OFFICE OF THE CHIEF ENGINEERING ADVISOR & CHAIRMAN FEDERAL FLOOD COMMISSION







MINISTRY OF WATER RESOURCES GOVERNMENT OF PAKISTAN

6-ATATURK AVENUE, SECTOR G-5/1, ISLAMABAD, PAKISTAN

JULY 2021

REVISION OF PAKISTAN'S NATIONALLY DETERMINED CONTRIBUTIONS (NDCs)



NATIONAL PROGRESS REPORT BY TECHNICAL REVIEW COMMITTEE (TRC) ON ADAPTATION

OFFICE OF THE CHIEF ENGINEERING ADVISER & CHAIRMAN FEDERAL FLOOD COMMISSION

6-ATATURK AVENUE, SECTOR G-5/1, ISLAMABAD, PAKISTAN

(JULY 2021)

PREAMBLE

The Paris Agreement is a legally binding international treaty on climate change. It was signed in 2016 under United Nations Framework Convention on Climate Change (UNFCCC) that deals with greenhouse gas emissions mitigation, adaptation, and finance. As of February 2020, all UNFCCC members have signed the agreement, 189 have become party to it. Pakistan is a Party to Paris Agreement.

The Paris Agreement's long-term goal is to keep the increase in global average temperature to well below 2 °C above pre-industrial levels; and to pursue efforts to limit the increase to 1.5 °C. Pakistan had submitted its first NDC to UNFCCC in November, 2016 as its obligation under Paris Agreement and in recognition of its responsibility to the comity of nations. It demonstrated the country's resolve to respect the COP 21 mandate and to highlight its commitment to addressing the issues of climate change and associated challenges.

Under first NDCs Pakistan intended to reduce up to 20% of its 2030 projected GHG emissions, subject to availability of international grants to meet the then total abatement cost of about US\$ 40 billion. Pakistan's adaptation needs, the then, were reported between U\$ 7 to U\$ 14 billion per annum.

Article-4/ Para-2 of the Paris Agreement urges the member countries to carry out the revision of their NDCs every five (05) years to reflect country's highest possible ambitions with regard to addressing climate change issues, challenges and adapt to climate change impacts. Hence, Ministry of Climate Change (MoCC) started the process of revision of the Pakistan's first Nationally Determined Contributions (NDCs) under two categories i.e. mitigation and adaptation. In view of that two Technical Review Committees (one for mitigation & second for adaptation) were conceptualized and formulated. This report presents the work performed by the Technical Review Committee on Adaptation.

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ACRONYM

ADB	Asian Development Bank
ADP	Asian Development Project
ADPC	Asian Disaster Preparedness Center
ADRC	Asian Disaster Reduction Center
AJ&K	Azad Jammu & Kashmir
AWS	Automatic Weather Stations
BHU	Basic Health Unit
BISP	Benazir Income Support Program
CBDRM	Community-Based Disaster Risk Management
CCI	Council of Common Interests
ССР	Concept Clearance Paper
CDA	Cholistan Development Association
CDWP	Central Development Working Party
CEA	Chief Engineering Adviser
CEO	Chief Executive Officer
CFFC	Chairman Federal Flood Commission
СМ	Chief Minister
COVID	Corona virus Disease
CPD	Continuing Professional Development
DC	Deputy Commissioner
DDMA	District Disaster Management Authorities
DDMU	District Disaster Management Unit
DDR	Disarmament, Demobilization, and Reintegration
DHQ	District Headquarter
DL	Desert Locust
DMIS	Disaster Management Information System
DPO	Deputy Police Officer
DPP	Director of Public Prosecutions
DRAP	Drug Regulatory Authority of Pakistan
DRF	Disaster Response Force
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DMIS	Disaster Management Information System
EC	Europe Commission
ECNEC	Executive Committee of the National Economic Council
EFWS	Enhancing Flood Forecasting & Warning System
ERRA	Earthquake Restoration and Rehabilitation Authority
EWS	Early Warning System

FAO	Food and Agriculture Organization		
FFC	Flood Control Commission		
FFD	Flood Forecasting Division		
FIR	First Information Report		
FPSP	Flood Protection Sector Project		
GCC	Gender and Child Cell		
GDP	Gross Domestic Product		
GE	Gender Equality		
GFDRR	Global Disaster Reduction and Recovery Facility		
GIS	Geographic Information System		
GLOF	Glacial Lake Outburst Flood		
HFA	Humanitarian Response Facility		
HRF	Humanitarian Response Facility		
INDC	Intended Nationally Determined Contributions		
IOS	iPhone operating system		
IRSA	Indus River System Authority		
IT	Information Technology		
IWMI	International Water Management Institute		
KP	Khyber Pakhtunkhwa		
LEAD	Leadership for Environment and Development		
MDMT	Medical Disaster Management Team		
MHVRA	Multi-Hazard Vulnerability and Risk Assessment		
MIS	Management Information Systems		
MLLCC	Mauza Level Locust Control Committees		
MoCC	Ministry of Climate Change		
MoWR	Ministry of Water Resources		
MPI	Multi-dimensional Poverty Index		
MT	Metric Ton		
NAMA	Nationally Appropriate Mitigation Action		
NAP	National Action Plan		
NDC	Nationally Determined Contributions		
NDM	National Disaster Management		
NDMA	National Disaster Management Authority		
NDMO	National Disaster Management Office		
NDMP	National Disaster Management Plan		
NDRMF	National Disaster Risk Management Framework		
NDRP	National Disaster Response Plan		
NFI	Non-Food Item		
NFPP	National Flood Protection Plans		
NGO	Non-government Organization		
NIDM	National Institute of Disaster Management		

Report of the Technical Review Committee on Adaptation

NSER	National Socio-Economic Register
NWP	National Water Policy
OBM	Out Board Motor
PDMA	Provincial Disaster Management Authority
PDNA	Post-Disaster Needs Assessments
PDRP	Post-Disaster Redevelopment Plan
PEOC	Provincial Emergency Operation Center
PFRERRP	Flood Relief and Early Recovery Response Plan
PITB	Punjab Information technology Board
PKR	Pakistan Rupee
PMD	Pakistan Meteorological Department
PMDA	Provincial Disaster Management Authority
POL	Petroleum Oil Lubricant
PPE	Personal Protective Equipment
SDNA	Sindh Drought Needs Assessment
SERAP	Strategic Early Recovery Action Plan
SI	Special Initiative
SOP	Standard Operating Procedure
SUPARCO	Space & Upper Atmosphere Research Commission
SWOT	Strengths, Weaknesses, Opportunities, and Threats
THQ	Tehsil Head Quarter
TOR	Term of Reference
TRC	Technical Review Committee
TTT	Trace-Track-Test
UK	United Kingdom
ULV	Ultra Low Volume
UN	United Nation
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund
US	United State
USD	United State Dollar
WAPDA	Water and Power Development Authority
WASA	Water and Sanitation Agency
WCAP	Water Sector Capacity Building & Advisory Services Project
WDD	Women Development Department
WE	Women Empowerment
WFP	World Food Program
WGs	Working Groups
WHO	World Health Organization

Report of the Technical Review Committee on Adaptation

CLIMATE CHANGE ADAPTATION RELATED REVISION OF PAKISTAN'S FIRST NATIONALLY DETERMINED CONTRIBUTIONS (NDCs)

BACKGROUND

MoCC accordingly planned to carry out the revision exercise under two main categories i.e. mitigation & adaptation and for each category, a Technical Review Committee (TRC) and various thematic Working Groups (WGs) were required to be formulated having representation from concerned Ministries/ line Departments for effective coordination. In this context, the Chief Engineering Adviser & Chairman Federal Flood Commission (CEA & CFFC) was assigned the responsibility to lead the TRC on Adaptation. Consequently, this National Progress Report regarding adaptation related revision of Pakistan's NDCs has been prepared by the O/o CEA & CFFC.

Based on M/o CC letter (August 31, 2020), M/o WR on September 28, 2020 designated CEA & CFFC as Chair of Technical Review Committee on Adaptation (28.9.2020). In line with MOCC's Concept Note on NDCs revision, first communication with stakeholders was made on November 05, 2020 seeking potential nominations for Adaptation Committee & associated sectoral Working Groups. Followed by the preliminary meeting with concerned departments held on November 16, 2020 wherein Technical Review Committee on Adaptation, headed by the CEA & CFFC, was formulated along with following (7 No.) Working Groups: -

- 1. Working Group on Water Resources Sector
- 2. Working Group on Agriculture and Livestock Sector
- 3. Working Group on Human Health Sector
- 4. Working Group on Forestry Sector
- 5. Working Group on Biodiversity & other Vulnerable Ecosystem Sector
- 6. Working Group on Disaster Preparedness Sector &
- 7. Working Group on Gender Sector

COMPOSITION OF ADAPTATION COMMITTEE/ WORKING GROUPS

Pakistan's first NDCs of the country considered only the five sectors i.e. Agriculture, Energy, Waste, Industry and Forestry with respect to determine their potential for GHG emissions while for 2nd revision under consideration, other important sectors like water resources, human health, disaster preparedness, biodiversity and gender had also been included for identification of the related mitigation as well as the adaptation aspects.

Based on the above, Technical Review Committee (TRC) on Adaptation comprised of the seven sectoral (7 No.) Working Groups as stated above. Main body of TRC regulated/ moderated the functioning of associated WGs. It is pertinent to mention here that in addition to nominative members, some ex-officio representation were also made while formulating the TRC on Adaptation & associated WGs in particular for all those concerned ministries/

organizations wherefrom nominations for TRC/WGs were not received. The composition of main body of TRC and associated WGs is given below: -

Main Body of TRC on Adaptation

Sr. No.	Name of the Officers with Designation	Membership detail
1.	Mr. Ahmed Kamal, the Chief Engineering Advisor & Chairman FFC, (<u>chairman@ffc.gov.pk</u>) Ph # 051-9244600, Cell # 0300-5278981	Chair of TRC/ Lead of WG on Water Resources
2.	Member (Engg./Infrastructure), Ministry of Planning Development & Special Initiatives	Member
3.	Member (DRR), NDMA	Member
4.	Mr. Shahid Hamid, General Manager (HRM) WAPDA	Member
5.	Mr. Muhammad Ayub Soomro, Add. Sec. (Tech), Irrigation Department, Sindh, (ayoubsoomro@gmail.com)	Member
6.	Mr. Irfan Tariq, DG (Environment, M/o Climate Change	Member
7.	DG Pak EPA Islamabad	Member
8.	Mr. Muhammad Riaz, D.G, PMD Islamabad.	Member
9.	Raja Muhammad Omer, Deputy Inspector General of Forests, M/o Climate Change / Cell # 0300-7617819	Member/ Lead of WG on Forestry
10.	Dr. Mohsin Hafeez, Country Representative IWMI, Lahore Pakistan, <u>m.hafeez@cgiar.org</u>	Member/ Lead of WG on Disaster Preparedness
11.	Mr. Naeem Ashraf Raja, Director Biodiversity, M/o Climate Change/ Cell # 0333-5201089	Member/ Lead of WG on Biodiversity
12.	Dr. Razia Safdar, Deputy D.G (Health), Ministry of Health Services, Regulation & Coordination/ 0333- 0943573, <u>razia.safdar7@gmail.com</u> (Ex-Lead retired since 29 12 2020)	Member/ Lead of WG on Human Health
13.	Dr. Saima, Coordinator WASH Programme, M/o Climate Change/ <u>saimashafique76@hotmail.com,</u> Cell # 0323- 4775777	Member/ Lead of WG on Gender
14.	A Senior Officer from M/o Finance (Ms. Nelofer Hafeez,	Member
	Joint Secretary (Expenditure Water Resources), Finance	
	Division, Islamabad (Ph # 051-9201982, 0304-5399372)	
15.	A Senior Representative from EAD	Member
16.	Senior Officers from each of Provincial P&D Departments	Members

Sr. No.	Name of the Officers with Designation	Membership detail
17.	Senior Representatives from International Partners (WHO, FAO, UNDP, WB, WWF)	Members
18.	Mr. Muhammad Arif Goheer Head Agriculture and Coordination Section, GCISC <u>arifgoheer@gmail.com</u> 0345-5109473 -New Lead as Ex-Lead can't complete the assigned task due to his personal commitments	Secretary/ Lead of WG on Agriculture & Livestock

Working Group on Water Resources Sector

Lead:

 Mr. Ahmed Kamal, The CEA & CFFC/ Chair TRC on Adaptation (chairman@ffc.gov.pk) (federalfloodcommission@gmail.com), Ph # 051-9244600, Cell # 0300-5278981

Members:

- 2. Mr. Muhammad Aamir Khan, Chief (SPRU), PID, Punjab, Lahore, 03009691577,
- 3. Mr. Jamal Mangan, Special Secretary (Technical), PID, Sindh, Ph# +03337541572, Email: <u>dpdwsip@gmail.com</u>
- 4. Mr. Muhammad Riaz, D.G. PMD, riaz1962@hotmail.com
- 5. Dr. Mohsin Hafeez, Country Representative IWMI, Lahore, <u>m.hafeez@cgiar.org</u>, Cell # 0305-1685569
- Prof. Dr. Zia ul Haq, Chairman Agriculture Engg. Deptt. UET Peshawar, Cell # 0345-8900235, <u>zia.haq@uetpeshawar.edu.pk</u>
- Engr. Ghazala Channar, Deputy Chief Water Resources, Ministry of Planning Development & Special Initiatives, Islamabad (Ph # 051-9201981, 0333-2019266, email, engr.ghazal@gmail.com)
- 8. Dr. Tahir Muhammad Khan, Deputy Director, R&D Section, PMD Islamabad (0335-5065333, email tahirdd@gmail.com)
- 9. Mr. Mian Muhammad, Director General Services, CDA (Cell No. 0333-5110508)
- 10. Mr. Muhammad Shariq Ahmed, Chief Engineer/Head Environment, Resettlement and Social Development Section and Geo-Technical and Geo-Environment Division, NESPAK, (Cell # 0333-4579099, email <u>scharique@hotmail.com</u>); recommended for WGs on Water Resources & Biodiversity
- 11. D.G Irrigation & Small Dams Directorate, Govt. of AJ&K, Muzaffarabad, <u>durrani.ajk60@gmail.com</u> Cell No: 0300 5162074
- 12. Mr. Shakeel Ahmed, Section Officer (DW), M/o Water Resources, shakeeldahar@yahoo.com
- 13. Ms. Attia Dastagir Ahmed, Senior Research Officer, Environment Cell, WAPDA, Lahore, <u>wapda.wec@gmail.com</u>, Cell No: 03460049649
- 14. Mr. Sajid Altaf, Water Management Officer, Federal Water Management Cell, 0300-8553396, sajidaltaf63@gmail.com

- 15. Dr. Anjum Rasheed, CCRD, Comsat University, Islamabad, Cell 0321-5032223,
- 16. Mr. Jalil Ahmed Soomro, IRSA,
- 17. Mr. Zafar Iqbal, AEA-Civil, O/o CEA & CFFC, 0301-7801859, zispak2001@gmail.com
- 18. Mr. Hussain Shigri, Sr. Engineer (Floods), O/o CEA & CFFC, Cell No: 0332-5341790
- 19. Mr. Farooq Aalam, RO (Liquid Waste) EPA-Punjab, Cell No: 03014211409
- 20. Representative from PID, KP
- 21. Representative from PID, Balochistan (Bashir Tareen, S.E./Provincial Coordinator)
- 22. Representative from PWD, Govt. of Gilgit Baltistan, (Mr. Ehsan Ali, Additional Secretary-Works Cell # 03468115500)
- 23. Ms. Saiqa Imran, Senior Research Officer, Water Quality Laboratory, Islamabad (Ph # 051-9101284, email <u>saiqa134@gmail.com</u>)

Secretary:

24. Dr. Zia ur Rehman Hashmi, Head Water Resources & Glaciology, GCISC, zaihashmi77@gmail.com Cell No: 0333 5575535

Working Group on Agriculture & Livestock Sector

Lead

1. Mr. Muhammad Arif Goheer Agriculture Section, GCISC 0345-5109473 (New Leader as decided during 4th Progress Review meeting held on March 18, 2021)

Members:

- 2. Dr. Bashir Ahmed, Director (Climate, Energy & Water Research), NARC dr.bashir70@gmail.com Ph # 051-9255022, Cell # 0333-5487506 (Ex-Lead)
- Dr. Mohsin Hafeez, Country Representative, IWMI, Lahore, m.hafeez@cgiar.org, Cell # 0305-1685569
- 4. Prof. Dr. Javed Akhtar, Dean Faculty of Agriculture, Agriculture University, Faisalabad
- 5. 03006635987, sarcuaf@gmail.com
- 6. Dr. Zakir Hussain Dhari, National Coordinator (WR), PARC, 0335 8077828, email zakir.dahri@parc.gov.pk
- 7. Dr. Haroon Khan, Deputy Director (Communication & Outreach), Climate Change Centre, University of Agriculture, Peshawar 0336-1777196
- 8. Chief (Agriculture Section), M/o PD & SI or his Representative
- 9. DG. OFWM, Agriculture Department, Govt of Punjab, Lahore
- 10. Rep. from Sindh Agriculture Department
- 11. Rep. from Agriculture Department, Govt of Balochistan

Secretary:

12. Mr. Muhammad Arif Goheer Agriculture and Coordination Section, GCISC

Working Group on Human Health Sector

Lead:

 Dr. Razia Safdar, .Deputy D.G (Health), M/o Ministry of Health Services, Regulation & Coordination, Phone # 051-9245971 (New Lead), 0333-0943573, razia.safdar7@gmail.com (D.G Technical, Ministry of Health Services, Regulation & Coordination drnaseers@gmail.com Cell # 0300-5359376 (Ex-Lead who retired since 29.12.2020)

Members:

- 2. Engr. Shahid Mehmood, XEN Public Health Engg. Deptt, Govt. of KP, Peshawar. 03005627727, xenpheharipur@gmail.com
- 3. Dr. Riaz Ahmed, M/s Sharooq Pharmaceuticals (Pvt) Ltd. info@sharooqpharma.com Cell No: 0321-4461242
- 4. Ms. Tehmina Saeed Ch. M/s The Data Group, tehmina@thedatagroup.biz Cell # 0300-8425787
- 5. Representative Public Health Engg. Deptt., Govt. of the Punjab Lahore.
- 6. Representative Public Health Engg. Deptt, Govt of Sindh, Karachi.
- 7. Representative Public Health Engg. Deptt, Govt of Balochistan, Quetta.
- 8. Representative from NIH, Islamabad
- 9. Representative from WHO
- 10. Representative from UNICEF

Secretary:

11. Mr. Shaukat Ali, Senior Scientific Officer, GCISC

Working Group on Forestry Sector

Lead:

1. Raja Muhammad Omer, Deputy Inspector General of Forests, M/o Climate Change omerraja07@gmail.com Cell # 0300-7617819

Members:

- 2. Dr. Fazal Bari, FAO
- 3. Malik Sagheer Ahmed, Conservator of Forests, Govt of KP, 0333-5032139, Sagheer_malik@hotmail.com
- 4. Dr. Mamoona Wali Muhammad, Director Forest Education Division, PFI, Peshawar. mamoonamuhammad313@gmail.com Cell No: 03000330355
- 5. Dr. Masud Arshad, Director WWF
- 6. Mrs. Maryam Khan, Assistant Director, EPA Punjab, Lahore. Cell No: 0322-4379076
- 7. Representative from Forest Department, Government of Punjab

- 8. Representative from Forest Department, Government of Sindh
- 9. Representative from Forest Department, Government of Balochistan

Secretary:

10. Mr. Muhammad Ijaz, Senior Scientific Officer, GCISC

Working Group on Biodiversity & other Living Ecosystems

Lead:

- Mr. Naeem Ashraf Raja, Director Biodiversity, M/o Climate Change, naeemashrafraja@gmail.com, Cell # 0333-5201089
 - Coordinator Group Lead Dr. Rizwan Irshad, Director (Biodiversity) M/o CC

Members:

- 2. Dr. Fazal Bari, FAO
- 3. Dr. Hina Beg, D.G., NIO, Karachi. 03018274900, Hina_baig@hotmail.com
- 4. Malik Sagheer Ahmed, Conservator of Forests, Govt of KP 0333-5032139, Sagheer_malik@hotmail.com
- 5. Dr. Mamoona Wali Muhammad, Director Forest Education Division, PFI, Peshawar. Cell # 03000330355, mamoonamuhammad313@gmail.com
- 6. Dr. Masud Arshad, Director WWF 0300-6245555
- 7. Dr. Rafaqat Masroor, Associate Curator, Pakistan Museum of Natural History, rafaqat.masroor78@gmail.com, Cell No: 0333-5451331
- Mr. Muhammad Shariq Ahmed, Chief Engineer/Head Environment Division, NESPAK, (Cell # 0333-4579099, email scharique@hotmail.com); recommended for WGs on Water Resources & Biodiversity
- 9. Ms. Pakiza Bukhari AD (TT), EPA- Punjab, Cell No: 0321-9044492
- 10. Rep. from each of EPAs of Sindh, KP & Balochistan Provinces

Secretary:

11. Mr. Muhammad Arif Goheer, Head Agriculture and Coordination Section, GCISC

Working Group on Disaster Preparedness Sector

Lead:

1. Dr. Mohsin Hafeez, Country Representative IWMI, Lahore, m.hafeez@cgiar.org, Cell # 0305-1685569

Members:

- 2. Dr. Hina Beg, DG. NIO, Karachi 03018274900, Hina_baig@hotmail.com
- 3. Malik Hameed Ullah, Director (DRM) PDMA Punjab, Lahore, hameedmalik32@hotmail.com, Cell # 0300 8608687

- 4. Mr. Hussain Shigri, Sr. Engineer (Floods), O/o CEA & CFFC shigri97@yahoo.com Cell No: 0332-5341790
- 5. Mr. Ismail Khan, DRM Specialist, PDMA KP, Lahore Cell # 0345-9297005
- 6. Mr. Riaz Hussain, Deputy Director, PDMA Sindh, Karachi. Cell # 0333-2201264
- 7. Ms. Tehmina Saeed Ch. Director, Lahore Chamber of Commerce & Industry, tehmina@thedatagroup.biz, Cell # 0300-8425787
- 8. Representative from NDMA
- 9. Representative from PDMA Balochistan
- 10. Representative from GBDMA
- 11. Representative from AJK-DMA

Secretary:

12. Mr. Muhammad Shahbaz, Head Climatology & Environment, GCISC, Islamabad (Cell # 03335481767

Working Group on Gender Sector

Lead:

1. Dr. Saima Shafique, Coordinator WASH Programme, M/o Climate Change, saimashafique76@hotmail.com Cell # 0323-4775777

Members:

- 2. Dr. Mamoona Wali Muhammad, Director Forest Education Division, PFI, Peshawar.
- 3. Cell # 03000330355, mamoonamuhammad313@gmail.com
- 4. Ms. Khaola Batool, Deputy Director (HR), M/o Human Rights
- 5. Cell 03325855573, khaolabatool@gmail.com
- 6. Dr. Azmat Naz, Deputy Director (I&S), EPA Punjab, Lahore Contact No. 03314527395, Azmatnaz.125@gmail.com
- 7. Ms. Tehmina Saeed Ch. Director, Lahore Chamber of Commerce & Industry
- 8. tehmina@thedatagroup.biz Cell # 0300-8425787
- 9. Ms. Daniya Khalid, Manager Research, Hisar foundation, Karachi
- 10. Ms. Daniya Khalid, Manager Research, 0345-5571143
- 11. Representative from Gender Cell of NDMA
- 12. Representative from BISP
- 13. Representative from NRSP

Secretary:

14. Ms. Nuzba Shaheen, GCISC 0336-9912433 muzba.geisc@gmail.com

TORs OF ADAPTATION COMMITTEE/ SECTORAL WORKING GROUPS

During the first progress review meeting held on 16th November 2020, following TORs were approved for the TRC on adaption: -

- i. Review the relevant (adaptation part related) provisions of Pak-NDCs submitted earlier to UNFCCC in November 2016;
- ii. Discuss/ Highlight the related adaptation projects implemented/ being implemented in Pakistan during the last 5 years (since 2016) and discuss the difficulties faced therein besides gaps, if any;
- iii. Review and discuss pertinent future adaptation projects proposed for implementation during the next 10 years (possible completion before /by the year 2030), the challenges likely to be confronted in coming years;
- iv. Assess future adaptation needs, in monetary terms at current prices, & contribute technical inputs on adaptation finance related issues; &
- v. Based on the above, present to the National Steering Committee the highest possible adaptation related commitments to address climate change issues/ challenges and adapt to climate change impacts.

Matching TORs for the associated Sectoral Working Groups were as follows: -

- i. Review the relevant (adaptation related sectoral) provisions of Pak-NDCs submitted earlier to UNFCCC in November 2016;
- ii. Discuss/ Highlight the adaptation related sectoral projects implemented/ being implemented in Pakistan during the last 5 years (since 2016) and discuss the difficulties faced therein besides gaps, if any;
- iii. Review and discuss pertinent future adaptation projects of the respective sector proposed for implementation during the next 10 years (possible completion before /by the year 2030), the challenges likely to be confronted in coming years;
- iv. Assess future adaptation needs, in monetary terms at current prices, & contribute technical inputs on adaptation finance related issues; &
- v. Based on the above, present to the Adaptation Committee the highest possible adaptation related commitments to address climate change issues/ challenges and adapt to climate change impacts.

METHODOLOGY ADOPTED BY ADAPTATION COMMITTEE

In line with MOCC's Concept Note on NDCs revision, first communication with stakeholders was made on November 05, 2020 seeking potential nominations for Adaptation Committee & associated sectoral Working Groups as well as progress related to adaptation related projects. In addition to official correspondence, inputs from the concerned organizations and their representatives (nominated/ ex-officio members of TRC & associated WGs) were also obtained by adopting a questionnaire approach. All questions included in the questionnaire were formulated in line with TORs of TRC on Adaptation. The questionnaire was circulated among the members of thematic Adaptation WGs through Whatsapp and Email groups and requisite

feedback on questionnaire was accordingly sought. Progress obtained so, was consolidated by each of the Group Leads in their respective sectoral reports. The same remained under discussion in various meetings of TRC/ associated WGs. Detail regarding meetings of TRC/ associated WGs held regarding revision of NDCs is given below:-

Sr. No.	Date & Venue	Purpose of the meeting
1	November 16, 2020 in O/o	To discuss progress and finalize composition of
	CEA & CFFC	TRC and Associated thematic WGs
2	December 03, 2020 in GCISC.	2 nd Progress Review Meeting
3	January 14, 2021 in NEECA	3 rd Progress Review Meeting
4		Follow up visit to NDMA for meetings with (i)
	January 18, 2021	DRR Wing, (ii) Gender and Child Cell for their
		inputs
5	March 18, 2021	4 Progress Review Meeting/Working Group Leads
	Online	meeting
6	June 09, 2021 in O/o CEA &	5 th Progress Review Meeting/Working Group Leads
	CFFC	meeting

The sectoral inputs were combined to form a single document as a comprehensive and consolidated progress report of TRC on Adaptation. Preliminary draft of the consolidated progress report was discussed during the 4th progress review meeting held on March 18, 2021 and it was observed that in some of sectoral reports details related to climate change adaptation projects implemented/ being implemented since 2016, future adaptation projects proposed for implementation before/by 2030 was missing. Besides total adaptation finance needs of the country up to 2030 should be worked out based on the projects already implemented and those planned so far. Subsequently additional inputs were sought from concerned Provincial departments through D.O letters written to them on December 08, 2020 and June 04, 2021.

STATUS REGARDING SUBMISSION OF THEMATIC PROGRESS REPORT

Detailed Progress Report of WG on <u>Water Resources</u>, as integrated in Section-I of this consolidated report, was prepared and formally submitted by O/o CEA & CFFC to MoCC on January 28, 2021. Progress Report of Working Group on <u>Disaster Preparedness</u> was submitted by the make-shift Group Lead i.e. Dr. Mohsin Hafeez, IWMI, Lahore via email on February 15, 2021. In line with the decision taken during the 4th progress Review meeting held on March 18, 2021, it was sent to NDMA for inclusion of their exclusive inputs. Accordingly feedback from NDMA was received on 5th April 2021 which was forwarded to Dr. Mohsin Hafeez, IWMI, Lahore for incorporation in the initially prepared draft report of WG. Subsequently revised/ improved report of WG on Disaster Preparedness, as received via email Dated April 11, 2021, has been made part of this consolidated report as Section-2.

Group Lead of <u>Gender Sector</u> submitted its final progress report to O/o CEA/CFFC via email on April 12, 2021; the same constitutes Section-3 of the Report. Section-4 comprises of Progress Report of Working Group on <u>Human Health Sector</u> submitted by the New Group Lead Dr. Razia Safdar, Deputy D.G (Technical), Ministry of Health to O/o CEA/CFFC via email on July 06, 2021. Updated versions of progress report of <u>Forestry WG</u> and <u>WG on Biodiversity &</u> <u>Other Vulnerable Ecosystems</u> were received via email on April 12, 2021 and July 01, 2021 respectively. The same are included as <u>Sections-5 & 6</u> of this consolidated report.

Due to his personal commitments, Ex. Group Lead (Dr. Bashir Ahmed, Director NARC) could not submit Progress Report modified in the light of decisions taken during 3rd Progress Review meeting (January 14, 2021). New Group Lead of Agriculture and Livestock WG (Mr. Arif Goheer, Head Agriculture Section GCISC) shared via email on May 24, 2021 the final report of WG related to Agriculture & Livestock Sector. The same is at <u>Section-7</u> of this report.

SECTION – 1: REVISION OF NDCs RELATED TO WATER RESOURCES SECTOR (ADAPTATION SIDE)





OFFICE OF THE CHIEF ENGINEERING ADVISER & CHAIRMAN FEDERAL FLOOD COMMISSION, ISLAMABAD

SECTION – 1: REVISION OF NATIONALLY DETERMINED CONTRIBUTIONS (NDCS) RELATED TO WATER RESOURCES (ADAPTATION SIDE)

1.1 Climate Change Indicators and Impacts on Water Resources

Water is fundamental cross-sectorial component for national climate change planning and to achieve climate change mitigation and adaptation goals. Unpredictable weather conditions due to climate change causes heavy flooding which eventually results in disasters and calamities in country. On the other hand, prolonged drought conditions and water scarcity in the country also adversely affect the water based economy. Highly visible changes can be marked in the intensity, variability and frequency of temperature, floods, droughts, cyclones and precipitation. This reveals that the hazards of climate change are increasingly becoming visible day-by-day over Pakistan.

According to Global Climate Risk Index 2020, Pakistan is ranked 5th most vulnerable country to climate change. Annual temperature rise in Gilgit Baltistan is 1.3 degree Centigrade (for the period from 1900 to 2015) which causes glacier melting and eventual flooding. Since its independence Pakistan has suffered an estimated economic loss to the tune of US\$ 38.053 billion with US\$ 19.040 billion loss occurred during the last 10 years since 2010 floods. The entire region where Pakistan is located is prone to extreme weather events, in particular, heavy rainfall and flooding as a result.

North of Pakistan is the junction of three world's famous mountain ranges known as Himalayas, Karakoram and Hindukush, which possess third largest mass of ice after the Polar Regions. Proven shift in monsoon trend from North East to North West has brought 25 additional districts (11 in Province of Khyber Pakhtunkhwa and 14 in Punjab) to a higher degree of vulnerability to extreme rains, flash and riverine floods.

In Pakistan the average increase in temperature since 1950 is twofold as compared to the rest of the world. Blackening of glaciers clearly reflect high carbon deposition thus resulting into increased glacial melt. Glaciers' melting and heat absorption capacity thus increased manifold raising future concerns on GLOF events. The maximum snowfall has shifted to February and the duration is also narrowing down.

Research has indicated that the Sea Surface Temperature of Arabian Sea has increased and is more than that of the Bay of Bengal. Occurrence of Yemyin, Phet, Nilofer and Ashoba cyclones since 2007 is a clear manifestation of this research outcome.

The economy of Pakistan relies on the agriculture sector, constituting 21 % of the GDP (Gross Domestic Product). It has a great part in fetching foreign income. Pakistan has an agrarian economy and its reliance on climate is indispensable. Pakistan has also adopted 18th

amendment to focus on the climate change effects in the country. Leadership for Environment and Development (LEAD) Pakistan has launched a "Climate Change Portal" for Pakistan.

Pakistan is a small GHG emitter with total GHG emissions amount to 379 million tonnes of Carbon Dioxide (CO2) equivalent and is placed at 132^{nd} place in the world ranking of countries on the basis of its per capita GHG emissions. Hence Pakistan's per capita emission of greenhouse gases is one of the lowest in the world. Yet it is placed in an extremely vulnerable category by a host of climate change indices.

Pakistan remains severely impacted by the negative effects of climate change by the following ways:

- i. Glacier melt in the Himalayas is projected to increase flooding, besides, affecting water resources within the next two/three decades. This will be followed by decreased river flows over time as glaciers recede.
- ii. Freshwater availability is also projected to decrease which will lead to biodiversity loss and reduce availability of freshwater for the population.
- iii. Coastal areas bordering the Arabian Sea (southern parts of the country) will be at greatest risk due to increased flooding from the sea owing to progressive cyclonic activity towards Balochistan and Sindh sea coast.
- iv. Being a predominantly agriculture economy, climate change is estimated to decrease crop yields in Pakistan, which in turn will affect livelihoods and food production. Combining the decreased yields with the current rapid population growth and urbanization in the country, the risk of hunger and food security will remain high to very high.
- v. Endemic morbidity and mortality due to diseases primarily associated with floods and droughts are expected to rise. Increases in coastal water temperatures would exacerbate the abundance of cholera especially in the low lying areas in the vicinity of Balochistan and Sindh Sea Coast.
- vi. The impact of climate change will also aggravate the existing social inequalities of resource use and intensify social factors leading to instability, conflicts, displacement of people and changes in migration patterns.
- vii. As per a study carried out by the World Bank and GFDRR in 2015 entitled "Fiscal Risk Assessment Options for Considerations" if a super food like that of 2010 hits the country again, it will cause an annual economic impact of US\$ 15.5 billion, 7% of GDP will be impacted and 40% of Federal Budget will be impacted owing to damages caused thereon and the relief, rehabilitation and reconstruction needs.

viii. Since its independence Pakistan has suffered an estimated economic loss to the tune of US\$ 38.053 billion with US\$ 19.040 billion loss occurred during the last 10 years since 2010 floods.

1.2 Water Sector related Provisions of Pakistan's First NDC's submitted earlier in November 2016

The review of Pakistan's first NDCs earlier submitted by MoCC in November 2016 to UNFCCC reveals that it relatively remained deficient in respect of details on adaptation when compared with the details provided for mitigation of climate change. Following water sector related provisions of Pakistan's first NDCs earlier submitted by MoCC in November 2016 to UNFCCC have been reviewed for revision/ update under this report;

- Section 1.1 (2nd last Paragraph at Page-6) states that "Pak-INDC has also benefited from the Government of Pakistan's National Climate Change Policy as well as the National Policy on Disaster Risk Reduction, draft National Water Policy (NWP) and draft National Flood Protection Plan-IV. Regarding approval of the NWP & NFPP-IV, following updated information may be made part of the revised NDCs for Pakistan;
 - Pakistan's first-ever National Water Policy (NWP) was approved by the Council of Common Interests on 24th April 2018 which provides comprehensive guidelines for water resources management and development so as to herald a new era for sustainable water resources management and development in Pakistan.
 - Concurrent to NWP, Pakistan Water Charter was signed by the Government of the four Provinces and the Prime Minister showing top most priority to water at the highest political level both in provincial and at the federal level.
 - Federal Flood Commission (FFC) has played a pivotal role in improving the National Flood Protection, Forecasting & Warning System in the country under the umbrella of three 10 yearly National Flood Protection Plans (NFPPs). Since its establishment in 1977, FFC has so far prepared and executed three NFPPs, i.e. NFPP-I (1978-1988), NFPP-II (1988-98) & NFPP-III (1998-2008). Formulation of National Flood Protection Plan-IV (NFPP-IV) began in the aftermath of devastating floods of 2010. Floods of 2011 & 2012 and later of 2014 further warranted for the preparation of Fourth National Flood Protection Plan (NFPP-IV) through nation-wide consultative planning process based on comprehensive and an integrated flood control planning and management approaches. The Consultants were engaged through World Bank funded Water Sector Capacity Building & Advisory Services Project (WCAP) in May 2013. NFPP-IV was prepared during the period of 2 years (2013-2015) with extensive consultations with provinces, Federal Line Agencies & all related federal and provincial stakeholders who have direct or indirect relevance with the impacts of climate change and the consequent impacts/effects in the form of floods, droughts, GLOFs and urban flooding. NFPP-

IV is composed of structural & non-structural measures costing Rs 332.246 billion. For a cogent, well thought out and long term integrated plan requirements, NFPP-IV remained under extensive deliberations process during the four (4) consecutive meetings of CCI, the highest Inter-Provincial Forum at the Federal Level i-e; Council of Common Interests (28th, 29th, 30th and 31st meeting) and was finally approved in CCI's 31st meeting held on **May 2, 2017**. The federation through CCI while approving the NFPP-IV decided that financing of Plan would be made by the Federal and Provincial governments @ 50:50 and the provinces will decide their respective share of contribution among themselves and report to the federal government.

- NFPP-IV by virtue of above is bifurcated into two phases i.e. Priority-I works costing Rs 177.661 billion to be executed in first 5 years whereas Priority-II works costing Rs. 154.585 billion to be executed during next 5 years. Breakup of the local currency and foreign exchange cost of both the Phases of NFPP-IV is attached as Annexure-I. This indicated approximate requirement of US\$ 3.00 billion during the next 10 years for the implementation of entire plan activities comprising structural as well as non-structural interventions.
- Section 1.3 titled 'Climate Variability' generally describes vulnerability of the country to Climate-induced disasters including floods (Refer Page-9). As stated above, Pakistan has suffered a cumulative financial of US\$ 38.053 billion due to floods since independence of which US\$ 19.040 billion loss has been caused by the floods occurred since 2010 to date. Details related to historic flood events and associated damages are attached as Annexure-II for further consideration.
- iii. Water sector related national adaptation priorities as given in Table-2 (Page-15) of Pakistan's first NDCs, need to be reviewed and updated in the light of adaptation related projects/ activities and priorities mentioned in subsequent sections of this report.
- iv. Pakistan's first Nationally Determined Contributions (NDCs) include National Adaptation priorities with Long-term Vision, Medium to Long term action (up to 2030) and Near term action (2020-2025). Long term vision was set to build a climate resilient society and economy by ensuring that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy. In order to achieve long term adaptation vision, Pakistan set some Medium to Long term actions (up to 2030) that address the vulnerability of water, agriculture and infrastructure sectors to climate change. Detail is as under;
 - Improving the irrigation system through actions such as lining of canals and irrigation channels
 - Enhancing water resource management through:

- Integrated watershed management
- Water conservation
- Development and optimization of water resource allocation, implementation of strict water management regulations and utilization of unconventional water resources such as recycling of used water and harvesting rainwater and flood water
- Strengthening risk management system for the agriculture sector
- Implementing a comprehensive Climate Smart Agriculture Programme
- Building climate-resilient infrastructure with focus on improved and safe operation of water-related infrastructure and better management of transport operations and energy transmission, supported by innovations in urban planning for synergistic implementation of mitigation and adaptation actions.

1.3 Adaptation Related Targets set for 2030 and Key Programmes initiated/ Projects implemented

Pakistan's Intended Nationally Determined Contributions (INDCs) and National adaptation priorities 2016 relevant to water sector are rooted in national policies, strategic plans and sectorial targets. Pillar IV of Vision 2025 recognizes the availability of sufficient, reliable, clean and cost-effective water to ensure sustainable economic growth and development. National Water Policy 2018 provides policy framework and guidelines for preparation of comprehensive action plan. National Water Policy is based on approach of integrated water resource management. It was also ensured in the National Water Policy that tentative targets proposed in the Policy would be firmed up in consultation with the Provinces and incorporated in the 12th Five Plan (2018-2023) and 13th Five Year Plan (2023-2028).

In November 2016 when Pakistan's first NDCs were submitted by MoCC to UNFCCC, draft National Water Policy was under process of refinement through consultation with the Provinces as per advice of Law Division. Based on series of meetings with major stakeholders and a consultative seminar organized on November 28, 2016 at Islamabad, refined draft of NWP was submitted to Ministry of Inter Provincial Coordination on January 13, 2017 for approval of the Council of Common Interests (CCI).

CCI considered the draft NWP in its 34th meeting held on November 24, 2017, 36th meeting held on March 27, 2018 and finally Pakistan first ever, **National Water Policy** was approved by the CCI in its 37th meeting held on April 24, 2018 along with signing of **Pakistan Water Charter** as a commitment towards assigning top most priority to the water sector.

1.3.1 Main Targets set under NWP

The most important national targets set under NWP are enumerated below:

- 1) Reduction of 33 percent in the 46 MAF river flows that are lost in conveyance, through accelerated programme of water course lining specially in saline or semi saline areas.
- 2) In order to augment the dwindling irrigation deliveries into the existing canal systems on account of ever decreasing existing storage capacity of Mangla and Tarbela due to sedimentation and to develop new cultivated area on canal irrigated water, the existing water storage capacity of 13.681 MAF shall be increased by immediately starting construction of the Diamer-Basha Dam Project having 6.4 MAF live storage on which consensus of all the federating units has already been achieved in 2009 at CCI level. The existing water storage capacity will be increased up to 10 MAF including Diamer-Basha Dam.
- 3) **Increase of at least 30 percent in the efficiency of water use** by producing "more crop per drop". This will require use of new technologies like drip and sprinkler irrigation and more realistic water pricing policy. The present average rate of water charges per acre is only one fourth of what the farmer pays for tube well water in the ground water market.
- 4) **Gradual replacement and refurbishing of decades old irrigation infrastructure** in accordance with an adequate asset management plan.
- 5) **Real-time monitoring of river flows** by IRSA is to be ensured through inter alia telemetric monitoring to **maintain transparent water accounting system** and to check the increasing trend of unaccounted-for water in the Indus System of Rivers. This task should be completed at the most earliest.
- 6) In order to establish and maintain a reliable assessment of water resources in the country, federal and provincial water sector organizations would **develop a standardized and uniform mechanism for data collection** of various parameters of water resources including but not limited to rivers/canals gauge and discharge, rainfall/snowfall, depth to groundwater table, surface/ subsurface water quality parameters, river/canal and reservoirs sedimentation.
- 7) National Water Policy also recognizes the need to ensure that water sector receives at least 10 percent of Federal PSDP allocation in 2018-19, gradually increasing to 20 percent by 2030. Correspondingly the Provincial Governments may also increase their development expenditure for this sector.

1.3.2 Sub-Sector wise Investment planned for 2030 under NWP

Sub-sector wise estimates of investment needed by 2030 are given below in Table WR-1;

Sub Sector	Investment	Major Projects	
Sub Sector	<mark>(Billion PKR)</mark>		
Storage	1,600	Diamer-Basha Dam, Mohmand Dam	
Conservation	800	HEIS Projects, lining of distributaries and minors, telemetric monitoring, conveyance efficiency	
Drainage	150	RBOD-I, RBOD-II and RBOD-III, reclamation projects	
Flood Control	186	National Flood Protection Plan-IV (NFPP-IV)	
Rehabilitation of Irrigation System	300	Rehabilitation of barrages, headworks and canals	
Sub-Total	3,036		
Research 1% of Sub-Total	30	IWASRI Research Programme, GMRC, Hi-AWARE	
G. Total	3,066		

TABLE WR-1

1.3.3 Progress made so far towards NWP Implementation

In pursuance of Para 29.5.1 of the approved NWP, **National Water Council (NWC)** headed by the Honorable Prime Minister was notified by Ministry of Water Resources on **June 14**, **2018** for implementation of NWP. A **Steering Committee** was also notified on same day i.e. **June 14, 2018 to assist NWC** through inter-provincial coordination, reviewing policy papers and monitoring reports before submission to NWC. Secretary Ministry of Water Resources designated O/o CEA/CFFC as **Secretariat of the National Water Council** on October 10, 2018 under which extensive work on National Water Policy Implementation process including formulation of NWP Implementation Framework, coordinating on first ever meeting of National Water Council was undertaken. In February 2020, it was shifted to MoWR.

Based on consultations with stockholders (concerned Federal and Provincial organizations), O/o CEA & CFFC, through an in-house effort, prepared an Implementation Framework (2018-2030) of NWP comprising 163 actions. The same was sent to M/o WR dated 01.07.2020. Hashoo Foundation provided their support regarding organization of series of meetings with key stakeholders of private sector so as to identify the role of Private sector towards implementation of National Water Policy. Hisar Foundation also extended support by developing the initial draft Framework document.

Actions proposed in the draft Implementation Framework of NWP, prepared by O/o CEA & CFFC have been designed into following four times frames:

- i. **Immediate Actions:** Mainly the ongoing projects likely to be completed within 1-2 years (preferable by end 2020).
- ii. Short Term Actions: Within next 2 years (completion preferable by 2022).
- iii. Medium Term Actions: Within nest 3-5 years (completion preferable by 2025).
- iv. Long Term Actions: within 10-years (completion preferable by 2030)

In addition to the above, following adaptation related activities/ projects have been initiated, carried out/ being carried out for sustainable management and development of water resources in Pakistan, hence, having implications for climate change adaptation as well:-

1.3.4 Enhanced Allocations for Water Sector under Federal PSDP

- → The Government of Pakistan is fully committed to cope with the negative fall-outs of climate change. 'Vision 2025', blueprint for a future-oriented and growth-centric roadmap for Pakistan, clearly recognizes global warming and climate change as priority areas for effective action by the government. Availability of adequate finance is at the core of the battle to confront the adverse impacts of climate change. Based on the above allocation for the water sector in Federal PSDP increased up to Rs 61.616 billion (6.16%) in Financial Year 2018-19 and Rs 85.727 billion (9.01%) during Financial Year 2019-20. In current F.Y (2020-21) allocation of Rs. 182.96 billion for the water sector is 28.14% of total 650 billion budget of PSDP of current financial year which is considerably above target set by NWP for 2030.
- → Similarly Rs 70.384 billion (7%) were allocated in Financial Year 2019-20 and In current F.Y (2020-21) allocation of Rs. 68.452 billion for the water sector is 11% of total budget of PSDP.
- → The provinces were also to enhance water sector allocation under their respective ADPs. In response, as per guide lines of NWP, Provincial Government of KP has enhanced water sector allocation in ADP from 7.4% to approximately 11%.
- →In line with Para 28.11 of NWP, Provincial Irrigation Department, Government of Sindh (PID, Sindh) shared Investment Plan up to 2030 indicating requirement of Rs 220.907 Billion for implementation of various water sector projects.

1.3.5 Construction of Water Storages/Dams

- → Work on two large dams (Diamer Bhasha Dam with live storage capacity of 6.40 MAF and Mohmand Dam with live storage capacity of 0.676 MAF) has been started. Other ongoing large dam projects with WAPDA are Kurram Tangi Dam (0.90 MAF), Gomal Zam Dam (0.892 MAF) and Nai Gaj Dam.
- → In order to meet the funding requirements of Diamer-Bhasha and Mohmand dam projects, (WAPDA) launched its first green Eurobond called the 'Indus bond'. Indus bond is the first green Eurobond in the international capital market by Pakistan. It has

tenure of 10 years. It has been listed on the London Stock Exchange. The bond brought the WAPDA \$500 million at a price of about 7.5 percent interest rate.¹

- → A concept of Climate Change Adaption and Mitigation was introduced for the **Mohmand Dam** (Planned and initiated since September 2019) for the first time in Pakistan. Hence Climate Change Adaptation/Impact Assessment Study was initiated by European Union (EU) for the proposed Mohmand Dam Project in 2013. As a result of this study the Probable Maximum Flood (PMF) of the Mohmand Dam was increased from 23,441 cubic meters per second to 27,427 cubic meters per second. After finalization and approval from Environmental Protection Agency (EPA) Pakistan, this PMF was accepted and considered in detailed design stage.
- → Due to regulated supplies from **Diamer Basha Dam** Project the flood peaks and duration of flood flows in the downstream river reaches will be controlled with somewhat assured likelihood of reduced damages. With the construction of Diamer Basha Dam, a significant reduction of maximum flow at Chashma and Taunsa Barrages will be there, hence, flood alleviation benefits. A reduction in flood damages was estimated at US\$ 20.33 million for the year 2002-03 which was escalated at the rate of 3% per year up to 2017-18 which comes to US\$ 31.67 million per annum, equivalent to PKR 2533.6 Million considering US\$ exchange rate of 2007-08. An estimated 195.5 million tons of sediment will be annually flowing into the reservoir. Trapping of this sediment will significantly change sedimentation pattern in Tarbela Dam and expected economic lifetime of Tarbela will be increased by at least 35 years.
- → Detail of water sector projects under implementation with WAPDA is given in Table WR-2.

Sr. No.	Name of Dams, Canal & Drainage Projects	Location	Estimated Cost Million Rs.	
	Dam Projects			
1.	Diamer Basha Dam Project	Indus River/ Chilas Town	654,686.000	
		(KP&GB)		
2.	Mohmand Dam Hydropower	Distt. Mohmand Tribal, KP	309,558.015	
	Project			
3.	Gomal Zam Dam	Distt. Tank & D.I. Khan KP	26,823.000	
4.	Mangla Dam Raising Project	Distt. Mirpur, AJ&K	111,238.820	
5.	Kurram Tangi Dam	Distt. Bannu, KP	21,059.000	
	Multipurpose Project			
6.	Nai Gaj Dam	Distt. Dadu City, Sindh	46,980.35	
		Total in Million Rs.	1,170,290	

TABLE WR-2

¹ Pakistan Raises \$500 Million in Its First Ever Green Bond (propakistani.pk)

Office of the CEA & CFFC, M/o Water Resources

Sr.	Name of Dams, Canal &	Location	Estimated Cost
No.	Drainage Projects		Million Rs.
	Canals Projects		
1	Rainae Canal	Distt. Ghokti, Sukkur &	18,862.000
	Kainee Canar	Khairpur, Sindh	
2	Kachhi Canal	Distt. Muzaffargarh, D.G.	80,352.000
		Khan & Rajanpur, Punjab	
3	Greater Thal Canal	Distt. Khushab, Bhakkar,	30,467.109
		Layyah & Jhang, Punjab	
4	REMEDIAL MEASURES	Distt. Naseerabad, jaffarabad,	8,565.288
	TO Control Water Logging	Balochistan	
	due to Muzaffargarh & T.P		
	Link Canals Project		
			138,246.288
	Drainage Projects		
1	Lower Indus Right Bank	Dadu/Larkana & Jamshoro,	17,506.018
	Irrigation & Drainage	Sindh	
	(RBOD-I)		
2	Balochistan Effluent Disposal	Distt. Naseerabadm &	10,804.540
	into RBOD (RBOD-III)	Jaffarabad, Balochistan	
		Total in Million Rs.	28,309.54
	Hydropower Projects		10 00 1 0 10
1	Allai Khwar Hydropower	Distt. Battagran, KP	13,834.948
	Project		0.001.470
2	Khan Khwar Hydropower	Distt. Shangla, KP	8,301.479
2	Project		16 224 476
3	Duber Knwar Hydropower	Distt. Kohistan, KP	16,324.476
1	Project	Kalahaah Tayun 224 km from	12 546 800
4	Jinnan Hydropower Project	Kalabagh Town, 254 Kin Ironi	15,540.800
5	Nachum Ibalum Hudronowar	Chattar Kalag AL&K	506 909 610
5	Project	Chattal Kalas, AJ&K	500,808.010
6	Colon Col Hydronower	Distt Chitral KD	20.077.173
0	Project	Disti. Cilitiai, Kr	29,077.175
7	Tarbela ^{1th} Extension	Distt Swabi KP	122 977 000
,	Hydropower Project	Distt. 5wa01, 1X1	122,777.000
8	Keval Khwar Hydropower	Distt Kohistan KP	26 084 178
	Project		20,007.170
0	Dasu Hydronower Project	Diamer Basha Dam 350 km	510 980 110
		from Islamabad	510,500.110
10	Tarbela 5 th Extension	Distt. Swabi KP	82,361.610

Report of the Technical Review Committee on Adaptation

Sr. No.	Name of Dams, Canal & Drainage Projects	Location	Estimated Cost Million Rs.	
	Hydropower Project			
11	Harpo Hydropower Project	Distt. Skardu, GB	9,522.801	
		Total in Million Rs.	1,339,819.00	

 \rightarrow The under study Dam & Hydropower Projects with WAPDA is given in Table WR-3:

Sr. No.	Name of Dams	Location	Estimated Cost Million Rs.	
1.	Naulong Dam	Distt. Jhal Magsi, Balochistan	28,465.000	
2.	Widner Dam	Distt. Lasbela, Balochistatn	1,695.770	
3.	Chiniot Dam	Distt. Chiniot, Punjab	533.303	
4.	Bhimber Dam	Distt. Bhimber, AJ&K	86.089	
5.	Hingol Dam	Distt. Lasbela, Balochistan	421.372	
6.	Tank Zam Dam	Distt. D.I. Khan, KP		
7.	Badin Zai Dam	Distt. Zhob, Balochistan	305.271	
8.	Sukleji Dam	Distt. Bolan, Balochistan		
9.	Murung Dam	Distt. Rajanpur, Punjab	349.956	
10.	Sindh Barrage Project	Distt. Thatta & Karachi, Sindh	327.528	
11.	Chashma Right Bank Canal	Distt. D.I. Khan, KP	477.853	
	Project (left-cum-Gravity)			
12.	Bara Dam of Mashura River	Distt. D.I. Khan, KP	14208.000	
	Khyber Agency, KP			
13.	Daraban Zam Dam	Distt. D.I. Khan, KP	2,750.486	
		Total in Million Rs.	49,620.63	
	Hydropower Projects			
1	Bunji Hydropower Project	Distt. Gilgit, GB	2,091.406	
2	Lower Palas Valley	Patan Town City, KD	196.684	
	Hydropower Project	Tatan Town City, Ki		
3	Lower Spat Gah Hydropower	Patan Town/Dasu Town KP	177.711	
	Project			
4	Patan Hydropower Project	Patan Town/Keyal Khwar, KP	731.233	
5	Thakot Hydropower Project	Thakot/Besham, KP	719.628	
6	Basho Hydropower Project	Basha, Lungma Nullah, GB	91.243	
7	Phandar hydropower Project	Ghizer River/Phandar Lak, GB	120.370	
8	Shyok Dam Project	Distt. Ghanche, GB	159.583	
		Total in Million Rs.	4,287.858	

TABLE WR-3

→WAPDA has also prepared a comprehensive plan for construction of water storage projects upto 2050. The same is given as under in Table WR-4;

Nome of Ducient	River/	Planned	Live Storage	Capacity		
Name of Project	Tributary	Completion Year	(MAF)	(MW)		
Priority up to 2020 ~ 2030						
Mohmand Dam	Swat River	2024	0.67	800		
Kurram Tangi Dam (Stage-II)	Kurram River	2026	0.9	64.5		
Chiniot Dam	Chenab River	2027	0.85	80		
Diamer Basha Dam	Indus River	2027	6.4	4,500		
Sindh Barrage	Indus River	2029	1.8	-		
Wazirabad Reservoir	Chenab River	2030	0.9	90		
Т		11.52	5,535			
Priority up to 2031 ~ 2040						
Shyok Dam	Shyok River	2034	5.0	640		
Kalabagh Dam	Indus River	2038	6.1	3,600		
Akhori Dam	Indus River	2039	6.0	600		
		TOTAL	17.10	4,840		
Priority up to 2041 ~ 2050						
Dudhnial Multipurpose Project	Neelum River	2043	1.0	960		
Mid Ranjha storage project	Chenab River	2043	1.2	80		
Shah Jiwana Dam	Chenab River	2045	1.2	80		
Dhok Abaki Dam	Soan River	2047	1.0	25		
Skardu Dam	Indus River	2050	3.2	1,200		
		TOTAL	7.60	2,345		
GRAND TOTA		36.22	12,720			

TABLE WR-4

→ In Punjab Province Ghabir Dam, Papin Dam Project and in Islamabad region Cherah Dam Project is under construction through federal PSDP.

1.3.6 Rainwater Harvesting

→ICT Administration

RWH Schemes completed by ICT during July 2014 to June 2020

 No. of Check Dams/Mini Dams/RWH Ponds etc. completed by ICT administration = 69 No. (From July 2014 to June 2017)

- RWH Schemes currently in progress with ICT
- No. of ongoing Rainwater Harvesting Forms Ponds = 39 No.

RWH Schemes Planned by ICT up to 2024

- No. of Check Dams/ Mini Dams/ Retention Weirs etc. = 57 No.

\rightarrow Sindh Province

Through federal funding,

- No. of small storage/mini dams completed in Sindh = 28 No. (as of 2019)
- No. of ongoing mini dam projects = 7 No.
- Total storage of the completed mini dams = 166,743 acre-feet (i.e. 0.167 MAF) to irrigate 85,191 acres.

Under provincial ADP,

- No. of small storage dams / delay action dams, retention weirs and I.S.S.O (Impervious sub surface outflow) barriers = 36 No. (as of 2019)
- No. of ongoing mini dam projects = 12 No.
- Total storage of the completed mini dams = 230,951 acre-feet (0.231 MAF) to irrigate 91,409 acres.

\rightarrow Khyber Pakhtunkhwa

In KP, 13 No. of small dams have been completed while 14 No. small dams are under various stages of execution.

\rightarrow Balochistan

Numbers of small storage and delay action dams are under construction in Balochistan province. Detail is given below;

- Abato dam and Sanza dam stand completed in Chaman area while work on Diasara dam is in process;
- District Killa Abdullah: 65 out of 200 ongoing dams completed while work is in progress on remaining sites;
- District Killa Saifullah: work on 71 dams out of 100 ongoing dams have been completed;
- Construction of Delay Action Dams in Balochistan in different areas
 - Package-I (out of 100 approved sites, work on 20 dams completed)
 - Package-II (out of 100 approved sites, work on 24 dams completed)
 - Package-III (out of 100 approved sites, work on 20 dams completed)
 - Package-IV (PC-I under approval process)

Detail of ongoing small check/ delay action dam projects of Balochistan is given below;

- Construction of 200 Small Check Dams for Ground Water Recharge in Quetta
- Construction of 100 Delay Action Dams in Tehsil Dobandi, Gulistan, Killa Abdullah and Chaman area, District Killa Abdullah
- Sirki Taleri Dam (3 Small Dams in Chaman area, 100 Dams Package-III
- Construction of Small Dams in Tehsil Khaliqabad District Kalaat (4-27)
- Construction of 10 No. Small Storage Check Dams Arenji Area, Wadh, District Khuzdar
- Construction of Bugmaodwan Storage/Delay Action Dam District Chaghi
- Construction of Small Dams in District Khuzdar
- Development of Water Resources by Construction of Small/Check Dam
- Construction of 100 dams in Balochistan Package-IV (23 dams)

<mark>→AJ&K</mark>

- Construction of 600 No. water tanks and harvesting structures for storage of 45 lac gallons of water is in progress (Physical progress = 21%)
- Feasibility study for Bhimber dam project (Storage capacity 40,000 AF) stands completed jointly through PSDP (50%) & ADP (50%)
- Feasibility Study of 34 mini dams to store 14,200 AF of water has been completed (Donor assisted).
- → Office of Chief Engineering Adviser/ Chairman, Federal Flood Commission and UN Habitat has jointly developed Concept Proposal (CP) titled "Operationalization of National Water Policy by Demonstrating Rainwater Harvesting in Islamabad Region and Downstream Flood Reduction". The objective of the project is to implement rainwater harvesting as effective climate adaption strategy for: a) Urban Flood Water Management; b) Control Surface Runoffs and Storm Water onsite; and c) Mitigation of Urban Flood. In that context, Concept Clearance Paper (CCP) costing <u>Rs 403.70</u> <u>million</u> was forwarded on December 2, 2019 to Ministry of Planning, Development & Special Initiatives through Ministry of Water Resources for further processing/approval. CCP stands approved by CDWP on March 03, 2020. <u>The project has been planned to be executed in a period of three years for which PSDP allocations will be required under PSDP-2020-21, 2021-22 & 2022-23</u>. The PC-I is under preparation.

1.3.7 Establishment of Groundwater Regulatory Authorities

→In pursuance of approved National Water Policy, the Provincial Governments are working on establishment of Groundwater Regulatory Authorities to regulate

groundwater extraction for appropriate water pricing for industrial, agricultural and domestic use.

- → Punjab Water Policy 2018 was approved by the Government of the Punjab followed by the Punjab Water Act 2019 passed by the Punjab Assembly on November 20, 2019 for conservation and regulation of water resources in the province. In line with Section-3 of the Provincial Act, Punjab Water Resources Commission, headed by the Chief Minister, Punjab has been notified on May 11, 2020 mainly responsible for water conservation, water allocation and securing proper use of water resources. Similarly as per Section-7 of Punjab Water Act 2019, a new authority namely Punjab Water Services Regulatory Authority had also been notified on May 11, 2020 by the Punjab Government for registration and regulation of water resources including issuance of licenses for abstraction of groundwater for domestic, agricultural, ecological, mining and industrial purposes (PID, Punjab letter No. SPRU/ESSG/2020 dated October 07, 2020).
- → Government of Sindh vide letter No. SO(R&S) 8-109/2018/NWP dated June 11, 2020 informed that case for formal approval of Chief Minister Sindh has been processed regarding formulation of Draft Act for establishment of Groundwater Regulatory Authority.
- → KP Government has initiated work on formulation of Groundwater Regulatory Act and subsequent enactment with the approval of their respective Provincial Assembly through establishment of Groundwater Regulatory Authority.
- → Government of Balochistan vide letter No SO(D)1-140/2020/1502-4 dated 12th October 2020 has informed that process of institutional restructuring and legal reforms in the water sector has been started to update the existing laws and regulation in line with NWP.
- → Government of AJ&K vide its letter dated June 18, 2020 intimated that establishment of an independent Groundwater Regulatory Authority in AJ&K would not be feasible. However, Irrigation Department, Government of AJ&K has already been mandated to ensure sustainability, safety, and affordability of groundwater under Rules of Business.

1.3.8 Water Use Efficiency and Conservation

→ Based on Prime Minister's priorities to conserve water, improve water use efficiency and reform the way water is managed in agriculture and help farmers to cope with the water scarcity under climate change, with the support of FAO, Ministry of Climate Change has undertaken project titled 'Transforming Indus Basing with Climate Resilient Agriculture and Water Management'. The project mainly aims to develop the climate smart water management and information system and build on-farm resilience to climate change. The project has been initially proposed to be piloted in five Districts of Punjab and three districts of Sindh province.

- → PCRWR provided Irrigation advisory services to 21,000 farmers in 41 districts of Pakistan. The service is being up scaled to 100,000 farmers.
- → Scientific monitoring of trans-boundary groundwater aquifers along the Eastern Rivers" was also being done by the PCRWR. The study is expected to be completed by 2021.
- → PCRWR also carried out implementation of following water management projects related to Climate Change adaptation

PSDP Projects (2014-2021)

- Demarcation of groundwater quality zones in Indus plain and marginal areas for sustainable development and management of groundwater (Lower Indus Plain) (2014-18) PSDP
- Integrated water resources management in the highly depleted Pishin Lora Basin of Balochistan (2014-18) PSDP
- Trans-boundary effects on ground and surface waters along the eastern border of Pakistan (2017-2020) PSDP
- Improved land and water conservation practices to enhance waste land productivity in Thal desert (2017-2021) PSDP
- Exploration of groundwater potential and promotion of interventions for rainwater harvesting and bio saline agriculture in Thar (2017-2021) PSDP

Collaborative Research Projects/ Studies (2016-2020)

- Assessment of environmental degradation of Manchar lake US-PCASW 2016-17 Groundwater investigations of five districts of KP (Peshawar, Charsadda, Swabi, Nowshera and Mardan) 2018
- Developing approaches to enhance farmer water management skills in Balochistan, Punjab and Sindh in Pakistan (2016-2020)
- Improving groundwater management to enhance agriculture and farming livelihoods in Pakistan, 2016-20
- Water conservation through smart water metering and pricing in Pakistan 2018
- Characterizing hydrology of the eastern rivers of the Indus Plain (Sutlej, Ravi, Jhelum and Chenab) under the project "Strategic strengthening of flood warning and management capacity of Pakistan Phase-II" UNESCO 2015-18
• Agricultural water, energy, and hazard management in the upper Indus Basin for improved livelihood and building resilience, Gilgit-Baltistan (Phase-II) 2016-19

Detail of each of above stated project is given in Annexure-III.

1.3.9 Lining of Distributaries & Minors

→ Federal Government is financing a Programme for 'Lining of Distributaries & Minors in Sindh province costing Rs 13,828.322 million'. Under this project, 109 channels have to be lined, out of which, 55 have been completed whereas 32 are in progress. The total length of 860 miles/ 1384 km has to be completed and it is expected to save 950 cusecs of water. Under provincial ADP, about 52 schemes have been completed with cost of Rs. 22,085.010 million, covering the lining of about 631.588 miles /1016.41 km of main canals, distributaries and minors. The lining work on 37 numbers of schemes of total 567.539 miles/ 913 Km is in progress with cost of Rs. 37,179.904 million, which after completion, is expected to save 1,100 cusecs of precious water.

1.3.10 Modernization of Irrigation and Drainage System

- → As per Action Plan 2018-2023 submitted by KP in June 2020, Government of KP aims to enhance agricultural area by bringing the additional 300,000 acres of land under irrigation by construction of construction of small dams and new canals. It would help the Province to utilize allocated share of water as WAA of 1991. Provincial Government also plans to construct sub-surface dams for groundwater recharge and carry out interventions like solar power driven agricultural Tube wells, rainwater harvesting and efficient use of water etc. PID, KP has accordingly indicated requirement of Rs 24.027 billion for implementation of proposed projects upto 2023.
- → Through World Bank funding, PID Sindh has been implementing a 'Water Sector Improvement Project' which aims to modernize irrigation & drainage system in a systematic way and deal with floods & drainage issues so as to increase agricultural production, employment and income through irrigation of over 1.8 million ha in Sindh province. The total cost of project is Rs. 30,353 million, out of which World Bank Loan is Rs. 28,840 million and Rs. 1513 million is Sindh share. Overall progress is 85%.
- → Irrigation Department, Government of the Punjab has completed the rehabilitation/ remodeling & modernization works at Jinnah, Taunsa, Baloki, and Khanki Barrages whereas rehabilitation/ remodeling & modernization work was near completion at Sulemanki (99.96%) and in progress at Trimmu (91%) and Panjnad (52%). New Khanki Barrage has the enhanced capacity 11.0 lac cusecs as against old capacity of 8.5 lac cusecs. Capacity of Baloki Barrage has been increased from 2.25 lac cusecs to 3.8 lac cusecs.

- → Rehabilitation work at Trimmu (with capacity to be enhanced from 6.45 to 8.65 lac cusecs) is planned to be completed by June 2022. Rehabilitation work at Panjnad Barrage (with capacity enhancement from 7.00 to 8.65 lac cusecs) is likely to be completed by June 2022.
- \rightarrow In Sindh, rehabilitation and modernization of Guddu Barrage and its associated structures is under process. Rehabilitation of Sukkur Barrage is also ongoing.
- → Baran Dam Raising has been taken up by Irrigation Department, Government of KP which envisions raising the dam height from present 120 feet to 142.90 feet (by 7 meters), thus increasing its storage capacity from 12,500 acre-feet to 100,000 acre-feet.
- →O/o CEA/ CFFC is collaborating with College of Hydrology and Water Resources, Hohai University, China for establishment of International Joint Smart Water Management Research & Training Centre for conducting Joint Research on hydrology, water resources, smart water management and mitigation of floods hazards. CCP of the project was approved by CDWP on March 03, 2020, based on which PC-I is at final stage of preparation.

1.3.11 Flood Protection

- → FFC has played a pivotal role in improving the National Flood Protection, Forecasting & Warning System in the country under the umbrella of three 10 yearly National Flood Protection Plans (NFPPs). NFPP-IV formulation began in the aftermath of devastating floods of 2010. It was formally approved by the CCI in May 2017, after a rigorous consultative process both at technical and political levels. NFPP-IV targeted to protect **2,479,555 hectares** area from inundation by flood water, **779,250 hectares** of lands from erosion besides reclamation of **154,180 hectares** of eroded land.
- → Aligned with the identified priorities of NFPP-IV, Concept Clearance Paper (CCP) for FPSP-III (Costing Rs 95.980 Billion) was prepared and forwarded to Ministry of Water Resources for further processing on 6th December 2019. CDWP approved the CCP on March 03, 2020 based on which Umbrella PC-I drafted through in-house capacity was submitted to Planning Commission on July 23, 2020 through MoWR for further processing/ approval by CDWP/ECNEC. PC-I has since been approved by the CDWP on October 12, 2020 and recommended the project for approval by the ECNEC once project donors are identified. For that purpose, Government of Pakistan through EAD has approached ADB/NDMRF, the World Bank, KfW, Sendai Fund, JICA, IBD, etc.
- → Under FPSP-III, PMD has proposed four projects indicating their requirement for installation/ replacement of Weather Radars (Cherat, Mangla, Sialkot, Lahore & Rahimyar Khan) and procurement of new Automatic Weather Stations (AWS) for catchment areas of Rivers in Balochistan and KP as well as establishment of Flood Early Warning Centers in Gilgit, Peshawar, Multan and Quetta. **These projects with**

total estimated cost of Rs 4.5 billion have already been technically scrutinized by FFC and PMD has been requested for their early further processing.

- → Under GoP funded Normal/ Emergent Flood Programme, total 31 No. emergent nature flood protection schemes costing Rs. 1,110 million were taken-up for implementation through Provincial Irrigation Departments of four provinces, FLAs (GB-PWD, Merged Areas and Irrigation & Small Dams Organization, AJK) during FY (2018-19 and 2019-20). GoP has allocated Rs. 1500 Million under Normal/ Emergent Flood Programme for implementation of 44 No. emergent nature flood protection schemes during CFY 2020-21. Finalization of PC-Is including their technical scrutiny, site inspection and consideration through Scrutinizing Committee is under process.
- → CCP of two (2) No. Flood Protection schemes of Sindh Province titled (i) "Construction of Retaining Wall along downstream Right Marginal Bund from mile 0/0 + 200 to 1/5 Guddu Barrage, Estimated Cost Rs. 800 million, (ii) Retaining Wall along Ganj Diversion Bund in Johi Division at Dadu, Estimated Cost Rs. 500 million" stand approved by CCC/ CDWP on 16th September 2020. PC-I being prepared through Irrigation Department, Government of Sindh. EAD has requested JICA HQ for arrangement of funds through Grant-in-Aid Programme.
- → FFC through M/o WR requested for the provision of **Technical Advisor on Flood Risk Management** by JICA. The Advisor is expected to mobilize in FFC in the next Japanese Fiscal Year commencing from March/ April 2021. The performance of O/o CEA/CFFC would be improved in the following areas:
 - a. Integrated flood management with innovative techniques especially being currently practiced in Japan.
 - b. Hydrological and Hydraulic modeling through on-the-job training and establishment of a GIS & River Hydraulics Modeling Cell.
 - c. Preparation and implementation of National Water Policy framework for <u>flood and hydro-meteorological related portion.</u>
 - d. Introduction and capacity building of new tools and engineering softwares through GIS and River Hydraulics Modeling trainings.
 - e. Institutional strengthening of O/o CEA/CFFC (equipment, logs, IT/softwares etc.)
- → Ministry of Climate Change project titled "Recharge Pakistan: Building Pakistan's Resilience to Climate Change through Ecosystem Based Adaption for Integrated Flood Risk Management" is also included in 3rd Flood Protection Sector Project (FPSP-III) based on NFPP-IV. Concept Paper already stands approved by CDWP of Ministry of PD&SI on March 03, 2020. Four RAMSAR sites are included in this project for re-routing of flood water. The PC-I is under preparation. FFC alongwith MoCC shall be the executing agency of Recharge Pakistan Project's Feasibility Study for which selection of consultancy firm is under way.

- → GLOF-I Project titled "Reducing Risks and Vulnerabilities from Glacial Lake Outburst Floods in Northern Pakistan" was the first climate change adaptation project at the Government level which was initiated under a joint collaboration of the Government of Pakistan, UNDP and the Adaptation Fund (Green Climate Fund). The Ministry of Climate Change implemented the project while UNDP in Pakistan provided technical assistance and oversight to the project. The project area mainly included Bindo Gol (Drongagh, Gohkir & Shogram) Valley in Chitral District of Khyber Pakhtunkhwa Province and Bagrot Valley in Gilgit District, Gilgit-Baltistan. Following are the main outputs of the project:
 - Meteorological observatories were installed at both pilot sites/target valleys at Bagrot and Bindo Gol and are completely functional. Meteorological data is recorded by trained community volunteers on a regular basis;
 - Base line studies on knowledge, attitude and practices (KAP) and glacial lake outburst floods socioeconomic impact studies conducted in both the pilot sites;
 - Awareness raising workshops on climate change including glacial lake outburst floods issues held for communities, government officials and local nongovernment organizations;
 - The capacity need assessment exercise conducted in Islamabad, Gilgit and Chitral to identify and address the key capacity gaps in the glacial lake outburst floods risk management at various levels to enhance the capability of the relevant stakeholders of the project;
 - The planned surveys and data collection for risk and vulnerability assessment and feasibility surveys for the establishment of automatic weather stations have been completed;
 - Installation of Early Warning System at both pilot sites;
 - Development of glacial lake outburst floods communication and awareness raising strategy;
 - Strengthening of district disaster response cells and relevant lined departments in Chitral and Gilgit;
 - Development of glacial lake outburst floods risk reduction plans of Bagrot and Bindo Gol (Drongagh) and districts Chitral and Gilgit; &
 - Case studies were conducted to document best practices on glacial lake outburst floods related disasters
- → Proposal for Strengthening and Capacity Building of Office of CEA/ CFFC costing Rs. 494.788 million prepared by FFC, has been submitted to MoWR on December 13, 2019. Follow up letter sent on May 18, 2020. Similar Capacity Building Proposal for Strengthening of Dam Safety Council of O/o CEA & CFFC has also been sent to Ministry of Water Resources. In this context, follow up letter sent to on December 09, 2020.
- → Dam Safety Council of O/o CEA & CFFC acts as Secretariat of PANCOLD. As per guidelines of PANCOLD, data for large dams in Pakistan is being updated for inclusion

in International Register of Dams maintained by ICOLD. The list of dams included in the **National Register of Dams** has been updated for the Punjab, KP and Sindh Provinces while it is being updated for Balochistan.

- → Seven Professionals of O/o CEA & CFFC were sent abroad (China, Nepal, Turkey, Indonesia, Japan and Malaysia) during the period from 2017 to date for attending various Technical Training Programmes for their capacity building in the field of Integrated Water and Flood Management besides Hydropower Planning & Operation.
- → As per charter of duties of Federal Flood Commission "Standardization of Design and Specification for flood protection works" is one of the main duties. Office of CEA/ CFFC has already prepared "Design Criteria of Flood Protection Works" in 2001 through the consultants engaged for the design and supervision of Flood Protection Sector Project (FPSP-II). Due to innovation in the technology and based on the lesson learnt after devastating floods of 2010, FFC has made some modification in the design in 2011 based on field experience of past floods and utilization of new innovative technology. FFC recently organized a meeting of all stakeholders i.e. Irrigation Departments of all four provinces, GB-PWD, AJK, PMD, WAPDA, IRSA, NHA, Pak Railways and PEC on 26th January 2021, wherein the possibility of changes in design was thoroughly discussed. The revised design criteria will be finalized accordingly by June 2021.
- → WAPDA in collaboration with FFC has prepared CCP for procurement and installation of **45 No. Flood Telemetry**, costing 5 million (USD) for improvement in the Early Warning System being financed by JICA through Grant-in-Aid programme. CCP stands approved by CCC/ CDWP on 3rd March 2020. PC-I is in final stage of preparation. Arrangement of Grant-in-Aid from **JICA** by EAD is under process.
- → Joint CCP regarding Grant-in-Aid Project through TIKA on Procurement & Installation of AWS & Flood Telemetry Stations and Capacity Building of office of CEA/ CFFC, Estimated Cost Rs. 649.60 million, based on inputs of PMD & WAPDA and in line with the decision taken in the meeting held in M/o NFS&R on January 4, 2021, has been prepared and submitted to Ministry of Water Resources for onward submission to Ministry of PDR &SI for approval.
- → CEA/CFFC performed as Federal Member IRSA (in the absence of Federal Member) and as member of the IRSA Advisory Committee. Technical inputs were sent to M/o WR on 17.4.2020 regarding IRSA's PC-I of "Automation of 07 key sites for Discharge Monitoring"
- →WAPDA at the initiative of and in coordination with FFC is developing a country-wide National Flood Telemetry Master Plan comprising of details relating to provision of expansion and modernization of telemetry system in four (04) provinces, Gilgit-

Baltistan and AJ&K. The Plan will cover the main river system, the secondary and tertiary rivers, all small streams/nullahs, hill torrents etc. having overall significance towards our precious water resources with regard to quantity, contribution and health of total surface water on efficient utilization. Once made and implemented on priority basis, this will immensely support FFC-WAPDA's real-time contribution in the issuance of most precise reservoir operation criteria by IRSA, once IRSA's water accounting system on main Indus River System is operational, real-time forecasting/now casting by PMD/FFD and effective country-wide management of floods by all concerned under the existing flood risk management mechanism under the auspices of the O/o CEA/CFFC.

1.3.12 Bilateral International Collaborations

- →A MoU on corporation in the field of Water Management between the Ministry of Interior of Hungary and the Ministry of Water Resources of the Islamic Republic of Pakistan was signed on 13th July 2020. CEA/CFFC is Focal Point on the MoU from Pakistani side. A Joint Expert Group (JEG) for implementation of the MoU has also been notified. 1st meeting of JEG regarding MOU implementation held on 17.12.2020 and 2nd follow up meeting with Members of JEG held on 7.1.2021. Similar MOU has also been signed by GOP with Australia on September 18, 2018. A MoU of cooperation between Pakistan National Committee on Irrigation and Drainage (PANCID) and Chinese National Committee on Irrigation and Drainage (CNCID) is also in process.
- → MOU on the Sino Pakistan Smart Water Management Project was also prepared and processed with M/o WR. Replies to observations of M/o WR regarding Memorandum of Understanding (MOU) on Cooperation in the Field of Hydrology, Flood and Water Resources Management between HOHAI University of Peoples Republic of China and Office of CEA/CFFC, were submitted to M/o W/R on December 22, 2020.

1.3.13 National Report on SDG Indicator 6.5.1

- → The office of the CEA/CFFC was designated as the National Focal Point to report on Pakistan's progress to UNEP on SDG Indicator 6.5.1, as degree of Integrated Water Resources Management (IWRM) Implementation. In the above context, one-day obligatory Consultative Workshop/ Stakeholders Conference on SDG 6.5.1 Indicator (IWRM) was successfully organized by this office in collaboration with Pakistan Water Partnership (PWP) on July 20, 2020 at Islamabad.
- \rightarrow Based inputs obtained from all related Federal and Provincial on stakeholders/Departments during this exercise of 2020, National SDG 6.5.1 score of '56' was worked for Pakistan which is considerably greater than earlier national SDG 6.5.1 score of '50' worked out in 2017 during the similar workshop held in Islamabad on 20^{th} December 2017. This indicated improved degree of implementation of Integrated Water Resources Management (IWRM) in Pakistan. National Report on

SDG Indicator 6.5.1 (Integrated Water Resources Management) finalized by O/o CEA & CFFC for Pakistan was submitted to the concerned quarters on July 30, 2020.

- → Secretary, Ministry of Water Resources was informed on September 01, 2020 about successful organization of Stakeholder Conference on sustainable Development Goal Indiacator 6.5.1 held on 20th July 2020" and subsequent excellent remarks received from UNEP.
- →On request of Ministry of Water Resources, template for SDG Indicator 6.5.2 related Transboundary cooperation on water issues in Pakistan was also filled-in and submitted to Ministry of Water Resources on June 05, 2020.

1.4 12th Five Year Plan 2018-2023 and its Key Deliverables

12th Five Year Plan ensures implementation of National Water Policy. To achieve the objectives of water-energy-food security by creating new storage facilities and increasing system efficiency for water conservation, 12th Five Year Plan prioritizes and line up investments for water sector. Based on that, detail regarding major on-going & future interventions in Water Resources Development sector are given below in Table WR 5;

Description	On-going Projects	Planned Interventions		
Large/Medium Dams	 Diamer-Basha Dam Mohmand/Munda Dam Gomal Zam Dam Kurram Tangi Dam (Kaitu Weir) Nai Gaj Dam Naulong Dam Ghabir Dam Construction of Mangi Dam Construction of Basol Dam Papin Dam Raising of Baran Dam 	 Kurram Tangi Dar (Stage-II) Chiniot Dam 		
Small Dams/ Delay Action/ Recharge Dams	All provinces	All provinces		
New Canals/Intra- basin water transfer	Rainee Canal (Phase-I)Kachhi Canal (Phase-I)	 Greater Thal Canal (Phase-II) Rainee Canal (Phase-II) Kachhi Canal (Phase-II) CRBC 		
Water Conservation/ Eradication of Contamination	 Canal lining in all provinces Rehabilitation of irrigation systems in all provinces Remodeling of Warsak Canal 	 Lining of KB Feeder Upper Canal for water supply to Karachi City Construction of Feeder 		

TABLE WR 5

Description	On-going Projects	Planned Interventions
	• High Efficiency Irrigation System in all provinces	canal to Manchar Lake to eradicate contamination
Flood Management	 Normal Emergent Flood Programme Other flood Management programs being implemented in all provinces. 	• National Flood Protection Plan-IV.
Drainage	 Lower Indus Right Bank Irrigation & Drainage (RBOD-I) RBOD-II Balochistan Effluent Disposal into RBOD (RBOD-III) Remedial measures to control water logging due to Muzaffargarh & TP Link Canals 	• The programs will be continued in future
Rainwater harvesting/Hill Torrents management	 A feasibility study on Rain Water Harvesting/Hill Torrents Management is in process. Survey and Study Design for construction of rain water dams (along river Indus in Sindh) 	• Future projects on the basis of feasibility study will be taken up for implementation.

The resource allocation and project/programme implementation under the 12th Plan should lead to the following deliverables.

<u>At Policy Level</u>

- Updation and implementation of National Water Policy as per manifesto of the ruling party to increase the water storage from 30 days to 41 days.
- Launch of National Flood Protection Plan costing Rs.177.6 Billion

Related to Water Resources Development Projects

- Substantial completion of Diamer Basha Dam (Dam Component)
- Substantial completion of Mohmand Dam (Dam Component)
- Completion of Part of Kachhi Canal Project (Phase-I)
- Completion of Nai Gaj Dam
- Operationalization of Darawat Dam
- Operationalization of Gomal Zam Dam
- Completion of Kurram Tangi Dam (Kaitu Weir)\
- Operationalization of Satpara Dam

Increase in Water Availability

- After completion of on-going medium/small dams during the 12th Five Year Plan's tenure it is, expected that water storage capacity will be increased up to 41 days from existing 30 days.
- Cumulative water availability (at farm gate) is planned to increase from 133.40 MAF to 137.90 MAF by the end of 2023.

1.5 Adaptation Related Allocations already made and Future Monetary Needs

The total allocations for Water Sector Projects for Climate Change Adaptation will be Rs. 1,089 billion (Rs.519 billion Federal and Rs.570 billion Provincial) in the 12th Five Year Plan (2018-23).

1.5.1 Federal Programme

The year-wise federal and provincial details of the investment plan is given in Table WR-6.

Sr. #	Sub Sector	2018-19	2019-20	2020-21	2021-22	2022-23	Total
On-g	On-going Programme (Rs. Billion); Throw-forward Rs.479 billion (as on July 2018).						
1	Basha & Mohmand	25.00	35.00	45.00	55.00	70.00	230.00
	Dam						
2	Medium/small	15.81	13.00	18.00	20.00	30.00	96.81
	Dams						
3	Canals	4.50	8.00	10.00	10.00	15.00	47.50
5	Drainage	10.66	5.40	8.00	11.00	15.00	50.06
6	Irrigation System	5.92	1.00	5.00	8.00	11.00	30.92
	Improvement						
7	Flood Protection	1.00	0.50	1.00	2.00	2.00	6.5
	Programme						
8	New initiative	0.74	6.80	8.00	12.00	14.68	42.22
	(Canals &						
	Research)						
9	Miscellaneous			5.00	5.00	5.00	15.00
	scheme						
	(Watershed						
	Management						
	activities)						
	Total	63.62	69.70	100.00	123.00	162.68	519.00

TABLE WR-6

1.5.2 Provincial Programmes

Refer to TABLE WR-7 below;

TABLE WR-7

Province	Themes	Financing (Rs.
		Billion)
Punjab	• Integrated Water Resources Management through	244.878
	implementation of IWRM Framework. Operation	
	and up keeping Irrigation System of Province	
	• Sustainable management of water resources and	
	optimal use of water resources by the equitable	
	distribution of irrigation water supplies.	
	• Flood Management & promoting the participation	
	beneficiaries in the management of Irrigation &	
	Drainage system.	
	Climate Change & Transboundary water issues	
Khyber	• Irrigation System sustainability	38.061
Pakhtunkhwa	• Management of flood water and harnessing of hill	
	torrents.	
	• Groundwater regulation and water pricing	
	Flood & Drought Management	
	• Public Private Partnership.	
	• Institutional Strengthening & capacity building	
Sindh	• Tackle water scarcity issue through both	225.889
	augmentation and conservation i.e. by constructing	
	medium and large dams, making more efficient	
	and sustainable use of water and existing irrigated	
	areas.	
	• Climate change and inter-provincial issues	
	• Control the impact of water logging, salinity and	
	floods hazards	
	• Managing (in terms of both quantity and quality)	
	drainage, municipal and industrial effluent in an	
	environmentally safe manner.	
Balochistan	• Tackle water scarcity issue through both	61.013
	augmentation and conservation i.e. by constructing	
	medium/large dams and improving water use	
	efficiency through agricultural engineering	
	measures.	
	• Regulating ground water pumpage and its	
	management.	

Province	Themes	Financing (Rs. Billion)
	 Ensuring sustainable water supply, particularly to urban hub of Quetta and Coastal area e.g Gwadar Enhance Public sector investment including Public-Private Partnerships (PPP) for construction of small and medium size dams and coping water scarcity through all possible means. 	
Total		569.840
Provincial		

Source: 12th Five Year Plan (2018-2023)

1.5.3 Public Sector Development Programme (2020-2021)

Allocation for water sector projects in Public Sector Development programme (PSDP 2020-21) is Rs.68.652 Billion for total 84 projects. Provinces -wise allocation details of projects are given in table below in Table WR-8.

TABLE WR-8

Location	No. of Projects	Allocation for PSDP 2020- 2021 (Rs. Billion)	
National	07	21.368	
Balochistan	50	23.713	
Sindh	10	8.402	
КРК	13	12.127	
Punjab	04	1.541	
Total	84	68.652	

Sub-sector wise number of projects initiated in PSDP 2020-21 are given below in Table WR-9.

TABLE WR-9

Sub-Sector	PSDP 2020-21
Storages/Dam	63
Irrigation	5
System Improvement	8
1.Modernization of Barrages	
2. Rehabilitation & Remodeling irrigation	
3. Lining of Water Channels	
4. Institutional Strengthening	

Sub-Sector	PSDP 2020-21
Drainage	6
Flood Control	2
Total	84

1.5.4 Total Monetary Needs

Ensuring water, food and energy security of the country in the face of the climate change challenges and minimizing risks related to increased frequency and intensity of extreme weather events are important objectives of National Climate Change Policy (NCCP) of Pakistan. NCCP was approved in September 2012 and all important water resources management & development related measures documented in NCCP were taken into consideration and expounded well in the National Water Policy (NWP) which was subsequently approved by the CCI on April 24, 2018.

NWP relatively better explains the national priorities in terms of quantification of targets and setting the timelines and investment required to achieve them. Time horizon set for achievement of NDCs and National Targets set under NWP remains the same i.e. 2030. Subsector wise estimates of investment needed by 2030 were worked out in 2018 to tune of Rs 3,066 Billion as per the breakdown provided in section 4.2 above.

In line with the approval of NWP, the water sector of the country has got clear direction to move towards IWRM for attaining sustainable development. Government of Pakistan has significantly increased the funding for water sector projects and started the construction of two (02) mega dams to overcome vast variations in seasonal water availability for food security and environment sustainability.

Ongoing intervention in water sector for climate change adaptation also include construction of Medium Dams, Small/Delay Action/Recharge Dams, Irrigation Canals, Water Conservation by Canal Lining, Rehabilitation of Canals, Flood Management, Drainage system and Rainwater Harvesting. Total monetary needs for the projects were Rs. 1,088.841 Billion in five years 2018-2023. After completion of on-going dam projects, water storage capacity will be increased up to 41 days from existing 30 days. With ongoing Water Conservation Techniques/ Projects cumulative water availability at farm gate can be increase from 133.40 MAF to 137.90 MAF by the end of 2023.

1.6 Key Issues & Challenges of Water Resources Sector

The major issues and challenges of water sector in Pakistan are as follows;

i. Over extraction of ground water is an exigent issue requiring immediate action.

- Country water laws (Sindh Irrigation Act 1879, Punjab Irrigation & Drainage Authority Act 1997, Sindh Canal and Drainage Laws/ Sindh Water management Ordinance 2002, KP's Act of 1948, KP's Irrigation & Drainage Authority Act 1997, Balochistan Canal and Drainage Ordinance 1980 etc.) are old and were conceived based on abundant water resources, however, conditions are much changed now and laws need to address water security situations.
- iii. Water conservation, recycling of water and rain water harvesting should be encouraged to address water security issues.
- iv. Over use of water in agriculture sector needs serious and immediate attention. Irrigation consumes over 90% of the country's water resources. Irrigation practices are highly unsustainable and result in loss of significant amount of water. Water returns in term of crop per unit of land are one of the lowest in the world.
- v. Pollution of fresh water bodies needs immediate attention. In this respect, proper implementation related regulation at local levels is also a challenge. Environmental protection act (EPA) needs to be strictly enforced to address water borne diseases and reduce mortality rate.
- vi. Transboundary water management arrangements have worsen over last few years. Transboundary water data for flood and drought management was not being shared by India since last 2-3 years.
- vii. Limited management of water-related ecosystems. Environmental flows are also not part of Indus Basin Treaty of 1960.
- viii. Most of the impacts of climate change are felt through water. Water sector is part of every country's critical infrastructures. Water structures may be targeted by cyberattacks. Cyber-attacks on water sector are detrimental to drinking water supply, transboundary flood risk reduction, electricity, waste water treatment, agriculture and have devastating effects on health, economy and environment. Therefore, to manage cyber security risks is especially important for riparian countries like Pakistan who share their water resources.

1.7 Policy Recommendations Regarding NDC's Revision

Pakistan is already facing climate change impacts. In view of the above mentioned major challenges of water sector in Pakistan, long term targets for Revised National Determined Contributions (NDC) relevant to water Resources Sector should be submitted with regard to address climate change issues challenges and adapt to climate change impacts based on National Water Policy (2018) and short term targets should be aligned with 12th Five Year Plan and 13th Five Year Plans for achieving universal target set in the Paris Agreement upto 2030. Integrated Water Resource Management approaches should be made part of Revised NDC. Adequate Project Design, Implementation, Monitoring and Evaluation mechanism should be devised to achieve the set targets of Revised NDC. Following policy

recommendations regarding adaptation related to revision of Pakistan NDCs may be considered;

i. The existing water management laws are required to be re-visited on immediate basis in Pakistan

- a. Groundwater management laws/acts need to be formulated and implemented.
- b. Provinces need to expedite the process of formulation of groundwater regulatory acts and establishment of groundwater regulatory authorities as guided by the NWP.
- c. Promulgation of a law banning flood irrigation throughout the country

ii. Re-visiting the transboundary water arrangement as per the current and future scenarios

- a. There is an immediate need to be enter into water sharing mechanism with Afghanistan.
- b. All transboundary issues/ disputes need to be resolved in line with 1960 IWT clauses safeguarding Pakistan's interest in view of environmental issues.
- c. PCIW shall take the lead and provide a platform for coordination among the concerned organizations.
- iii. Environmental flows in rivers worked out under a National Study should be instituted.
- iv. **Strict enforcement of environmental laws** is required to protect the surface and groundwater resources from wastewater pollution load.
- v. In line with NWP, **Public-Private Partnership (PPP) approach,** should be adopted for developing and managing water resources by introducing water conservation technologies and techniques in irrigation practices.

vi. Farmers have critical role in Water Resources Management. Training of farmers is required so as

- a. To enable them to optimally utilize the water resources based on new and emerging trends; &
- b. To move towards planting crops that require less water and have more economic value.
- vii. A country wide campaign for judicious use of water resources in rural and urban areas of the country may be launched by the **Prime Ministry of Pakistan** at the national level to ensure water saving and conservation.
- viii. Above should focus on protection of the freshwater water bodies (rivers/lakes/groundwater reserves) from environmental pollution through various sources not limited to municipal, commercial, agricultural and industrial.
- ix. **Establishment of consortium of government organizations, NGOs and private sector** to raise the awareness on management and conservation of water-related ecosystems.
- x. National Level Plan for Climate Change Adaptation including a comprehensive monitoring and evaluation system needs to be developed and implemented.
- xi. **Municipal-level planning** needs to accompany measures that seek to change local-level water infrastructure, water resources management and land use practices.

- xii. **Considering "Storage"** as an important instrument of Adaptation & Mitigation against the impact of climate change on water resources, <u>Construction of large/medium and small</u> <u>reservoirs</u>, be included in future Adaptation Programme.
- xiii. **Other water resources development and management measures** to increase water-use efficiency and productivity include
 - a. Watershed protection/ management;
 - b. Rain water harvesting and storage;
 - c. Groundwater recharge;
 - d. Water-conserving irrigation technologies;
 - e. Wastewater recycling;
 - f. Water metering; &
 - g. Economic incentives including water pricing and the encouragement of water markets.

xiv. Early/ Effective implementation of high priority water sector Projects/ Plans

- a. Early implementation of Recharge Pakistan Project
- b. Implementation of NFPP-IV/FPSP-III through assured financing.
- c. Implementation of National Master Plan on Flood Telemetry.
- d. Phased Implementation of Urban Flood Management Measures, in 20 cities, as identified in NFPP-IV.
- e. Indus Basin Irrigation System (IBIS) Automation of Discharge Monitoring at Seven (07) Pilot Sites for Discharge Monitoring; &
- f. Implementation of 4 No. Priority Projects of PMD related to installation of Radars & other FF&EW equipment)

xv. **Other Soft Adaptation Measures**

- a. Implementation of Water Apportionment Accord of IRSA
- b. Establishment of Authentic National Water Data Base to support WAA implementation
- c. Strict enforcement of River Act by the Provincial Governments for removal of encroachments from bed and banks of rivers and smooth passage of flood flows.
- d. Institutional capacity enhancement of O/o CEA & CFFC through GIS Based wing fully supported with relevant MIS arrangement, linkage with all relevant federal and provincial departments
- e. National Decision Support System (DSS) for effecting management of hydrometrological disasters.
- f. Water is critical to national security of each country. Cyber security risk assessment and management need to become central to water facilities governance. Water sector is becoming more efficient with digitization, but also vulnerable at the same time because of lack of awareness, capacity and willingness to invest in its cyber security. Telemetry system faults may create disharmony; disruption of one sensor or any least secure part of the system could render the desired results to the attackers.

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Annexure-I/Section-I

		Cost in Million Rupees				
	Description	Phase-I	Phase-II	Total	Local	Foreign
		1 st 5-Years	2 nd 5-Years		C. Cost	Ex. Cost
I.S	tructural Measures					
1.	Construction of Proposed Flood Protection Works.	90,992	102,944	193,936	193,936	-
2.	Flood Management Structures Across Hill Torrents and Flood Generating Nullahs.	26,371	30,326	56,697	56,697	-
3.	Feasibility & Detailed Design Studies of Barrages and Hydraulic Structures.	1,500	-	1,500	1,500	-
4.	Master Planning, Feasibility Studies, and Detailed Designing Studies.	3,751	-	3,751	3,751	-
5.	Physical Hydraulic Model Study for Major Railway Bridges and Improvements of Existing Flood Protection Facilities of Pakistan Railway.	450	-	450	450	-
6.	Physical Hydraulic Model Study for Selected Reaches of Major Rivers.	200	-	200	200	-
7.	Measures for GLOFs & Land Sliding in Hilly Areas.	1,000	-	1,000	1,000	-
8.	Remodeling&ProperMaintenanceofDrainageSystem in Lower Indus.	9,763	-	9,763	9,763	-
9.	Coastal Flood Protection Works.	1,622	-	1,622	1,622	-
10.	Flood Mitigation, Channelization and Execution of the Lai Nullah Project (Only Flood Component).	16,000	-	16,000	16,000	-
11.	Studies for Proper Town Planning in Future and Improving the Existing Storm Drainage System of Urban Areas.	1,000	-	1,000	1,000	-
12.	Provision of Annual Funds under Provincial ADPs for Flood Fighting Activities during Flood Season and Procurement & Repair of	5,000	-	5,000	5,000	-

Local Currency Cost & Foreign Exchange Cost of Phase-I and Phase-II of NFPP-IV

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Cost in Million Rupees						
	Description	Phase-I	Phase-II	Total	Local	Foreign
	Flood Fighting Equipment & Machinery under PIDs.	1 5-Years	2 5-Years		C. Cost	Ex. Cost
	Sub-TotaI (I)	157,649	133,270	290,919	290,919	-
II.	Non-Structural Measures					
1.	Up-gradation/replacement & Expansion in Existing Flood Forecasting and Warning System of PMD	4,505	9,495	14,000	7,696	6,304
2.	Up-gradation, Installation and Expansion in Existing Gauging System of WAPDA.	2,297	-	2,297	2297	-
3.	Study to be Conducted for Removal of Encroachments in major Rivers & Hill Torrents and Procurement of LiDAR's.	750	-	750	-	750
4.	Study and Implementation Cost for Development of Watershed Management in Upper Catchment Areas of Rivers & Hill Torrents.	4,500	-	4,500	4500	-
5.	Disaster Management Activities by NDMA, Rescue and Relief.	6,500	11,820	18,320	18,320	-
6.	Study for Drought Management	50	-	50	50	-
7.	Feasibility/Technical Studies for Ramsar Sites.	30	-	30	30	-
8.	Capacity Building for All Institutions Dealing with Flood Management in the Country.	1,380	-	1,380	1380	-
	Sub-Total (II)	20,012	21,315	41,327	35,023	7,054
	Total (I+II) 177,661 154,585 332,246 325,192 7,054					

Annexure-II/Section-I

Sr. No.	Year	Direct losses (US\$ million) @ 1US\$= PKR 86	Lives Lost (No)	Affected villages (No)	Flooded area (Sq-Km)
1	1950	488	2,190	10,000	17,920
2	1955	378	679	6,945	20,480
3	1956	318	160	11,609	74,406
4	1957	301	83	4,498	16,003
5	1959	234	88	3,902	10,424
6	1973	5134	474	9,719	41,472
7	1975	684	126	8,628	34,931
8	1976	3485	425	18,390	81,920
9	1977	338	848	2,185	4,657
10	1978	2227	393	9,199	30,597
11	1981	299	82	2,071	4,191
12	1983	135	39	643	1,882
13	1984	75	42	251	1,093
14	1988	858	508	100	6,144
15	1992	3010	1,008	13,208	38,758
16	1994	843	431	1,622	5,568
17	1995	376	591	6,852	16,686
18	2010	10,000 @ 1US\$= PKR 86	1,985	17,553	160,000
19	2011	3730* @ 1US\$= PKR 94	516	38,700	27,581
20	2012	2640** @ 1US\$= PKR 95	571	14,159	4,746
21	2013	2,000^ @ 1US\$= PKR 98	333	8,297	4,483
22	2014	440^^ @ 1US\$= Rs 101	367	4,065	9,779
23	2015	170 1US\$= PKR 105.00	238	4,634	2,877
24	2016	6 [#] 1US\$= PKR 104.81	153	43	-
25	2017	-	172	-	-
26	2018	-	88	-	-
27	2019		235		
	Total	38,171	12,653	197,273	

Major Flood Events witnessed in Pakistan

* Economic Survey of Pakistan 2011-12

** NDMA (<u>http://www.claimsjournal.com/news/international/2012/10/05/214891.htm</u>)
 ^ Thomson Reuters Foundation (<u>http://www.trust.org/item/20130909134725-rm708/)(Agriculture sector</u>)

^^ Economic Survey of Pakistan (2014-15)

Annexure-III/Section-I

CLIMATE CHANGE ADOPTATION RELATED WATER MANAGEMENT PROJECTS OF PCRWR

I. PSDP PROJECTS (2014-2021)

DEMARCATION OF GROUNDWATER QUALITY ZONES IN INDUS PLAIN AND MARGINAL AREAS FOR SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF GROUNDWATER (LOWER INDUS PLAIN) (2014-18) PSDP

After successful completion of groundwater mapping in the Upper Indus Plain, investigations were carried out during 2014-2018 mainly focusing the areas of the Lower Indus Plain – Sindh Province along with the areas falling in Punjab on right side of the River Indus (parts of Mianwali, D.I. Khan, D.G. Khan and Rajanpur districts) and left side of the River Sutlej (parts of Bahawalnagar, Bahawalpur and Rahim Yar Khan districts). Results of this study have been completed and a report has been published. The report reveals that groundwater quality at deeper depths is highly saline. However, a layer of freshwater of varying quality is present with varying thickness in the aquifer in the areas of favorable lithologies where sources of groundwater recharge are available. The groundwater quality is fresh or usable along the River Indus due to its recharge. With increasing distance from the river, the salinity in groundwater increases. The extent of groundwater salinity further increases and intensifies below Hyderabad towards the Indus Delta.

INTEGRATED WATER RESOURCES MANAGEMENT IN THE HIGHLY DEPLETED PISHIN LORA BASIN OF BALOCHISTAN (2014-18) PSDP

The study was undertaken in sub basins of Pishin and Kuchlagh through an integrated approach. Pishin-Lora Basin is located in the northern part of Baluchistan. The total area of the Basin is 1.775 Mha spreading over 5 districts of Pishin, Killa Abdullah, Quetta, Mastung, and Kalat. The area has medium to high recharge potential.

The survey of selected sites was conducted and accordingly rainwater harvesting and groundwater recharge techniques were implemented such as, construction of 10 leaky dams, 30 check structures and 10 inverted wells. 06 Piezometers were installed to study the recharge phenomenon of established techniques. The feasible techniques were disseminated through field visits and outreach workshops for wide scale adaptation to manage groundwater resources in water scarce areas. The implementation of groundwater recharge techniques would help reduce the soil erosion and increase the groundwater storage and rise in water table. This in turn would reduce the installation and operation cost of the tube wells. The improved water ability in depleting groundwater areas would facilitate water demand for agriculture and other uses, and would directly improve social and economic conditions of beneficiaries.

TRANS-BOUNDARY EFFECTS ON GROUND AND SURFACE WATERS ALONG THE EASTERN BORDER OF PAKISTAN (2017-2020) PSDP

Pakistan has shared water sources with India regulated through Indus Waters Treaty (IWT) and groundwater is not part of the IWT. As indicated from satellite observed data, it was anticipated that due to huge groundwater pumping in Indian Punjab, the groundwater along the Pakistan

borders may be affected (in terms of its quality and quantity). The objective of the project is to study groundwater flow pattern and characteristics along Pakistan - India border.

Following major activities have been carried out

- 1. Installed groundwater assessment gadgets (12 multiple and 95 single) and random bench marks with respect to mean sea level (MSL) have been established.
- 2. Groundwater flow patterns were developed in various sectors.
- 3. Electrical Resistivity Survey was conducted on 246 probes.
- 4. Isotope Analysis of 500 water samples was carried out. \ddot{Y}
- 5. Water quality of Hudiara drain was monitored. Groundwater flow pattern developed under the study

IMPROVED LAND AND WATER CONSERVATION PRACTICES TO ENHANCE WASTE LAND PRODUCTIVITY IN THAL DESERT (2017-2021) PSDP

The project is being carried out in Thal Desert with the objective to introduce various improved land and water conservation practices. This includes solar-powered drip irrigation system, sprinkler irrigation, etc. During the reported period following progress has been made; two Solar powered drip and sprinkler irrigation systems were installed at Noorpur Thal and Dulewala. In order to increase vegetative cover at three sites, indigenous Khagal plants (8,000 plants) was provided to control the issue of wind erosion and sand dune stabilization.

EXPLORATION OF GROUNDWATER POTENTIAL AND PROMOTION OF INTERVENTIONS FOR RAINWATER HARVESTING AND BIOSALINE AGRICULTURE IN THAR (2017-2021) PSDP

In Tharparkar the groundwater is mostly saline with scattered pockets of freshwater, which can be used by applying appropriate methodologies. The introduction of saline agriculture in such saline areas may help improve agriculture by growing salt tolerant crops. The main objectives of the study are to identify fresh groundwater pockets in the Thar area using geophysical methods, develop & modify existing rainwater harvesting techniques for domestic, agricultural and rangeland purposes and also develop and promote bio-saline agriculture to improve livelihood of the inhabitants. The aims of the study are to upscale the interventions and disseminate to the local communities for adoption on large scale.

The main achievements are Electrical Resistivity Survey up to 300 ft depth on 600 sites and groundwater mapping, one solar system installed at R& D center, Mithi. Whereas, two rainwater harvesting ponds constructed in Thar. The trials on wheat and barley crops with saline ground water (EC 9.15 dS/m), mixed fresh and saline water, and fresh water (EC 0.7 dS/m) were completed, whereas the pearl millet, sesame, wheat and barley crops were also started.

II. COLLABORATIVE RESEARCH PROJECTS/STUDIES

ASSESSMENT OF ENVIRONMENTAL DEGRADATION OF MANCHAR LAKE US-PCASW 2016-17

Manchar is a beautiful shallow water lake with an average depth of 0.5 to 3.75 m. It is located in district Jamshoro of Sindh–Pakistan. The lake was originally fed by two sources–storm

water and hill torrents from Kirthar mountains and inundation canals from the Indus, namely Aral Wah and Danister Wah.

This study was conducted by Pakistan Council of Research in Water Resources (PCRWR) in collaboration with the US-Pakistan Center for Advanced Studies in Water (USPCAS-W), Mehran University of Engineering and Technology Jamshoro to evaluate the current water quality status of the lake and its impacts on the ecosystem.

The study revealed that water quality of the Manchar Lake had severely been degraded. The concentration of total dissolved solids in low flow period was seven times higher than the threshold level. Use of the lake water for irrigation has imposed severe threat on the agricultural lands in the surrounding. The soil has been turned into saline-sodic. The groundwater of area has become saline, which is not fit for drinking. Higher concentration of persistent organic pollutants in water and sediments is of serious environmental concern. The major source of pollution is the MNV drain and its tributaries derived from the Shahdadkot and Miro Khan areas. Throwing of untreated wastewater into the lake should immediately be stopped.

GROUNDWATER INVESTIGATIONS OF FIVE DISTRICTS OF KP (PESHAWAR, CHARSADDA, SWABI, NOWSHERA, MARDAN) 2018

The study was carried out with the financial support of HELVETAS. The conventional disciplines and tools used in groundwater investigations such as geology, hydrology and hydrochemistry have been complemented with modern methods of geophysics, isotope hydrology, remote sensing and mathematical modelling. An extensive analytical modelling was performed by using Aqua Chem software. The water table depths were measured to cover both shallow and deep groundwater sources such as hand pumps, dugwells and tube wells where possible. The study reveals that generally, the groundwater is of useable quality (0-2.5 dS/m) covering about 97% of the total area. However, some hotspots of groundwater salinity have been found mainly at Risalpur in Nowshera district where groundwater salinity ranges from 2.6 to 4.8 dS/m. Moreover, it has been estimated that the quantity of usable groundwater is about 97-million-acre foot (MAF) as active storage. This groundwater reserve is available up to the depth of 300 m. The isotopic results have revealed that most of the area is being recharged through a mix of river and rainfall water sources. The groundwater modelling indicates that groundwater is depleting at an average rate of about 0.21-0.7 m per year at different locations.

DEVELOPING APPROACHES TO ENHANCE FARMER WATER MANAGEMENT SKILLS IN BALOCHISTAN, PUNJAB AND SINDH IN PAKISTAN (2016-2020)

The project is funded by ACIAR and is focused to develop tools and approaches for increasing farmers' irrigation management skills. The project is being implemented in 49 villages located in Bahawalpur, Sargodha, Faisalabad, Nawab shah, Hyderabad and Quetta

The study has been started with the objectives to determine the successful elements of existing on-farm irrigation water management initiatives and farmer training models in Pakistan; develop and test farmer tools for on-farm soil water, nutrient-monitoring and supply chains. In this project, 700 farming families form 49 canal irrigated village sites located in 6 districts of Pakistan. With exception to Quetta district, only irrigated by groundwater, project sites are located in Sargodha, Bahawalpur and Faisalabad districts of Punjab, Hyderabad and Shaheed

Benazirabad districts of Sindh province. Soil moisture and nutrient management tools were tested by experimenting on 400 chameleon moisture sensors, 300 densitometers, and 150 Fullstop (Wetting Front Detectors). These tools are tested along with three adult learning/community engagement models; Discovery Learning, Value management and Collaborative problem solving. So far the results of this research project indicate that farmers are learning to manage over irrigation using the tools to control fertilizer leaching to groundwater. Eventually this research project for farmer learning will help establish best practices to be disseminated across small-medium landholder of Pakistan. This message will help farmer learning to work for sustainable agricultural practices with lesser impact on natural resources. Using the approach of Stakeholder Forums in project districts, farmers are now sharing their learning experiences and seeking more support with districts level agricultural institutions and other knowledge partners.

IMPROVING GROUNDWATER MANAGEMENT TO ENHANCE AGRICULTURE AND FARMING LIVELIHOODS IN PAKISTAN 2016-20

The project is funded by ACIAR with the following objectives: To develop and articulate a shared understanding of sustainable groundwater use for agriculture and the need for improve management in Baluchistan, Punjab and Sindh provinces. To develop, groundwater management tools and options that have the potential to enhance livelihoods of farming families with collaborating stakeholders in each case study. To enhance capacity and institutional arrangements for post project adoption of tools and options develop in objective 2 by collaborating with stakeholder organizations.

Collaborative research action plans have been developed for all case studies by their stakeholder forums.

- Stakeholders have been engaged in Representative Agricultural Pathways (RAP) sessions.
- Three groundwater models have been developed and modelling scenario has commenced.

Booklets, leaflets and briefing cards on groundwater and its management have been developed and shared: available in Urdu, Sindhi, English.

- Research by a PhD student and project team member has been undertaken.
- Networks and partnerships have been established through the project to provide opportunities to engage and build capacity through interaction.
- Trials of low water/high value crops have been carried out.
- Demonstration sites have been established on farms managed by leading members of the stakeholder forums in both case study areas in Sindh.
- Groundwater management model for Sindh province has been developed for Balochistan province being worked upon
- Groundwater observation wells are developed to educate farmers in managing groundwater level and quality themselves
- Established district level stakeholder forums in project district to share the findings of the project with district level authorities

WATER CONSERVATION THROUGH SMART WATER METERING AND PRICING IN PAKISTAN 2018

This project is carried out in selected area of Islamabad partnership with Climate Change Research and Development Center, COMSATS University, Islamabad and Swiss Agency for Development and Cooperation (SDC). Upon completion of the project, a seminar was organized on November 6, 2019. The seminar was aimed to rationalize the need of smart water metering and pricing in urban areas to ensure equitable, leakage free domestic water supplies to the general public. This project has introduced a concept of metered water supply in an urban unit of Islamabad district. This project has also introduced the concept of supply and demand management in urban water supply. Such projects are crucial for district like Islamabad for having a bleak future of water supply.

CHARACTERIZING HYDROLOGY OF THE EASTERN RIVERS OF THE INDUS PLAIN (SUTLEJ, RAVI, JHELUM AND CHENAB) UNDER THE PROJECT "STRATEGIC STRENGTHENING OF FLOOD WARNING AND MANAGEMENT CAPACITY OF PAKISTAN PHASE-II" UNESCO 2015-18

Pakistan Meteorological Department and UNESCO are developing a flood forecasting model to be used in Pakistan. PCRWR is major partner of the umbrella project. Soil physical and hydraulic properties are an important input for the proposed model. In the present study, focus is on determining soil physical and hydraulic characteristics in Doabs and active flood plains of eastern tributaries of the Indus River, seepage within the river tributaries and their morphological characteristics, and the measurement of the river flow regimes for meeting input data requirements of Integrated Flood Analysis System (IFAS) model. PCRWR conducted field survey of 50 river sections for flow regimes, seepage rates and morphological characteristics of the rivers Chenab, Jhelum, Ravi and Sutlej. Also determined soil physical, chemical and hydraulic characteristics and infiltration rates profiles at various depths at both the banks of the fifty river sections. Therefore, completed the analysis of data of soil hydraulic and physical characteristics of 100 pits (300 samples) of the active flood plains. Also completed and analyzed data of flow regimes and morphological features of fifty river sections. This study will help in flood forecast in a localized flood forecasting model.

AGRICULTURAL WATER, ENERGY, AND HAZARD MANAGEMENT IN THE UPPER INDUS BASIN FOR IMPROVED LIVELIHOOD AND BUILDING RESILIENCE, GILGITBALTISTAN (PHASE-II) 2016-19

The Upper Indus basin (UIB) is the mother well of all the water resources of Pakistan. However, it is subject to a number of anthropogenic and natural calamities such as glacier melting, soil erosion, poor land and water productivity etc. The project was designed to improve livelihood of UIB communities through enhancing local capacity in understanding, managing and demonstrating state of the art climate smart water, energy and hazard management technological options at the pilot sites. PCRWR implemented a project in collaboration with WWF (World Wide Fund for Nature), KIU (Karakoram International University), MARC (Mountain Area Research Centre). The major component included climate smart, cost effective and energy efficient water management to promote high value agriculture. The activities include: water pumping, micro drip irrigation systems and sustainable water supply solutions. A headwater structure was also constructed with the community participation to route glaciasl water to Zarabad community for micro irrigation network of orchards. hydra

ram pumps were installed for pumping water from river to the site. Prepared land for cultivation, established tunnels with drip irrigation lines and integrated drip installed for alley cropping on 1-hectare apple orchard at Khyber village. Established 4-kilometer pipeline to fill water tanks for irrigating vegetable tunnels for the community at Borit Lake site. The vegetable tunnels were re-established with integrated drip and vegetable seedlings were planted. Constructed a 0.3 square meter water delivery to route glacier water to the plantation site. Water delivery structure was then connected to pipes conveying irrigation water. A 16 mm water line was established to irrigate the plantation of Sea buckthorn at the Passu site. This project has offered climate smart and zero energy water supply option of the communities of GB. These will be reduced carbon emissions to acquire fresh water. High value permanent orchards on drip irrigation will reduced land disturbance leading to less land erosion. Moreover, tunnel farming for high value vegetable copping has provided vegetable entrepreneurship opportunity to the local people.

ADAPTION STRATEGIES TO COPE WITH CLIMATE CHANGE IMPACTS ON PAKISTAN'S WATER RESOURCES 2018

Climate change is an accepted reality and climate change resilience and adaptation demands revisiting cropping pattern and water allowance. The study was conducted with the major objective to cope with the reducing water availability due to climate change in the Indus Basin through changes in cropping pattern and to re-allocate the water allowance accordingly. In this regard, the policy papers were drafted and shared with the GCISC. Following are few findings of this study;

- Water scarcity in canal irrigated areas is more a canal water governance issue rather than climate change
- Increase crop water requirement is also attributed to choose of high delta crops such as rice and sugarcane in drier climate such as; D.G.Khan and Bahawalpur divisions
- Increased market demand of produce, such as sugar mills are a big driving factor behind the cultivation of sugarcane and hence more water consumption
- Indus Basin is more suffering from climate variability rather than climate change; there are certain factors to account for before declaring climate change for Pakistan's agriculture

SECTION – 2: REVISION OF NDCs RELATED TO DISASTER PREPAREDNESS (ADAPTATION SIDE)





OFFICE OF THE CHIEF ENGINEERING ADVISER & CHAIRMAN FEDERAL FLOOD COMMISSION, ISLAMABAD

SECTION – 2: REVISION OF NATIONALLY DETERMINED CONTRIBUTIONS (NDCS) RELATED TO DISASTER PREPAREDNESS (ADAPTATION SIDE)

2.1 Climate Change Indicators and Impacts related to Disaster Sector

Pakistan is the fifth country on the list which is most vulnerable to climate change and adverse events, including natural disasters. Climate change along with natural disasters is already causing a \$14 billion/year loss to the economy of Pakistan that costs around 5% of the GDP (LEAD, 2015). The increasing frequency and severity of climatic catastrophic weather and natural disasters indicate that significant steps and policy initiatives are needed to be taken in emergency preparedness and climate change adaptation. In the twenty-first century, Pakistan has been struck by a string of natural disasters. A magnitude of 7.6 earthquakes happened in October 2005, and there were extreme floods in 2010, 2011, and 2012. Such catastrophes have had a huge cumulative impact on the economy of the country. The monsoon rains alone triggered major flooding in 2010, killing nearly two thousand people, affecting more than 20 million, creating food shortages for at least 7.8 million people, and causing economic losses of more than US\$ 16 billion. Around 21% of Pakistan's GDP, 45% of jobs, and 60% of exports are accounted for by agriculture. The loss of 7.5 million tons of sugarcane, 2.5 million tons of rice, 0.7 million tons of cotton and 0.3 million tons of maize resulted from this catastrophe. The locality of Pakistan is vulnerable to severe weather conditions, including heavy rainfall and floods (Rehman et al., 2016).

Approximately, 80% of catastrophes are tied to the atmosphere. Climate-only catastrophe losses are estimated at 1% of GDP during 2005-2013. Pakistan has been generally ranked in the top five nations which are being most impacted by the extreme impacts of climate change events since the mega flood of 2010 (floods, heat waves, and storms). EM-DAT catastrophe statistics (2000-2013) and World Bank population figures for the same time indicate that, on average, 1.16% of national GDP is significant economic losses caused by disasters. For less intense disasters or disasters with a slow onset, direct casualties are not recorded due to poor data collection infrastructure. The goal of reducing economic losses from all disasters by 20% (per unit of GDP) by 2030 would enable Pakistan to reduce its economic losses to 0.93% by 2030, according to the LEAD Organization. Assessing Pakistan's vulnerability and level of risk is a very ambitious goal. It is projected that, due to extreme weather events and other losses, climate change will cost the economy just \$14 billion a year, which is almost 5% of the GDP (LEAD, 2015).

Pakistan has a varied geography, ranging from the high elevations of the Himalayas, one of the biggest river systems (Indus), and a vast number of inhabitants, to the long coastline created by the Indian Ocean in the south. Pakistan is frequently struck by many hazards such as earthquakes, intense precipitation, especially during monsoons, droughts, landslides, and Glacial Lake Outburst Floods (GLOFs), causing multiple casualties due to distinctive topography, climate zones, and habitats. Also, the NDMA has established district-wise vulnerabilities throughout Pakistan: 42 districts are vulnerable to flooding, 18 to earthquakes, 19 to droughts, 11 to landslides, 7 to cyclones, and 16 to the forest fire.

The disaster loss statistics in Pakistan are incomplete, distributed through multiple organizations, and frequently unavailable, and often not accurate. To track threat trends,

frequency, vulnerability, extent, and severity, catastrophe damage & loss information is not routinely taken together. The probability of determining the relative effect of catastrophe threats is constrained by these gaps. It is hard to forecast differential future scenarios, particularly for certain types of disasters where each sub national unit is exposed to a certain collection of disasters, with minimal historical impact data, especially at the sub national level. Various provinces/regions have varying hazard profiles and these differences should be represented in national datasets to reliably monitor the economic effects of disasters.

Due to significant structural damage to pump houses, water tanks, and pipes, flash flooding also occurs in mountain areas. The regular floods destroy electrical and mechanical components, pumping machines, transformers, construction foundations, water supply, and sewerage in Punjab and Sindh, where flooding is normally less violent but more severe in nature and duration. Extreme heat waves have also stunned the national grid in recent years, causing an extensive collapse in electricity. Pakistan's National Disaster Risk Reduction (DRR) Strategy 2013 acknowledges that "strategies and plans must define a program to promote and enforce adequate construction standards and location requirements, and propose possible retrofitting activities and measures to mitigate non-structural damage, as well as appropriate procedures for preparation, operation, and maintenance."

Synergies between emergency preparedness and climate change adaptation need to be discovered. A thorough understanding of how various segments of the economy are vulnerable and resilient to climate change and natural disasters is required to devise a sound strategy. At the very same time, awareness of the ability of various agencies at national and sub-national levels to cope with disasters and the impacts of climate change is required for evaluation of needs at different levels of policy implementation. To establish sound policy and implementation mechanisms, information on the vulnerability and responsiveness of local populations vulnerable to multidimensional impacts of climate change and natural disasters is needed.

Pakistan remains seriously affected by the detrimental impacts of climate change specifically in the following aspects:

- i. In addition to impacting water supplies over the next two/three decades, glacier/snowmelt in the Himalayas is expected to intensify flooding. When glaciers recede, these will be accompanied by reduced river levels over time.
- ii. Karachi, Pakistan's largest populated metropolitan city, is emerging from the grasp of a deadly wave of heat. Over the Arabian Sea, a prolonged low-pressure system stifled ocean breezes and carried temperatures above 113°F (45°C) in June to the region of 23 million inhabitants. Electricity and water service interrupted by the intense heat, make life almost impossible in the region. With high severity as well as frequency, The local studies suggest that such events with high severity as well as frequency will increase in the future. Officials report that at least 1,200 Pakistanis were killed in the 2015 heatwave (Tim Kovach, 2015).
- iii. Approximately 411,000 acres of crop area were also affected by the 2003 monsoon rainy events in Sindh, while 18,500 kilometers of road networks suffered tremendous losses. The projected losses are approximately about 45 billion rupees. This will continue to affect crops, health, the education system, and the road networks in the future (PDMA Sindh).

- iv. Due to significant structural damage to pump houses, water tanks, and pipes, flash flooding also occurs in mountain areas. Frequent floods can destroy electrical and mechanical components, pumping machines, transformers, construction foundations, water supply, and sewerage in Punjab and Sindh, where flooding is typically less violent but more severe in nature and duration.
- v. It is predicted that endemic morbidity and mortality due to diseases mainly linked to floods and droughts will increase. Coastal water temperature rises will intensify the abundance of cholera, especially in the low-lying areas near the Sindh Sea Coast and Baluchistan.
- vi. Cyclones have also negatively impacted the coastal districts. Cyclones will destroy human villages and result in the immense loss of human and animal life, as well as the devastation and disruption of fishing vessels, which will have a significant effect on the livelihoods of the majority of residents. Tropical cyclones have historically emerged over the Arabian Sea and settled on the coastal areas of Sindh. On many occasions, the districts of Thatta and Badin have been seriously affected.
- vii. Devastating and worst floods have been faced by Pakistan in present years. As dams, rivers, and reservoirs overflowed, Azad Jammu Kashmir, KP, and North Eastern Punjab were seriously affected during the monsoon rains. The floods are responsible for deaths, casualties, and damage to buildings. Each year, millions of people are displaced. Also, cattle, cropland, and means of income still have an impact in rural areas.
- viii. According to a report conducted by the World Bank and the Global Disaster Reduction and Recovery Facility (GFDRR) in 2015, titled "Fiscal Risk Assessment Options for Considerations," if a mega food like that of 2010 reaches the nation again, it would cause an annual financial consequence of US\$ 15.5 million, 7% of GDP will be affected and 40% of the Federal Budget will be impacted due to damage caused by such a flood event. (Fiscal Risk Assessment Option for Consideration, 2015)
- ix. Pakistan has experienced an estimated economic loss of US\$ 19,040 billion from the last 10 years since the 2010 floods (Harris, 2017).
- x. Resulting in significant coastal cyclonic activity, coastal regions surrounding the Arabian Sea (southern parts of the country) would be at the highest risk due to sea tsunamis.
- xi. Sindh experiences the condition of drought because of its geographical position. The last intensive drought event occurred in 2002. Severe drought sterile large fields with crops. It is expected that the supply of groundwater will become low and eventually drained in the case of a future major drought event. Sickness has erupted as a result of malnutrition. The planted area would decrease. Also, low crops have been grown in cultivated fields, which will generate food shortages in the drought zone.
- xii. Thatta and Badin lie in the coastal part of Sindh province are also severely disturbed by sea intrusion. The outflow of water downstream of the Kotri Barrage decreased between 2000 and 2002, resulting in significant marine intrusion into the coastal areas of Thatta and Badin. When this sea intrusion wreaks, not only the human and fish population will be affected, but farmland will also be seriously hurt. Every year, the country loses the marine food market due to the loss of the shrimp & fish population around the world.

- xiii. Smog has become an issue in Lahore and its attached areas, in the past few years. As a consequence, it is so dense that even airplane flights to Lahore are canceled. This smog has become even heavier in the last 5 years, leading to poor air quality and high levels of emissions. Smog induces or worsens health conditions such as asthma, emphysema, chronic bronchitis, and other respiratory problems, as well as inflammation of the lungs and lowers susceptibility to colds and lung infections. In smog, ozone also slows plant growth which can cause extensive harm to crops and forests.
- xiv. Most residents in Muzaffarabad live on vulnerable mountain slopes, so they are particularly prone to the danger of landslides. During winter in Kashmir, recurrent avalanches and landslides strike, frequently blocking roads and leaving communities disconnected. Avalanches and landslides can cause accidents and deaths. Moreover, several individuals are missed per year.
- xv. Pakistan is facing many challenges resulting from a pest attack invasion since 2019. Pakistan is extremely vulnerable to the breeding of locusts. Desert locust breeds on 38% of Pakistan area, out of which 60% consist in Balochistan, 25% in Sindh, and 15% in Punjab, while if the desert locusts are not in the breeding areas, the entire country is at risk of attack. In areas where major Rabi (winter-sown) crops such as wheat, chickpea, and oilseeds emerge, "severe damage has occurred". Agriculture losses could exceed PKR 205 billion (USD 1.3 billion), accounting for a 15% harm rate to wheat, gram, and potato production alone. The FAO forecasts overall possible losses of approximately PKR 353 billion for the Rabi crops at a 25% level of damage and approximately PKR 464 billion for the Kharif (summer-sown) crops (Notezai & Rehman, 2020).
- xvi. Epidemics: Dengue fever and dengue hemorrhagic fever have been the fastest-growing arboreal diseases in Pakistan since 2005. There were about 147,200 cases of dengue fever and over 800 deaths from 1995 to 2019. This disease has multiple population impacts per year (Zareen, 2019).

2.2 Disaster Preparedness Sector related Provisions of Pakistan's First NDCs (2016)

The analysis of Pakistan's first NDCs previously submitted by the MoCC to the UNFCCC in November 2016 indicates that, compared to the information given for climate change mitigation, it remained largely inadequate in terms of details on adaptation. The provisions of Pakistan's first NDCs submitted earlier by MoCC to UNFCCC in November 2016 following the disaster preparedness sector were reviewed for revision/update under this report;

- Section 1.1 (2nd last Paragraph at Page-6) states that "Pak-INDC has also benefited from the Government of Pakistan's National Climate Change Policy as well as the National Policy on Disaster Risk Reduction, National Water Policy (NWP) 2018 and draft National Flood Protection Plan-IV. Regarding approval of the DRR & NFPP-IV, the following updated information may be made part of the revised NDCs for Pakistan;
 - a. The implementation in 2012 of the National Policy on Climate Change and the National Policy on Disaster Risk Mitigation offered a detailed context for policy priorities and actions towards the mainstreaming of climate change, notably in economically and socially disadvantaged sectors. A follow-up to these initiatives was the announcement in 2013 of the Climate Change Policy Development Process (2014-2030), which details the risks of different industries to climate change and defines

necessary measures for adaptation and mitigation. The framework document has been designed to act as a mechanism for the incorporation of climate change issues into national and sub-national decision-making and to establish an enabling atmosphere for an inter-connected phase of climate-compatible growth. The paper supports the planning of the National Adaptation Plan (NAP), Nationally Appropriate Mitigation Actions (NAMAs), future UNFCCC National Correspondence, as well as comprehensive action plans for the sub-national adaptation.

- b. Under three 10-year National Flood Control Programs, the Federal Flood Commission (FFC) has played a pivotal role in developing the country's National Flood Protection, Monitoring & Warning Framework. Since its establishment in 1977, FFC has so far prepared and executed three NFPPs, i.e. NFPP-I (1978-1988), NFPP-II (1988-98) & NFPP-III (1998-2008). NFPP-IV formulation began in the aftermath of the devastating floods of 2010. The 2011 & 2012 floods also warranted the preparation of the Fourth National Flood Protection Plan (NFPP-IV) by a detailed, coordinated, and consultative planning process nationally. The consultants became active in May 2013 through a W (WCAP) sponsored by the World Bank. Over the 2 years (2013-2015), NFPP-IV was prepared with comprehensive consultations with provinces, Federal Line Departments & all associated federal and provincial stakeholders who are directly or indirectly important to the consequences of climate change and the consequent impacts/effects of hurricanes, droughts, GLOFs and urban floods. Structural & non-structural steps costing Rs 332,246 billion were composed of NFPP-IV. NFPP-IV remained under lengthy consultations over the four (4) consecutive meetings of CCI, the highest Inter-Provincial Platform at the Federal Level i-e; Council of Mutual Interests (28th, 29th, 30th, and 31st meeting) for a coherent, well-thought-out and long-term integrated strategy criterion, and was finally accepted at the 31st meeting of CCI held on May 2, 2017. Although accepting the NFPP-IV, the federation through CCI agreed that the Federal and Provincial Governments would finance the Programme at 50:50 and the provinces would determine their respective share of the allocation among themselves and report to the federal government.
- Section 1.3 titled 'Climate Variability' generally describes the vulnerability of the country to Climate-induced disasters including floods (Refer Page-9). As stated above, Pakistan has suffered a cumulative financial of US\$ 38.053 billion of which US\$ 19.040 billion was caused by floods that occurred from 2010 onwards.

2.3 Adaptation Related Targets Set for 2030 and Progress on Subsequent Projects Implemented/ Being Implemented

The first expression in the National Disaster Management Ordinance (NDMO), 2006, was replaced in 2010 by the current National Disaster Management - NDM Act, followed up by the National Disaster Risk Management Framework (NDRMF) (2007-2012) that outlined a comprehensive national DRR agenda. The policy was approved by the National Disaster Management Commission on 21st February 2013. NDMA, being the lead focal agency for disaster preparedness and management, has, therefore, embarked upon the formulation of a comprehensive National Disaster Risk Reduction Policy through wider consultations with all stakeholders including all provinces, State of AJ&K, and regions. This policy covers disaster risk reduction in a more holistic way and introduces a proactive and anticipatory approach by laying special emphasis on risk assessment, prevention, mitigation, and preparedness.

The policy is based upon an extensive review of existing background documentation including assessments, relevant frameworks, policies, and plans. The building blocks of the current DRR policy reflect the priority actions of the Hyogo Framework for Action (HFA) and are within the NDM Act 2010 that decentralized responsibilities for the implementation of DRR to the provincial and district level. The policy is based upon consultations with the district, provincial, and national government stakeholders as well as civil society actors and development partners. National Disaster Management Authority has been prepared National Monsoon Contingency Response Directive 2016, 2017, 2018, 2019 & National Monsoon Contingency Plan 2020.

2.3.1 Main Targets Set Under DDR

The most important national goals set under Disarmament, Demobilization, and Reintegration (DDR) Policy are enumerated below:

- 1) Creating an integrated national capacity to identify and monitor vulnerability and hazard trends including potential climate change impact.
- 2) Creating Multi-Hazard Early Warning capacity while building upon existing systems and emphasizing the information and warning needs of vulnerable end-users.
- 3) Strengthening integrated disaster preparedness and response capacity from the local to the national level.
- 4) Promoting development planning that considers and addresses disaster risks alongside environmental and climate change concerns.
- 5) Strengthening the structural and non-structural resilience of key infrastructure and lifelines in Pakistan.
- 6) Strengthening capacity at national and provincial levels to facilitate and provide support to the implementation of DRR policies, plans, and programs across sectors and in high-risk areas.
- 7) Strengthening Local Level Risk Reduction capacity focusing upon communities, and supportive linkages with union councils, tehsils, and districts.
- 8) Ensuring DRR is systematically integrated into recovery and reconstruction programming, "building better, safer and stronger" and informing DRR mainstreaming in general.

2.3.2 Progress Made So Far Towards Disaster Preparedness Implementation

Since the country has suffered recurrent flooding and other large-scale events which have caused accumulating financial impacts, international agencies have played a crucial role in strengthening financial resource for DRM including a US\$ 200 million loan approved by the ADB in 2016 to support the establishment of a National Disaster Risk Management Fund, and support by the World Bank on the establishment of disaster risk financing strategies and DRM funds at the provincial level (ADB, 2019).

In addition to above mentioned institutional improvements, the following adaptationrelated activities/ projects have been initiated, carried out/ being carried out for sustainable management and development of water resources in Pakistan, hence, having implications for climate change adaptation as well:-

2.3.3 Enhanced Allocations for Disaster Preparedness Sector

- 1) Addressing socio-economic vulnerabilities will mean reducing economic gaps under which social insurance networks play a vital role in cushioning extreme crises and financial disruptions and, more generally, supplying the vulnerable with basic income protection.
- 2) In addition to the Workers Welfare Program, the Staff Old-Age Benefits System, the Zakat Fund, the Pakistan Bait-ul-Mal, and the Benazir Income Support Network, Pakistan has implemented social safety net programs for labor and non-labor forces.
- 3) Established in 2008, BISP, which includes more than 7.7 million families, helps minimize social and economic vulnerabilities (ADB, 2019).
- 4) The BISP-established National Socio-Economic Register (NSER) hosts a database of more than 27 million households (approx. 167 million people) used by federal and provincial social sector agencies to boost targeted pro-poor results (World Bank, 2015).
- 5) In development planning, risk-sensitive DRR spending has now been compulsory. The Planning Commission has made it obligatory for government departments to complete catastrophe risk monitoring using DRR checklists as part of official procedures (ADPC, 2018), ensuring the integration of DRR into public sector construction initiatives before their acceptance by the highest implementation preparation forum (NDMA, 2015). In several provinces, including Punjab, Balochistan, and Khyber Pakhtunkhwa, DRR has begun to be integrated into regional planning and development departments. (NDMA, 2015).
- 6) Farming is one of the highly vulnerable sectors in terms of Sectoral DRR mainstreaming, provided that the economy and livelihoods are primarily dependent on agriculture. Main impediments have to be addressed, including the high cost of adaptation steps in semi-arid rural areas and the lack of awareness of hazards among farmers (Qaisrani, et al., 2018).
- 7) Investment in irrigation production schemes has been rendered to extend irrigated areas for local farming and improve flood protection potential, with the Flood Control Commission (FFC) and provincial irrigation departments as main executors.
- 8) In addition to structural initiatives, however, priority should be given to investing more in experimenting with cost-effective and locally viable adaptation alternatives, funding the requisite provisions to allow local adaptation, and increasing capacity building for farmers to adapt to improve the resilience of the agricultural sector.
- 9) In 2020, the Board of Executive Directors of the World Bank accepted \$300 million in support for two projects in Pakistan, the Sindh Resilience Project and the Emergency and Quality Solid Waste Project. These investments will help Pakistan's efforts to create resistance to natural disasters such as floods and droughts in the province of Sindh and improve solid waste management in the city of Karachi to resolve frequent urban floods and public health emergencies. PDMA Punjab Budget 2016-2017 is provided in **Annexure-I.**

2.3.4 Strengthening Disaster Risk Governance to Disaster Risk Management

- 1) The Earthquake Restoration and Rehabilitation Authority (ERRA) was set up to take responsibility for earthquake recovery and post-earthquake growth work, including catastrophe risk mitigation aspects, as a central coordinating body.
- 2) The National Disaster Management (NDM) Act 2010 was enacted to set up institutional arrangements of DRM in Pakistan with decentralized responsibility under the three-tier governance level: federal, provincial, and district level, with authorized DRM bodies: the National Disaster Management Authority (NDMA), Provincial Disaster Management Authorities (PDMAs) and District Disaster Management Authorities (DDMAs).
- 3) Pakistan's Disaster Risk Management (DRM) policy and plans have evolved over the years with the National Disaster Risk Management Framework (NDRMF) 2007-2012 outlining a comprehensive DRR agenda and a successive National Disaster Management Plan (NDMP) for 2012-2022, as a mechanism to manage the complete spectrum of disasters by developing disaster risk reduction policies, strategies, measures and actions in partnership with all stakeholders, having highlighted priority actions and costs for the ten years.
- 4) The NDMP comprises the Master Plan, Human Resource Development Plan on Disaster Management, Multi-Hazard Early Warning System Plan, and Instructors' Guidelines on Community Based Disaster Risk Management, which is a tested model for CBDRM for possible replication (NDMA, 2012).
- 5) The Gender and Child Cell was founded by NDMA to prioritize, embed gender, and integrate children's needs and issues and vulnerabilities of the marginalized and poor segment of society in crisis relief, management, and DRR initiatives.
- 6) The Gilgit-Baltistan Disaster Management Act, No. II of 2017 has been evolved.
- 7) Hazard specific preparedness programs, contingency plans, and regular operating practices are all to act as a guide for all entities involved.
- 8) Institutional capacity strengthening has taken place by the National Institute of Disaster Management (NIDM) acting as a technical and training institute of NDMA, with funding support from international donors. Major programs include capacity building of disaster management bodies at the federal, provincial, and district levels.
- 9) Given the increased frequency of natural disasters and challenges being faced in the implementation of existing building codes, NDMA along with the Pakistan Engineering Council (PEC) successfully reviewed the Fire Safety Regulations in the Country, and Fire Safety Codes were launched in an impressive ceremony in February 2017. Safer construction practices have been widely followed in the region affected by Earthquake 2005 as part of the reconstruction process.
- 10) In addition to the above, Environmental Impact Assessments have been made mandatory for all public sector projects. A comprehensive DRR compliance checklist has been made mandatory for mainstreaming DRR into development, planning, and public sector projects.
- 11) Similarly, NDMA has already formulated several plans, manuals, reports, and SoPs as mentioned above.

2.3.5 Multi-Hazard Vulnerability and Risk Assessment (MHVRA)

- The main focus area is the Implementation Roadmap 2016-2030 of Pakistan's National Disaster Management Plan. While a nationwide scale MHVRA is still to be developed, detailed and location-specific assessments have been carried out, providing comprehensive risk information for Provincial Disaster Management Authorities (PDMAs) and concerned agencies in DRM and development planning.
- 2) Multi Hazards & Risk Evaluation Studies covering the full range of hazards and threats of five districts in Punjab (R.Y.Khan, Bahawalpur, Multan, Khanewal & Jhang), while another related assessment has been operated to cover Sindh Province (ADPC & NDMA, 2017). The Natural Disasters Consortium (NDC) consists of FAO, IOM, ACTED, UNICEF, and HANDS conducted Sindh Drought Needs Assessment (SDNA) in eight Sindh districts, namely, Umerkot, Tharparkar, Sanghar, Badin, Thatta, Dadu, Kambar Shahdadkot & Jamshoro. The World Food Program (WFP) and World Health Organization (WHO) also provided technical support for the assessment. The comprehensive evaluation was carried out to determine the effect of droughts on agriculture (water availability, livestock, crop cultivation, and production), food security and livelihood, access to adequate water and sanitation and hygiene activities for households and communities, and to make recommendations to the Government of Sindh, NDC partners, and other decision-makers to prioritize interventions (short, medium and long term) in specific sectors and geographical areas to resolve immediate problems.
- 3) A macro-scale risk assessment initiative under NDMA and the Ministry of Climate Change was completed with support from the Japan International Cooperation Agency (JICA) as a part of activities aimed at strengthening the National Disaster Management Plan (NDMP).
- 4) The overall NDMP identifies macro-level hazards and risks in qualitative terms for floods, landslides, earthquakes, tsunamis, cyclones, droughts, avalanches, and glacial lake outbursts of floods (GLOFs).
- 5) Sector-specific risk evaluations have been undertaken in the past to promote riskinformed decision-making for sectoral growth. Some provide multi-dimensional vulnerability concerns by the use of the Multi-dimensional Poverty Index (MPI) as a food safety vulnerability proxy. The nine districts (Jamshoro, Sanghar, Khairpur, Mirpurkhas, Tharparkar, Badin, Umerkot, Thatta, and Dadu) in Sindh and three districts (Quetta, Naseerabad, Jaffarabad) in Balochistan needs drought assessment to recognize drought risk and its impacts on water, sanitation, food security, nutrition, livelihoods, and hygiene sectors. At the local level, risk assessment exercises have been carried out in small cities and districts as pilot versions, and for other purposes such as for zoning reconstruction areas to enable the estimation of seismic risks and related phenomena.

2.3.6 Disaster Preparedness for Effective Response

 To strengthen emergency response and coordinating mechanism for crisis management include the National Disaster Response Plan (NDRP-2019), an updated version of NDRP-2010, the Host Nation Support Guidelines for Foreign Assistance to Pakistan during Disasters (2018), and the National Monsoon Contingency Response Directive. The National Monsoon Contingency Response Directive, revised and released annually before the monsoon season, describes the outlook for the monsoon situation for the coming year, visualizes monsoon contingencies, and offers response guidance for three stages of action: Local Emergency Response by DDMAs, Provincial level and National level by the NDMA. The directive directs step-by-step measures and assigns responsibilities to the hydro-met hazard organizations involved, including cyclones, flash flooding, GLOFs, landslides, and avalanches (NDMA, 2018).

- 2) PDMA exchanged guidance with district governments, line authorities, armed forces, and other stakeholders for 2017 Monsoon contingency planning mainly to predict possible scenarios and interpret levels of danger. Furthermore, it primarily includes recognizing weaknesses and problems in the successful response to emergencies and then preparing and introducing a range of steps aimed at improving the ability to respond and mitigating possible gaps based on the technical expert's advice and inputs from the relevant departments. Circumstances have been used as a framework for designing preparation plans, unlike prior basic or generic plans.
- 3) Adhoc recovery management bodies were developed by Pakistan with proposals planned for quick recovery and recovery measures. Special agencies developed to advise and guide the recovery framework include the Earthquake Reconstruction & Rehabilitation Authority (ERRA) for post-Earthquake 2005 recovery, a Strategic Early Recovery Action Plan (SERAP), and Flood Relief and Early Recovery Response Plan (FRERRP).
- 4) Post-disaster needs assessments (PDNAs) consider sectorial harm and cross-cutting themes have been undertaken to assist the government in assessing socio-economic impacts and formulating recovery plans for successful restoration with the help of GFDRR and various technical agencies. The Guidelines for Mainstreaming Disaster Risk Mitigation in Early Recovery of Floods, built to direct disaster risk-sensitive recovery across 8 clusters, improve build-back-better: governance, water and sanitation, community physical infrastructure, food security, education, health, housing, agriculture, and nonfarm livelihoods.
- 5) The National Disaster Management Authority (NDMA) Guidelines on Minimum Ex-Gratia Assistance to Persons Affected by Natural and Man-Made Disasters were published in 2017 to create a clear benchmark. The Planning Commission worked to close the policy void in 2017 by releasing a draught Social Security Policy Framework, which stresses the importance of including victims of natural disasters, internal conflicts, and internally displaced persons as vulnerable populations who can receive social protection. This is a major step forward in recognizing the significant danger that disasters pose to vulnerable people and ensuring that they are included in safety net services. Even then, it is too early to say if this system can accomplish its essential goals without a solid agency to oversee implementation.

2.3.7 Development of Integrated Hazard Mitigation Strategies

2.3.7.1 Identify Safe Areas for Evacuation of People & Livestock In Each Vulnerable Locality

• As Disaster Management is a devolved subject and primary responsibility lies with Provinces and Districts as first responders, identification of safe evacuation areas for people and livestock in vulnerable areas is therefore undertaken by District Administration in each respective area. Once adequate sites have been identified and marked, they are included in both District and Provincial Contingency Plans and are

shared at the appropriate level. Key factors in identifying safe evacuation areas include the safety of the site, distance from an affected area, ease of access at the site, availability of basic utilities, i.e. water, power, etc.

2.3.7.2 Development of DRM Plans with Consent & Participation of Communities

 Development of the DRM Plans including the evacuation plans is undertaken by Deputy Commissioners / Coordination Officers in each respective District at grass roots level after analyzing the facts on the ground and developing a District Level Contingency Plan. The same is then shared with respective Provincial Authorities. Contingency Plans are also developed and shared at National Level by the NDMA after an extensive consultation process with Provinces and relevant stakeholders. The culmination of the entire process is a yearly Coordination Conference (Flood Specific) in which coordination is done with all stakeholders and all plans are discussed. This is followed by the preparation of a National Contingency Plan. Furthermore, National / Provincial Authorities in coordination with District Authorities have conducted numerous Capacity Building Programmes / Training.

2.3.7.3 Capacity Building Training

• Currently, the National Institute of Disaster Management (NIDM) is undertaking a comprehensive training program locally and in each Province to further develop the capacities and capabilities of the Government Officials and the local populace. More than 8,000 persons have been trained.

2.3.7.4 Development of Efficient Rescue Mechanism, Relief & Rehabilitation Options & their Implementation Strategies Before a Disaster

• NDMA has undertaken concerted efforts in this regard. The NDRP 2019 has been prepared which chalks out a response mechanism for a coordinated and prompt response. This Plan is further augmented by the NDMP which identifies disaster management areas. In the current system, each Province has varying capacities in responding to disasters. The PDMAs have Civil Defence components, Rescue 1122, and other services for rescue and relief. The Armed Forces of Pakistan are requisitioned in aid of Civil Power, helping given the availability of trained manpower and equipment with them. Relief is undertaken by each respective PDMA with the NDMA providing Federal backup. Extensive stockpiling of essential relief items is undertaken at Provincial and Federal levels and is placed at strategic locations across the country. Rehabilitation measures are undertaken in the post-disaster phase by both Federal and Provincial Governments in the form of compensation, relief funds, and infrastructure development grants.

2.3.7.5 Standard Operating Procedures, Guidelines Clearly Defining the Role and Priority Responsibilities of Departments during Natural Disasters

• Considerable work has been put into the development of comprehensive Standard Operating Procedures for Government Departments during a disaster situation. As mentioned before, NDMA has developed an NDRP in 2019 which covers the tasks and responsibilities of Government Departments at all three tiers.

2.3.7.6 Disaster Management Information System (DMIS)

A proposal is suggested to equip PDMA, DDMU, and DDMA personnel with the new IT equipment to ensure that emergency relief operations are tracked and datasets from districts and divisions are uploaded to DMIS to resolve all humanitarian facets of crises
in terms of preparedness, reaction, and recovery. This framework encourages decisionmakers to collect information in real-time and serves to further organize and advise emergency response methods. It is of vital importance to establish an effective DMIS system in this paradigm, i.e. a system that is accurate, functional, and resilient to face the challenges in a crisis where people are searching for humanitarian assistance to sustain and revive their everyday routine lives.

- National IT Board (NITB) provides an e-office interface to 40 government agencies, as well as the Islamabad City App, which offers 42 citizen assistance and emergency services to the National Command and Operation Centre (NCOC) and the National Disaster Management Authority (NDMA). The NITB is a one-of-a-kind unified resource management system. Backup systems and Disaster Recovery Services (DRS) are in operation regularly to ensure that government archives are not destroyed in the event of a disaster. With the help of the NDMA and the NITB, a website was created where local hospitals can directly update the availability of beds and ventilators. The NDMA team is assessing local hospitals and collecting crucial knowledge about the COVID-19 equipment availability. The NITB is working on software to aid, in the war against a global pandemic that is wreaking havoc around the globe.
- 6) DMIS can record accidents and statistics on payments earned from the Deputy Commissioner's Office, along with the latest provincial weather conditions.
- 7) Also, SMS Alerts are another means of disseminating Early Warnings to at risk populations. A case in point is elaborate coordination done by the NDMA with Pakistan Telecommunications Authority (PTA) and Cellular Mobile Operators (CMOs) for issue SMS Alerts. A total of 52.2 million SMS Alerts were disseminated to different areas to ensure early evacuation, thereby helping reduce casualties.
- 8) The suggested DMIS is a live framework that can create division and district-level contingency plans.
- 9) The framework will also be able to produce information on risk evaluation, hazard assessment reports, emergency evacuation plans, disaster risk management (DRM), and disaster risk mitigation reports.
- 10) In case the water level exceeds its fixed threshold, the early warning system will be part of DMIS, which will be capable of sending live water level updates and alarm generation.
- 11) The planning of services is also an important part of the life cycle of emergency recovery.
- 12) DMIS also maintains a close liaison with the organizations involved and coordinates contact. For improved disaster management, DIMS includes the Department of C&W, Rescue 1122, Health Department, Irrigation Department, Livestock Department, Meteorological Department, Education Department, Federal Flood Commission, Municipal Unit, Pakistan Railways, NDMA, SUPARCO, PITB, NGOs, and Donors, etc.

2.3.8 Geographic Information System (GIS) Center at PDMA

• The Geographic Information System (GIS) unit is one of the main parts of the Geospatial Aspects Regional Emergency Response Centre, PDMA, which is responsible for the prompt implementation of advanced geographical data and mapping

in both emergency and usual scenarios. One of the most critical components of GISbased systems is geospatial knowledge. This is performed through the compilation of geospatial data which is already available from numerous authentic sources, departments, and agencies. The GIS team has been successfully collecting the geospatial data and even self-generated basic infrastructure data, including administrative limits, Health Services, No of Villages, Major Cities, Waterways, Highways, Bridges, Ground Cover, Pre-Disaster Camps, EFWS Sensors Locations, Flood Extensions, and Damage Data, Landslide Stock, Surveillance Locusts, and Spray Operations Data, and Rescue 1122 Stations Locations.

- The district-wise (25 districts) mapping operation including reference maps, population maps, and city maps of **KP** province has already been completed by the GIS team.
- By generating foundation maps and extremely detailed maps of hazard risk evaluations from time to time, the unit supports the DRM segment of the PDMA.
- The unit has finished mapping operations at the district level of the Pre-disaster Camps site and also for the whole province of KP.
- The GIS unit is directly engaged in the daily condition mapping of Surveillance and Spray of Locust operations carried out by the KP Agriculture Department.
- In an emergency, the GIS system also supports PEOC-PDMA by supplying damage/loss charts on request.

2.3.9 Deployment of Mobile Application; Emergency Alert

- The Emergency Warning smartphone Android/IOS-based program has been deployed in different Divisions/Districts in KP for the prompt monitoring of any untimely accidents during the disaster.
- The application significantly encourages the deputy reporting officer in Kohat, Malakand, Mardan, and Hazara for timely reporting in the respective divisions on the daily Condition Sheet, Weather Warning, and Relief Activities.
- The program was deployed online and is available for download from the Google Play Store.

2.3.10 Flood Protection

- The FFC has played a pivotal role in improving the National Flood Protection, Forecasting & Warning System in the country under the umbrella of three 10 yearly National Flood Protection Plans (NFPPs). NFPP-IV formulation began after the devastating floods of 2010. It was formally approved by the Council of Common Interests CCI in May 2017, after a rigorous consultative process both at technical and political levels. NFPP-IV is targeted to protect 2,479,555 hectares area from inundation by floodwater, 779,250 hectares of lands from erosion besides reclamation of 154,180 hectares of eroded land.
- Based on the NFPP-IV, Concept Clearance Paper (CCP) for Flood Protection Sector Project FPSP-III based on NFPP-IV (Cost of Rs 95.980 Billion) was prepared and forwarded to the Ministry of Water Resources for further processing on 6th December 2019. CDWP approved the CCP on March 03, 2020, based on which Umbrella PC-I drafted through in-house capacity has been submitted to Planning Commission on July 23, 2020, through Ministry of Water Resources (MoWR) for further processing for

approval by Central Development Working Party/ Executive Committee of the National Economic Council (CDWP/ECNEC). PC-I has been approved by the CDWP on October 12, 2020, and recommended the project for approval by the ECNEC.

- Under FPSP-III, PMD has proposed four projects indicating their requirement for installation/ replacement of Weather Radars and Automatic Weather Stations (AWS) as well as the establishment of Flood Early Warning Centers.
- Ministry of Climate Change project titled "Recharge Pakistan: Building Pakistan's Resilience to Climate Change through Ecosystem-Based Adaption for Integrated Flood Risk Management" is also included in the 3rd Flood Protection Sector Project (FPSP-III) based on NFPP-IV. Concept Paper already stands approved by CDWP of Ministry of PD&SI on March 03, 2020. Four Ramasa sites are included in this project for the rerouting of floodwater. PC-I is under preparation.
- WAPDA is developing a country-wide National Flood Telemetry Master Plan comprising of details relating to provision of expansion and modernization of telemetry system in four (04) provinces, Gilgit-Baltistan and AJ&K. The Plan will cover the main river system, the secondary and tertiary canal network, all small streams/nullahs, hill torrents, having overall significance towards country precious water resources concerning the quantity, contribution and health of total surface water for efficient utilization.

2.3.10.1 Flood Control System in KP

- The PDMA (KP) has successfully installed the flash flood Early Warning System in the upper catchment areas on 07 Swat River at Khawaza Khela and Chakdara Bridge, Panjkora River at Bypass Road, Munda Head Works, Kalpani River, Dir Lower, Abazai, Mardan Ring Road Bridge, under the project titled "Revamping of PEOC & Management Information Systems (MIS) in partnership with the Irrigation Department. This Early Warning System cost about Rs. 59.06 million has been used to modernize existing water gauges and rain gauges to obtain real-time data of water discharge, water velocity, and rainfall measurement.
- The Early Warning System is connected to the computer-based model that stores the data of streams water level and rain gauges in the hilly areas of KP. Besides, this smart app analyzes the current data with historical evidence of flash floods to ultimately produce warning signals upon approaching a hazardous level. These warning signals enable the provincial emergency operation center, thereby impacting district, tehsil, and union councils to be alert in such crucial situations to deter human losses.
- In KP, 211 gauge reading sites available where gauge readers take water flow readings by physically visiting the site at a specified interval. The mechanism relies on regular reporting of flows through manual gauge reading at the heads and tails of each channel in the primary and secondary channels of the system. Using rating curves, estimated water levels are transformed into flows.
- The Early Warning System (EWS) installation has been recommended by the Provincial Disaster Management Authority for the Malakand Division. The Province's Construction of the Early Warning System for Flash Floods was part of a project by the PDMA ADP Scheme entitled "Revamping PEOC & MIS and Development of MIS for

PDMA," which has already finished and is accompanied by locations where PDMA is constructing telemetry stations.

2.3.10.2 Flood Control System in Punjab (2019 & 2020)

- The paradigm moves from manual relief operations to early warning, flood monitoring, and rescue and relief operations dependent on Information Technology (IT), satellite, and GIS information.
- Satellite real-time monitoring of the Sutlej River for the first time in history is being recorded.
- In-house operationalization of the existing flood inundation model for flood prediction, routing, and preparation for emergency management.
- Comprehensive Standard Operating Procedures SOPs, rules, and obligations of all parties have been established and shared with all concerned Post-Disaster Redevelopment Plan (PDRP) for organizational and monitoring uniformity.
- Given Rs. 27,216,000 relief / reimbursement to flood impacted people, ration to 11,000 families, 29,203 people rescued, 76 Medical & 75 Relief camps developed.
- Make sure flood control by stringent enforcement of Mangla Dam operational SOPs through the flood mitigation committee and reached the highest degree of dam conservation after 5 years.
- By introducing the "Early Warning" system, poor communities have been rescued from rain/flood damages. GIS-based rescue & relief activities and damage estimation have been carried out. Rs. 360 million was issued to Deputy Commissioners (DCs) for rescue & relief operations for 5,000 families.
- 29,808 food hampers, 250 life jackets, 2,734 tents supplied, 4,311 evacuees, 40 relief camps and 55 established medical camps.
- The flood-fighting equipment was refurbished with new vessels, engines, and an added amount of Rs. 75M.

2.3.10.3 Flood Control System in Sindh

- The PDMA Sindh in consultation with a Chief Secretary Sindh is responsible for response & relief operations. The Director General PDMA on his behalf is headed a Composite Team (comprising representatives of Lead Agencies/ Departments and focal persons of support organizations) to coordinate response & relief operations.
- Assisting the DDMAs in provisions of adequate required resources for monsoon season.
- Tents, Plastic Sheets, Mosquito Nets, De-watering Pumps, Water Purifying Filters, Jerry Cans, and boats, are being procured to be placed at the disposal of DDMAs.
- In 2019, a flood alert has been issued by the PDMA Sindh to the administrations of 15 districts directing them to take appropriate measures.

- This alert has been issued to the disaster management authorities of Sukkur, Larkana, Ghotki, Kashmore, Khairpur, Shikarpur, Dadu, Jamshoro, Tando Mohammad Khan, Matiari, Hyderabad, Thatta, Sujawal, Naushahro Feroze, and Benazirabad districts.
- The PDMA, which falls in the provincial rehabilitation ministry, referred to the Pakistan Meteorological Department's bulletin issued, identifying inflow and outflow of floodwater at Guddu, Sukkur, and Kotri barrages.
- The district DMAs have been said to take precautionary measures in coordination with all relevant departments and district administrations.

2.3.10.4 Flood Control System in AJ&K

• SDMA responded to Monsoon 2009, Flood 2010 and 2011 & Monsoon 2012, enabling the state in reducing human and infrastructure loss.

2.3.11 Gender and Child Cell (GCC)

- The Gender and Child Cell, which is responsible for incorporating awareness of the needs of children, women, and other disadvantaged segments of the population during crisis relief, emergency management, and DRR, represents the country's effort to meet its legal responsibilities to uphold fundamental rights, following international conventions and treaties on fundamental rights, as expressed in the Constitution. Policy directives, protocols, and tools have been established to be followed in emergency management, including National Policy Guidelines for Vulnerable Groups in Disasters (2014), Minimum Standards for Children's Safe Spaces (2013), and Minimum Standards for Camp Relief (2017).
- The Gender and Child Cell was founded by NDMA to prioritize, embed gender, and integrate children's needs, issues, and vulnerabilities of the vulnerable and marginalized segment of society in humanitarian response, crisis management, and DRR initiatives.
- Gender and Child Cell (GCC) with development partner support and its provincial equivalents was founded in August 2010.
- The 2010 NDM Act, the 2012-22 NDMP, which specifies the steps to be deemed mandatory for disaster relief, describes the functions and duties of the disaster management stakeholders. The NDM Act and the NDMP are committed to highlighting and integrating the unique insecurity of women and other communities into DRR procedures, but gender inclusion as such is not incorporated into any of the proposed operations.
- In partnership with United Nations International Children's Emergency Fund (UNICEF), the Child Protection Disasters Program of PDMA Punjab has been functional and aims to ensure that child protection issues are integrated through disaster management and response.
- PDMA Punjab has recorded standard operating procedures (SOPs) for the safety of children during disasters and has been working to improve the compliance processes for these SOPs.

- To improve data collection and service delivery in this field, a CPD Management and Information system is also being developed.
- The CPD initiative also works on developing capacity for different partners to raise awareness of CPD challenges and to encourage child-friendly disaster relief and response.
- Within the context of this initiative, PDMA Punjab and UN Women are holding workshops on Gender Mainstreaming in humanitarian assistance to raise awareness of issues faced mainly by women, especially in post-disaster contexts, as well as viable strategies to address them.
- The Gender Disaggregated MIS is a special PDMA Punjab project focused on supplying policymakers with gender-disaggregated data to ensure gender-sensitive recovery response.
- The differentiated effects that disasters can have on most people at risk are critically recognized by GCC KP. Disaster approaches ensure that when developing, preparing, executing, tracking, and reviewing DRR and DRM efforts, the various desires, goals, and capabilities of women, men, girls and boys, and others vulnerable to numerous disadvantages (people living with disabilities, sexual and gender minorities, senior citizens, separate caste/ethnic groups, etc.) are discussed. To conform to all gender-specific protocols, GCC performs at PDMA.

2.3.12 Camp Coordination and Camp Management

- The NDMA has established guidelines and provided instructions to the relevant departments or the provincial governments on how to respond appropriately to any threatening catastrophe or disaster situation. Section 11 (a) of the NDM Act 2010 requires the NDMA to provide minimum standards for relief camps in terms of accommodation, clothing, safe potable water, medical coverage, sanitation, special arrangement for vulnerable groups, education, security, and entertainment, etc. for disaster victims.
- The KP Government has set up its own Camp Management Support Team to address the needs of displaced people. One of the primary duties of the Camp Management Support Team is to locate possible campsites in each district of KP where shelter and protection would be provided to displace people in the event of a catastrophe. As a result, 178 pre-disaster campsites have been established around KP where camps can be set up in the event of an emergency. Identifying the locations, though, is only the initiation and this will be accompanied by more systematic exercises that will streamline PDMA's emergency preparedness.
- Previously, mapping of 178 pre-disaster campsites has already established.
- Setting up the Tehsil Wise Volunteer Task Force as an early emergency response force.
- Sector-wise preparation on Camp Administration & Camp Coordination, Emergency Preparedness, First Aid, Age and Disabilities Representation in Humanitarian Response for volunteers and government department personnel.

- Camp Management Guidance formulation/review, distribution to appropriate stakeholders.
- Annual visits for monitoring and assessment at all campsites.
- Structure of data collection tools and documentation forms to capture data in the event of crises from the camps.
- Mock/Drill Exercises
- In the event of floods, PDMA has provided instructions to DDMAs for flood-prone districts to find appropriate campsites that should be highly elevated, and close to affected areas, where the facilities needed are either accessible or easy to arrange.
- The District Administrations will equip these campsites with adequate medical, water, and sanitation facilities.
- Transportation equipment will be arranged from government and private outlets for the evacuation of patients. Punjab Emergency Services personnel will perform prompt and successful operations to find and evacuate people and take them to secure areas.
- PDMA has provided recommendations to all DDMAs to build separate toilets and bathing facilities for women and men and to conform to requirements that are observed in emergencies when setting up washrooms and toilets.
- The District Administration and/or WASA authorities should regularly engage in the proper everyday clean-up of the facility.
- Vector protection is an integral aspect of the administration of the camp and action to remove mice, rodents, mosquitoes, etc. should be taken. It must be assured that during crises and in camps, all classes of society are well taken care of.
- For particularly vulnerable people in camps / temporary shelters, special plans should be made. Extra treatment should be provided to particularly disadvantaged populations, such as older people, infants, pregnant women, and people with disabilities.
- Basic medication such as anti-rabies, anti-venom, anti-malarial medicine, and other medicines should be kept in the treatment center at these shelters.
- The NDMA can support over 0.3 Million people across the Country over and above the Provincial capabilities. Country-wide Warehouse Network has been established with the support of the WFP, including 8 Strategic Humanitarian Response Facilities and 51 Flospans. Each warehouse complex has several sheds, is administered within a building boundary wall, and a backup generator. Once functional, these warehouses will ensure effective disaster response by up-scaling preparedness level concerning stocking piling of emergency relief goods. This would facilitate field coordination and easy access to disaster-prone communities.
- In conjunction with the local police, a good surveillance scheme should be in place as the presence of police often serves as a deterrent for offenders that might be drawn to those locations.

- With adequate treatment and fulfillment of their physical and psycho-social requirements, unaccompanied minors can be put separately. Deputy Police Officer (DPO), DC, and PDMA should be informed promptly of missing people/infants.
- For the establishment of separate women's relief camps with sufficient protection, light arrangements, the needs of women according to the local and cultural climate are considered.
- The establishment of Flospan (300 MT capacity) in six districts of AJ&K and Central Ware House (3000 MT Capacity) are coming projects of the State Disaster Management Authority (SDMA).

2.3.13 Epidemic Control

2.3.13.1 COVID-19 Control

- The following specifications are now being applied in Pakistan to uniform PPEs and have been accepted by the Drug Regulatory Authority of Pakistan (DRAP).
- The NDMA provides required medical equipment & supplies to strengthen the national health system. This role continues to date.
- The NDMA established an Isolated Hospital and Quarantine facility in Islamabad and quarantine facilities at the borders.
- The NDMA Coordinates with international and local donors
- The NDMA also conducts disinfection operations in the country.
- Via numerous inter-ministerial consultative dialogues, the NDMA worked with the NDRMF and the Ministry of National Health Services, Regulations, and Coordination to determine the immediate needs for health equipment and productions, such as research kits, viral RNA extraction kits, mobile X-ray machines, clinical ICU ventilators, syringe pumps, N-95 masks, Tyvek suits (protection suits for health care staff), thermal guns and scanners, that the country will need under a 0-3 month caseload.
- The PDMA has mobile storage units (MSUs) 12 in Balochistan, and 3 in Sindh, and 3 NDMA Islamabad for medical goods storage and equipment with the cooperation of WFP. NDMA receives centralized coordination assistance for the supply chain management.
- To guide people against COVID-19 and to prevent the possible spread of the current pandemic, on 13 April 2020, the Relief Department took a major initiative and established a remote call management system in the Provincial Emergency Operation Center, PDMA with toll-free helpline 1700 with a total cost of Rs. 3.5 million under the project entitled "Revamping the PEOC & MIS Segment for KP PDMA.
- The Ehsas Kafalat and Insaf Imdad Program in Punjab crossed 6.60 million beneficiaries on a fast-track basis by setting up 500 camps and disbursing Rs. 79,866 million.
- In Punjab, selection of 2.5 million beneficiaries for the combined Insaf Imdad Scheme of Ehsas Group III and CM.

- 3,000 zaireens were transferred from Taftaan to Quarantine centers in Punjab and back home & rationed to 39,500 quarantined Zairean families.
- Under Trace-Track-Test (TTT)- over 350,000 returned, tracked, and directed international calls as per SOPs in Punjab.
- Protected by supplying PPEs containing 150,000 Coveralls (PPEs), 85,426N-95 Masks, 571,880 Caps, 712,998 Surgical Masks, 110,000 Sanitizer Bottles, 72,197 Goggles, line departments, divisions, and law enforcement agencies, Pak Army, Rangers and Police in Punjab.
- Representatives of the required Govt. Departments have been linked to the above facilities with 1700 also sitting in their own offices or homes willingly delivering their services approximately 24/7. For the general population, 10 services have been launched and approximately 1 lac (100,000) calls have only been processed in 45 days, whereas the main objective of these services is to promote the general public and interlinked government departments.

2.3.13.2 Dengue Control System in Punjab

- PDMA (Punjab) has partnered with the Government of Punjab to introduce a robust initiative called the "Epidemic Prevention Program" to not only avoid and monitor outbreaks of Dengue but also to include preventive and long-term measures to tackle this threat.
- With a particular focus on Lahore, PDMA (Punjab) and the government took proactive measures to avoid the outbreak of dengue in Punjab, as it faced the most severe threat. All hospitals declared an emergency and PDMA Punjab provided 14 mobile hospitals for treatment of patients with pouring dengue.
- Sprays for the eradication of dengue mosquitoes were carried out on a large scale, which was counter to the anticipated harm due to such efforts.
- The performance of the Lahore Model in dengue controlled to a staggering decrease in the transmission of the disease in 2012, with just 255 cases registered and no deaths.
- To stress the policies and methodologies implemented by the Government of Punjab and PDMA to eliminate this disease, the PDMA (Punjab) has also released a book on 'Dengue, Prevention & Control, and The Lahore Model of Progress'.
- The publishing of this book is another commendable initiative by PDMA Punjab through the exemplary Lahore Model of saving precious lives to build mass consciousness of precautionary and preventive measures against the transmission of dengue.

2.3.14 Establishment of Disaster Management Wards in the Healthcare Department

- All districts have set up a Disaster Relief Ward in both teaching and district-level hospitals in Punjab.
- The emergency relief ward consists of 20 beds each in teaching hospitals and 10 beds each in all District Head Quarter & Tehsil Head Quarter (DHQs and THQs).

- The Medical Disaster Management Team (MDMT) formed and alerted all teaching and DHQ hospitals that compromised the following team, along with their name and contact details; a general doctor, a general surgeon, a neurosurgeon, and an orthopedic.
- To offer first aid to the wounded people and to prepare for more help to evacuate the patients.
- The prevention and management of communicable disorders, immunization, and the availability of critical medicines should be organized in medical camps and mobile health teams.
- A list of all medical officers and paramedics who will be sent to these camps and teams will be generated by the health department.
- In all these camps, and with mobile teams, medicines and other medical supplies should be available. For relevant flood-related problems, medication should be available.
- Health centers with ambulances and special services for women and children should be available in the tents or relief camps set up by the district administration.
- In the office of the Directorate General of Health Services, an emergency control room will be formed and a representative of that emergency control room will be appointed as the control room of the PDMA.
- The Health Department will compile a list of necessary drugs to ensure that medicines and other services are available in adequate inventories in disaster-hit areas in hospitals.
- Medical schools may be interested in forming emergency response teams.
- It will also work with foreign organizations such as the WHO and UNICEF in the health department.
- If required, comprehensive disease monitoring in the disaster-hit areas should be carried out via the Disease Early Warning System to provide alerts.
- For quick diagnosis and rapid reaction in the impacted areas, emergency teams and paramedic personnel should be mobilized and dispatched.
- An action plan on preparedness for any catastrophe or calamity would be prepared and submitted.
- WHO has been established by the National Emergency Response Authority as the main agency that will fill the holes in the availability of medications, fast testing kits, and vaccines, etc.
- The District Health Authority's CEO will oversee all district health-related programs and directly hire female health staff in emergency zones to increase awareness of health threats in a crisis and any vaccine or immunization program that could be requested during an emergency.
- The Directorate General Health Office will form a Health and Nutrition Cluster with overall coordination and supervision of the emergency response of the Health Department.

- The Department will draw up a plan for early recovery of health infrastructure and service delivery if the drug supplies or even the infrastructure were destroyed due to flooding.
- The research has been carried out in basic health units (BHUs) across six districts of KP to determine the preparedness and Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis to play their role in disaster risk management. The BHU preparedness study in KP reveals that most BHUs show major shortcomings and weaknesses in formal, non-structured, and practical preparedness and are inadequate to address the needs of local populations at the time of any natural disaster. The majority of BHUs lack sufficient facilities, human capital, preparation, and access from the regional health department and the government to numerous support services. Also, SWOT research reveals an immense capacity and ability to upgrade and use BHUs with the least investment as an emergency response center that can respond quickly to natural disasters and help local communities.

2.3.15 Coordinating Assistance of Humanitarian Partners

- In partnership with PDMA and the government of Punjab, the United Nations World Food Program (WFP) has built state-of-the-art warehouses in Muzaffargarh and Lahore. Such warehouses are referred to as the FAO (HRF) and have a gross storage capacity of approximately 3,000 Metric Ton (MT) and are set up for \$3.0 million.
- For two separate regions of Punjab, HRFs have allowed PDMA to store relief products. The time lag for deliveries to southern Punjab has been effectively minimized by such storage facilities.
- Warehouse WFP has built small warehouses with a storage capacity of 300-500 MT in 11 vulnerable districts of Punjab.
- **The PDMA KP** also interacts with all UN agencies and other humanitarian stakeholders to address vulnerabilities in response and relief before, during, and after flooding.
- In the high impact scenario (food and non-food products (NFIs) including shelter) for the 2020 monsoon season, **PDMA KP** coordinates with all UN agencies and humanitarian partners to ensure a stock of at least 1/3 of the necessary humanitarian needs.
- **The PDMA KP** formed relations with all related stakeholders in the COVID-19 pandemic by notifying thematic action plans in pursuit of the decision of the Government of Pakistan, NDMA, under the chairmanship of the relevant provincial line department and UN agencies, including humanitarian organizations operating in KP, for a stronger and coordinated response.

2.3.16 Watan Card

• The Government of Pakistan in collaboration with the PDMAs set up the Citizens' Damage Compensation Program to support affected households with cash in their recovery efforts in all four provinces Khyber Pakhtunkhwa, Sindh, Punjab, and Balochistan, as well as Gilgit-Baltistan and Azad Jammu and Kashmir.

- The Programme was mutually financed by the Federal and Provincial governments under the name of "Watan Card" to support the flood-affected families, and provide some relief to the affected people.
- In Azad Kashmir, 11652 Watan cards were issued disbursing Rs. 233 million while NADRA sites were set up in Hattian, Haveli, Mirpur, Neelum, and Rawalakot. Overall 13,299 flood victims have been disbursed Rs. 500 million via Watan Cards in Phase II.
- The State Disaster Management Authority aided the issuance and distribution of Watan Cards to help the flood victims to cover basic consumption and to recapitalize assets, repay loans, recover their livelihoods, and repair housing.

2.3.17 NDMA Role in Pest and Locust Control

- The government proclaimed a "National Emergency on Locust" on the recommendation of the Ministry of National Food Security and Research (MNFS&R) in 2019, the desert locust occurring in cultivated areas in the four provinces of Pakistan, the size of the infestations, and the unexpectedly favorable conditions for breeding.
- Large-scale locust control operations in Pakistan are organized and assisted by the National Disaster Management Authority, the Regional Agricultural Departments, and the Pakistan Armed Forces.
- In 2019, the Department of Plant Protection examined an area of 932,580 hectares and treated 300,595 hectares, using 150,839 liters of pesticides in three provinces. Out of the 300,595 hectares that were handled, aerial spraying cleared 20,300 hectares.
- The Cabinet has formulated and adopted a detailed National Action Plan for Desert Locust Surveillance and Control in Pakistan, 2020-21 (NAP-DL-Pak). Powerful cooperation with main stakeholders (public and private sector institutions), timely resource mobilization, successful monitoring, control operations, and mass awareness campaigns are among the measures to safeguard national food security in compliance with the Standard Operating Procedures (SOPs) approved by the Food and Agriculture Organization (DAT) to tackle significant threats to agriculture arising from de-farming.
- The NAP-DL-Pak presents three phases of surveillance and control activities under the supervision of the NDMA: January to June 2020 (Phase 1), July to December 2020 (Phase 2), and January to June 2021 (Phase 3).
- Community participation for locust surveillance under the NDMA direction, forming 23,716 Mauza Level Locust Control Committees (MLLCC) which takes up an entire province and provided instant knowledge of locust.
- At least PKR 50-60 million per month was saved by engaging MLLCCs for surveillance, monitoring, and combat operations.
- Pakistan's share of Locust Surveillance in the world stayed 97-98% on FAO's Dashboard, 97% of which was Punjab Province's share.
- The NDMA also played a critical role in coordinating with the international and local donors.
- International acknowledgment of Punjab's efforts for locust surveillance and control by Mr. Keith Cressman, the globally recognized authority on locust and FAO Locust Program Head.

- Built a state-of-the-art android-based detection, coordination, and tracking device for locusts, which was recognized by UN-FAO at the international level.
- The PDMA surveyed 14,727,115 hectares in partnership with DPP, agriculture, livestock department, and Cholistan Development Authority (CDA) to carried out combat operations on 756,533 hectares. However, the entire province was surveyed regularly, i.e., 32 million acres, after citizen participation (MLLCCs).
- The deployment and fighting potential of Rs. 1,028 million funds grew from 1,000 hectares to 20,000 hectares a day, precipitating the miracle of having 1.1 million tons of extra wheat from the previous year (9.4 MT present / 8.3 MT previous) against the odds of losing the whole food basket to the locust.
- The NAP also provides risk assessment-based simulations to help prioritize monitoring and control activities in the cropping calendar and agricultural areas.
- The Government of Pakistan has taken various anticipatory steps to resolve this challenge and to plan for a timely and successful response in collaboration with FAO and with the assistance of other international partners.
- By reverse engineering, PDMA obtained 80 Micron Ultra Low Volume (ULV) spray machines through local production and saved PKR 136 million.
- A faster and more efficient evaluation of the locust infestation was made possible by the technological innovations and helped to concentrate and stage control operations.
- The NDMA also encouraged the private sector for the development of local biopesticide for locust control.
- 194,000 ULV grade Malathion 96 percent and 18 Europe Commission (EC) tractormounted sprayers have been given to the government by the government of China.
- FAO supported Pakistan's locust surveillance and control program by providing technological and organizational assistance from the very early beginning. Before 2019, FAO played a key role in supplying 14 Defender style trucks, sprayers, 30eLocust3 durable portable tablets for field data collection, and assistance for joint surveys and border meetings with neighboring nations, locust forecasting, and advanced personnel training. In addition to technical assistance, major support was offered by the procurement of spares and Petroleum Oil Lubricant (POL) for vehicles and aircraft during 2019. The eLocust3 framework was extended by FAO and a mobile phone version, eLocust3m, was introduced where training was provided to DPP and partner organizations and surveillance teams.

2.3.18 Smog Control

- Invoked crisis on SMOG, created brick kiln owners' advice and information documentary and geo-mapped all kilns.
- In a record duration of one month, 2,000 kilns were converted to the Zig Zag technique, and all kilns producing black smoke were closed in Punjab.
- Rs. 51 million fine levied 4,325 First Information Report (FIRs) filed, and 536 kilns seized, 93,122 impounded cars, 2,533 sealed industrial units, 1,628 sealed Brick Kilns.
- The fines levied on polluters, including smoke-emitting cars, manufacturing units, and anti-stubble burning FIRs, outweigh the cumulative amount of criminal prosecutions for

such practices in the previous five years, resulting in a reduction in smog severity in urban areas during the current season. Smog is nearly non-existent in remote areas.

• Smog reporting and the tracking of thermal disturbances dependent on GIS.

2.3.19 The Disaster Response Force (DRF)

- Under each province's PDMA, the Emergency Response Force (DRF) includes Rescue 1122, Civil Defense, and District Disaster Coordinators.
- It consists of 7,500 Rescue 1122 staff in **Punjab**, qualified in water rescue and normally in any sort of disaster.
- The KPK 1122 department has trained more than 30,000 rescuers, including some divers who are trained to respond to aquatic emergencies.
- The DRF will be work under Rescue 1122's tactical order.
- For rescue and evacuation operations, the **PDMA Punjab** has already supplied Rescue 1122 with 210 vessels. Sophisticated search and rescue would be carried out by the Emergency Relief Force and affected and disabled persons would be rescued.
- 1122 department has 495 people for the service. PDMA under government supervision setting up a rescue service, Emergency, and Rescue 1122, in Quetta and along with all national highways in the province.
- 186 rescuers have 1122 departments in Gilgit-Baltistan. Now women-based rescuers team also has trained in the GB area.
- AJ&K 1122 department under emergency response force has two ambulances and two firefighter vehicles for Rawalakot and Jehlum valley to meet any emergency and disaster-related incident. Now they are expanding rescue services in Neelum Valley, Bagh, and Havelly.
- Rescue 1122 will create a Regional Control Cell at its headquarters in Lahore to handle the high number of operations during a crisis. This tracking cell will be active round the clock along with the command and control room of Rescue 1122 and would also be connected by video conferencing and radio access to the 4C at PDMA.
- 1122 institute focuses on delivering emergency care services to people in emergencies.
- Multipurpose emergency vehicles carrying critical rescue equipment such as heavy-duty hydraulic cutters, spreaders, and automated search and rescue systems are operated by Agency 1122. The department also has firefighting equipment, ambulances, water bowsers, emergency vehicles, vessels, water rescue trucks, life jackets, Out Board Motor (OBM) engines, rings, and buoys, etc., in addition to the rescue vehicles.
- Rescue-1122 has handed over a team of 20 officials from across Punjab to Pakistan Army Urban Search and Rescue (USAR) specialists for capacity building of rescue officers and officials as master trainers in the field of Urban Search and Rescue.
- The rescue team consisted of 9 Emergency Services Academy officers and members, 9 Station Coordinators from nine divisional headquarters, one officer from Lahore, and one from Rawalpindi.
- These master instructors, who are Pakistan Army USAR experts, will also train the Divisional Urban Search and Rescue Teams at the Emergency Services Academy in

Lahore.

2.3.20 DRR Checklist

• In the context of mainstreaming, a key development has been the incorporation of the DRR checklist as an integral part of Pakistan's public sector development project proposal format i.e. PC-I, ensuring DRR mainstreaming in each new project before its approval by the highest planning forum for implementation. Some of the key policies/reports and frameworks formulated by NDMA are attached as **Annexure-II**.

2.3.21 Disaster Education and Awareness

The NDMA is proactively working to reduce risks and vulnerabilities to disasters through DRR education and awareness and the following notable activities have taken place for the reporting period:-

- The NDMA conducts various activities related to DRM education and awareness throughout the year.
- At NDMA, we believe preemptive awareness and education on disaster mitigation measures are vital for Disaster Management. NDMA has taken various initiatives to exploit print, electronic, and digital media forums for Disaster Risk Mitigation (DRR) and therefore, devised electronic Advocacy & Awareness Campaigns.
- The tools used for educating people on DRM include; posters, booklets, radio & television talk shows, radio spots, documentaries, and lectures.
- 8th October has been notified as National Disaster Awareness Day since the year 2015. This Day was re-notified as National Disaster Resilience Day in 2017. This Day is commemorated by undertaking City branding, Flag March of Emergency Services, Cyclathon, Public Event/ ceremony in F 9 Park, Islamabad, the Federal Capital. All provincial/ State/ Regional DMAs also undertake activities and extensive Media coverage of the events is ensured through print, electronic and social media.
- Steps have been taken to engage youth and students as ambassadors for disaster awareness and adaptation.
- Rich Library on Public Service Messages has been established. NDMA has developed a library of fourteen (14) public service TV Commercials (TVCs) of short duration. These messages are aired on various TV channels depending upon the nature of the impending hazard to keep the people aware.
- A dynamic website with Global viewership and Alerting Capability has been put in place. The website has Knowledge Resource in the form of publications etc.
- The NDMA has developed two documentaries: 'Towards a Disaster Resilient Pakistan' and 'Vulnerable Groups in Disasters'. These documentaries are displayed at important events, international conferences, and seminars and are much appreciated by the audience. An improved version of the documentary highlighting the resilience of the people of Pakistan has been prepared in 2019.
- Child-centered and gender-sensitive IEC material designed for all potential hazards, emergencies, and disasters.
- The NDMA and PDMAs conduct pre, during, and post-disaster Media Campaigns.

- Several national and provincial level Media Training Workshops on responsible media reporting during disasters at Karachi, Lahore, Islamabad, and Peshawar have been held.
- Seven, 40 minutes full-length duration TV/Radio programs on Flash Floods, Riverine Floods, fire hazard, droughts, etc that covered all types of natural and man-made disasters. These TV programs are aired from time to time depending upon the season and the nature of the imminent threat.
- A complete social media constellation is formed, maintained, and promoted to include Facebook, Twitter, and Flickr Accounts.
- Apart from this NDMA issues early warnings and advisories through print and electronic media to educate people about the weather forecast along with relevant precautions to be taken.
- The NDMA also publishes Public Awareness and Education Messages on regular basis to keep the people of Pakistan updated on all types of hazards. SMS through telecom operators and Pakistan Telecom Authority is also aimed for the public to raise awareness.
- The NDMA in collaboration with various local and international organizations conducted Media Workshops as a matter of routine, in all parts of the country to educate media reporters and camerapersons on ethics of disaster reporting and sensitives attached.
- Pakistan School Safety Framework is an exemplary initiative of NDMA that ensures the safety of young children at schools in the event of an emergency. This is a countrywide program wherein teachers, students, and school administrations are sensitized to the possibility of an emergency in school and trained to cope up with such emergencies.
- Child-Inclusive Climate Change Adaptation (CCA) Tools are in the phase of finalization for printing that was developed and designed to strengthen the capacity of children within the education sector by mainstreaming climate change adaptation and disaster risk reduction.
- Media Toolkit has been developed and finalized to sensitize media personnel regarding key disaster management principles and crisis management journalism, as well as on the role of media in disaster risk management.
- Coffee Table Books have been developed for documenting the case studies showcasing women's leadership and contribution in humanitarian preparedness and response in DRR/M through personal stories of resilience.
- Media Workshop National Workshops on the role of Media in Preparedness for Response and Climate Change Adaptation.
- Press Releases, Advertisements & Tickers are used to project important events of NDMA in print media through press releases. Exclusive Interaction with Media. Several exclusive meetings have been held with leading anchors of different media houses as part of the Awareness and Advocacy campaign.

2.3.22 Implementation of Pakistan School Safety Framework (PSSF)

• Pakistan School Safety Framework was developed after a series of National level consultative meetings with Government and private sector stakeholders. It was pretested through a Pilot in 68 Public and Private Schools across Pakistan, AJ& K, and GB to

view its effectiveness in disaster risk management in the Education Sector in Pakistan. 263 teachers were trained, and 50,000 students benefitted from the programme.

- Owing to the monumental success of the Pilot, it was scaled-Up in ICT as Model Pilot in 500 Public, Private Schools, and informal educational institutes, where 1500 teachers will be trained. In this regard, an MoU was signed for partnership with FDE for the roll-out of the Pakistan School Safety Framework (Project) in 391 schools that fall under FDE jurisdiction.
- Development of PSSF Document and Training Toolkit in English & Urdu version (Teacher's Guide, Trainer's Guide, Evaluator's Guide, Evaluator's Handbook) for implementation of PSSF in 500x Schools of Islamabad in two phases have been finalized and printed.

2.3.23 International Cooperation

2.3.23.1 Bilateral & Regional Linkages:

• The NDMA has been instrumental in extending and strengthening Pakistan's diplomatic outreach through the establishment of various bilateral and multilateral linkages for collaboration in the field of DRR.

2.3.23.2 Regional Linkages

Heart of Asia – Istanbul Process. The Istanbul Process provides a new agenda for regional cooperation in the 'Heart of Asia' by placing Afghanistan at its center and engaging the 'Heart of Asia' countries in sincere and result- oriented cooperation for a peaceful and stable Afghanistan, as well as a secure and prosperous region as a whole. The countries participating in the Istanbul process have agreed on the following three elements for the follow-up to the Istanbul Process:

- Conduct political consultations involving Afghanistan and its near and extended neighbors.
- A sustained incremental approach to implementation of the Confidence Building Measures (CBMs) identified in the Istanbul Process document; and
- Seeking to contribute and bring greater coherence to the work of various regional processes and organizations, particularly as they relate to Afghanistan.
- Pakistan is the Co-chair of DM-CBMs along with Kazakhstan.

Regional Consultative Committee on Disaster Management (RCC). The Regional Consultative Committee on Disaster Management (RCC) comprises members who are working in key Government positions in the national disaster management systems of countries of Asia and the Pacific region and was established at the initiative of the Asian Disaster Preparedness Center (ADPC) in 2000. Its role as a consultative mechanism for regional cooperation is recognized and affirmed by the Charter of ADPC. To date, 26 countries are represented by 30 RCC Members from Asia and the Pacific region namely, Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia, China, Georgia, India, Indonesia, Iran, Jordan, Kazakhstan, Republic of Korea, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, the Philippines, Sri Lanka, Thailand, Timor-Leste, and Vietnam. Pakistan has hosted the 13th RCC meeting in Islamabad on 3-5th October 2016 under the theme of "Operationalizing Global Frameworks for Risk-Resilient Development in Asia."

Economic Cooperation Organization (ECO). The ECO Region is one of those regions which is most susceptible to natural hazards causing continuous human and economic losses. The 9th ECO Summit in 2006, highlighted the importance of regional cooperation on the issues of disaster risk management and recommended consideration of regional programs and projects for early warning, preparedness, and management of natural disasters and the need for strengthening collaboration within and beyond the Region in this regard. Subsequently, ECO has organized several meetings, conferences, workshops, seminars, and symposiums on disaster risk reduction in collaboration with regional and international organizations. These events were aimed at making the sound assessment of disaster risk in the Region through identifying the needs, defining the level of risk to people's lives and livelihoods as well as the capacity and commitment of the main actors, including regional and local organizations, institutions and governments. ECO Ministerial Meetings on Disaster Risk Reduction" were held on the sidelines of the "Third World Conference on Disaster Risk Reduction" in Sendai, Japan, and explored enhanced regional cooperation on disaster risk reduction in post-2015 under the overall Sendai Framework for Disaster Risk Reduction in the ECO Region. It was agreed during these meetings for the development of a regional framework for actions. The NDMA remained part of these meetings and was part of the Working Group which formulated the Regional Framework.

Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR): The NDMA participated in Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) that was held from 3rd – 6th July 2018, in Ulaanbaatar, Mongolia. A documentary was developed on vulnerable groups in PSSF by NDMA and played for the competition held during conference presentation/ discussion session on PSSF at Safe School event, organized by the UNICEF Regional Office.

2.4 Challenges

The topic of catastrophe risk management and adaptation to climate change has gained a great deal of interest from policymakers, academicians, and development sector organizations over the last decade, and a variety of projects on the subject are being carried out. However, most of the programs and interventions have struggled to meet their goals because they neglect the essential knowledge of core stakeholders and implementing member organizations on local vulnerability and adaptive capability assessments.

- Budget allocation for the DRR on national, provincial, and district levels.
- Financial investment vis-à-vis huge outlay of development for resilience at infrastructure and community level.
- Mainstreaming DRR in key sectors relevant to development.
- Baseline studies need to be undertaken to clarify ground conditions to implement climate change adaptation and catastrophe risk reduction programs.
- In addressing natural hazards and climate threats, the vulnerability and adaptive potential of multiple players, including provincial entities and local populations should also be explored.
- Due to a lack of knowledge and experience in natural hazards, many agencies and organizations are unprepared to handle natural disasters.

- These departments are less equipped to handle natural disasters and deliver adequate care at the time of a crisis because of the lack of human, financial and physical capital and equipment.
- Lack of coordination between different institutions is found to be another bottleneck and reason for less preparedness to deal with natural disasters.
- Structured, non-structured, and practical preparedness deficiencies and gaps cannot address the needs of local communities at the time of any natural disaster.
- Due to this lack of clarity, knowledge, and tools to respond to climate change, there are large differences in perceiving and responding to climate change.

2.5 Policy Recommendations of WG for Disaster Preparedness Sector

- i. Pakistan's National Disaster Risk Reduction (DRR) Strategy was approved in 2013 and it offered a detailed context for policy priorities and actions towards the mainstreaming of climate change, notably in economically and socially disadvantaged sectors. Presently, Pakistan is the fifth most climate-vulnerable country across the globe and it is projected that, due to extreme weather events and other losses, climate change will cost the economy just \$14 billion a year, which is almost 5% of the GDP. Therefore there is a need of developing new knowledge products and tools related to preparing, responding to disaster risks in vulnerable areas across Pakistan. The approach should include cost-effective innovative disaster risk management solutions to reduce the loss of life, infrastructure, and livelihoods at all scales.
- ii. There is an urgent need to strengthen and build climate risk management capacities of the NDMA and PDMA's staff for rapid response and recovery to reduce losses at local, regional, and national levels.
- iii. The NDM Act (2010) and the NDMP (2012-22) are committed to highlighting and integrating the unique insecurity of women and other communities into DRR procedures but gender inclusion is not incorporated into any of the proposed operations. There is a need to ensure that gender issues are integrated into DRR activities, for example, the inclusion of gender specialists in the teams or committees who liaise with communities or develop the DRR plans.
- iv. Multi-Hazard Vulnerability and Risk Assessment (MHVRA) is the main focus area in the Implementation Roadmap (2016-2030) of Pakistan's National Disaster Management Plan. There is an urgent need to develop a nationwide scale MHVRA in a Spatiotemporal format including detailed and location-specific assessments to providing comprehensive risk information for Provincial Disaster Management Authorities (PDMAs) and concerned agencies in DRM and development planning for multi-sector (agriculture, water and industrial, and services sector).
- v. Climate change adaptation requires having in place a comprehensive monitoring and evaluation system, to make accessible reliable information about current climate variability impacts and potential climate change impact to decision-makers and the public through a hydro-meteorological monitoring system for developing an operational system on water-related DRR products and effective dissemination through online systems.

- vi. Establishment of Authentic National Water, weather, and climate Database to tackle natural disasters.
- vii. Awareness campaigns may be launched at various levels including:
- viii. National level to enhance knowledge on the DRM with local officials, farmers, civil society, and NGOs.
- ix. Farm-level in building through knowledge products (e.g. Farmer's campaigns).
- x. Program on integrated gender strategy in DRR intervention.
- xi. Local level on agriculture-disaster risk management (e.g. bundling seeds with insurance, post-flood recovery).
- xii. Implementation of NFPP-IV/FPSP-III through assured financing.
- xiii. Implementation of National Master Plan on Flood Telemetry.
- xiv. National Level Plan for Climate Change Adaptation needs to be developed and implemented. A comprehensive implementation framework and institutional setup need to be developed. For example, baseline studies need to be undertaken to clarify ground conditions to implement climate change adaptation and catastrophe risk reduction programs at the provincial, and district level.
- xv. Capacity building programs are regularly needed to be developed for raising scientific knowledge and experience in handling natural disasters for many agencies and organizations. These departments also need to be equipped to handle natural disasters and deliver adequate care at the time of a crisis with adequate human, financial and physical capital and equipment.
- xvi. There is a need to improve coordination between different institutions for better preparedness to deal with natural disasters at local, regional, and national levels.
- xvii. Phased implementation of Urban Flood Management Measures, based on studies, in 20 cities, most valuable to urban floods, as identified in the NFPP-IV.
- xviii. Funding opportunities at local, national, and international levels should be increased to enhance research regarding disaster preparedness across all levels. There is a need to promote the use of space technologies and Digital innovation in DRR, agriculture water management through capacity development for national partners.
 - xix. National Decision Support System (DSS) for effecting management of hydrometrological disasters.
 - xx. There is a need for a better database and trained staff for developing operational plans and its implementation for the smog and pest controls in hotspot areas.
- xxi. Development of GIS-based maps of potential water-borne health risk areas (flood, drought) and develop guidelines for disaster risk strategies across all levels.
- xxii. DRM products including disaster hazard and risk maps, flood/drought monitoring, forecasting, and early warning should be publicly available.
- xxiii. There is a need to develop weekly crop insurance advisory services and disaster information in partnership with the private sector (insurance industry, Google, and ICT).

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Annexure-I/Section-2

Punjab Disaster Management Authority Budget 2016-2017

2016 - 2017	Budget Estimate (PKR)
Total Employees Related Expenses	45,233,000
Total Operating Expenses	295,786,000
Transportation of Goods	30,000,000
Cost of Other Stores	210,000,000
Total Physical Assets	210,000,000

Annexure-II/ Section-2

Sr. #	Title	Туре
1.	National DRR Policy	Policy
2.	National Disaster Management Plan	Plan
3.	National Monsoon Contingency Plan / Response Directive yearly	Plan
4.	National Disaster Response Plan	Plan
5.	National Multi-Sector Initial Rapid Assessment (MIRA) Guidelines.	Guidelines
6.	National Guidelines for Minimum Standards of Relief in Camps.	Guidelines
7.	National Guidelines for Minimum Ex-Gratia Assistance to the Persons	Guidelines
	Affected by Natural and Man-Made Disasters.	
8.	Integrated Context Analysis (ICA) vulnerability to food insecurity and	Document
	natural hazards in Pakistan.	
9.	Post Industrial Disaster Mock Exercise Report 2017	Report
10.	National Multi-Hazard Vulnerability Risk Assessment Guidelines.	Guidelines
11.	Life & Fire Safety Provisions in Pakistan Building Codes.	Policy
12.	Integrating Gender-Based Violence Prevention Intervention in Pakistan	Document
	School Safety Framework.	
13.	Gender Mainstreaming and Gender-Based Violence in Disaster Settings in	Document
	Context of Pakistan.	
14.	Pakistan School Safety Framework (PSSF) Guidelines.	Guidelines
15.	Pakistan School Safety Framework (PSSF) Project Report	Report
16.	Training documents for PSSF Scale-up.	Document
17.	GBV Guidelines and SOPs to Prevent, Mitigate, and Response in	Guidelines
	Humanitarian Settings.	
18.	Gender analysis of Pakistan School Safety Framework.	Report
19.	Commitments on Gender Mainstreaming and GBV in Disaster Settings in	Report
	Context of Pakistan	
20.	Integrating Gender-Based Violence Prevention Intervention in Pakistan	Report
21.	Media Toolkit	Guidelines
22.	Regional Toolkit for Heat Wave management	Guidelines
23.	Revised National Disaster Response Plan	Plan
24.	Annual Report covering activities of the complete year	Document
25.	Pakistan School Safety Framework (PSSF)	Document
26.	NDMA's Guidelines on Minimum Cash Compensation to Disaster Victims	Guidelines
27.	Host National Support Guidelines for Foreign Assistance to Pakistan during	Guidelines
	Disasters	
28.	Multi-Hazard Vulnerability Risk Assessment (MHVRA) Punjab Atlases for	Atlas
	District Jhang, Bahawalpur, Khushab, Multan, and Rahim Yar Khan	
29.	Multi-Hazard Vulnerability Risk Assessment (MHVRA) Sindh Atlases for	Atlas
	District Tando Allah Yar, Badin, Thatta, Sujawal, Mirpur Khas, and Tando	
	Muhammad Khan	

POLICIES / PLANS/ SOPS /GUIDELINES

SECTION – 3: REVISION OF NDCs RELATED TO GENDER SECTOR (ADAPTATION SIDE)





OFFICE OF THE CHIEF ENGINEERING ADVISER & CHAIRMAN FEDERAL FLOOD COMMISSION, ISLAMABAD

SECTION – 3: REVISION OF NATIONALLY DETERMINED CONTRIBUTIONS (NDCS) RELATED TO GENDER SECTOR (ADAPTATION SIDE)

3.1. Climate Change

Climate change is a complex and global issue. It is connected with almost every aspect of life when its impacts and causes are considered. One of the main causes of climate change is the greenhouse effect which actually is a function of Earth's atmosphere, where heat from solar radiations are trapped by greenhouse gases resulting in increased temperature of Earth. In the absence of this effect, the Earth would have been cooler by some 18°C. The real issue arises when uncontrolled amount of greenhouse gases are emitted as a result of human activities that disturbs the energy balance of the Earth's climate system leading to a more rapid rise of Earth's air temperature than normal. Climate change not only includes global worming but also involves everlasting changes in weather patterns and conditions such as precipitation, atmospheric pressure, humidity and wind.

Intergovernmental Panel on Climate Change (IPCC) have already declared that warming of Earth is actually happening and they support this fact with the evidence of melting of ice and snow in northern hemisphere, increase in ocean and global air temperature, and rise of sea levels. Climate change is a serious concern as it has been responsible for many disastrous events such as floods, droughts, soil erosion, biodiversity loss, frequent wildfires, thunderstorms, and melting of glaciers, thus, affecting both natural and human ecosystem. Thus, in order to prevent climate change from happening, swift actions need to be taken before its gets too late.

3.2. Climate Change and Gender

Climate change has a significant impact on those groups of people that mostly rely on natural resources for their livelihood and possess the minimal resistance to natural disasters such as landslides, hurricanes, floods and droughts. When it comes to gender, both men and women are affected differently by the climate change. Women generally bear more risk and burden from the climate change impacts. Various factors need to be kept in mind when climate change is considered from gender equality point of view. One of the aspects is related to the questions such as who holds the power, who has the authority in decision making and how the process of decision-making is carried out. All these questions refer to the issue of disproportion of men and women in decision making bodies, technology development and research institutes of climate change, as well as in general participatory processes and international organizations.

Secondly, numerous gender-related aspects should be taken into account when devising policies related to climate change. These features include climate change influence on men and women, difference of their perceptions and contributions towards climate change, and remedial measures that both sex will adopt for the mitigation of climate change. All these features will be investigated by addressing different gender dimensions such as; how socio-economic element like age, class and income level influences the men's and women's mitigation strategies, how the psycho-social factor impacts men's and women's perception and behavior towards climate change and how different dimensions influence gendered aspects of policies and measures.

The linkage between climate change and gender equality has been widely acknowledged in many countries, however, even today the focus is still on consequences of climate change on women rather than on both gender. There exists a lack of awareness and a research gap on gender related aspects of climate change, especially in developing countries. And if the projects or policies are continued to be

implemented without women participation, it can further aggravate the gender inequality and reduce its effectiveness.

3.3. Paris Agreement and Nationally Determined Contributions (NDCs)

The Paris Agreement is a first ever international charter within United Nations Framework Convention on Climate Change (UNFCCC) on climate change adaptation, mitigation and finance. On 12th December, 2015, 196 state parties adopted this agreement at the 21st Conference of the Parties (COP 21) of the UNFCCC in Le Bourget, near Paris, France. The Paris Agreement came into force on 4thNovember, 2016. As of now, there are only seven countries that have never ratified the agreement and which are Iran, Turkey, Iraq, Libya, South Sudan, Yemen and Eritrea.

The aim of the Paris Agreement is to significantly minimize the greenhouse gas emissions worldwide. The agreement has laid down a global framework with an effort to restrict the average increase in Earth's temperature to 2 °C in this century and implementing measures to limit the rise in temperature to 1.5 °C. The signatories of this agreement are legally bound to cut short their climate pollution in order to mitigate climate change. Another purpose of this agreement is to fortify countries ability to tackle down the negative consequences of climate change. Thus, the Paris Agreement acts as a bridge between today's policies and climate-neutrality before the culmination of this century.

The Paris Agreement, acknowledges on one hand that climate change is common concern for the entire mankind, and on the other hand also encourages its Parties to incorporate "gender equality" and "empowerment of women" while formulating action plans to address climate change. At multiple points in the Paris Agreement, focus on gender equality has been given. For instance, in Article 7 of the agreement, it has been stated that the Parties should develop gender-responsive adaptation strategies. Likewise, in Article 11, it has been mentioned that the Parties should consider the element of gender while strategizing capacity building activities. Thus, the role of gender equality cannot be neglected during the implementation of Paris Agreement.

3.4. Why Gender Mainstreaming into NDCs

Several decisions have been taken at various Conference of Parties (COP), regarding the importance of women in designing climate change policies. For example, Decision 23/CP 18, encouraged the participation of women and maintaining gender balance in the bodies that are associated in developing policies and actions plans for mitigating climate change. Similarly, Decision 18/ CP 20, focused on the role of Parties to develop and implement climate policies that are gender-responsive [1].

The main aim of these decisions was to give fair share of benefits, resources and opportunities to women. As it has been found, that in developing countries, about 43 % of labor force in agricultural sector comprises of women and according to the Food and Agricultural Organization (FAO), these women could have raised farm yield by 20 - 30 % and increased the total agricultural productivity by 2.5 - 4 % if they had the similar access to useful resources as men (such as credit, information, land and extension services).

In the same fashion, socio-economic status as well as social norms can result in different climate change impacts for women and men. The possibility of women and children to die during natural calamities is 14 times higher than men[2]. Approximately, 70 - 80 % of non survivors were women during the catastrophic Indian Ocean tsunami of 2004. Likewise, during the 1991 Bangladesh Cyclone, 90 % of total fatalities were women[3]. However, there are some examples of countries such as Bangladesh where intervention measures greatly decreased the disaster mortality and female to male death ratio by 65 % [4]. This feat was accomplished due to the encouragement of women empowerment and leadership across all sectors and incorporating women in preparing the design of cyclone shelters, early warning systems and community awareness strategies. Thus, women can prove to be a force of progressive change and can bring about climate resilient development if given equal resources and opportunities. Furthermore,

women should also be given their due rights and benefits that occur as a result of climate resilient development.

All the above examples demonstrate how differently climate change effects the lives of men and women. Hence, it is essential to include women and other marginalized groups in designing of climate change adaptation and mitigation strategies, capacity building, and devising plans for disaster risk reduction. This will not only lead to just and unbiased solutions but will also galvanize impactful and cogent climate results.

3.5. Gender Inequality from Pakistan's Perspective

The Global Gender Index Gap report 2020 ranks Pakistan as third worst country where Pakistan stood at 112 out of 120 countries in economic participation and opportunity [5]. The report also highlights that under health and survival category, women in the country do not have the same access to healthcare as men. Pakistan has 48% women population and among these 64% are residing in rural settings. Not much importance is given to the women in the country as it has been evident from the Pakistan Demographic and Health Survey (PDHS) statistics, that proportion of households that are headed by women is just 10.9 % in 2012-2013. Another estimate of Labor Force Survey (2017-2018) demonstrates that the participation of women declined to 20.1 % as compared to the value of 22 % in the year 2014-2015. Women in Pakistan are majorly employed in agricultural, fishing, forestry and hunting sector having a participation of 67.2 %, followed by manufacturing division with the representation of 16 % and 14.6 % representation in the field of social, community and personal services[6]. Climate change has significantly impacted Pakistan and historic data reveals that Pakistan is 5th most vulnerable to impacts of climate change [7].

Climate change has augmented glacier melting that is affecting precipitation patterns and water availability in the country. Pakistan is an agro-economy and these changed precipitation patterns and water scarcity have impacted agricultural yields in rural areas. Pakistani women in rural areas are involved in labor in **agriculture** sector and stats show that 79% of the total women in the country are engaged in agriculture [8], where they normally work as unpaid family labor. These women are culturally bound to labour in this sector and this is the only job they are skilled in. Their participation in agriculture sector decision making is never prioritized given they do not have any land ownerships and their participation in skill development is also limited. Moreover, restricted access to markets and irrigation systems is also one of the reasons for the limited participation of women. Lastly, since major proportion of women are involved in agricultural activities, so they are exposed to pesticides that are sprayed on crops, thus creating negative health impacts. Also, no measures have been taken to inform such working women about the health risks they are exposed to.

Extreme weather events like droughts, floods, heat waves and climate-sensitive diseases are directly affecting health and well-being. When these effects are met by the already existing poor socio-economic conditions like poor water and sanitation, food insecurity etc. the impacts are multiplied. Pakistan has also faced extreme drought situations where 15 events have been reported from 1997 – 2003. The drought situation has impacted women and children more as unavailability of nutritious food impacts maternal and fetal health and growth. The existing socio-economic condition in these drought stricken areas of Sindh and Balochistan further exacerbate the existing vulnerabilities for girls and women. Men of the house are forced to migrate for livelihood opportunities increasing the burden of work for women. Another impact caused by climate change is early marriage of women. According to the PDHS survey of 2012-2013, 18.8 % of women (of age 18-22 years) got married before the age of 18 years[9]. During the crisis situation, including those related to climate change, as a coping mechanism, the head of the family get their daughters to marry early so that they have to feed less people, transfer their daughter's safety on the bridegroom, and use the bride's money as a rehabilitation measure for their family. This act of early marriage has imposed serious negative impacts on the well-being, health and education of the girl.

Lack of economic empowerment prevents Pakistani women from adapting to the impacts of climate change, making climate resilience almost an impossible option for them. Since women form almost half of the country's population, it will be significant to identify their risks and consider their needs to respond to climate change challenges. According to Asian Development Bank (ADB) report, one third of

Technical and Vocational Education and Training (TVET) students comprise of women, and almost 50 % of higher education institutions are accessible by women[10], so if these women are incorporated into the bodies that are associated in developing mitigation plans for climate change, not only will it minimize the climate change impacts but will also reap benefits and advantages for women gender in the country.

3.6. Pakistan Climate Change Policy analysis from Gender perspective

The role of women in policy making and planning is unreported in the country. The Pakistan Health Vision 2016-2025, National Food Security Policy 2018, Climate Change Act 2017, National Biodiversity Strategy and Action Plan 2017-2020, Framework for implementation of Climate Change Policy 2014-2030, and National Climate Change Policy 2012 chart out the policy measures to empower women to enhance their role in planning and implementation. Pakistan Health Vision and National Food security Policy also include holistic strategy to cater climate change impacts and build capacity of women to adapt to the direct and indirect effects.

The need for women's role, needs and perspective for climate change mitigation and adaptation can only be strengthened through inclusive policies. The analysis of Pakistan's policies highlight that women and children are identified as vulnerable groups, however their participation from climate action is missing (refer **TABLE G-1** given below).

Name of Policy, Plan/ Mainstreaming Aspects	Gender analysis on climate risks, impacts and vulnerability	Identificatio n of gender/ vulnerable groups or youth	Direct benefits to women, youth or vulnerable groups	Participation and empowerment of women and youth	Capacity building, training & enhancing education
National Climate Change Policy 2016	\checkmark	\checkmark	\checkmark	\checkmark	X
Pakistan Nationally Determined Contributions 2016	Х	\checkmark	X	Х	X
National Disaster Response Plan 2019	X	X	X	X	X
Pakistan Health Vision 2016-2025	\checkmark	\checkmark	\checkmark		\checkmark
National Food Security Policy (2018)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
National Biodiversity Action Plan (2017 - 2020)	\checkmark	\checkmark	\checkmark	\checkmark	X

TABLE G-1

Building on the existing policies and strategies, Pakistan can integrate these perspectives in to its NDC with a goal to enhance the role of women in adaptation and mitigation actions to meet the commitments. This provides the opportunity to focus specifically on how and in which sectors gender equality results will be measured.

In addition to the above mentioned policies, Pakistan is undergoing various projects that have tried to address gender related issues apart from mitigating climate change impacts. The list of these projects together with their aim is presented in the table below.

TABLE G-2

Sr. No.	Name of the project	Implementing Body	Aim
1.	Ten Billion Tree Tsunami Programme (TBTTP)	MoCC	To revive forest and wildlife resources in the country, to conserve the existing protected areas, to encourage eco-tourism, community engagement and job creation
2.	ReducingEmissionsfromDeforestationforestDegradation(REDD+)Project	World Bank	To minimize the emissions of greenhouse gases (GHGs), and enhance their removal by implementing forest management options
3.	SustainableForestManagement(SFM)Project	Global Environment Facility (GEF), UNDP	To conserve the natural habitats of animals and plants, and to give rights to forestry workers and local communities
4.	GlacialLakeOut-burstFloods(GLOF)IIProject	Green Climate Fund (GCF), UNDP	To minimize the risk of flash floods in the northern areas of the country
5.	Global Environmental Benefits (GEB) Project	GEF, UNDP	To remove the obstacles in the path of environmental information management, and to incorporate global environmental concerns into economic decision-making
6.	Pakistan Snow LeopardandEcosystemProtection(PSLEP)ProjectEnd	GEF, UNDP, Snow Leopard Foundation (SLD)	To promote integrated landscape-wide- approach for the protection of snow leopard and its prey species, and to implement sustainable land and forest management in critical habitats in northern Pakistan
7.	Chilgoza Restoration Project	GEF & FAO	To protect, restore and manage the Chilgoza pine forest to enhance socio-economic resilient development
8.	National Rural Support Programme (NRSP)	GCF	To reduce poverty by utilizing people's potential, and to undergo development activities in the country
9.	World Food Programme (WFP) project	GCF	To deliver food assistance during emergency situations, to improve the nutrition and build the resilience of the communities
10.	Strengthening Community Managed Protected Areas (SCMPA) Project	GEF, UNDP	To conserve biodiversity by strengthening the terrestrial system of national protected areas

If these projects are studied in detail, it can be found that all these projects have measures or strategies that are gender responsive. From this it can be inferred that the country possesses some experience in mainstreaming gender into different sectors, thus, lessons can be learnt from these projects and the findings can be implemented on a larger scale through the implementation of NDCs.

3.7. Recommendations:

3.7.1. Agriculture, Forestry and other land-use Change AFLOLU:

- 1. Increase women participation in adaptation projects related to AFLOLU
 - a. Build capacity of women on drought resistant crop varieties, contemporary technologies, water efficient irrigation system and novel farming practices
 - b. Encourage the investment by women in animal production and bio-product industries to enhance job opportunities and minimize waste
 - c. Ensure women participation in protected areas management
 - d. Support women in establishing tree nursery
- 2. Increase women's access to agricultural information through radio and mobiles
- 3. Introduce a legal reform that
 - a. Allows female farmers to buy or sell a land
 - b. Conducive environment for female farmers to sell their goods at farmers markets
 - c. Allows female farmers to access loans and finances
 - d. Ensure that governmental incentives targeted women farmers also
- 4. Increase women participation in decision-making and implementation related to food security, forestry and agricultural programs or projects
 - a. Raising awareness of whole rural community about importance of women participation in decision making in natural resources management and making use of the traditional knowledge about agricultural activities that women possesses
 - b. Promote women's participation in decision-making positions at local levels e.g. women quota in provincial blue carbon management units, participation of women organizations in stakeholder meetings etc.
 - c. Give priorities for supporting to organization that women participate actively in decision making
 - d. Consider lessons learned from different initiatives like REDD+ project, Strengthening Community Managed Protected Areas (SCMPA) Project GEF-UNDP etc. when seeking to engage with the communities in order to address gender equality.
- 5. Ensure that plans, strategies, programs and budgets of government bodies, funding agencies and NGOs promote gender equality, access to natural resources and advance mitigation and adaptation to climate change
 - a. Assign a Gender Focal Point (GFP) for the national (inter-ministerial) level committee

- b. Revisit the national policies and legislations to ensure that gender and climate change are taken into consideration
- c. Integrate gender considerations in forest sector strategy
- d. Ensure that policies and plans specify manners for engaging with communities that instigates the use of gender-responsive and socially inclusive methodologies in forest conservation and management especially the women and other vulnerable groups by giving them management authorities as well as their increased responsibility for the management of such resources
- 6. Track Indicators of Women's Nutrition by collecting data on women's nutritional status, apart from tracking the practices that prioritizes the feeding of male family members over the female members in order to inform governments about the nature, extent, and consequences of climate change on female malnutrition
- 7. Ensure that benefits (financial or otherwise) from Result Based Payments (RBP) mechanism developed under REDD+ can be enjoyed by the women and men of the neighboring or participating communities. If funds coming from this RBP are to be directed into projects, these could also be designed with specific targets to recognize/encourage the participation of women in forest/biodiversity protection
- 8. Conduct case studies illustrating customary use of biological resources by women and men, households participating in traditional activities and consumption of traditional foods
- 9. Introduce Social Environmental Impact Assessments (SEIAs) to collect and present data in a sex-disaggregated manner as a part of EIA regulations to address the gender considerations
- 10. Coastal hazards impact on men and women are different e.g., consider the health impacts of the salinization of water sources on maternal health and pregnant women.
- 11. Explore the use of the W+ standard for carbon credits by Women Organizing for Change in Agriculture and Natural Resource Management WOCAN in further funding gender-responsive activities through mitigation actions

3.7.2. Water

- 1. Make union of local women's association to create effort for keeping the water bodies (rivers, canals, lakes and wet lands) usable.
- 2. Capacity development of women to fully engage in water resource management and maintenance of water infrastructure.
- 3. Extension services on alternative irrigation technology (e.g. water purification, rain water harvesting, waste water collection, water conservation)that target both female and male users at household or family level. Keeping track of changes that occur in expenditures during the collection/conservation of water before and after the implementation of these initiatives.
- 4. Introduction and capacity development on low water consuming crop technology targeting women and men as participants in these training processes.
- 5. Identification, documentation and expansion of indigenous water management technology capturing the traditional knowledge and practices of women and men.
- 6. Technological support for new efficient water technologies in the hand of the community, seeking to ensure knowledge dissemination among women and men and identifying the

needs, biases or restrictions these groups may have in order to ensure access to the most appropriate technology and support means.

- 7. Awareness raising campaigns on management and conservation of water-related ecosystems ensuring they reach women and men in urban and rural contexts, taking into account their literacy rates and preferred communications outlets (radio, tv, others).
- 8. Ensure Monitoring and Evaluation of initiatives collects data on beneficiaries and presents in a sex-disaggregated manner. Additionally, it would be an important tool to track reduction in time poverty (time invested in water collection) or investment in securing water (for example, buying bottled water for human consumption).

3.7.3. Energy

- 1. Evaluate the energy and technology policies and incentives to promote efficient production, consumption, distribution to ensure gender considerations are addressed
- 2. Increase participation of women in the energy sector. For example, by hiring women for marketing of energy technologies
- 3. Disseminate information on environment friendly and green technology regarding the positive impact of these technologies on the health of women
- 4. Train and create access of women to renewable alternative energy solutions
- 5. Pilot energy efficient low cost cooking technology projects
- 6. Soft credits/ loans for women to use green technology

3.7.4. Disaster Management

- 1. Advocacy/ awareness at local level, including engaging print and electronic media, community radio for dissemination to improve women, girls and children security.
- 2. Include relevant issues in national curriculum and any other education materials.
- 3. Sensitize men and harness them as champions in preventing violence and assaults.
- 4. Undertake special programs on income generating activities for women during and after disasters

3.7.5. Waste

- 1. Encourage women to participate in decision-making positions in municipal waste management. Apart from this, a particular proportion of women are involved in informal collection of waste, thus, strategies should be proposed to incorporate these women into formal system, so that they have the opportunity to earn.
- 2. Encourage or support women's access to credit, finance and services for waste management and recycling entrepreneurship
- 3. Learn from experience Pakistan Biogas Development Program-Gender Mainstreaming 2011 and Pilot bio-gas technology amongst women farmers to deal with agricultural waste in rural areas
- 4. Formalizing the informal sector

- i. Engage public sector waste management companies and waste management boards to provide data on informal waste pickers who collect material in their property/area of work and disaggregate this data by women/men, girls/boys engaged in these activities
- ii. Design a process to map these informal networks, including noting if these are women/men engaged as informal waste pickers.
- iii. Develop a plan for engaging them in the formal recycling sector and/or retrain them to engage in other income generation activities. The co-benefits being income generation and increasing health condition of women and men who would otherwise be displaced by the "formalization" of the sector.
- iv. Engage Ministry of Human Rights for social inclusion, and to get a "just transition" perspective

3.7.6. Water Sanitation and Hygiene WASH

- 1. Engage WASH unit to develop guidance for mainstreaming gender in WASH projects, and for collecting data in a sex-disaggregated manner. This in turn would allow for the MRV system to also present data and track progress in a sex-disaggregated manner. This may also include further disaggregating the data collection using other social variables, such as age group, disabilities, etc.
- 2. Ensuring WASH services are also accessible to girls and women, and that they can cater to their hygiene needs.
- 3. Seek ways to ensure women can have a voice and be part of community management schemes, so that water collected can be used also for household purposes and not just for irrigation, for example.
- 4. Shared latrines need to be designed with safety features in mind –appropriate location, lighting, privacy etc. Otherwise, they can become a dangerous place for women and children, exposing them to violence and sexual assaults. Additionally, these latrines would need to cater to the hygiene needs of women, including manners for disposing of menstrual pads or other hygiene products used during menstruation.
- 5. Set into place manners to ensure women can participate in community based action plans, so that their needs, priorities and ideas can also be identified and included in local WASH plans.
- 6. Campaigns related to menstrual hygiene (and the disposal of menstrual hygiene products)
- 7. Include men in WASH campaigns/messaging so that they know why these practices are required and they either support these practices actively or at least do not oppose them.
- 8. Hygiene and sanitation related material on proper practices and safe measures should be produced in at least two formats i.e. Audio and written. This is to ensure that people with blindness or deafness can also benefit from the information. Also produce pictograms/graphic messages, to address literacy rates of some groups/communities.

3.7.7. Research, Knowledge and Database

1. Develop a gender statistics data center in collaboration with relevant line ministries like Ministry of National Health Services, Regulations and Coordination, NDMA etc. and link up with the Pakistan Bureau of Statistics, to create a centralized database.

- 2. Mapping of impacts of climate change and its gender dimension through case-studies
- 3. Identify gaps in women's representation in key policy making bodies
- 4. Institutionalize gender-sensitive benefit sharing mechanism, MRV system
- 5. Collaborate with the Ministry of National Health Services, Regulations and Coordination to strengthen research on the linkages between climate change/ gender, disasters and health
- 6. Develop different funding scenarios for integration of gender issues in agricultures, forestry, water and waste sector programs
- 7. Establish a gender-climate platform for knowledge sharing, resources and networking to strengthen cross-sector access and application of gender-responsive climate action tools.

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SECTION – 4: REVISION OF NATIONALLY DETERMINED CONTRIBUTIONS RELATED TO HUMAN HEALTH





OFFICE OF THE CHIEF ENGINEERING ADVISER & CHAIRMAN FEDERAL FLOOD COMMISSION, ISLAMABAD

SECTION – 4

REVISION OF NDCS RELATED TO HUMAN HEALTH

4.1. Climate Change Indicators and Impacts Related to Health

Climate change undermines the social and environmental determinants of health, including people's access to clean air, safe drinking-water, and sufficient food and secure shelter & emergency health products. Many of the public health gains we have made in recent decades are at risk due to the direct and indirect impacts of climate variability and climate change. Sustainable development across sectors can strengthen health resilience to climate change, as explained in Table HH=1 below:

SDG No.	Target	Indicator	Year	Estimate
1	No poverty	Proportion of population living below the national poverty line (%)	2015	24.3%
3	Good health and well-being	Universal Health Coverage Service Coverage Index	2017	45
3	Good health and well-being	Current health expenditure as percentage of gross domestic product (GDP)	2016	2.8%
6	Safe Water & Sanitation	Proportion of the population with access to safely managed WASH services	2017	56%
6	Safe Water & Sanitation	Proportion of total population using at least basic sanitation services	2017	60%
7	Sustainable Energy For All	Renewable energy share in the total final energy consumption (%)	2017	25%
13	Climate Action	National disaster risk reduction strategy in place	X	X

Table HH-1

Studies and assessments undertaken by the National Disaster Management Authority (NDMA) show that extreme climate events between 1994 and 2013 have resulted in an average annual economic loss of almost US dollars 4 billion. The last five floods (2010-2014) have resulted in
monetary losses of over US\$ 18 billion with 38.12 million people affected, 3.45 million houses damaged and 10.63 million acres of crops destroyed. Likewise, over 1200 people lost their lives due to the unprecedented heat wave in Karachi in 2015.

The health community is highly trusted, and sector serves an important role in; raising awareness of the health risks of climate variability and climate change, responding to increasing climaterelated health pressures and determining the most effective adaptation measures that will protect our citizens. The health sector also has a responsibility to reduce our contribution to greenhouse gas emissions and highlight the potential health considerations of national mitigation policies.

In 2015, Pakistan was the first country in the world to adopt the Sustainable Development Goals (SDGs). In order to improve the life of the people it is utmost important to have a safe environment. Climate change threatens all aspects of the society in which we live. The severity of the impacts of climate change on human health are increasingly clear (refer **Figure HH-1**), and further delay in action will increases the risks.



Figure HH-1

4.2. Health Sector Related Provisions of Pakistan's first NDC

In previous NDCs Health was not included as such, even though health sector has been working on promoting climate change adaptation and mitigation. Contributions to GHG from health sector are minimal. But effect on health is large. Water Resource Management and Agricultural resilience are two vital pillars to promoting good health and wellbeing besides to have health facility infrastructure improvement as explained in Figure HH-2.



Figure HH-2

Climate change affected health of people in Pakistan; the rise in temperature and dengue outbreaks were tackled by adapting different strategies. Action plans prepared and surveillance of disease was done very effectively.

4.3. Climate Change Interventions related to Health Sector

National Documents depicting the essential role of the climate change interventions include Joint External Evaluation, Pakistan Vision 2025 and National Health Vision Pakistan 2016-2025 besides Environmental component of Inter-sectoral Package. Important take outs are given below:

4.3.1. Joint External Evaluation (JEE)

There is need for an integrated One Health approach and coordination between the health and non-health sectors to address the issue of climate change adaptation in Pakistan. Representatives from health, environment and climate change sectors, food security, livestock, agriculture, national and provincial disaster management authorities, and the Pakistan Atomic Energy Commission are among the core stakeholders of the JEE.

Cross-sector preparedness and response capacity for all hazards applying the incident management system approach should be established. Preparedness includes the development and maintenance of a national, intermediate and community/ primary response level, and public health emergency response plans for relevant biological, Environmental hazards (chemical, radiological) and nuclear hazards.

4.3.2. Technical Areas - Country's 5-year Plan/ Roadmap

There is a critical need for a sufficiently funded, country's 5-year Plan/ Roadmap to strengthen IHR capabilities. Implementation of this plan will provide the basis for the Government of Pakistan, the Ministry of NHSR&C, Ministry of National Food Security and Research, Ministry of Climate Change and other stakeholders to agree on priorities for implementation and negotiation with internal and external partners for investment and support. The roadmap will also provide the core platform to develop action plans for the key priorities identified across the 19 technical areas.

4.3.3. Inter-sectoral Package

There is a critical need for continued and expanded multi sectoral communication and coordination. This extends in all directions – between sectors (including but not limited to public health, animal health, security, water, agriculture and environment) and between the federal government and provincial authorities Preparedness plan involving multi sectoral organizations and department (Multi-sectoral All Hazard Plan)

Governments will be enforcing the public health laws promulgated, related to smoking, drug safety, organ donation and transplant, safe blood transfusion, environmental protection, food safety. Factors such as illiteracy, unemployment, gender inequality, food insecurity, rapid urbanization, environmental degradation, natural disasters and the lack of access to safe water and sanitation all have the potential to aggravate the state of health of individuals and communities.

As Pakistan is signatory of SDGs, Ministry of National Health Services, Regulation & Coordination is working towards Universal Health Coverage which covers broader policy recommendations in health sector and has prepared Essential Health services Package which is

being piloted and inter-sectoral interventions which lies in other sectors and climate change is having many interventions. The proposed interventions which are partially implemented/needs to adapt by all sectors are explained in Table HH-2.

Sr. #	Health Related Climate Focused Interventions	Risk Control domain	Concerned Ministry
Air po	llution		
1.	Indoor sources: Ban on kerosene and halt use of unprocessed coal as a household fuel	Regulatory	MoCC Ministry of Energy
2.	Indoor sources: Subsidies to promote the use of low emission household energy devices and fuels	Fiscal	Ministry of climate change Ministry of Finance
3.	Indoor air pollution: Promote the Use of Low Emission Household Devices	Information and education	MoCC/ Ministry of Energy
4.	Fossil Fuel Emissions: Regulate Transport, Industrial, & Power Generation Emissions	Regulatory	MoCC Ministry of Energy
5.	Fossil fuel emissions: tax emissions and/or auction off transferable emission permits	Fiscal	MoCC/Ministry of Energy/Ministry of Finance
6.	Fossil Fuel Emissions: Dismantle Subsidies for and Increase Taxation of Fossil Fuels (Except LPG)	Fiscal	MoCC/ Ministry of Energy/ M/o Finance
Water	supply and sanitation		
7.	WASH: Enact National Standards for Safe Drinking Water and Sanitation within/& outside Households Institutions	Regulatory	Ministry of NHSR&C Ministry of climate change
Toxic s	substances		
8.	Hazardous waste: Legislation and Enforcement of Standards for Hazardous Waste Disposal	Information and education	Ministry of NHSR&C MoCC
9.	Pesticides: Enact Strict Control and Move to Selective Bans on highly Hazardous Pesticides	Regulatory	Ministry of NHSR&C MoCC
10.	Lead exposure: Take Actions to Reduce Human Exposure to Lead, including Bans on Leaded Fuels and Phase-Out of Lead-Based Consumer Products	Regulatory	Ministry of NHSR&C MoCC

Table HH-2

List of important adaptation projects implemented/ being implemented in Pakistan since 2016 and total investments made on them;

Sr. No	Name of Project/ Programme	Approved/	Investment	Remarks/ Issues faced
(i)	1 Togramme	LSt. Cost	made so fai	In the first wave availability was a major
	Procurement of PPEs (COVID-19)		1,359.09	issue due to global market shortage. Therefore, PPEs were procured from various donors in order to protect the frontline healthcare workers across Pakistan. Now local manufacturers have started producing PPEs and ample local supply is available.
(ii)	Procurement of Oxygen Concentrators (COVID-19)		319.64	Enhancement in the capacity of hospitals in dealing with patients who require oxygenation (low flow) at Health Facilities across Pakistan.
(iii)	Procurement of Testing Kits + Auto Extractors + PCR Machine (COVID-19)		2070.96	Enhancing in country's capacity of testing for COVID-19 detection to 85,000-90,000 per day.
(iv)	Procurement of Ultra- Cold Chain Freezer (COVID-19)		23.41	23 UCCs were procured to store vaccines requiring temperatures -60 to - 80°C
(v)	Procurement of Vaccine (COVID-19)		17,721.82	
(vi)	Stimulus package for COVID-19	50,000	11,000	The funds were utilized for strengthening COVID response during the first wave.
GLOE	BAL FUND (DONOR) C	OMPONENT	I	•
(vii)	Human Resources (HR) through Global Fund Resources	1652	1428	
(viii)	ProcurementsofHealthProductsPharmaceuticalProducts (Antimalarialdrugs)	359	343	
(ix)	Health Products - Non-Pharmaceuticals (HPNP)	2920	3309	
(x)	Health Products - Equipment (HPE)	21	16	
(xi)	Health Products - Equipment (HPE)			

Sr	Name of Project/	Approved/	Investment		
No	Programme	Fst Cost	made so far	Remarks/ Issues faced	
(vii)	Procurement and	LSt. Cost	made so fai		
	Supply-Chain				
	Management costs	1260	1130		
	(PSM)				
(xiii)	Infrastructure (INF)	49	44		
(xiv)	Non-health equipment (NHP)	40	31		
(xv)	Communication				
	Material and	144	101		
	Publications (CMP)				
(xvi)	Programme				
	Administration costs	303	251		
	(PA)				
REGU	JLAR BUDGET DoMC				
(xvii	Human Resources				
	(HR) through Global	107	88		
	Fund Resources				
(xvii	Procurement of				
	chemicals/insecticides,	86	85		
	plant and machinery	0.0	0.5		
	(PSDP)				
(xix)	Repair and	12	11.8		
	maintenance	12	11.0		
NUTRITION PROGRAM					
(xx)	National Nutrition	303, 519.87	NIL	Funds not allocated yet. Government	
	Program, "Tackling	million		committed to allocate resources	
	Malnutrition Induced				
	Stunting in Pakistan"				
	2021-2016				

Report of the Technical Review Committee on Adaptation

Detail of future high priority adaptation projects proposed for implementation during the next 10 years (possible completion before /by the year 2030) is given below:-

Sr. No.	Name of Project/ Programme/Initiative	Estimated Cost/ Monetary Needs up till completion/2030	Remarks if any
(i)	National Vaccine	112.065.00	
	Procurement and Deployment	112,005.00	
(ii)	Development of Integrated		The PC-I has been
	Diseases Surveillance and		approved from the
	Response System (IDSRS)	4,154.158	competent forum and the
	with Public Health		project will commence
	Laboratories Network		from July 2021.

		E-thread Cart/Mariatan	
Sr. No.	Name of Project/ Programme/Initiative	Needs up till completion/2030	Remarks if any
	(PHLN) and Workforce Development for transition of		
	Field Epidemiology &		
	Laboratory Training Program		
	(FELTP)		
(iii)			The fund has been allocated
			for
			• Public sector health
			emergencies.
			Strengthen Public Health
	COVID-19 Response and		Surveillance in both
	other natural calamity control	70,000	human and animal sector.
	program		• To expand coverage of water supply and
			sanitation facilities.
			With a special focus on
			least developed areas which
			are disproportionately
(iv)			Impacted by COVID-19.
(1V)	Strengthening of Point of		Entry of Pakistan &
	Entries	404.84	Directorate of Central
			Health Establishments
MA	ALARIA COMPONENT: MAI	LARIA ELIMINATION IN PAR	KISTAN (NATIONAL
	STRA	TEGIC PLAN 2021-2035)	
PREVE	NTION SERVICES		
(v)	Procurement of Long Lasting	26,000	Cost for 2021 2025
	(I I INs)	30,000	Cost for 2021-2025
(vi)	Indoor Residual Spraving		
()	(IRS)	16,912	Cost for 2021-2025
(vii)	Larval Source Management	342	
DISEAS	E MANAGEMENT		
(viii)	Diagnosis	2523.8	
(ix)	Antimalarial drugs	2090.2	
(X)	Laboratory Reagents &	590.2	
САРАС			
(xi)	Training of Health Care		
()	Providers and other personals	13,531	
COMM	UNITY-BASED INTERVENT	IONS	
(xii)	IEC materials	249.8	

Report of the Technical Review Committee on Adaptation

Sr. No.	Name of Project/ Programme/Initiative	Estimated Cost/ Monetary Needs up till completion/2030	Remarks if any
(xiii)	BCC	6899.0	
MONIT	ORING AND EVALUATION	(M&E)	
(xiv)	Monitoring & Evaluation (M&E)	3100	
PROGR	AM IMPLEMENTATION		
(xv)	Human resources	13200	
(xvi)	Infrastructure development including warehouses	2800	
PROGR	AMME MANAGEMENT & A	SSISTANCE	
(xvii)	Technical Assistance (TA)	2,699,418	
(xviii)	Project Management Cost) 3%	34,688,972	
VECTO	R-BORNE DISEASE MANA	GEMENT (VBD): This National	Plan of Action (PoA: 2020-
2024) ma	ainly deals with major current V	BDs like Dengue, Chikungunya,	Leishmaniasis, Congo virus
(CCHF).	It also have link with up-coming	threats of Yellow Fever, and Japa	anese Encephalitis (JE)
(xix)	Improved Surveillance	84	
(xx)	Epidemic Preparedness and Response	200	
(xxi)	Institutional Strengthening	325	
(xxii)	Diagnosis & Treatment	73	
(xxiii)	Multiple Prevention	110	
(xxiv)	Health Education/BCC	57	
(xxv)	Research & Surveys	65	

4.4. Policy Recommendations

- i. Incorporate health and environment in climate related policies and vice versa. Both policymakers and researchers need to recognize that health aspects of climate change require interdisciplinary and multi-sectoral research. Scientists and researchers from multiple disciplines and sectors should be encouraged to participate in such initiatives. (Health in All Policies)
- ii. Funding opportunities at local, national and international levels should be increased to enhance research regarding impacts of climate change on health. Develop a resource mobilization strategy to identify and access international funding for climate and health resilience and adaptation projects (e.g. GCF, GEF and bilateral donor agencies)
- iii. DATA platform .Establish a MoU among various stakeholders including the meteorological, environment, health and science ministries and departments to share data and establish a baseline for prioritized climate-health risks. Develop a knowledge-sharing platform to disseminate climate change and health research to relevant stakeholders to inform policy.
- iv. Disease Surveillance Systems Increase monitoring of climate sensitive diseases and introduce forecasting systems to increase effective planning prior to disease outbreaks. It

should also be ensured that vaccination and medication are available in case of a disease outbreak.

- v. Involve academia .Climate education should be prioritized in medical institution and health personnel should be educated and trained regarding climate change related health issues including vector-borne diseases, heat-related illnesses, water-borne diseases, pollution-related respiratory issues and nutrition and medical emergencies.
- vi. Integrate climate-related health risks into the National Disaster Risk Reduction Strategy and incorporate climate-related health risks into emergency preparedness and disaster response plans for health facilities to increase access and manage medical and disaster response supplies during emergencies
- vii. Develop GIS mapping to identify climate change/health impacts hotspots and develop and implement specified health adaptation prevention and control programs.
- viii. Schedule regular maintenance and up-gradation of BHUs especially in remote vulnerable areas and develop standardize emergency procedures and stockpiling of essential medicines in advance of e.g. dengue season.
- ix. Identify and address barriers to health adaptation to climate change (policy ,Finance ,coordination).Continue efforts to increase capacity and reduce vulnerability. Estimate the costs to implement resilient health systems to climate change and include these costs in planned allocations. (CCHIA)
- x. Inclusion and implementation of proposed inter-sectoral interventions of DCP3 (Climate change action plan at MOCC)
- xi. Judiciary awareness needs to be created of the public health impact and benefit of environmental regulations at National and provincial levels, which will enable EPAs to enforce environmental safety laws and regulations on industry.

SECTION – 5: REVISION OF NATIONALLY DETERMINED CONTRIBUTIONS (NDCS) RELATED TO FORESTRY





OFFICE OF THE CHIEF ENGINEERING ADVISER & CHAIRMAN FEDERAL FLOOD COMMISSION, ISLAMABAD

SECTION – 5

REVISION OF NDCs RELATED TO FORESTRY

Working Group on Forestry sector has provided input on both adaptation and mitigation towards NDCs of Pakistan.

5.1. National Context

The diversity of landscapes and climates in Pakistan allow a wide variety of trees and plants to flourish. Some of the world's most unique forests including Juniper, Deodar, Oak and Chilghoza forests exist in the country despite the fact that only 5.45% of the total land area is under forest. A significant portion of land area is occupied with coastal, riverine, scrub and coniferous forests. These forests provide multiple benefits in the form of regulating water flow, controlling soil erosion, major source of carbon sequestration, medicinal plants and support livelihood at local level.

The total forest cover assessed under the National Forest Reference Emission Level was 5.45% of the total land area of the country. The national forest cover assessment was based on notified national forest definition. This does not include the fruit trees in orchards and farmland trees. By forest type, dry temperate forests have the largest proportional coverage (36%) followed by sub-tropical broadleaved scrub (19%), moist temperate (15%), Chir Pine (13%), riverine (4%), irrigated plantation (4%), thorn (3%), mangrove (3%) and sub-alpine forests (2%). The mean forest carbon stock was about 192 Million tons in 2004-2012.

The forests in Pakistan suffer from a number of problems – many linked to habitat change and land degradation. Pakistan is predominantly a dry country, with about 80% of its area falling in semi-arid and arid region. The changes in water regime, due to change in weather patterns pose additional threats in form of drought and resultant desertification. The average annual deforestation from 2004 to 2012 was estimated up to about 11,000 hectares, whereas, it was 27,000 ha in 2004. An increasing trend of more than 17,000 ha was observed from 2008-2012. The area affected by deforestation from 2004 to 2012, consisted of riverine (34%), scrub (20%), dry temperate forests (19%), pine (13%) and thorn forests (9%).

The mean annual emissions from the deforestation were up to 1.0 Million tons of CO_2 -e between 2004 and 2012 with the increasing emission trend from deforestation. The largest share of CO2 emissions originated from dry temperate (34%), riverine (27%) and Chir pine forests (16%) followed by moist temperate (11%), scrub (9%) and thorn (3%) forests in 2004-2012. Based on above, the FREL has been proposed as 946,653 Tonnes CO_2e .

The rate of deforestation does not commensurate with the rehabilitation efforts. The share of public investment towards rehabilitation is disappointedly low. The repercussions are in the form of low growth and decline in yield of existing forests. Deforestation in watershed areas has adversely impacted the yield and quality of water at outlets besides triggering land degradation and loss of biodiversity. In low-lying and coastal areas, deforestation amplify floods and facilitate sea water intrusion inflicting huge economic losses.

5.2. Review of Previous NDCs on Forestry Sector

Over the past five years, many initiatives were launched for adaptation and mitigation of forest resource in the country. It necessitates that the NDCs earlier submitted by MoCC to UNFCCC in 2016 are revised. The forest sector related provisions of earlier NDCs may be revised as under:

i. Section 1.2 National Context (last paragraph at page 8) states that "The forestry sector, commonly considered as bearing a high natural capital value for the society and also a safeguard against climatic threats, has suffered heavily during the past two decades. A number of factors have contributed to deforestation: prominent among these being poverty, population pressures and lack of fiscal space for strong policy initiatives in protecting forests. The current forest cover of Pakistan is about 5 percent, which is extremely inadequate when considering exposure of the country to future climatic threats. Considerable efforts are in hand for the revival of forestry, aiming to expand the forest cover through mega tree plantation programmes and strengthening the regulatory & forest protection policy mechanism. The Khyber Pakhtunkhwa Province's afforestation programme and the Green Pakistan Programme are other noteworthy examples of the country's commitment." The requisite paragraph may be updated to include;

The current forest cover of 5.45% is inadequate to meet the future environmental and social need of the country. A number of factors have contributed to deforestation: prominent among these being poverty, population pressures and lack of fiscal space for strong policy initiatives in protecting forests. The rate of deforestation does not commensurate with the rehabilitation efforts. The share of public investment towards rehabilitation is disappointedly low. The repercussions are in the form of low growth and decline in yield of existing forests. Deforestation in watershed areas has adversely impacted the yield and quality of water at outlets besides triggering land degradation and loss of biodiversity. In low-lying and coastal areas, deforestation amplify floods and facilitate sea water intrusion inflicting huge economic losses.

Considerable efforts were made over the past five years to revive forest resource in the country. Ten Billion Tree Tsunami Programme (TBTTP) was approved by ECNEC on 29-8-2019. The first phase of the programme is being implemented throughout Pakistan with the support of all provincial governments including AJ&K and GB for a period of four years (2019-20 to 2022-23). During this first phase of the programme a total of 3.29 billion plants will be planted/regenerated. The TBTTP was replication of Billion Tree Afforestation Project (BTAP) that was implemented in the Khyber Pakhtunkhwa province to successfully plant / regenerate one billion plants from 2015 to 2018. Both these initiatives were acknowledged and quoted as examples for replication by the World Economic Forum, UNFCCC, UNEP, UNCCD, Bonn Challenge and other international organization.

ii. Section 2.1 Policy Initiative. It needs to include a paragraph on significant features of the National Forest Policy that was approved by the Council of Common Interest in 2017 as under:

The Policy aims at expansion, protection and sustainable use of national forests, protected areas, natural habitats and watersheds for restoring ecological functions, improving

livelihoods and human health in line with the national priorities and international agreements. It has three pronged approach i.e. conserve existing forests, increase tree cover through community participation, and meet international obligations related to forests. The policy has provision for implementing a national level mass afforestation programme to expand and maintain optimum forest cover and enhance role and contribution of forests in reducing carbon emissions by increasing forest carbon pools. The policy provided a legal basis for the federal government to arrange and extend support to all provinces and regions towards achieving their respective targets and meeting international obligations by improving their capacity and financial gaps for forestry sector.

- iii. Section 2.1 Policy Initiatives. The Pie Chart depicting budgetary expenses related to Forestry Sector shall need revision.
- iv. Section 3.2 Emissions by Sectors. The GHG inventory for Land Use Change and Forestry in Table 6 shall need to be revised with latest inventory. It should coincide with the National Forest Reference Emission Level endorsed by the UNFCCC.
- v. Section 3.2.4 Land Use Change and Forestry. The write up of the section says, "Contributions of 'Land Use Change and Forestry' sector in overall emissions profile of the country are merely 2%. A consistent but gradual increase can be noticed over the last twenty years. Another striking fact in this sector is the alarming rate of deforestation (27,000 hectares per year). With strengthened regulations and aggressive plans for reforestation, it is expected that the country will benefit from the sink effect in the long run. However, in the short-term the emissions are expected to increase."

The figures of GHG inventory for Land Use Change and Forestry shall need to be revised with latest inventory. The write up may be revised to highlight the decrease in rate of deforestation and reduction in emissions as under:

The average annual deforestation from 2004 to 2012 was estimated up to about 11,000 hectares, whereas, it was 27,000 ha in 2004. An increasing trend of more than 17,000 ha was observed from 2008-2012. The area affected by deforestation from 2004 to 2012, consisted of riverine (34%), scrub (20%), dry temperate forests (19%), pine (13%) and thorn forests (9%).

The mean annual emissions from the deforestation were up to 1.0 Million tons of CO_2 -e between 2004 and 2012 with the increasing emission trend from deforestation. The largest share of CO2 emissions originated from dry temperate (34%), riverine (27%) and Chir pine forests (16%) followed by moist temperate (11%), scrub (9%) and thorn (3%) forests in 2004-2012. Based on above, the FREL has been proposed as 946,653 Tonnes CO_2e .

vi. Section 4.2.4 Land Use Change and Forestry. The section says that, "Historical emissions from the land use change and forestry sector remained 2 to 3 percent of overall emissions. The projected increase in emissions is based on massive changes in land use and enormous deforestation which the country is currently suffering and potential use of biomass in energy and industrial processes. Large-scale tree plantation programmes in

Khyber Pakhtunkhwa and Green Pakistan Programme are likely to increase forest cover from the current 5 percent to 6 percent, using domestic resources during the period 2016-2020. An approximate amount of US\$ 936 million has been allocated for this purpose. An increase in the forest cover from 6 to 10 percent by the year 2030 requires an estimated US\$ 3.74 billion.

Projected emissions for the land use change and forestry sector for year 2030 are 29 MT CO2-equivalent."

The figures of emissions related to Land Use Change and Forestry shall need to be revised with latest inventory. The write up may be revised to highlight the decrease in rate of deforestation and reduction in emissions as under:

The average annual deforestation from 2004 to 2012 was estimated up to about 11,000 hectares, whereas, it was 27,000 ha in 2004. An increasing trend of more than 17,000 ha was observed from 2008-2012. The area affected by deforestation from 2004 to 2012, consisted of riverine (34%), scrub (20%), dry temperate forests (19%), pine (13%) and thorn forests (9%).

The mean annual emissions from the deforestation were up to 1.0 Million tons of CO_2 -e between 2004 and 2012 with the increasing emission trend from deforestation. The largest share of CO2 emissions originated from dry temperate (34%), riverine (27%) and Chir pine forests (16%) followed by moist temperate (11%), scrub (9%) and thorn (3%) forests in 2004-2012. Based on above, the FREL has been proposed as 946,653 Tonnes CO_2e .

Historically the rate of deforestation does not commensurate with the rehabilitation efforts. The share of public investment towards rehabilitation was disappointedly low. The repercussions are in the form of low growth and decline in yield of existing forests. Deforestation in watershed areas has adversely impacted the yield and quality of water at outlets besides triggering land degradation and loss of biodiversity. In low-lying and coastal areas, deforestation amplify floods and facilitate sea water intrusion inflicting huge economic losses.

However, this trend has changed over the past five years and revival of forest resource in the country has started. Ten Billion Tree Tsunami Programme (TBTTP) was approved by ECNEC on 29-8-2019. The first phase of the programme is being implemented throughout Pakistan with the support of all provincial governments including AJ&K and GB for a period of four years (2019-20 to 2022-23). During this first phase of the programme a total of 3.29 billion plants will be planted / regenerated. The TBTTP was replication of Billion Tree Afforestation Project (BTAP) that was implemented in the Khyber Pakhtunkhwa province to successfully plant / regenerate one billion plants from 2015 to 2018. An investment of about USD one billion shall be made from the indigenous resources on these two massive afforestation projects. Both these initiatives were acknowledged and quoted as examples for replication by the World Economic Forum, UNFCCC, UNEP, UNCCD, Bonn Challenge and other international organization.

5.3. Adaptation Measures since first NDCs

- i. The National Forest Policy was approved in 2018 to strengthen the long term objectives related to forestry sector. The policy has three pronged approach i.e. conserve existing forests, increase tree cover through community participation, and meet international obligations related to forests. The policy provides a legal basis for the federal government to arrange and extend support to all provinces and regions towards achieving their respective targets and meeting international obligations by improving their capacity and financial gaps. It has been ensured that it does not infringe upon provincial autonomy and is supportive of provincial forest policies and programmes while addressing the obligations of the federal government under the international treaties related to forests to which Pakistan is a party.
- ii. The Climate Change Act, 2017 calls for the Climate Change Authority to "formulate guidelines for the protection and conservation of renewable and non-renewable resources, species, habitats, and biodiversity in general which are adversely affected or threatened by climate change". The guidelines to be formulated by the Climate Change Authority shall reduce the impact of climate change on conservation of forest biodiversity.
- iii. The National Biodiversity Strategy and Action Plan (NBSAP) proposes to conserve forest biodiversity and its sustainable use by providing an enabling institutional and policy environment, protection and restoration of forest ecosystem services, increasing indigenous floral diversity; improve knowledge base by adopting scientific research and modern technologies relating to forest biodiversity, and reform the rights and concessions of local people.
- iv. The REDD+ Readiness project is being implemented with a total cost of US\$ 7.81 million to develop mechanism for Result Based Payments for improving forest ecosystem. The Forest Reference Emission Level (FREL) prepared by the project has been endorsed by UNFCCC after a rigorous review process. The National Forest Monitoring System has been designed and launched to ensure effective management of forest ecosystem.
- v. It is firmly believed that the efforts to restore forest resources in Pakistan can only be achieved with active public participation. In all national level projects and programmes related to forestry, community involvement has been included as a major component. The organization of spring tree planting campaign is one of the steps towards ensuring public involvement for a noble cause to increase tree cover in the country.

5.3.1. Related Mitigation Measures

Massive forestation projects were initiated in the country over the past five years to increase forest cover and measures were taken to reduce deforestation. The details of such initiatives are given as under:

i. Ten Billion Tree Tsunami Programme (TBTTP) was launched in 2018. Historically it is the largest afforestation / regeneration project initiated on forestry sector. The first phase of the programme is being implemented throughout Pakistan with the support of all provincial governments including AJ&K and GB for a period of four years (2019-20 to

2022-23). During this first phase of the programme a total of 3.29 billion plants will be planted / regenerated to revive nine different forest categories over an area of 1.12 million ha. The estimated project cost of about USD 800 million is being met from the indigenous resources. It is expected that total carbon sequestration of 84.118 million tons of CO_2Eq (0.08 GtCO_2Eq) will take place over the next ten years.

- ii. The Billion Tree Afforestation Project (BTAP) was successfully implemented in the Khyber Pakhtunkhwa province to plant / regenerate about 1.2 billion plants from 2015 to 2020. An investment of about USD 125 million was made from provincial resources for the project. It is expected that total carbon sequestration of 0.04 GtCO₂Eq will take place as an outcome of this project. The achievements of the project were acknowledged and quoted as examples for replication by the World Economic Forum, UNFCCC, UNEP, UNCCD, Bonn Challenge and other international organization.
- iii. Keeping in view the Post-COVID-19 scenario, The World Bank has provided a Grant of USD 60 million to provide short term relief in the shape of job creation and livelihood operations. Restoration of degraded forests is one of the components of this grant.
- iv. A UNDP and GEF funded Sustainable Forest Management project is being implemented by the Government of Pakistan with the support of provincial governments at a cost of USD 9.338 million for a period of five years (2015-19). The project aims to implement on-the-ground approaches for improving management of high value forests within seven landscapes covering an area of 67,861 ha. Besides that practical approaches will be developed to enhance carbon sequestration through restoring degraded and former forested areas and reforestation of 10,005 ha of degraded conifer forests; 3,400 ha of degraded scrub forests, and reforestation of 13,099 ha of Riverine forests with native species.
- v. The UNDP, GEF, Government of Pakistan with the technical and financial support of the provinces are implementing the Sustainable Land Management Programme with a total cost of Rs. 1.666 billion for a period of five years. The project intends to execute interventions on integrated management of land and water resources; measures to rehabilitate degraded rangelands; measures to improve dry land forest and control shifting sand dunes in 244 villages of 14 districts in the country.

5.4. Policy Recommendations

- i. **National Forest Policy,** approved in 2018, does not infringe upon provincial autonomy and is supportive of provincial policies and programs while addressing the obligations of the federal government under the international treaties related to forests to which Pakistan is a party.
- ii. Climate Change Act, 2017 calls for the Climate Change Authority to <u>"formulate guidelines for the protection and conservation of renewable and non-renewable resources, species, habitats, and biodiversity in general which are adversely affected or threatened by climate change".</u> The guidelines need to be formulated so as to reduce the impact of climate change on conservation of forest biodiversity.
- iii. **National Biodiversity Strategy and Action Plan** (NBSAP) proposes to conserve forest biodiversity and its sustainable use by providing an enabling institutional and policy

environment, protection and restoration of forest ecosystem services, increasing indigenous floral diversity; improve knowledge base by adopting scientific research and modern technologies, and reform the rights and concessions of local people.

- iv. The REDD (reduce emissions from deforestation and forest degradation) Readiness project is being implemented with a total cost of US\$ 7.81 million to **develop mechanism for Result Based Payments for improving forest ecosystem**. This be given priority.
- v. The Forest Reference Emission Level (FREL) prepared by REDD project has been endorsed by UNFCCC after a rigorous review process. The **National Forest Monitoring System** has been designed and launched. The implementation be critically seen to ensure effective management of forest ecosystem.
- vi. Efforts to restore forest resources in Pakistan can only be achieved with **active public participation**. Thus in all national level projects and programs related to forestry like spring tree planting , **community involvement** has been included as a major component. This should be practices both in letter & spirit.
- vii. **Plantation / Regeneration over 1.129 million hectares by 2023** be ensured and strictly adhered to so that the existing forest area of 5.4% shall increase to about 6.5%.
- viii. Timely implementation of **Ten Billion Tree Tsunami Programme (TBTTP)**, launched in 2018, throughout Pakistan with the support of all provincial governments including AJ&K and GB should be ensured through which, it is expected that total carbon sequestration of 84.118 million tons of CO₂Eq (0.08 GtCO₂Eq) will take place over the next ten years.
- ix. Flow of financial resources for implementation of **Ten Billion Tree Tsunami Programme** is required to remain consistent the plantation targets can be increased by 5 to 6 times annually.

5.5. Commitments for Future

It is expected that by plantation / regeneration over 1.129 million hectares by 2023 the existing forest area of 5.4% shall increase to about 6.5%. On the average about 120 to 140 million plants were planted / regenerated annually by the provinces / territories over the past ten years. All these plants were raised and planted by the respective entities from their own resources. Due to limited financial resources, scope of plantation activity could not be enhanced. Sharing of financial resources under Ten Billion Tree Tsunami Programme has provided the desired impetus to increase tree plantation activity in the country. It is anticipated that if flow of financial resources remain consistent the plantation targets can be increased by 5 to 6 times annually.

The Ten Billion Tree Tsunami Programme will be implemented in a phased approach. During first phase plantation / regeneration of 3.29 billion shall be achieved by 2023. During next phase of the project it is envisaged that the same momentum of plantation / regeneration of 750 to 850 million plants will continue over the next six years upto 2030. Accordingly, the anticipated target will be to plant / regenerate an additional about five billion plants over an additional area of approximately 1.5 million hectares by 2030.

SECTION – 6: REVISION OF NDCs RELATED TO BIODIVERSITY & OTHER LIVING ECOSYSTEMS





OFFICE OF THE CHIEF ENGINEERING ADVISER & CHAIRMAN FEDERAL FLOOD COMMISSION, ISLAMABAD

SECTION – 6

REVISION OF NDCs RELATED TO BIODIVERSITY & OTHER LIVING ECOSYSTEMS

6.1. National Context regarding Biodiversity Conservation

To streamline implementation of the Paris Agreement of Climate Change, Pakistan has enacted Pakistan Climate Change Act 2017. The Act establishes a policy-making Climate Change Council, along with a Climate Change Authority to prepare and supervise the implementation of projects to address climate risks through adaptation and mitigation actions. Article 8 tasks Climate Change Authority to —formulate guidelines for the protection and conservation of renewable and non-renewable resources, species, habitats, and biodiversity in general which are adversely affected or threatened by climate change

Pressure on biodiversity resources is increasing as the human population is increasing. The impact of climate change has become more visible and it cannot be separated from declining biological diversity as well as socio-economic activities. The fact is that climate change phenomenon is impacting biodiversity and conversely, loss of biodiversity and degraded environment has contributed towards increasing global warming, rise in CO2 levels and other elements of Climate Change phenomenon.

Addressing the loss of biodiversity is actually; in a way is actually a struggle to achieve the SDGs UNFCCC objectives. Considering this significant overlap, coordinated efforts in meeting climate change obligations, SDG targets and Aichi targets is obvious. For Pakistan, Aichi Targets are already aligned with SDGs and are valid till 2030. It is established that climate, development and biodiversity agendas if streamlined, will contributing to conservation of biodiversity, achieving the SDGs. Climate Change Biodiversity and ecosystem conservation are interdependent challenges, so the Nationally Determined Contributions (NDCs) set by various groups, actually are contributing to halting and reversing the loss of biodiversity. Similarly, apparently, distantly related activities aiming at conservation of species and rehabilitation of habitats are actually a direct contribution towards climate change adaptation.

National Biodiversity Strategy and Action Plan (NBSAP) was approved in Oct. 2018 and it is aligned with SDGs and is valid till 2010. The same document is actually our NDC as it invariably fulfills adaptation related efforts to restore ecosystem functioning and conservation of species.

Establishing the NDCs have another positive impact towards addressing the very biodiversity agenda: It will act as a tool to sensitize the provincial entities in adoption of biodiversity conservation agenda.

The 15th meeting of CBD (COP-15) and agreement of the SDGs concluded with the need of integration and mainstream biodiversity, including the Aichi Biodiversity Targets into SDGs.

The CBD reports/documents have also highlighted the synergies between the SDGs and Aichi Targets, showing that each SDG aligned with at least one of the Aichi Targets. Pakistan, while

preparing the 5th National Report for CBD, the Provincial governments was consulted for agreed targets for NBSAP covering the time span of 2018 to 2030. The next CoP planned in 2021 will agree on new targets for the post 2020 era and will be incorporated into the SDG targets that expire in 2020. In the case of Pakistan, the SDGs and NBSAP will run until 2030 and the document is ready to received new and emerging issues.

Considering the role of biodiversity in maintaining ecosystem functions, as well as providing many essential resources and services, these include:

- Carbon sequestration and storage,
- Nutrient cycling
- Agricultural pollination, Flood protection/ disaster risk reduction

Considering the preceding, efforts for conservation of Biological Diversity invariably contribute towards Adaptation and mitigation of the impact of Climate Change. The converse is also true. Taking into account the preceding, following tabular data reflects the elements of Pakistan's Nationally Determined Commitments. Some visibly significant activities and having direct impact on climate change adaptations include having an effective system of PAs and reducing direct threats to the biological populations. Identifying, in a discrete and quantifiable manner, the activities aiming at conservation of species and habitats is an uphill task. Through its programs and projects, some key activities that significantly contribute towards Pakistan's commitment (NDCs) are presented that are ongoing and thus present a target for coming years:

Federal Government having its policy and supportive role has, in its interventions, supported the integration of biodiversity concerns in programs and projects developed and implemented by provincial governments. Pakistan's sixth National Report is a recent document highlighting the level of implementation of NBSAP and has pointed out the areas where more efforts are required.

6.2. Biodiversity Concerns integration in National Policies and Plans

6.2.1. Ten Billion Tree Tsunami Programme

Ten Billion Tree Tsunami Programme is under implementation. The Programme targets are designed in such a way to mitigate the impact of climate change in the country and comply with the obligations under MEAs. The Programme is in line with the International 2030 UN Development Agenda known as Sustainable Development Goals (SDGs) with the following specific targets

15.1 "ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and dry lands, in line with obligations under international agreements';

Target 15.2 "promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation';

Target 15.5 "Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and protect and prevent the extinction of threatened species"; &

Target 15.7 "Take urgent action to end pouching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products."

6.2.2. Sustainable Production and Consumption of Biodiversity

Increasing pressure on natural resources and biodiversity remains a challenge. Through its plans and programs, the sustainable production and consumption is highlighted. The same is reported as far as compliance is concerned in the sixth national report to CBD. TBTTP, being an umbrella project aims to Increase forest lands productivity and produce timber, firewood and other multipurpose tree species. The enhancement of forest cover by adding indigenous plants through afforestation, reforestation and regeneration over next four (04) years will be beneficial to increase productivity. This will also crucial to meet the needs of local communities for timber, firewood and fodder production. Incorporation of similar elements in other biodiversity related projects is reflected. For example Chilghoza project and recently launched project to Strengthen community-managed Protected Areas for Conserving Biodiversity and Improving Local Livelihoods in Pakistan

6.2.3. Habitat Fragmentation and Degradation

Protected areas are considered as single most potent tool for conservation of biological diversity in a holistic manner.

Effective management of the Protected Areas cannot attain the conservation objectives in isolation. Fragmentation and degradation of habitats need to be addressed effectively. The total PA coverage of 12% of the total land area of the country before 2018; this has increased to 13% over the past two years. TBTTP under PAI aims to Expand Protected Areas Network from 13% to 15% by 2023. This enhanced coverage will address the corridors and the missing crucial biodiversity hotspots. Inclusion of new PA categories like community managed PAs and protected forests will enhance the level of compliance. These elements are already well incorporated in the umbrella project (TBTTP).

Newly notified PAs in GB is an example of establishment of corridor within widely spaced habitats of significant wildlife species. A baseline survey is a planned activity to assess the biodiversity of key inland wetlands and establish a system to monitor at regular intervals.

Assessing the status of species demanding attention due to declining trends is also part of the plan under TBTTP and is surely an integral component of ecosystem thus adding towards smooth functioning and resilience of natural environment. Development of Red data book for mammals and birds is at high priority under the Programme.

Conservation of biological diversity has many dimensions and invariably all contribute towards strengthening of ecosystems and survival of species that are facing additional threats due to changing climate. Invasive Alien Species (IAS) are considered as very lethal element for habitats and species and there is a need to quantify the adverse effect on the biodiversity and proposing effective mitigation measures. The issue of IAS cuts across various sectors like agriculture and aquaculture. For this purpose, activities such as research on quantum and IAS impact on wild populations in 05 National Parks & 02 wildlife Sanctuaries is planned. Such an exercise will trigger additional activities in other PAs as well. In a more holistic manner the issue needs to be

addressed through policy measures. National Action Plan on IAS is under preparation through technical support of CAB International. It will suggest ways and means to address this menace.

PAs as potent conservation tool need efforts and enlisting protected areas based on effective management regimen and ones meeting internationally recognized definitions. Protected Areas Coordination Committee is an advisory body that is working on this subject. Species recovery and Action Plan as a policy tool contribute towards recovery of species under threat. Raptors' Action plan is adopted in 2020 and its implementation will help in migratory as well as resident populations of these top carnivores.

Under the Protected Areas Initiative' (PAI), the protected areas will be registered for IUCN Green listing to meet the international standards. Management plans will be prepared and implemented for effective and equitable management of protected area integrated into the wider landscapes. The activities of preparation of management plans and their implementation is the part of TBTTP such as Preparation of "Hundrab/ Shandur National Park Management Plan" and "Preparation of Management Plan for CCHAs". For the successful implementation community needs to be involved and consultative meeting for Implementation of management plans are also considered.

Wetlands and RAMSAR sites are probably the worst hit habitats due to changing climate change and thus demand more efforts for sustained existence and provision of their services. The National Programme (TBTTP) has elements to address the threats posed to Ramsar sites and surrounding landscapes through local community organizations.

There are 19 Wetlands notified under Ramsar Convention. The conservation of Ramsar sites and the surrounding landscapes is crucial for the protection of migratory birds in particular. In TBTTP for the management of Ramsar sites, following activities are being conducted.

- I. "Conservancy & Works for improvement & restoration of Namal Lake" in Punjab.
- II. Protection of staging areas for cranes and water birds.
- III. Improvement, management and review of Ramsar sites

Recovery plans will be prepared and implementation to improve the conservation status of major threatened species of fauna in different ecosystems.

To promote the dwindling local fauna and to improve the conservation status of major threatened species of fauna in different ecosystems. Following activities will play a key role as well as act as catalyst for similar initiatives elsewhere.

- I. "Feasibility study for reintroduction of critically endangered indigenous wildlife species i.e. Marco polo sheep, Blue sheep, Ladakh Urial, Musk deer & Brown Bear".
- II. Establishment of Reintroduction /breeding center for critically endangered indigenous species/globally significant species.
- III. Engagement of local university to identify sites for revival of the habitats belonging to critically endangered species.
- IV. Development of Prerelease pens over 500 acres for reintroduction of Blackbuck in Cholistan along with allied facilities i.e. habitat enrichment, water ponds etc.
- V. supplementary feeding for peafowl for rehabilitation of peafowl

Enhancing ecosystem functioning through improving the population and diversity of pollinators is channelized in a way that it will contribute towards enhancing the livelihood opportunities for the youth. Billion Tree Honey is a significant step that aims at enhancing pollination function of the pollinators as well as providing a livelihood opportunity for youth. The program is in its pilot phase and a full scale project will be implemented based on the findings of pilot phase. The same can be perceived as an effort for enhancing resilience of ecosystem and contributing towards food security.

To summarize, Pakistan's commitment towards Aichi Biodiversity Targets (ABT) and Sustainable Goals SDGs in the perspective of Biodiversity are essentially contributing towards resilience of ecosystems and adaptation to the changing climatic conditions. Some actions have visible impact like PAs, species and ecosystem improvements. Yet there are some actions that apparently have little contribution, yet they provide foundation for a more functional ecosystem. Implementation of Nagoya Protocol and Cartagena Protocol, CITES have somewhat indirect yet prevailing impact with obscure linkages.

6.3. Detail of Adaptation Related Projects

Biodiversity as a sector was not included in the first NDCs. The reason, being valid today as well, was the fact that programs and activities in the domain of biodiversity conservation cut across the sectors and are well incorporated in forestry, land degradation and environment sectors.

An indicative list of projects and investment thereof is as under :

Ten Billion Tree Tsunami Program (TBTTP)

- i) Wildlife Component
- ii) PAs Component
- iii) Third Component: Reversing Deforestation and Degradation in High Conservation Value Chilghoza Pine Forest in Pakistan

(Cost involved is US\$ 23.97 Million; project duration as 2018-2022; under implementation)

Biodiversity concerns are addressed in programs and projects in forestry sector. Costs and status cannot be mentioned here as it will make duplications. Projects in the domain of Biodiversity, through GEF and GCF include the following.

Sr. No	Name of the Project/Program	Approved/Estimated Cost	Implementation made so far	Remarks issues faced so far
1	REDD Plus readiness	USD: 7.81 Million	Under	2015-2022
	Preparation for Pakistan		implementation	

Sr. No	Name of the Project/Program	Approved/Estimated Cost	Implementation made so far	Remarks issues faced so far
2	Sustainable Forest	USD 2.0 million	Under	2016-2021
	Multiple Benefits in	03D 3.9 minion	Implementation	
	Pakistan's High			
	Conservation Areas			
3	Italian Grant-UNDP	200,000 USD	Under	2018-Ongoing
	Project: Improvement of		implementation	
	Central Karakoram			
	National Park (CKNP)			
	Management system as			
	Model for Mountain			
	Ecosystem of Northern			
	Pakistan		** 1	2 010 0
4	Global Assessment of the	Approved cost:	Under	2018-Ongoing
	state of nature and	100,000 USD	implementation	
	Biodiversity Safeguarding			
	Actions in Northern			
5	Pakistan Debieten en en la en en d	Ammanual Costs USD	IInden	
5	Pakistan snow leopard and	Approved Cost: USD	Under implementation	
	program:	4.3 mmon	Implementation	
6	Reversing deforestation and	Total Cost: USD 28.1	Under	PPG: 150,000
	degradation in high	Million	implementation	USD
	conservation value chilgoza			GEF: 4.0 Million
	pine forests in Pakistan:			
7.	Preparation of NBSAP and	USD: 220,000	Completed	Completed
	5 th National Report to CBD			
8.	Preparation of sixth	USD: 100,000	Completed	Completed
	National Report to CBD			

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Future high priority adaptation projects included the following: -

Sr. No.	Name of the project/Program/Initiative	Estimated Cost/Monitory need	Remarks if any
Under Biodive	GEF, following projects will be exec ersity concerns	cuted in future. These p	projects invariably address
1	Transforming the Indus Basin with Climate Resilient Agriculture and Water Management	47.7 million USD	600,000 USD grant for project preparation is used for developing the full scale project
2	Protected Areas Initiative: 3.89 Billion Rs. (USD 25 Million)	USD 25 Million	Under implementation

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Sr.	Name of the	Estimated	Domorka if ony
No.	project/Program/Initiative	Cost/Monitory need	Kemarks it any
3	Strengthening Community-managed	USD 2.6 Million	Project not yet initiated
	Protected Areas for Conserving		
	Biodiversity and Improving Local		
	Livelihoods in Pakistan		
4	Strengthening Governance and	USD 3.0 Million	Project not yet
	Capacity for combating illegal wildlife		initiated
	trade in Pakistan		
5	Strengthening Pakistan's Capacities for	USD 10 Million	Concept note
	Demo Nstrating REDD+ Systems and		
	Accessing Result-based Payments		
6	Biosafety Clearing House (BCH III)	USD 15000	Approved. Project
	Capacity Building Project		delayed due to Covid

Regarding the financial needs for the next decade regarding biodiversity Conservation and meeting international commitments, it is reiterated that the contribution of each sector towards NDCs and reducing carbon emissions is only partial. Identification of biodiversity as contributing factor towards increasing carbon cannot be worked out. The following figures indicate the support needed for healthy ecosystems and species and habitat conservation, sustainable use and equitable sharing of benefits.

Sectors/activities to be corried out till 2031	Financial Needs
Sectors/activities to be carried out thi 2031	Million USD
Awareness: Concerns of biodiversity, its significance across the	
sectors	7.10
Biodiversity values integrated into national and local development	
and poverty reduction strategies and planning processes	1.02
Incentives, including subsidies, harmful to biodiversity are addressed	0.67
sustainable production and consumption	0.42
Rate of loss of all natural habitats, including forests, is at least halved	1.75
Fish and invertebrate stocks and aquatic plants are managed and	
harvested sustainably	3.98
Agriculture, aquaculture and forestry are managed sustainably,	3.00
Pollution, including from excess nutrients	3.00
Invasive alien species and pathways are identified	0.50
Anthropogenic pressures on coral reefs	0.10
At least 17 per cent of terrestrial and inland water, and 10 per cent of	
coastal and marine areas	6.50
Extinction of known threatened species	2.80
Genetic diversity of cultivated plants and animals	1.30

Ecosystems services related to water, and contribute to health,	
livelihoods and well-being, are restored	6.00
Ecosystem resilience and the contribution of biodiversity to carbon	
stocks	5.50
Nagoya Protocol on Access to Genetic Resources	0.60
Policy tools and instrument	3.45
Traditional knowledge	0.25
Knowledge and technologies relating to biodiversity	1.55
Mobilization of financial resources	0.25
Total	49.78

6.4. Policy Recommendations

Considering the preceding efforts for conservation of Biological Diversity invariably contribute towards Adaptation and Mitigation of the impact of Climate Change phenomenon. The converse is also true. Taking into account the preceding, following policy recommendations reflect the elements of Pakistan's Nationally Determined Commitments.

Sr. No.	Key Area	Remarks
1	Biodiversity Mainstreaming	
i.	Increasing the biodiversity knowledge of decision makers to	
	Development of low cost tools and methods for valuation of	
	biodiversity that in addition to economic value recognize the	
	social and cultural values.	Seven ecosystems
iii.	Undertaking Valuation Studies in major ecosystems to	
	influence policy makers and planners for mainstreaming	
	biodiversity in national planning and development processes.	At least six studies
iv.	Incorporation of Biodiversity in national accounting and	Biodiversity
	reporting systems.	incorporated in the
		national accounting
		and reporting systems.
2	Sustainable Production and Consumption	
i.	Launching of a demonstration project to develop and test a	Islamabad, Peshawar
	Biodiversity Index in major cities to assess and monitor urban	Lahore, Karachi,
	biodiversity.	Quetta, Gilgit,
		Muzaffarabad
ii.	Development of legislation for Pakistan Trade Control of Wild	
	Fauna and Flora Act and issuance of policy guidelines for trade	
	in species of flora and fauna to prevent extinction of the	
	threatened species.	
111.	The government institutions, academia, business sector and	Government agencies;
	strictly adhere to precautionary principle for protecting	Academia; NGOs
	survey adhere to precautionary principle for protecting	

Sr. No.	Key Area	Remarks
	biological diversity from the potential risks posed by genetically modified organisms resulting from modern biotechnology	
3	Habitat Fragmentation and Degradation - Management Plan	15
1.	Launching of a pilot project jointly with the custodial communities for restoration of at least 7,000 ha of degraded mangrove ecosystems on sustainable use principles and equitable sharing of benefits.	7,000 ha
4	Sustainable fisheries through Coordination Committees of st	akeholders
i.	Incorporation of Biodiversity considerations in fisheries policies, laws and regulations to ensure sustainable use and equitable sharing of benefits.	Updated fisheries policies, laws and regulations
ii.	Undertaken a baseline survey to assess biodiversity of key inland wetlands and establish a system to monitor at regular intervals .the status of species most in decline	
iii.	Development & implementation of a procedure for sustainable harvest of fish stock to minimize impact on threatened species and vulnerable habitats	Standard operating procedure
iv.	Six Important wetland habitats of national biodiversity significance together with surrounding landscapes will be co- managed with custodial communities through their empowerment and building capacity for conservation and sustainable use.	Six wetland sites
v.	Laws, regulations, and policies shall be updated or drafted by 2016 incorporating biodiversity concerns and effective management of marine biodiversity on sound ecological principles and to prevent threat of extinction of utilized species.	Updated policies, laws and regulations
vi.	Launching pilot projects to develop and test approaches for organizing, empowering, and building capacity of coastal communities to sustainably harvest all fish and invertebrate stocks	At least 6 pilot test sites
vii.	Capping of number of operating fleets to prevent over exploitation of marine fish and invertebrate resources.	7,000 fleets
viii.	Modification of the fishing boats to improve the outdated fishing methods.	At least 2000 boats
ix.	Determination & strict enforcement of assessment of stocks and limits of sustainable harvest levels of major species.	Two sites
5	Sustainable Resource Management	
i.	Development of Suitable ecosystem approaches after the adoption of NBSAP and their piloting in different forest ecosystems; and training workshops held for managers for their application.	At least six pilot sites
ii.	Piloting of collaborative or joint forest management approaches in different forest ecosystems to reduce the	At least 6 pilot sites

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Sr. No.	Key Area	Remarks
	anthropogenic impacts by improving livelihoods of local people based on sustainable use of components of biodiversity.	
iii.	Development, testing, and demonstration of Models of sustainable production of major crops with minimum external inputs and wise use of water	Cotton, sugarcane, rice, and wheat.
iv.	Integration of Sustainable agriculture and bio-diversification of agro ecosystems in the extension programmes of agriculture.	Brochures on sustainable agriculture
v.	Establishment of Pilot on-farm models of bio diverse-agro ecosystems in major agro-ecological zones.	At least 15 biodiversity farms in operation
6	Invasive Alien Species	
i.	Control of the spread of alien species through appropriate measures to prevent escape into natural habitats from hatcheries and aquaculture.	Prevention
ii.	Assessment made and measures taken on the impact of alien species in wetlands of biodiversity significance to control and ultimately eradicate invasive alien species.	Control
iii.	Drafting of appropriate legislative and regulatory measures to prevent early detection, rapid response and control of invasive species.	Law and readiness
7	Vulnerable ecosystems and Protected Areas	
i.	Preparation of Climate Change Adaptation Plans for coastal areas and capacity development of coastal communities to cope with impacts of climate change.	Planning and readiness
ii.	Refinement of the lists of protected areas to include only those sites that meet the internationally recognized definition.	Redefined provincial and National Lists of PAs
iii.	Preparation and implementation management plans for effective and equitable management of protected area integrated into the wider landscapes	Management plans prepared/ implemented
iv.	Expansion of the protected areas network to cover at least 17% of terrestrial area to fill in the gaps in the protected area system and to establish corridors between fragmented habitats of threatened species.	New PAs
v.	Mechanisms will be developed and put in place to ensure the financial sustainability of the protected areas.	Private-Public partnerships
vi.	Representative forest landscapes of special importance for biodiversity will be designated as Forest Biodiversity Reserves and effectively managed.	At least 15 Forest Biodiversity Reserves

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Sr. No.	Key Area	Remarks
vii.	Wetlands protected areas will be established covering at least	At least 12 wetland
	15% area of wetlands of biodiversity significance and	area added to the
	effectively managed together with the surrounding landscapes.	Protected Areas
		network
viii.	RAMSAR sites and surrounding landscapes will be effectively	At least 15 sites
	managed under plans through local community organizations.	managed
ix.	Protected areas covering at least 10% of the marine area of	3 Marine PAs
	biodiversity significance will be established and managed	
	effectively as seascapes for conservation and sustainable use.	
8	Species and extinctions - Species of fauna in Annex 2 of the N	IBSAP
i.	Preparation & implementation of Recovery plans to improve	Species of flora in
	the conservation status of major threatened species of flora in	Annex 2/ NBSAP
	different ecosystems.	
ii.	Preparation & implementation of Plans for recovery of	Species of fresh water
	depleted freshwater fish species.	fish in Annex
		2/NBSAP
iii.	Regular monitoring and application of necessary remedial	Species of marine
	measures for population of known threatened marine species	fauna in Annex 2 of
	particularly of those in most decline state to improve and	the NBSAP
0	sustain their population.	
<u>9</u>	Genetic diversity	D · · C 1· ·
1.	The considerations of sustainable agriculture, bio	Revision of policies
	diversification of agro ecosystems, conservation of pollinators	and plans
	and soil biodiversity, wise use of transgenic organisms, and	
	climate change will be incorporated in agriculture policies and	
	The gong in the in-situ and an situ concernation of the agra	At loost 6 field
11.	hiediversity will be assessed and measures taken to fill the	At least 0 field
	gaps	established for in situ
	gaps.	conservation
iii	Important local varieties land races and breeds will be	L ocal varieties of
	improved through selection for resistance to disease drought	cotton rice
	tolerance and for increased production	sugarcane and wheat
10	Ecosystem services	sugareane, and wheat.
i.	Landscapes that provide essential services related to water for	At least six
	major dams, and contribute to health: livelihoods and well-	ecosystems
	being of local communities will be restored and safeguarded.	· · · · · · · · · · · · · · · · · · ·
11	Climate resilience, sequestration and restoration	
	, 1	
ii.	At least 20% of the degraded ecosystems of ecological	At least four pastoral
	significance will be restored to combat desertification and to	management projects
	demonstrate economic, social and cultural benefits.	Bernent Projects
iii.	At least 25 percent of all degraded forest ecosystems will be	At least 60.000 ha
	restored to improve their resilience and contribution to carbon	restored
	stocks.	

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6.5. Commitment regarding Revised NDCs

The approved National Biodiversity Strategy and Action Plan acts as a policy document for Biodiversity Conservation in the country. The relevant targets become tool for enhancing the resilience of species and ecosystems to the climatic change scenarios. Pakistan has supported the 30X30 initiative for protecting the 30% of the planet by year 2030, which is perceived as a challenge in conserving the biological resources as well as contributing towards climate change mitigation goals.

SECTION – 7: REVISION OF NDCs RELATED TO AGRICULTURE AND LIVESTOCK





OFFICE OF THE CHIEF ENGINEERING ADVISER & CHAIRMAN FEDERAL FLOOD COMMISSION, ISLAMABAD

SECTION – 7

REVISION OF NDCs RELATED TO AGRICULTURE AND LIVESTOCK

Agriculture is the largest sector of the economy of Pakistan in terms of labor participation and as such livelihood of the majority of the population directly or indirectly depends on it. However, during the last few decades, its contribution to GDP has gradually decreased to 19.3 percent though there is a lot of potential in the sector to increase its share in GDP through increased productivity utilizing latest agricultural technologies. Being the sector engaging the largest workforce and providing raw material to most manufacturing sector, its development not only contributes towards achieving poverty alleviation but can also uplift socio-economic structure of a major segment of the population. In terms of potential, the sector has the capacity to not only produce for the domestic population but to have surplus production for exports, which can ensure food security as well as contribute towards foreign exchange earnings. (*Pakistan Economic Survey 2019-20*). Agriculture has also contributed a great role in the development of the banking sector as well through provision of credit line to famers and investments in agro-based industry thereby increasing agricultural productivity.

7.1. Agriculture as Impacted by Climate Change

Agriculture the key sector is adversely affected with the vagaries of climate variability and change. Climate change can disrupt food availability, reduce access to food, and affect food quality through:

- Loss in Crop Yields
- Shortening of growing season length
- Increased evapotranspiration
- Increased insect-pest infestation
- Increased land degradation
- Decreased Livestock productivity
- Physical damages to crops and livestock through extreme weather events

Climate Projections indicate that average temperature over Pakistan will increase in the coming decades at a pace faster than that of the average global temperature and may exceed by about 1°C by the end of this century. Studies carried out at GCISC point towards yield losses and reduced growing cycles in the various climatic zones of the country under the influence of increasing temperatures. The water security of the country is also threatened by the climate change which further accentuates the food insecurity concerns. Comprehensive studies carried out at the Centre to assess the impact of climate change on various crops in different climatic zones of the country using crop simulation models reveal that Wheat crop yield will be reduced by 3.4-12.5%, in Semi-arid irrigated areas (like Faisalabad, Sheikhupura), 3.8-14.5% in arid areas (like Hyderabad, Badin, Bahawalpur, Multan) and more than 16% in rainfed (Chakwal) areas under different climate change scenarios towards the end of the century. Similarly, Rice and maize yields are expected to decline by 12- 22% and 34-41% respectively under various climate change scenarios in different agro-ecological regions of the country by the end of the

century. The growing season length of these crops will also be shortened resulting in significant decline in yields. Studies also reflect an increase in net crop water requirements owing to the increase in temperatures. An analysis of future warming extremes (Consecutive Summer Day Index (CSU), impacting critical crop growth stages of wheat crop in Pakistan reports that the temperatures in the South Eastern part of Pakistan have shown to exceed the thresholds at the times of flowering and ripening. An overall increase of 1000 Growing Degree Days (GDDs) between historical and late century extreme scenarios (RCP8.5) has been observed in case of wheat, implying that South Eastern side of Pakistan are likely to become unsuitable for wheat production due to temperature extremes after mid-century (Shaheen et. al 2020).

7.2. Agriculture and Livestock Contributing to Climate Change

The agricultural sector is a driving force in the greenhouse gas emissions. In addition to being a significant user of land and consumer of fossil fuel, agriculture contributes directly to greenhouse gas emissions through practices such as rice production and the raising of livestock; according to the Intergovernmental Panel on Climate Change, the three main causes of the increase in greenhouse gases observed over the past 250 years have been fossil fuels, land use, and agriculture. The reductions of 'living carbon potential' have resulted from:

- Deforestation
- Biodiversity loss
- Accelerated soil erosion
- Loss of soil organic matter
- Salinization of soils
- Costal water pollution and
- Acidification of the oceans

Land Use:

- Agriculture contributes to greenhouse gas increases through land use in four main ways:
- CO2 releases linked to deforestation
- Methane releases from rice cultivation
- Methane releases from enteric fermentation in cattle
- Nitrous oxide releases from fertilizer application

Livestock:

- Livestock and livestock-related activities such as deforestation and increasingly fuelintensive farming practices are responsible for over 18% of human-made greenhouse gas emissions, including:
- 9% of global carbon dioxide emissions
- 35–40% of global methane emissions (chiefly due to enteric fermentation and manure)
- 64% of global nitrous oxide emissions (chiefly due to fertilizer use)

Fertilizer production:

• The greenhouse gases carbon dioxide, methane and nitrous oxide are produced during the manufacture of nitrogen fertilizer. The effects can be combined into an equivalent amount of carbon dioxide. The amount varies according to the efficiency of the process.

Soil erosion:

• Large scale farming can cause large amounts of soil erosion, causing between 25 and 40 percent of soil to reach water sources, with it carrying the pesticides and fertilizers used by farmers, thus polluting bodies of water.

7.3. Adaptation in Agriculture

For Pakistan, adaptation to the adverse impacts of climate change is inevitable and is very critical for a key sector like agriculture due to geo-physical conditions of the country, climatic extremes and high degrees of exposure and vulnerability. In the past due to climate extremes (floods and droughts) the country had to face the food insecurity situation at times.

Given the critical nature of the agriculture and livestock sector, Pakistan has included it in its 1st NDC (submitted 2016) as key area for adaptation and resilience. And a number of adaptation strategies were also reflected in that document. Since the climate vagaries have become severe and more uncertain, and Pakistan is now going to submit its revised version to the UNFCCC this year, a Working Group on Agriculture and Livestock has been formed under the Committee on Adaptation. Composition & TORs of Working Group have been mentioned in the introductory part of the report. Deliberations were held for long hours in a number of meetings. Information was collected from various sources and is summarized in the ensuing sections.

7.4. Agriculture Climate Change Related Projects Undertaken by Federal Ministries, Attached Departments and Provincial Governments since 2016

List of important adaptation projects implemented/ being implemented in Pakistan since 2016) and total investments made on them is presented in the table below. A significant amount has been spent/allocated for various completed and ongoing activities.

Sr. No.	Name of Project/ Programme	Approved/ Estimated Cost (Rs. Millions)	Investment made so far (Rs. Millions)	Remarks/ Issues faced
i.	On-Farm Water Management Punjab (2019-24)	117,724.938	4707.503	Continued
ii.	Agricultural Field Punjab (2019-22)	2967.12	879.272	Continued
iii.	Ayub Agriculture Research Institute Faisalabad (2019-23)	4057.67	877.154	Continued
iv.	Soil Survey of Punjab	114.929	70	Continued
v.	Floriculture (T and R) Punjab (2020-22)	65.035	45.5	Continued
vi.	National program for improvement of climate resilient watercourses in Pakistan Phase-II	1,651		Continued
vii.	Enhancing Vegetable Production in Punjab	410.87	410.87	Completed
viii.	Management of Fruit Fly with Special Reference to Non- Conventional Methods	227.610	227.610	Completed

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Sr.	Name of Project / Programme	Approved/	Investment	Remarks/
No.	Name of Project/ Programme	(De Millione)	(De Millione)	issues faceu
11	Promotion of Dulgas Cultivation in	(KS. WIIII0115)	(KS. WIIII0IIS)	Completed
1X.	Punjab	127.200	127.200	Completed
х.	Community based Integrated	83.137	83.137	Completed
	Management of Pink Bollworm and			
	Provision of Missing Facilities of			
<u> </u>	Pest Warning Wing	11.55.000	11.55.000	
X1.	Promotion of Agriculture	1166.000	1166.000	Completed
	Mechanization in Punjab	250	250	
X11.	Uplifting of Extension Farms	250	250	Completed
xiii.	Establishment of Food Security			Continued
	Information System DDWP	100.012		
	24.02.2020			
xiv.	National Programme for Enhancing			
	Profitability productivity of	2048	116.830	Continued
	sugarcane (2019-20 to 2023-24)			
XV.	National Programme for Enhancing	60 0 7	100.0.00	
	Profitability productivity of Rice	6327	183.263	Continued
<u> </u>	(2019-20 to 2023-24)			
XV1.	National Programme for Enhancing	10525	000.00	Continued
	$(2010, 20, t_0, 2023, 24)$	12353	900.00	Continued
vvii	Promotion of Pulses Cultivation in	127 262	127 262	Completed
ΛνΠ.	Puniab (2013-14 to 2017-18)	127.202	127.202	Completed
xviii.	Promotion of Agriculture	1166.518	896.550	Completed
	Mechanization in Punjab (2015-16	11000010	0,00000	Compressed
	to 1016-17)			
xix.	Community based integrated			
	Management of Pink Bollworm and	96.232	96.232	Completed
	Provision of Missing Facilities of			
	pest Warning wing (2017-18)			
XX.	Updation of Agro Ecological Zones	50 4 7 0		Completed
	of Pakistan through Satellite and In-	60.450		
:	Situ Data Mapping			Continue
XX1.	to the Farming Community for	764 105		Commue
	Figuring Food Security in Pakistan	/04.105		
x x i i	Promotion of High value			Continue
ллп.	Agriculture through Solarization of	600		Continue
	Drip & sprinkler Irrigation Systems			
xxiii.	Developing Pothwar water stress	233		Continue
	region into an olive valley			
xxiv.	National Program for Enhancing			Continue
	Command Area of Small and Mini	127		
	Dams in Barani Areas of Pakistan			
XXV.	Upgradation of Hydrualic Research			Completed
	Station Nandipur, Gujranwala	\$35m		
xxvi.	Recharge of Aquifer for	582		Continue
	Groundwater Management Punjab			

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Sr. No.	Name of Project/ Programme	Approved/ Estimated Cost (Rs. Millions)	Investment made so far (Rs. Millions)	Remarks/ Issues faced
xxvii.	Capacity building of water user Association and staff of Water Management GB. 27-11-2014	100.00		Completed
xviii.	Sustainable Management of Fish Resources in GB	59.000		Continue
xxix.	Poverty reduction through promotion of Horticultural and Cereal Crop in District Diamer	35.000		Continue
XXX.	Poverty alleviation through farm income generation activities in Ghizer.	56.000		Continue
xxxi.	Development and conservation of Fisheries resources in District Hunza-Nagar. 04-09-2014	10.000		Completed
xxxii.	Water Conservation in Barani Area of Khyber Pakhtunkhwa ECNEC 29.08.2019	5090.431		Continue

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7.5. Key Initiatives

The following are the key initiatives that the Federal and Provincial Governments have undertaken in the last 5 years for adaptation of agriculture to climate change, increase resilience and ensure food security:

Climate Smart Agriculture technologies and practices present opportunities for addressing climate change challenges, as well as for economic growth and development of the agriculture sector. Practices are considered CSA if they enhance food security as well as at least one of the other objectives of CSA (adaptation and/or mitigation). Hundreds of technologies and approaches around the world fall under the heading of CSA. Most CSA practices address chronic challenges to Pakistan's agricultural sector, namely drought, flood, intense heat and pest/insect attacks. Water management strategies, improved crop and livestock varieties, integrated pest management and manure management, and renewable energy technologies for the agricultural sector are among the most widely adopted intervention in agriculture & livestock sectors in Pakistan. Matrix of these intervention including themes, adaptation practices, scale of adoption in Pakistan and its adaptation potential is given in Annex-1.

Water Management strategies have grown in importance for agriculture in Pakistan in recent years given the increased intensity and unpredictability of both drought and flooding events in the country and the growing unreliability of glacier melt. Pakistan has extensive irrigation system having about 140,000 watercourses with 1.6 million km length having huge conveyance and application losses. Watercourse lining and rehabilitation is a widely adopted intervention in agriculture sector through On-Farm Water management of all provinces. Government of Pakistan is investing on the promotion of climate smart water management practices. Table 1 shows the overall progress since the beginning of program in 1976 to 2019 and target from 2020 to 2024. About 6.82 MAF annually water is saved through watercourse lining. Another important water
management technique in Pakistan is LASER land levelling. While irrigation is widespread in Pakistan, because of poor field design and surface unevenness, considerable agricultural water resources are lost due to water accumulation or dry pockets. As a result, germination is often inconsistent, and crops grow unevenly. The use of a laser beam (situated at a fixed point at the edge of the field with a receiver box on a plow) allows farmers to achieve uniformity in field preparation for uniform water and moisture distribution. Precision land levelling with laser is another successful practice in Pakistan having significant water saving and productivity It has already been adopted on 4,247,700 acres and next five year target improvement. 2,490,000 acres. Govt. of Pakistan will provide about 9,500 LASER land levelers to farmers on subsidized rates. In Punjab province, for example, about 14,000 LASER land levelling units have been delivered to the farmers for provision of services in rural areas. Area under High Efficiency (Drip/Sprinkler) Irrigation Systems (HEIS) is about 75,000 acres with 70,000 acres of next five years target. Furthermore, in Punjab Province, HEIS are coupled with solar systems by replacing conventional energy sources (diesel and electric) with solar systems. One practice of particular importance to Pakistan rice production systems is alternate wet and drying (AWD) of paddies. AWD is a management strategy where close monitoring of soil saturation is used to reduce the need for constant submergence of rice paddies. Rice remains flooded during critical growing periods like flowering, but otherwise water levels can alternate between surface flooding and flooding up to 15cm above the soil surface. A simple "pani" pipe is used to determine flooding depth. AWD is moderately adopted in Punjab and Sindh provinces. Raised beds is an efficient irrigation method. Maize crop on raised beds has been adopted about on 40% of maize cropped area. Anticipated annual water savings is about 1.0 MAF. Direct Seeded Rice (DSR) is being practiced on about 20% of cultivated area/100,000 (acres). These climate resilient water management practices are helping in improving the environment.

Conservation agriculture and **no-till practices** are also on the rise in Pakistan. In Punjab and Sindh provinces, for example, no-till rice-wheat systems are increasingly being adopted (this is true across much of South Asia, more broadly). In this management system, wheat is planted immediately following the rice harvest without tilling the land. Only shallow channels sufficiently deep for seed germination are utilized, minimizing soil disturbance and maximizing soil carbon storage. Soil ripping, another minimal till practice, is currently widely adopted by sugarcane producers in Pakistan, also in Punjab and Sindh provinces. Raised bed planting of maize is also a widely adopted management strategy in both KPK and Punjab provinces, contributing to considerable water use efficiency improvements.

The use of improved seed varieties and livestock breeds is a central CSA strategy being utilized in Pakistan, although limited in its current deployment given the reduced availability of breeding materials. Early maturing varieties of maize—a moderately adopted adaptation strategy— in KPK province is denoted as especially climate smart given its strong effect on productivity improvements. Meanwhile pest tolerant varieties of onion are also widely adopted in Punjab and Sindh provinces and considered moderately climate smart. Drought tolerant varieties of wheat and cotton, and heat tolerant varieties for cotton are utilized across Pakistan.

Integrated Pest Management (IPM) aims to reduce environment and human impacts of pesticides and promotes natural pest control methods. To control white fly populations in chili crops in Pakistan, for example, natural predators like ladybugs, lacewings, or whitefly parasites can be released. This approach has been promoted by the Agribusiness Support Fund in Pakistan, with support from the U.S. Agency for International Development (USAID). IPM strategies are

determined to be highly climate smart in the context of sugarcane production in Sindh province, for example. Similarly, the use of bio-fertilizers, bio-pesticides and weed control practices are also widely adopted CSA practices that can reduce agricultural GHG emissions and solid waste pollution. This includes the application of bio-power fertilizer and Spinosad (bio-pesticide against fruit flies) in the case of mango and biological-controlled varieties of sugarcane. Generally speaking, across Pakistan a balanced used of chemical and biological fertilizers is maintained for the important cotton crop.

The key focus is to improve the dissemination of underutilized, low-barrier adaptation and mitigation strategies. In addition to adjusting crop calendars and planting dates, this includes the maintenance of proper row spacing, constructing agroforestry wind barriers, earthing-up during cropping of sugarcane, and crop rotations with legumes (wheat and maize), among other widely known practices.

Pakistan is making considerable efforts to incorporate renewable energy technologies into its agricultural production systems which mainly includes solar water pumping, solar drying and bio-energy production.

Besides these a number of initiatives have been taken for uplifting agriculture, increase resilience and maximize production. These are:

- Punjab Fasal Bema Program
- Empowerment of Kissan through Financial and Digital Inclusion (E-Credit)
- Subsidy of Fertilizers and Seeds
- Pilot Testing of Innovative Technologies to Improve Water Use Efficiency
- Oilseed Crops Promotion
- Farm Machinery and Implements
- Strengthening Markets for Agriculture and Rural Transformation (SMART) Punjab Program
- Drive against Adulteration of Agri. Inputs

A detailed list of actions undertaken is attached as **Annexure –II**. Govt of Pakistan is giving due consideration to uplift agriculture in the country. PM special package has an allocation of Rs. 230 Million has been done to ensure national food security for the period 2020-2024 (**Annexure –III**).

7.6. Agriculture as Reflected in the NDCs of Other countries

The NDCs of other countries have also been reviewed to see their specific reflections in the countries' NDC. It has been observed that the countries whose economies are agriculture reliant are most affected by climate change an adaptation is their main focus. The key adaptation recommendations are increasing water use efficiency, promoting resilient crops and breeds, increasing crop diversity, promoting local solutions for adaptation, etc. The country specific adaptation and mitigation recommendations, as reflected in their NDC submission, are attached as **Annexure-IV**.

7.7. Policy Recommendations

8. A number of policy recommendations were received (**Annexure-V**) The WG members after a thorough review of the Sector recommends the following:

- i. **Establishment of a permanent roundtable on climate change, agriculture and food security** led by Federal Ministry of National Food Security and Research and co-led by MoCC with representation from Mo WR, National and Provincial agricultural research, irrigation and extension institutions, agricultural universities, Food and Agriculture related UN organizations, stakeholder farming communities, to design and implement an appropriative National Adaptive System (NAS) and address the overarching research and policy questions and improve climate resilient agriculture and food security;
- ii. **Review of Agro-ecological zones in the context of climate change and available water and land resources.** Based on a long term agriculture strategy a cropping system may be designed with the three pronged agenda for precision farming (improvement of farm practices, laser land levelling, crop diversification and proper cropping patterns optimised planting dates), mechanization and communication on sustainable basis for each zone;
- iii. **Development & Implementation of a comprehensive national climate smart agriculture program** is required to be developed and implemented given the alarmingly rising climate change and food security concerns of the country duly considering the effects of climate change on agriculture as well as the impacts of agriculture on climate change. The key consideration should be given to adaptation co-benefits i.e, minimizing climate change impacts by simultaneously curtailing the greenhouse gases;
- iv. Launching of a comprehensive program on Zero Food Waste to avoid the loss of resources used in the production of food so as to avoid further stress on agriculture and livestock;
- v. **Development and introduction of better breeds of livestock** which would have higher productivity of milk and are less prone to heat stress and are more drought tolerant;
- vi. Introduction of **fodder species which are palatable, fast growing, less water consuming, salt and drought tolerant** and can provide year-round availability of fodder for the livestock.
- vii. **Development of a New high yielding varieties of crops,** which are resistant to heat stress, drought tolerant, less vulnerable to heavy spells of rain and loss prone to insects and pests to cope with the pressures being exerted on crop sector due to increasing food demands and climate change; &
- viii. **A robust risk management system** be strengthened given the increasing frequency and intensity of climate extremes, to inform decision makers about the potential disruptions in the secure provision of food.

Annexure-I/ Section-VII

Agriculture Climate Change Related Projects Undertaken by Federal Ministries, Attached Departments and Provincial Governments

Since 2016

Federal:

- Establishment of Food Security Information System DDWP 24.02.2020 100.012
- Updation of Agro Ecological Zones of Pakistan through Satellite and In-situ Data Mapping DDWP 24.02.2020 60.450
- Quality Seed Production and Supply to the Farming Community for Ensuring Food Security in Pakistan DDWP 02.04.2020 PKR 764.105
- National program for improvement of climate resilient watercourses in Pakistan Phase-II (PKR. 1,651 Million)

Punjab:

- Promotion of High value Agriculture through Solarization of Drip & sprinkler Irrigation Systems
- (PKR. 600 Million)
- Progress Report of NCCP Implementation Framework Page
- Developing Pothwar water stress region into an olive valley (PKR. 233 Million)
- National Program for Enhancing Command Area of Small and Mini Dams in Barani Areas of Pakistan (PKR. 127 Million)
- Upgradation of Hydrualic Research Station Nandipur, Gujranwala. World Bank assistance of \$35m
- Establishment of Strategic Planning Reform Unit in Irrigation Deptt (PC-II)
- Strengthening Left Flood Embankment of link No.III (DCRIP)
- Reclaiming Agriculture Land Affected due to Water Logging R.Y.Khan
- Rehabilitation of Naushera Disty System. Approved PDWP 2014/07/01 Gujranwala
- Irrigation Management of Hill torrent Flood Protection Rajanpur
- Flood Protection Bund Basti Darbar Hazrat at Sultan Bahoo. Approved DDSC 2016/02/04 Jhang
- Recharge of Aquifer for Groundwater Management Punjab, PKR. 582 Million
- Protection of Bhakkar Flood Bund, Approved PDWP 2014/12/05 Bhakkar

- Management of Hill Torrents in Irrigation Zone, (SORI, Kaha Hill torrent, Mithawan), Approved
- PDWP 2014/12/08 Dera Ghazi Khan,Rajanpur
- Rasing and Stregh. of Sanawan Flood Bund D.G. Khan
- Enhancing Capacity of Sheikhupura Drain, Approved PDWP 2016/07/15 Sheikhupura
- Rehabilitation concrete Lining of sharqpur Disty system
- Management of Flood Protection of Deg Nullah (Channelization and enhancing capacity of Basantar Nullah Un-Approved Sialkot
- Rehabilitation of Eastern Siddige Canal
- Construction of Flood Bund along River Indus from Raikh Bagh Wala Rajanpur
- Selected Reaches of Jhang Flood Protection Bund Jhang and Thatta
- Construction of Jhelum City Flood Protection Bund along Right Bank
- Providing Flood Protection Bund along Left Bank of River Chenab
- Remodeling of SMB Link Canal and enhancing Mailsi Syphon
- Study on Aquifer Punjab at Sub Basin Determine Options (as on 27.4.17)
- Extending Cantonment Flood Bund Downstream G.T. Road Bridge Jhelum
- Rehabilitation and Upgradation of Fakhar Flood Bund Rajanpur
- Emergent works / measures against the erosive action of river flows to protect Flood / Irrigation
- Infrastructure (PKR. 400 Million).

GB:

- Capacity building of water user Association and staff of Water Management GB. 27-11-2014 PKR 10.000 Million
- Sustainable Management of Fish Resources in GB. un-app 59.000 Million.
- Promotion of horticultural crops with special focus on off season vegetable farming in Diamer 08-02-2013 PKR 45.000 Million
- Poverty reduction through promotion of Horticultural and Cereal Crop in District Diamer PKR. 35.000 Million
- Poverty alleviation through farm income generation activities in Ghizer. PKR 56.000 Million.
- Development and conservation of Fisheries resources in District Hunza-Nagar. 04-09-2014 PKR 10.000 Million

KP:

Water Conservation in Barani Area of Khyber Pakhtunkhwa ECNEC 29.08.2019 5090.431

Annexure-II/Section-VII

Table 1: Climate Smart Adaptation Practices in Agriculture &Livestock in Pakistan

Themes	Adaptation Practices	Scale of adoption	Adaptation Potential
Drought Tolerant varieties	Wheat: Pakistan developed fourteen new high yield wheat varieties recommended for irrigated and eight for rainfed environments of Punjab, Shahkar-13 for the mountainous Gilgit- Baltistan, Ehsan-16 for rainfed areas in general, and the Umeed-14 and Zardana varieties for Baluchistan.	Wheat occupies 29% of total harvested area. These varieties are being practiced on about 10% of cultivated area (details in Table 1)	 Enhances water use efficiency Increases resilience to moisture stress and other climate shocks. 10-17 % more yield Disease resistant
Starse	Cotton:	Cotton occupies 9% of total harvested area. Drought tolerant varieties are being practiced on about 5% of cultivated area	 Increases the yield per unit area, especially during dry periods, hence ensuring income for the farmers. Enhances water use efficiency. Increases resilience to moisture stress and other climate shocks. Provides moderate reduction in GHG emissions per unit of food produced
Stress tolerant	KLC-1, KLC-3 by PCSIR Karachi		 Water saving Stress tolerant
Use of early- maturing varieties	Maize	Maize occupies 4% of total harvested area. Early maturity varieties are being practiced on about 35-50% of cultivated area	 Promotes high yields per unit area hence an increase in income and profit due to reduced production costs Optimizes the use of available soil moisture contributing to avoid crop loss. Increases water use efficiency. Provides moderate reduction in GHG emissions per unit of food produced.

Heat & drought tolerance	Sesame (Til-18, TS-3, TH-6, TS- 5)	Area under Sesame was 90,700 ha. About 80 % of the area under cultivation in Punjab under these varieties (Table 1)	Water efficient25% more yield
Heat & drought tolerance	Sunflower (NK-265, SF-187, PI- 6480, Hysun-33)	New Release (Table 1)	Water efficient25% more yield
Heat & drought tolerance	CANOLA & MUSTARD AARI Canola, Rohi Sarson, Super Raya	82% of the area under cultivation in Punjab (Table 1)	Water efficientMore yield
Pest Resilient varieties	Onion Rice (5% of total harvested area)	40-50% of the area under cultivation in Punjab & Sindh is under pest resilient varieties	 Reduces environmental degradation due to reduced use of pesticides. Increases biodiversity on the farm as well as in the soil. Reduces GHG emissions by reducing use of synthetic pesticides
Improve Rice Management	Alternate Wetting & Drying (AWD)	AWD is being practiced on about 7% of cultivated area	 30 % reduction in water No adverse impacts on yield. More income Saving in input costs (water, fertilizers and insecticides)
	Direct Seeded Rice (DSR) Rice (8% of total harvested area)	DSR is being practiced on about 20% of cultivated area or at 100,000 (acres)	 Increases yield by maintaining optimum conditions for plant development. Promotes the efficient use of scarce resources such as water The practice may contribute to reductions in GHG emissions by reduced use of fossil fuels.
Improve Soil and Water Management	Water course lining	Pakistan has a total of about 140,000 watercourses and about one third has been lined over past few years. About 6.82 MAF water saving is anticipated with water course lining	 129 acre feet of water saving per watercourse per annum Save 40 % water 9% Increase in Cropping Intensity 31% Crop Yield Enhancement Reduce water logging Prevent weed growth
	Drip/sprinkler irrigation system	About 75,000 acres of land under micro irrigation in	 drip methods can reduce the volume of water applied to fields by up to 70 percent.

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Pain water harvesting	Pakistan Targets: 70,000 acres by 2024	 90 % water efficiency Increase crop yields by 20- 90 percent. Reduction in use of fertilizers upto 40% Labour cost is low Drought resistant 90 % water efficiency
Kani water narvesting	 About 22,300 acres were brought under HEIS with Solar water pumping by departments 180,000 acres will be brought under HEIS with Solar water pumping under command area national project 	 90 % water enriciency Reduce water losses can reduce the storm water runoff from surface of lands Conserve water Delivers high quality drinking water; Simple, flexible and durable solution; Recharge underground water
Furrow Irrigation		 23% water saving 11% higher Low initial investment Low pumping costs per acre- inch of water pumped.
Reduced/zero tillage		 Better water use efficiency and water economy in dryland areas. Yield increase and greater yield stability Reduction of costs in machinery and fuel more livelihood Reduce salinity problems and increase fertilizer use and nutrient-efficiency Weed control, Reduce co2 emissions
Raised beds	Maize crop on raised beds at about 40% of total water harvested area. Anticipated annual water savings is about 1.0 MAF	 Water saving: 30% Yield increase (maize): 30% Yield increase (wheat): 10% Adopted on majority of row crops and vegetables Reduction in fuel and labour by 33 % Weeds reduction No need of tilling Less soil compaction
Laser land leveling	In Punjab about 4,247,700 has been laser land levelled with provision of 14159 laser levels. There is a target of 2,490,000 acres to be levelled with	 water application efficiency up to 50% Increase cropping intensity by about 40%. Increase crop yields (wheat 15%, sugarcane 42%, rice 61% and cotton 66%)

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		provision of 8300 units	 Better land levelling reduces weeds by up to 40%. Water Saving by 25% Improvement in crop yield by 23% Enhancement in fertilizer use efficiency by 11% Saving in farm labour by 18%
Improve Soil Fertility	Wheat crop rotation with legumes	Wheat crop rotation with legumes are cultivated at about 2% of wheat area	 Optimizes water and nutrient use Minimizes disease, pest and weed problems Heightens yields Builds soil fertility Preserves the environment Boosts economic returns to enhance household security Adds to crop and market diversity
	Maize crop rotation	Maize crop rotation at about an area of 20% in Punjab & Khyber- Pakhtunekhaw	 Increases total production and productivity per unit of land. Harvests of multiple crops increase income and food security. Reduces the risk of total crop failure due to diversification of crops under unfavourable weather conditions Protects soil structure and organic carbon reserves. Leguminous species integration reduces the need of nitrogen-based synthetic fertilizers
	Crop residue mulching		 Reduces water use up to 75% as it protects the soil from evaporation Helps to conserve soil moisture, prevent soil degradation, and protect vegetables from rains and high temperatures Enhance soil fertility, structure and other soil properties
	Intercropping:	Mango has 1% of total	 Increases total production
	Mango on about 30-60%	Sindh & Puniab On about	and productivity per unit area Harvests of multiple

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	of mango area in Sindh & Punjab	30-60% of mango area in Sindh & Punjab have intercropping mostly with tomatoes etc.	 crops increase income and food security. Reduces the risk of total crop failure due to crop diversification under unfavourable climatic conditions. Ensures soil coverage and increases in soil organic matter. Legume integration can reduce the use of synthetic Nitrogen-based fertilizers Less water use
Feed	Climate smart cattle		 Less water usage Denshaa weine seiter usage
Management	ranching		 Ranches using sylvo-pasture produced 50% more milk in both the dry and wet season. Integrating trees into pastoral systems improves soil stability and provides shade to reduce heat stress on livestock.
Dairy development	Controlled Shed	About 15% in dairy & poultry is under controlled sheds	 Increase milk production Faster growth and higher feed conversion ratio due to proper housing. Reduces exposure to adverse climatic conditions, reducing animal's stresses. Allows better manure management, thereby reducing the related GHG emissions
Manure Management	Composting	About 20-30% in dairy & poultry manure is managed by composting	 Improves soil health by increasing organic matter content and microbial activities. Increases possibility of farming in degraded soils. Mitigation Improved soil characteristics (structure, bio-chemical), leads to a better soil capacity to sequester carbon. Reduces Methane emissions, and can be integrated with other practices such us bio- digesters.
Clean Energy in	Bio-gas Production		Clean EnergyReducing greenhouse gas
			emissions from AgricultureIncrease reliance on local

Agricultural			renewable energy sources
	Simple solar dryers (date, fig etc.) to raise the market value of perishable products		 Improved livelihoods increase resilience to all kinds of shocks. The enclosed drying frames might protect against unpredictable weather or climate-driven pest outbreaks
	Solar pumped irrigation system	 About 22,500 acres were brought under HEIS with Solar water pumping by departments 180,000 acres will be brought under HEIS with Solar water pumping under command area national project 	 Clean energy Less pollution resulting from inadequate fuel handling (diesel pumps) Enhance agricultural yields/productivity. Improve farmer and agribusiness income- generating opportunities and revenues and/or increase energy efficiency

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Crop Varity	Trait	Ecology	Estimated Area under Cultivation (Acres)
WHEAT			
Markaz-19	Drought tolerance		New Release
Barani-17	Drought tolerance		New Release
Borlaug-16	Drought tolerance		New Release
Fatehjang-16	Drought tolerance		New Release
Ihsan-16	Drought tolerance		New Release
Dharabi-11	Drought tolerance	Rainfed area of Punjab	340,000
Pakistan-13	Drought tolerance		340,000
NARC-2009	Drought tolerance		170,000
BARS-2009	Drought tolerance		34,000
Uqab-2000	Drought tolerance		85,000
Chakwal-50	Drought tolerance		850,000
Ghazi-19	Drought tolerance		New Release
Jauhar-16	Drought tolerance		100,000
Gold-16	Drought tolerance	Southern Punjab	200,000
Aas-11	Drought & heat		5,00000
	tolerance		
Shafaq-06	Heat tolerance		36,000
Farid-06	Heat tolerance		340,000
Seher-06	Heat tolerance	Central & Southern Punjab	2,540,000
Fsd-08	Drought & heat tolerance	All over Punjab	6,827,000
Galaxy-13	Drought & heat tolerance		2,737,000
Ujala-16	Heat tolerance	Central & Southern	100,000
Millat-11	Heat tolerance	Punjab	38,000
Anaj-17	Drought & heat tolerance	All Punjab	14,500
Akbar-19	Drought & heat tolerance		New Release
SKD-1	Heat tolerance		4,132,000
TD-1	Heat tolerance	Sindh province	1,240,000
Fakhar-e-Bhakkar	Drought tolerance / Early Heat Stress	Thal (Sand dune) ecology	1,000,000
Bhakkar Star	Drought / terminal heat stress tolerance		New Release

Table 2: Climate Resilient Cultivars of Field Crops

Office of the CEA & CFFC, M/o Water Resources

Crop Varity	Trait	Ecology	Estimated Area under Cultivation (Acres)			
Shahkar-CCRI	Drought tolerance	Rainfed area of Khyber	183.000			
NIFA-Lalma	Drought tolerance	Pakhtunkhwa	915,000			
Pakhtunkhwa-15	Drought tolerance		36,600			
Pirsabak-15	Drought tolerance		36,600			
MAIZE						
Fakhar-e-NARC Hybrid	Drought tolerance	ICT, KP, AJ&K, GB	1,500			
Haq Nawaz Gold	Drought tolerance		1,500			
Islamabad White	Drought tolerance	Rainfed area of Punjab	New Release			
MUNGBEAN			1			
AZRI-Mung 20	Heat tolerance	Fit for wide range of soils ones	s except for water logged			
NIFA Mung-19	Heat tolerance					
AZRI-Mung 18	Drought tolerance	Khyber Pakhtunkhwa				
PRI-Mung 18	Heat tolerance	Punjab				
LENTIL	-					
Punjab-Masoor 2020	Drought tolerance					
Lentil-2019	Drought and cold tolerance					
Punjab-Masoor 2020	Drought tolerance					
CHICKPEA						
Thal 2020	Drought tolerance					
Indus-2019	Drought and cold tolerance					
NIAB-CH-104	Drought tolerance					
Noor-2019	Drought tolerance					
MILLET						
Johar	Drought tolerance	Marginal areas				
Bajra Super-I	Drought tolerance	Marginal areas				
CANOLA & MUS	STARD	, -	1			
Sandal Canola	Frost tolerance					
Super Canola	Frost tolerance	82% of the area under cu	ltivation in Puniab			
AARI Canola	Heat tolerance					

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Crop Varity	Trait	Ecology	Estimated Area under Cultivation (Acres)	
Rohi Sarson	Heat & drought tolerance			
Super Raya	Heat & drought tolerance			
Faisal Canola	Frost tolerance			
SUNFLOWER				
ORISUN-648	Heat & drought tolerance	New Release		
ORISUN-516	Heat tolerance			
SESAME				
Til-18	Heat & drought tolerance	180/ of the area under ould	ration in Dunich	
TS-5	Heat & drought tolerance	18% of the area under curry	vauon in Punjao	
TH-6	Heat & drought tolerance	80 % of the area under cultivation in Punjab		
SOYBEAN				
Faisal Soybean	Heat tolerant	Punjab		

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Table 3: Climate Smart Water Management Adaptation Practices in Pakistan(1976-77 to 2019-20)

Name of Technology	Unit		Achievement			Targets
Ivanic of Teenhology	Omt	Punjab	Sindh	KP	Baluchistan	2021-2025
Improvement of Un- improved Watercourses	Nos.	50649		26494		26,534
Additional lining of partially improved Watercourses	Nos.	6946		584		7900+2500
Length of lined water courses	Km	35013				12,412
Length of earthen reconstruction	Km	127,142				12,412
Provision of LASER Land Leveling Units	Nos.	14159				8300+1100
Area under Precision Land Level	Acres	4,247,700		150,477		2,490,000
Area under High Efficiency	Acres	64,823		4855		30,177+11650

Office of the CEA & CFFC, M/o Water Resources

(Drip/Sprinkler) Irrigation Systems (HEIS)				
Area under Solar pumping Systems for operating HEIS	Acres	21287		20,000
Provision of Bed Planters	Nos.	394		
Area under Bed plantation	Acres			
Provision of Zero Tillage	Nos.	1484		
Area under Zero Tillage	Acres			
Construction of Rainwater Harvesting Ponds (Nos.)	Nos.	456		780
Construction of Dug Wells (Nos.)	Nos.	3700		736
Construction of Water Storage Tanks/ Ponds (Nos.)	Nos.	1000		3,000

Table 4: Summary of Federal Break-up of expenditure (2015-2020) and Plan(2019-2025)

Theme	Expenditure Cost (2015-2020) as on Every December	Plan (2020-2021)
Water Management	4727.3	220,425.0
Crops	2855.5	17,883.0
Livestock and Poultry	1579.1	6,450
Fisheries	70.6	13,991.6
Horticulture	2104.4	20,352
Agri. Research and Adoptive	1971.0	489.3

Annexure-III/Section-VII

Projects & financial outlays – PM Emergency Program on national food security & research (2019-2024)

Initiative	Allocation for 2020-24 (Millions)
National Program for Improvement of Watercourses in Pakistan Phase-II	179,705
Enhancing Command area of Small and Mini Dams in Barani Areas	27,700
Water Conservation in Barani Areas area of Khyber Pakhtunkhwa	13,020
Promotion of Olive Cultivation on Commercial Scale in Pakistan	10,176
Productivity Enhancement of Wheat, Rice, Sugarcane, Cotton	19,301
Productivity Enhancement of Rice	11,433
Productivity Enhancement of Sugarcane	3,912
Productivity Enhancement of Cotton	2538
National Oilseed enhancement program	10,176
Promoting Research for Productivity Enhancement in Pulses	1737
Backyard Poultry	329.13
Save & Fattening of Calf	5,344
Promotion of Trout fish farming, Shrimp Farming, Cage Fish Culture	13,991.62
Total Costing for future 5 year plan (2020-25)	<u>230,601</u>

Annexure-IV/Section-VII

Cross-Country Comparison of Intended Nationally Determined Contributions

Countries Nationally Determined Contributions – A			riculture		
Countries	Adaptation	Mitigation	Cross-Cutting		
	Central Asia				
Kazakhstan First NDC: 2016	No details are provided regarding agriculture				
Kyrgyzstan First NDC: 2020			Only mentioned the vulnerability of agricultural sector but makes no mention of steps taken to reduce this vulnerability		
Tajikistan First NDC: 2017	Implementing the Agriculture Reform Programme of the Republic of Tajikistan for 2012- 2020;	Agriculture sector is listed as one of the highly focussed sectors along with hydraulic power industry and renewable energy sector. However, there are no details given in the text regarding mitigation measures taken to reduce GHG emissions.			
Turkmenistan First NDC published in 2016	The agriculture is the main consumer of water in Turkmenistan, and therefore the problem of changing the flow of rivers and hydrography, namely its reduction during the vegetation period may worsen.				
Uzbekistan First NDC: 2018	Improvement of the climate resilience of the agriculture through diversification of food crops production pattern; conservation of germplasm and indigenous plant species and agricultural crops resistant to droughts, pests and diseases; development of biotechnologies and breeding new crop varieties adopted to				

Sector: Agriculture

Countries	Nationally Deter	mined Contributions – Ag	riculture
Countries	Adaptation	Mitigation	Cross-Cutting
	conditions of changing climate. Improvement of water management practice in irrigated agriculture with wide use of integrated water resources management approaches and innovative technologies for water saving, including broad introduction of drip	0	9
	irrigation systems		
	South	Asia	
Afghanistan First NDC: 2016	National Comprehensive Agriculture Production and Market Development Programme Increasing irrigated agricultural land to 3.14 M-ha, through restoration and development of Afghanistan's irrigation systems. For this, Eco- agriculture and climate friendly irrigation technology transfer to Afghanistan will be ensured Vocational and engineering capacity to design, build and maintain climate friendly irrigation networks and local schemes	Agriculture and Livestock (manure management, land use/change for agriculture) Introduction of energy efficiency practices in agriculture sector Better spatial planning for community and production agriculture National herd, reduction in fuel used, or cleaner fuel technologies. South-south collaboration on low- carbon agriculture, study tours. Funding for R&D activities. Improved national dataset on agriculture, food security data.	
Bangladesh First submission: 2016 Updated submission: 2020			Government estimated the carbon emission for Agriculture, Forestry and Other Land Use (AFOLU) sector to develop the Forest Reference Level (FRL) and submitted to the UNFCCC.

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Countries	Nationally Deterr	nined Contributions – Ag	riculture
Countries	Adaptation	Mitigation	Cross-Cutting
Bhutan	Promote climate smart agriculture to contribute towards achieving food and nutrition security through:	Various other policies and initiatives are already in place that contribute to mitigation such as sustainable land management practices, improved livestock management, promotion of organic agriculture	The National Mission
First NDC: 2016			on Sustainable Agriculture (NMSA) aims at enhancing food security and protection of resources such as land, water, biodiversity and genetics. The mission focuses on new technologies and practices in cultivation, genotypes of crops that have enhanced CO2 fixation potential, which are less water consuming and more climate resilient. India has developed 580 district level (covering many states) contingency plans based on early warning systems and other weather forecasting systems. Government of India adopted a mega project called the National Initiative on Climate Resilient Agriculture (NICRA). Its four main modules include Natural Resource Management, improving crop production livestock

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Countries	Adaptation	Mitigation	Cross-Cutting
Maldings	Strengthen existing alignets right		and fisheries and institutional interventions A Scheme has been launched to provide in mission mode Soil Health Card to every farmer. Additionally, 100 mobile soil-testing laboratories have been setup across the country.
Maldives First 2016 Updated: 2020	Strengthen existing climate risk insurance mechanisms for building resilience against the loss of assets, livelihoods due to extreme events and enhancing relief efforts in the post disaster period taking into account national food and nutrition security. Scale-up investments in building public food reserves and stocks and expanding regional distribution mechanisms across the country as an adaptive measure to increase accessibility and availability to reduce risks of food shortages during extreme events and market irregularities. Promote research and development focusing on climate smart technologies and practices to address challenges facing the sector due to climate variabilities, seasonal changes and extreme events. Enhance capacity to implement climate smart and Integrated Pest Management (IPM) strategies and practices towards reducing pest damages and pest induced crop losses to increase resilience on crop yields and		

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countries	Adaptation	Mitigation	Cross-Cutting
	Facilitate and enhance access to finance via available national funds and other mechanisms including access to micro-credit, grants etc., to increase farmer's capacity to enhance food security and to increase investments on production systems.		
Nepal First NDC: 2016 Second NDC: 2020			Integrate climate change in the upcoming revised Agriculture Policy
Srilanka First NDC: 2016	Promote/introduce/develop Integrated Pest Management (IPM) practices to minimize pest damages to improve environmental impacts and health Develop/introduce varieties resistant/tolerance to biotic and abiotic stresses arising from climate change Re-demarcating Agro Ecological Regions (AERS) maps of Sri Lanka with current climate and future climate, and recommend appropriate crops for different areas to reduce vulnerability to climate change impacts. Introduce suitable land and water management practices for central highlands and other marginal areas to minimize land degradation and to improve land and water productivity.		
China First NDC: 2016	East-	Asia	To promote the low- carbon development in agriculture, making efforts to achieve zero growth of fertilizer and pesticide utilization by 2020;

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Countries	Nationally Determined Contributions – Agriculture		
Countries	Adaptation	Mitigation	Cross-Cutting
			To construct a recyclable agriculture system, promoting comprehensive utilization of straw, reutilization of agricultural and forestry wastes and comprehensive utilization of animal waste;
			To improve greenhouse gas emission statistics covering areas including energy activity, industrial process, agriculture, land-use change, forestry and waste treatment;
Japan First NDC: 2017 Updated Submission: 2020	(No mention of agriculture)		
Mongolia First submission: 2016 Updated: 2020	Save water for irrigation by using plastic films/mulches on potato and vegetable fields; Reduce water use and irrigation costs by applying drip and infusion systems in irrigated potato, vegetable, fruit, and berry productions; Protect the soil from wind, water erosion and damages, and sustain a high yield by applying straw mulches for non-irrigated crop and forage fields; Reduce soil moisture loss and damage of mechanical structure soil and reduce direct tillage costs by eliminating mechanical tillage	Regulate and reduce the livestock number • Improve the livestock manure management	

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Countries	Nationally Determined Contributions – Agriculture		
Countries	Adaptation	Mitigation	Cross-Cutting
	and implementing zero-tillage	¥	<u>2</u>
	technologies.		
	Southea	st Asia	
Myanmar	The	To mitigate GHG	
	agriculture sector is	emissions from the	
	implementing climate smart	agriculture	
	agriculture approaches through	sector from combustion	
	implementation actions	of agricultural residues	
	such as legume crops	and growing rice in	
	diversification, measures in the	paddy fields.	
	agro-forestry sector and	The Ministry of	
	systematic control of soil	Agriculture and	
	quality and irrigation water. In	Irrigation is researching	
	addition, Myanmar is working	alternative wet and	
	to reduce climate change	dry paddy production	
	vulnerability and	techniques. This is an	
	reduce poverty in rural areas	example of how	
	and for subsistence farmers as a	Myanmar 1s	
	priority. Crop varieties are being	resolving the need to	
	researched with the involvement	mitigate climate change	
	of universities, research	whilst also adapting to it	
	institutions and local	To reduce CUC	
	communities across the	amissions from the	
	instance, research is being	burning of aron residues	
	instance, research is being	in fields the Ministry of	
	rice variatios?	A grigulture and	
	resiliance to drought flood	Agriculture and	
	tolerance salt tolerance and into	implementing affective	
	alternative variaties that are	mitigation actions such	
	resistant To diseases	as energy from crop	
	resistant 10 diseases.	residues promoting the	
		use of organic fertilisers	
		and methods to shorten	
		the time of composting	
		agricultural by products	
		The bio-char program is	
		also being planned and	
		will reduce GHG	
		emissions to atmosphere	
		as a result of less	
		anaerobic decomposition	
		in the production	
		process. At the same	
		time, this will increase	
		crop production.	
Laos	Promote Climate Resilience in		
	Farming Systems and		
	Agriculture		
	Infrastructure: improve		

Countries	Nationally Deterr	nined Contributions – Ag	riculture
Countries	Adaptation	Mitigation	Cross-Cutting
	appropriate resilient agricultural farming system practices and technologies to address climate change impacts Develop and improve crops and animal diversification and resilience especially in the risk, flood and drought areas Promote and enhance development of appropriate technologies to cope with climate change. This may include the conservation of agricultural soil, animal health and disease outbreak monitoring and control, long term feed storage improvement, climate resilience crops, efficient water use cropping systems, short rotation cropping and maximising the use of indigenous climate resilient		
Vietnam First NDC: 2016 Updated: 2020			In the agriculture sector, actions on GHG reductions have been implemented: replacing long-duration rice varieties with short- duration ones, helping reduce typhoon- related risks and GHG emissions time; increasing areas with mid-season water drainage and alternating wet and dry irrigation techniques; increasing areas with integrated crop management (ICM) or areas with the "3 decrease 3 increase (3G3T)" 1 and "1 must 5

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Countries	Nationally Determined Contributions – Agriculture		
Countries	Adaptation	Mitigation	Cross-Cutting
Thailand First NDC:	(No mention of agriculture)		decrease (1P5G)" 2 techniques applied; converting inefficient rice growing models to the rice - shrimp model and converting the rice - rice model to the upland crop model ; reducing the rate of field burning of rice straw from 90% to less than 30%; improving diets for tens of thousands of milk cows; collecting and treating millions tonnes of organic waste in livestock production to make organic fertilisers; applying water saving irrigation techniques on hundreds of hectares of coffee
2016 Updated submission:			
2020	Development of Disc suggestion	Construction of his	
Cambodia First NDC: 2017 Updated: 2020	Development of Rice crops for increase production, improved quality-safety; harvesting and post harvesting technique and agro-business enhancement Development of Horticulture and other food crops for increase production, improved quality-safety; harvesting and post harvesting technique and agro-business enhancement Development of Industry crops for increase in production, improved quality-safety; harvesting and post harvesting technique and agro-business enhancement Improvement of support services and capacity building to crop production resilient to	Construction of bio- digesters Increasing the effectiveness and sustainability of agricultural land management techniques (Conservation Agriculture) Organic input agriculture and bio- slurry; and deep placement fertilizer technology	

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Countries	Nationally Deterr	nined Contributions – Ag	riculture
Countries	Adaptation	Mitigation	Cross-Cutting
	climate change by promoting research, trials and up-scaling climate-smart farming systems that increase resilience to CC and extreme weather events Building climate change resilience on cassava production and processing Development of rubber clone		
	varieties suitable for AEZ and resilient to climate change		
Malaysia	(Agriculture is mentioned as one of the most vulnerable sectors of the economy but there are no specific adaptation and mitigation measures mentioned in the INDCs for this sector)		
Indonesia		The use of low emission crops. Implementation of water-efficient concept in water management. Manure management for biogas. Feed supplement for cattle.	
Philippines Updated 2021	The successive typhoons in October and November 2020 alone resulted in approximately USD 852 million in losses and damages in agriculture and infrastructure The Philippines shall undertake adaptation measures across but not limited to, the sectors of agriculture, forestry, coastal and marine ecosystems and biodiversity, health, and human security, to pre-empt, reduce and address residual loss and damage	The Philippines commits to a projected GHG emissions reduction and avoidance of 75%, of which 2.71% is unconditional 9 and 72.29% is conditional, 10 representing the country's ambition for GHG mitigation for the period 2020 to 2030 for the sectors of agriculture, wastes, industry, transport, and energy. 11 This commitment is referenced against a projected business-as- usual cumulative economy-wide emission of 3,340.3 MtCO2e 12 for the same period.	

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Countries	Nationally Determined Contributions – Agriculture		
Countries	Adaptation	Mitigation	Cross-Cutting
Singapore First NDC: 2016 Updated: 2020			Creation of an Agriculture Productivity Fund (APF) to co-fund systems to better control environmental variables and boost production capabilities, as well as to leverage technology to produce food sustainably.
Brunei	(Agriculture is not mentioned in the declaration)		
Papua New Guinea	Climate-Smart Agriculture Policy is socially inclusive • Progress on food security is underpinned by the National Food Security Policy 2016-2027		

Annexure-V/Section-VII

Stakeholders Policy Recommendations

Federal:

- Pakistan needs *a plan of action*, which clearly sets out the government's intent regarding emissions reductions and simultaneously ensuring food security.
- We should have a *set target* to reduce emissions from enteric fermentation and a set target to promote dry sowing of rice seeds.
- Without a specified target for emissions reduction or climate smart agriculture, Pakistan would not be able to achieve any mitigation or adaptation measures in the agriculture sector.
- To mitigate the methane emissions from rice paddies, an alternative cropping should be promoted e.g. rice-pea combination or introducing microbial decomposition of methane.
- The participation of agricultural communities should be mandatory in formulation and designing of agricultural policies. It is one way for effective implementation of these policies with farmer's interest addressed in it.

Punjab:

- There is need to ensure *food security* whilst also addressing climate change impacts from the sector.
- There is need to *outreach, awareness* and *capacity building* as the basic tools for any policy's implementation.
- There is need to encourage *agroforestry for carbon sequestration*, and within the practice of agroforestry, to ensure that the varieties of trees chosen are suitable to the climate and soil conditions of a particular region. In this regard, it is further recommended that authority should be given to the agricultural officer of a jurisdiction to inspect farmlands so that he may ensure that the requisite number of trees and the right kind are grown.
- There is need to establish *livestock valleys* within rangelands to lower methane emissions and to make biogas projects easier to operate within defined territory.
- There is need to reach out to the farming community to bring back the concept of *"jauhar"* or ponds as a sustainable exercise of storing rainwater and having the effect of keeping groundwater level high. Additionally, farmers should be encouraged to take up *"cooperative farming"* whereby resources, such as tractors, water pumps, may be shared.

KP:

- There is need to ensure availability of water to the agriculture sector by *upgrading existing canals*, making new canal system and establishing high frequency water irrigation system to save water for future.
- Promoting *small dams* on major channels to make irrigation practices more sustainable in terms of water and energy provision.
- Agricultural practices should be adjusted with the climate cycle because due to climate change period of planting has changed for different crops.

- Waste from the livestock should be used for *biogas* and generation of electricity as this dual policy will generate energy as well as reduce GHG emission.
- To meet mitigation goal, plantation throughout motorway route should be encouraged. Preference will be given to planting of fruit trees, which will have co-benefits.
- Local crops/tree species should be promoted in agriculture practices.
- Much of the land in KPK is clear which can be used for tree plantation to mitigate climate change. Backyard farming should be promoted and made mandatory for each house to plant at least 2-3 trees to meet national NDC goals,

Balochistan:

- There is a need to produce seeds varieties that are climate resilient.
- Huge proportion of financial assistance is required for agricultural research and development.
- There should be more focus on organic crops, which require less use of fertilizer and chemicals.
- Installation of strong regulation control systems with the ability to control and capture fertilizer and crop hazard chemicals.
- Instead of using chemicals and fertilizers, we need to use biological agents such as insects that will not affect the crops but could eat other harmful insects.
- Water scarcity is the biggest constraint of Balochistan; therefore, there is a need to manage the water resources. Underground water is going down with the passage of time and it needs to be addressed.
- Progress should be made for high frequency water system to increase water productivity and enhancement of farmer's access to water.
- Nowadays most people use the Internet so we should develop a smart application to check fertilizer, seed and pesticide quality for the enhancement of agricultural productivity and yield per hectare.
- Agricultural practices should be adjusted with the climate cycle because due to climate change timing of planting is moving ahead.
- The use of less water intensive crops and orchards should be increased. In most areas of Balochistan, farmers plant apples, which is a water-demanding crop that can be replaced with less water-demanding crops/orchards like *pomegranates, olive and pistachio*.
- In Balochistan, there is huge potential for growing *Olive*, which is low water intensive orchard at the moment. 18 districts are producing native olives species that need to promote all over the Balochistan. Baluchistan's farmer community should be taken on board for projects such as the recently announced "*Olive Tsunami*" project.
- We should have pro-public polices and creating awareness among farming communities regarding climate change impacts and *Climate Smart Agriculture* should be introduced and promoted.
- The most cost-effective low carbon strategies would be: (i) *climate change resilient crops*, as biotic and abiotic stresses are getting intense and prolonged; and (ii) adopting *water use efficient strategies*.
- There are several public regulatory bodies in the agriculture sector but monitoring of implementation is poor or ineffective. These bodies may need to coordinate with each other to avoid the repetition of mandates for an effective implementation and

should have the "Right Person" for this job. Financial and administrative authorities can help to make policy implementation more effective.

Sindh:

- Information on projects conducted on climate change mitigation should be compiled and shared at a provincial platform.
- Implementation of agricultural policies is lacking in the Sindh province.
- To improve policy implementation, training of relevant staff is the first and foremost step. The second step should be the provision of facilities to the workers to keep the good impression of the department (e.g. vehicles, infrastructure etc.) as the local communities respond more to well-equipped officials as per cultural norms.
- To sustain the promotion of biogas plants, the provision of natural gas to the villages should be aborted. During training, farmers should be educated on the harmful effects of GHG and how they can contribute in mitigating emissions.

SECTION – 8: TOTAL ADAPATION NEEDS AND RELATED COMMUNICATION MECHANISM

We all know that today a change in climate is felt primarily through a change in water. Around the world, frequency and intensity of water-related natural disasters including droughts and floods is expected to increase with climate change. The first-ever National Water Policy (NWP) approved by the Government of Pakistan on 24th April 2018 sets 6 national targets to be achieved by 2030 which include (i) 33% reduction in the 46 MAF river flows that are lost in conveyance, (ii) an increase of 10 MAF in existing water storage capacity mainly through construction of the Diamer-Basha and Mohmand Dam Projects, (iii) at least 30% increase in water use efficiency, (iv) gradual replacement and refurbishing of decades old irrigation infrastructure, (v) real-time monitoring of river flows by IRSA through inter alia telemetric monitoring to maintain transparent water accounting system and (vi) development of a standardized and uniform mechanism for data collection of various parameters of water resources.

In order to achieve above stated targets by 2030, total investment needed by the Water Resources sector was worked out as Rs 3,066 billion (Para-28.11 of NWP) which equates to US \$ 27 Billion. Based on the increase in dollar exchange rate from 2018 (Pak Rs 115) to date (Pak Rs 158) escalated adaptation needs in monetary terms turn out to be US \$ 37 Billion i.e. approximately US \$ 3.7 Billion per annum.

Updated input received from WG on Biodiversity Sector indicated total adaptation needs as US \$ 49.78 Billion i.e. approximately US \$ 5 Billion per annum. The inputs received from other sectors/ Adaptation WGs did not include such long term estimates. Therefore for the Agriculture and Disaster Preparedness Sectors, a value of around US \$ 3.7 Billion per annum equal to that of water Sector has been adopted while for cross cutting sectors i.e. Health, Forestry, Gender and Biodiversity, estimates were halved. Accordingly, sector wise detail is given below:

Sr. No.	Name of Sector	Adaptation Finance Needs upto
		2030 (Billion US \$ per annum)
1.	Water Resources Sector	3.70
2.	Agriculture and Livestock Sector	3.70
3.	Disaster Preparedness Sector	3.70
4.	Human Health Sector	1.85
5.	Forestry Sector	1.85
6.	Biodiversity & other Vulnerable Ecosystem Sector	5.0
7.	Gender Sector	1.85
8.	Total	21.65

There are two main UNFCCC documents/ processes used for measuring adaptation ambition in terms of planning and communication:

- Adaptation communications (Adcoms) are short, political, documents setting adaptation plans, actions, needs and support provided. COP 25 called for all countries to publish these as soon as possible, as an input to the Global Stock take.
- **National Adaptation Plans** (NAPs) are longer strategic planning tools which identify adaptation needs and how to fulfill them. They should facilitate the integration of adaptation into existing policies, programmes and activities.

The adaptation communication shall be submitted, as appropriate, as a component of or in conjunction with other communications and/or documents, including a national adaptation plan, a national communication, a nationally determined contribution, or a biennial transparency report.

An adaptation communication may include information on the following elements:

- (a) National circumstances, institutional arrangements and legal frameworks;
- (b) Impacts, risks and vulnerabilities, as appropriate;
- (c) National adaptation priorities, strategies, policies, plans, goals and actions;

(d) Implementation and support needs of, and provision of support to, developing country Parties;

(e) Implementation of adaptation actions and plans, including:

(i) Progress and results achieved;

- (ii) Adaptation efforts of developing countries for recognition;
- (iii) Cooperation on enhancing adaptation at the national, regional and international level
- (iv) Barriers, challenges and gaps related to the implementation of adaptation;

(v) Good practices, lessons learned and information-sharing;

(vi) Monitoring and evaluation;

(f) Adaptation actions and/or economic diversification plans, including those that result in mitigation co-benefits;

(g) How adaptation actions contribute to other international frameworks and/or conventions;

(h) Gender-responsive adaptation action and traditional knowledge, knowledge of indigenous peoples and local knowledge systems related to adaptation, where appropriate;

(i) Any other information related to adaptation.