.	Health Dept. is provincial subject operated from Account-1.
8.	No Sehat Sahulat Card in vogue	Sehat Sahulat Card throughout KP
9.	Budget of the Health Department: 18.34 billion Rs.	Budget of the health Dept. 205 billion Rs.
10.	Staff position in 2010: 42,522	Staff position in 2022: 76,392
11.	Lower & Upper Kohistan, Chitral lacks medical officer.	Same as before. Medical Officers like to serve only in Peshawar for service and pursuit of higher degrees.
12.	Lack of warehouse facility where temperature and humidity is controlled.	Still prevalent and medicine are stored in EPI warehouses.
13.	Health department wasn't held in priority by the then political government.	Health is the most favorite flagship department of the political government.
14.	Many dysfunctional health facilities at the districts level	Dysfunctional facility turned into effective ones through PPP. Caesarian are carried out in Razmak and Dasu.

The total sanctioned strength of the health department in 2010 and 2022 is exhibited in the pie chart shown below which show substantial increase in the human resources. This is partly due to the political ownership of the health department and due to merger of the erstwhile FATA into the province of Khyber Pakhtunkhwa. As far as 2022 is concerned, the total sanctioned posts, filled and vacant posts are known while in the year 2010-11 only sanctioned posts could be traced from the Financial Management and Implementation Unit of the finance department government of Khyber Pakhtunkhwa. This information about the human resources is followed by the tenures in offices of the Secretaries health department (0.8 years) along with the Director General Health Services (0.9 years).

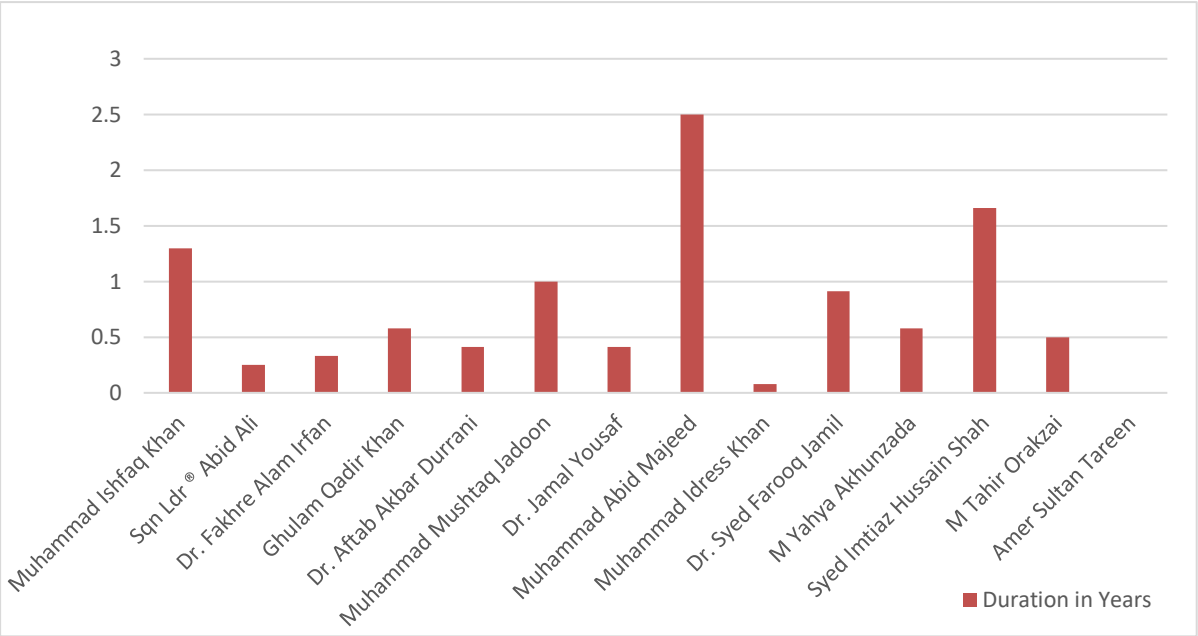


Total Sanctioned Posts in 2010-11 were: 42,522

Secretaries Health Tenure (2011 till date)

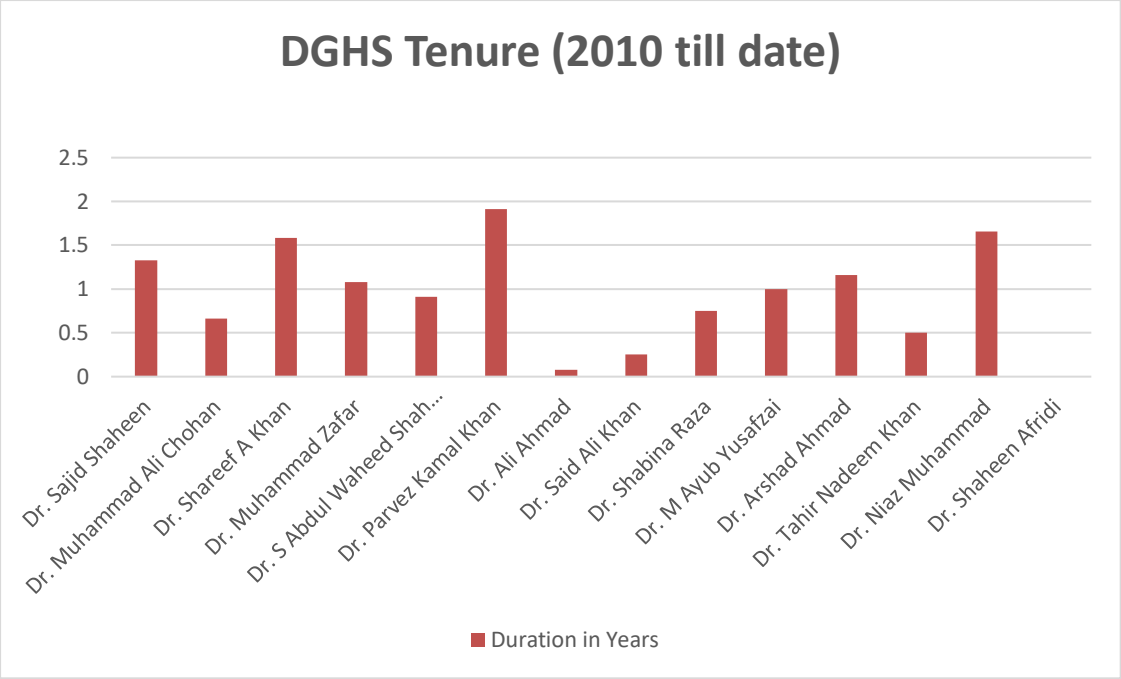
S. No.	Name	Tenure From – To		Duration in Months	Duration in Years
1.	Muhammad Ishfaq Khan	09-12-2011	08-04-2013	16	1.3
2.	SqnLdr ® Abid Ali	08-04-2013	03-07-2013	03	0.25
3.	Dr. Fakhre Alam Irfan	05-07-2013	08-11-2013	04	0.33
4.	Ghulam Qadir Khan	08-11-2013	11-06-2014	07	0.58
5.	Dr. Aftab Akbar Durrani	12-06-2014	17-11-2014	05	0.41
6.	Muhammad Mushtaq Jadoon	20-11-2014	04-11-2015	12	1
7.	Dr. Jamal Yousaf	04-11-2015	17-03-2016	05	0.41
8.	Muhammad Abid Majeed	17-03-2016	06-09-2018	30	2.5
9.	Muhammad Idress Khan	06-09-2018	18-10-2018	01	0.08
10.	Dr. Syed Farooq Jamil	06-11-2018	02-09-2019	11	0.91
11.	M Yahya Akhunzada	02-09-2019	03-04-2020	07	0.58
12.	Syed Imtiaz Hussain Shah	04-04-2020	27-12-2021	20	1.66
13.	M Tahir Orakzai	29-12-2021	27-05-2022	06	0.5
14.	Amer Sultan Tareen	30-05-2022			
15.	**Average Tenure of Secretary during the last 10 years**				**0.80 years**

Secretaries Health Tenure (2011 till date)



DGHS Tenure (2010 till date)

S. No.	Name	Tenure From - To		Duration in Months	Duration in Years
1.	Dr. Sajid Shaheen	30-07-2010	27-03-2011	16	1.33
2.	Dr. M. Ali Chohan	28-03-2011	05-09-2011	08	0.66
3.	Dr. Shareef A Khan	05-09-2011	18-04-2013	19	1.58
4.	Dr. Muhammad Zafar	19-04-2013	12-02-2014	13	1.08
5.	Dr. S Abdul Waheed Burki	13-02-2014	16-11-2014	11	0.91
6.	Dr. Parvez Kamal Khan	28-11-2014	24-10-2016	23	1.91
7.	Dr. Ali Ahmad	25-10-2016	04-12-2016	01	0.08
8.	Dr. Said Ali Khan	05-12-2016	02-02-2017	03	0.25
9.	Dr. ShabinaRaza	03-02-2017	25-10-2017	09	0.75
10.	Dr. M AyubYusafzai	26-10-2017	22-10-2018	12	1
11.	Dr. Arshad Ahmad	23-10-2018	16-01-2020	14	1.16
12.	Dr. Tahir Nadeem Khan	17-01-2020	15-06-2020	06	0.5
13.	Dr. Niaz Muhammad	16-06-2020	26-02-2022	20	1.66
14.	Dr. ShaheenAfridi	07-03-2022			
Average Tenure of DGHS KP					**0.99**



Conclusion

Floods in 2022 resulted in a notable spike in waterborne diseases, including acute watery diarrhea, skin, and respiratory infections. IDSRS data from the health department illustrates a high incidence of acute diarrhea, acute respiratory infections, and skin infections in the aftermath of the floods. Dengue fever cases were on the rise, as flood relief camps were densely populated, thereby providing an impetus for the spread of contagious diseases. The high incidence of waterborne diseases demonstrates that the provision of clean drinking water was an insurmountable challenge for the health authorities. The IDSRS data does not provide information on leptospirosis, which is caused by potable water coming into contact with cattle and rodent urine. The oral cholera surveillance program was hampered by the floods, leading to a disruption in the administration of the cholera vaccine. Mental health issues arising from the destruction of homes have been disregarded and understudied throughout Pakistan. IDSRS and access to health personnel in remote areas remain a challenge. The data also does not provide information about deaths caused by epidemics, which presents a utopian view that contrasts with the ground realities. Since snake bites were frequent in the districts of Tank, Nowshera, and D.I. Khan, they need to be provided with sufficient antivenom before the onset of the next monsoon. A top-up stock of medicines and supplies, to the tune of 30-40%, needs to be maintained in the DGHS office in the future as well.

The response to the 2022 floods was better due to the installation of telemetric equipment on the course of rivers by the PDMA with technical support from the irrigation department. In the health department, the improved response to the floods can be attributed to IDSRS, PDSRU, DDSRU, coherent efforts by line departments, and the top-up stocks of medicines and supplies maintained by the DGHS

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