

TYPE AND NATURE OF ACTION TO ADDRESS LOSS AND DAMAGES

Sr #	Activity	Approximate cost (Million US \$)
1.	Develop sectoral disaster management operational plans in federal ministries, departments and authorities (Intervention 2 of NDMP)	1.0
2.	Conduct research on impact of climate change on glaciers and ice caps (Intervention 3 of NDMP)	5.0
3.	Enhancement of research activities for snow/glacier/glacial lakes (Intervention 4 of NDMP)	3.0
4.	Enhancement of community enlightenment for EWS with execution of training and drills (Intervention 4 of NDMP)	2.0
5.	Raise people's awareness of disaster management (Intervention 5 of NDMP)	1.9
6.	Strengthen awareness Program on disaster risk reduction at local level (Intervention 6 of NDMP)	14.0
7.	Structural vulnerability evaluation for schools and hospitals against earthquakes, tsunamis and floods in Pakistan (Intervention 7 of NDMP)	10.0
8.	Retrofitting works of important public facilities (schools and hospitals) (Intervention 7 of NDMP)	60.0
9.	Construction of DRM centres in vulnerable areas to disasters (Intervention 7 of NDMP)	10.0
10.	Enforcement of effective land use control and regulations based on urban disaster management plan; introduction of the space needed for evacuation and disaster relief into land utilization program (Intervention 7 of NDMP)	6.0
11.	Mainstreaming disaster risk reduction into development (Intervention 8 of NDMP)	3.0
12.	Establish and strengthen warehousing or stockpiling system for storing food, medicine, relief supplies and rescue equipment at strategic locations (Intervention 9 of NDMP)	10.0
13.	Establish a robust communication system, supply chain and efficient transport and logistics mechanism to be used during emergency situations (Intervention 9 of NDMP)	6.0
14.	Develop capacity of stakeholders in post-disaster recovery (Intervention 9 of NDMP)	3.0
15.	<u>Up-gradation of National Emergency Operation Centre (NEOC) and Integrated Disaster Information Management System.</u> Up-gradation can improve communication and coordination with stakeholders, dissemination of information / early warnings till community and monitoring of situation.	9.7
16.	<u>Measures against Urban and Flash Flooding.</u> Capacity building and awareness campaign through NIDM.	-
17.	<u>District Disaster Management Plans.</u> Preparation / formulation of DDMPs of most vulnerable districts.	0.3
18.	Capacity building / refresher training and strengthening of USAR teams of CDA, Islamabad and KMC, Karachi.	8
19.	Revision of National Disaster Response Plan (NDRP).	0.05

CONCEPT NOTE ON ACTION TO ADDRESS LOSS AND DAMAGE CAUSED DUE TO CLIMATE CHANGE IN PAKISTAN

I. INTRODUCTION:

According to report released by the German Watch Index, Pakistan is ranked 8th among the countries hit by climate change (Table-1 below). The report revealed that increase in world temperature till 2100 is estimated at 3.5 centigrade while Pakistan's share in emission of gases from greenhouse is less than 0.5 percent. 1985 people lost their lives in 2010 devastating floods and it caused setback to the Pakistan economy equal to 7 % of GDP.

Table 1:

The Long-Term Climate Risk Index showing 10 countries most affected
from 1996 to 2015 (annual averages)

CRI 1996–2015 (1995–2014)	Country	CRI score	Death toll	Deaths per 100 000 inhabitants	Total losses in million US\$ PPP	Losses per unit GDP in %	Number of events (total 1996–2015)
1 (1)	Honduras	11.33	301.90	4.36	568.04	2.100	61
2 (2)	Myanmar	14.17	7 145.85	14.71	1 300.74	0.737	41
3 (3)	Haiti	18.17	253.25	2.71	221.92	1.486	63
4 (4)	Nicaragua	19.17	162.90	2.94	234.79	1.197	44
5 (4)	Philippines	21.33	861.55	1.00	2 761.53	0.628	283
6 (6)	Bangladesh	25.00	679.05	0.48	2 283.38	0.732	185
7 (8)	Pakistan	30.50	504.75	0.32	3 823.17	0.647	133
8 (7)	Vietnam	31.33	339.75	0.41	2 119.37	0.621	206
9 (10)	Guatemala	33.83	97.25	0.75	401.54	0.467	75
10 (9)	Thailand	34.83	140.00	0.22	7 574.62	1.004	136

Source: German Watch

2. 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 increasing becoming visible day-by-day over Pakistan. According to the report, Pakistan had to face loss of US \$ 6 billion because of the climate change in the year 2012. Pakistan now requires an investment of US \$ 8 billion for curtailing emission of gases from green house by 15 percent.

3. 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 Pukhtunkhawa 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 is more than that of the Bay of Bengal. Occurrence of Phet, Nilofer, Ashoba cyclones is a clear manifestation of this research outcome.

4. 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.

5. Pakistan is a small GHG emitter with total GHG emissions amount to 379 million tonnes of Carbon Dioxide (CO₂) equivalent and is placed at 132nd 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.

II. IMPACTS OF CLIMATE CHANGE ON PAKISTAN:

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 coastal cyclonic activity.
- 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 flood like that of 2010 hits the country again, it will cause an annual economic impact of US\$ 15.5 million, 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 faced 24 major flood events (i.e., every three years there is a big flood) causing an estimated loss to the tune of US\$ 38.053 billion with US\$ 19.040 billion loss occurred during the last seven (7) years since 2010 floods.

III. CLIMATE THREATS, COUNTRIES MOST AT RISK:

- 6. The rate of global climate change is projected to be more rapid than any to have occurred in the last 10,000 years. Humans have altered the structure of many of the world's ecosystems. They have cut down forests, plowed soils, used rangelands to

graze their domesticated animals, introduced non-native species to many regions and intensively fished lakes, rivers and oceans. These relative changes in the structure of the world's ecosystems have made them less resilient to automatically adapt to climate change. Moreover, pollution, as well as other indirect effects of the utilization of natural resources, has also increased since the beginning of the industrial revolution.

7. Developing countries are the least responsible for climate change: The world's least developed countries contribute only 10 percent of annual global carbon dioxide emissions. However, the geographical location and socio-economic fragility of most of the developing countries make them more vulnerable to the environmental, social and economic ramifications of climate change and the lack of resources and capabilities to adapt to the changes will worsen the situation.

8. Moreover, people who live in poverty around the world will be hardest hit by climate change. This is because the poor are more dependent on natural resources and have less of an ability to adapt to a changing climate. Table 2 below shows the list of top 12 countries which are mostly at risk from climate-related threats:-

Table-2
Five Climate Threats, and the 12 Countries Most at Risk

Drought	Flood	Storm	Coastal 1m	Agriculture
Malawi	Bangladesh	Philippines	All low-lying Island states	Sudan
Ethiopia	China	Bangladesh	Vietnam	Senegal
Zimbabwe	India	Madagascar	Egypt	Zimbabwe
India	Cambodia	Vietnam	Tunisia	Mali
Mozambique	Mozambique	Moldova	Indonesia	Zambia
Niger	Laos	Mongolia	Mauritania	Morocco
Mauritania	Pakistan	Haiti	China	Niger
Eritrea	Sri Lanka	Samoa	Mexico	India
Sudan	Thailand	Tonga	Myanmar	Malawi
Chad	Vietnam	China	Bangladesh	Algeria
Kenya	Benin	Honduras	Senegal	Ethiopia
Iran	Rwanda	Fiji	Libya	Pakistan

Source: World Bank

IV. PAKISTAN- FLOODS MAJOR DISASTER:

9. In recent years, Pakistan has witnessed the vagaries of climate change with growing regularity and destructive ferocity. Droughts, desertification, glacial melt, sea-level rise and recurrent floods are all manifestations of climate-induced phenomena. The frequency of occurrence of floods has increased during the past several years due to global warming and rapid climate change. The overall flood damages during the past 7 years are almost equal to the past 60 years in the country. Table-3 depicts this reality .Besides the tragic human and material costs, these threats also impede our ability to promote sustainable growth and development, and to ensure economic prosperity for our people.

Table-3

HISTORICAL FLOOD EVENTS EXPERIENCED IN PAKISTAN

Sr. No.	Year	Direct losses (US\$ million) @ 1US\$= PKR 86	Lost lives (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

Sr. No.	Year	Direct losses (US\$ million) @ 1US\$= PKR 86	Lost lives (No)	Affected villages (No)	Flooded area (Sq-km)
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\$= PKR 100.89	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	45	-
Total		38,171	12,330	197,275	616,598

* Economic Survey of Pakistan 2011-12

** NDMA (<http://www.claimsjournal.com/news/international/2012/10/05/214891.htm>)

^ Thomson Reuters Foundation ([http://www.trust.org/item/20130909134725-rm708/j\(Agriculture_sector\)](http://www.trust.org/item/20130909134725-rm708/j(Agriculture_sector)))

^^ Economic Survey of Pakistan (2014-15)

Based on PIDs & FLA's interim reports related to irrigation, drainage & flood protection infrastructure only

• FFC's Annual Flood Report-2016

10. 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. The National Climate Change Policy and its Framework for Implementation for the period 2014-2030 serve to integrate climate-friendly policies in our national economic and development planning.

11. Pakistan's mitigation measures cover all sectors of the economy. In the energy sector, for example, renewable energy sources were being developed to increase the share of nuclear and hydroelectric power to reduce carbon emissions. More than 2000 MW of wind electricity will come on line next year. A 10,000-acre Solar Park will generate 1000 MW, and will be one of the biggest solar power projects in the world. To offset carbon emissions in the transport sector, mass transit systems have been operationalized in two metropolitan cities of Pakistan.

12. Availability of adequate finance is at the core of the battle to confront the adverse impacts of climate change. Pakistan requires up to US\$14 billion annually to undertake adaptation measures to climate change impacts. There must be full consideration to specific needs and special circumstances of developing countries, especially those, like

Pakistan, which are extremely vulnerable to climate change. Further there is a dire need for transfer of affordable technology to developing countries, along with capacity building, and above all to incorporate an effective “Loss and Damage” mechanism.

V. PLANNING TO MITIGATE FLOOD DAMAGES CAUSED DUE TO CLIMATE CHANGE IN PAKISTAN:

13. With a view to combat hydro-meteorological disasters with focused and integrated approach at national level, Government of Pakistan in 1977 established Federal Flood Commission (FFC). Since its establishment in 1977, FFC/Ministry of Water & Power (now Ministry of Water Resources) has prepared and implemented three National Flood Protection Plans {NFPP-I (1978-88), NFPP-II (1988-98) & NFPP-III (1998-08)} during the past 40 years. Floods of 2010 followed by subsequent flood events during 2011 & 2012 warranted for preparation of Fourth National Flood Protection Plan (NFPP-IV) through nation-wide comprehensive and integrated & consultative planning process. 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.

14. For a cogent, well thought out and long term integrated plan requirements, National Flood Protection Plan-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.

15. 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 (2018 to 2022), whereas

Priority-II works costing Rs. 154.585 billion to be executed during next 5 years (2023 to 2027). Table-4 below depicts the details.

Table-4

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

Description		Cost in Million Rupees				
		Phase-I 1 st 5- Years	Phase-II 2 nd 5- Years	Total Ph.-I + Ph.-II	Local C. Cost	Foreign Ex. Cost
I. Structural 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 & Proper Maintenance of Drainage System 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 Flood Fighting Equipment & Machinery under PIDs.	5,000	-	5,000	5,000	-
Sub-Total (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

Description	Cost in Million Rupees				
	Phase-I 1 st 5- Years	Phase-II 2 nd 5- Years	Total Ph.-I + Ph.-II	Local C. Cost	Foreign Ex. Cost
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

VI. EFFECTIVE FLOOD MANAGEMENT-THROUGH LOSS & DAMAGE MECHANISM:

Approximately US\$ 3.00 billion would require during the next 10 years for the implementation of entire plan activities comprising structural as well as non structural interventions.

The implementations will result into following major benefits on ground in qualitative terms:

- Reduction of flood losses in an economically sound manner;
- Protection of cities and vital infrastructural installations;
- Strengthening of existing flood forecasting and warning facilities from immediate term to longer term flood forecasting;
- Integrated management of coastal floods, GLOFs and wetlands across the country;
- Enhancement in flood forecasting capacity in future at the national and hence at the regional level;
- Preparation and enforcement of flood plain legislation/regulation to avoid encroachments, reduction in relief and response spending;

- g) Development of watershed management in the uplands of major rivers and hill torrents areas ensuring revival of bio-diversity, national habitat etc;
- h) Drought management in the drought hit areas of Pakistan;
- i) Improved and quality enhanced civic life through improvements in the existing storm drainage system of urban areas;
- j) Precise and real time rain and river gauging by up-gradation/strengthening of rain and river gauging network; and
- k) Much desired Capacity building and institutional strengthening of related institutions (Federal, Provincial, Academic, Civil Society, Local Communities, Private Sector etc.)

In quantitative terms following major benefits are expected:

a) Protection of lands from erosion	779,250 hectares
b) Reclamation of eroded land	154,180 hectares
c) Protection of area from inundations	2,479,555 hectares
d) Flood water harvesting	4 Ramsar Sites

VII. RECOMMENDATIONS:

16. Foregoing in view, an effective implementation of Warsaw International Mechanism on Loss & Damage can be achieved through the inclusion of some of the priority interventions of NFPP-IV (if not all) for implementation under the Five-Year Rolling Work Plan of the Executive Committee of the Warsaw International Mechanism on Loss & Damage.

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**GOVERNMENT OF PAKISTAN
MINISTRY OF WATER RESOURCES
OFFICE OF THE CHIEF ENGINEERING ADVISOR &
CHAIRMAN FEDERAL FLOOD COMMISSION**

**CONCEPT NOTE ON ACTION TO ADDRESS LOSS AND DAMAGE
CAUSED DUE TO CLIMATE CHANGE IN PAKISTAN**

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