FLOOD 2022 in Sindh



Provincial Disaster Management Authority Rehabilitation Department Government of Sindh

Flood 2022 in Sindh from June 20, 2022 to March 31, 2023

PREPARED BY



PROVINCIAL DISASTER MANAGEMENT AUTHORITY - SINDH (PDMA - Sindh)

Contents

Preamble	01
 Chapter 1: Monsoon 2022 Seasonal Forecast Monsoon 2022: Sindh June July August September 	02 03 04 05 06 07 08
Chapter 2: Losses and Damages	10
 Deaths and Injuries Population Affected Crop and Household Infrastructure 	11 13 15 17
Chapter 3: Relief Distribution	18
 Shelter Food and Security Household Items Machinery 	19 21 23 25
Lesson Learned	27
Conclusion	28

Preamble:

Monsoon rains in South Asia are major source of fresh water in the region. Rains fill surface water reserves and recharge aquifers to sustain life and livelihood. At times, abundance and above normal rainfall bring floods and devastation in different parts of the region. This year due to unusual pattern of monsoon, southern Pakistan received large volumes waters due to connective and reoccurring spells of monsoon rains. Sindh, Balochistan and southern Punjab severely impacted due to compound effects of riverine, flash and urban floods. Sindh recorded 426% above normal rainfall during the season (July-September). Rainfall in other provinces remained +450%, +70%, +33%, +104% in Balochistan, Punjab, Khyber Pakhtunkhwa and Gilgit Baltistan respectively.

In July 2022, southern and middle Sindh received heavy rains which caused flooding in urban settings specially in Karachi and Hyderabad. Large scale dewatering operations were conducted to remove accumulated water from low lying areas. PDMA provided man and material resources to District Disaster Management Authorities and other stakeholders for conducting dewatering operations. Till the end of July, situation remained under control except some parts of southern and coastal districts of the province. However, rains in July saturated the percolation capacity of the soils which complicated the situation in upcoming spells.

The connected and consecutive heavy rain spells during August coupled the medium flood in Indus (11th to 27th) worsen the landscape. Losses and damages exponentially increased to millions and thousands of families displaced due to damaged houses and inundation in and around settlements. The emergency was declared in 24 out of 30 districts of the province and large rescue and recovery operation with assistance of relevant stakeholders were initiated. The major challenge for PDMA was to provide relief to displaced population in almost entire province. As large population of 3 provinces disturbed simultaneously, therefore demand and supply chain of relief goods specially shelters was disturbed and hampered relief operation which further intricated due to damaged communication infrastructure.

Rains were over till the end of August but domino effects of rain remained dominant during September. Large volumes of water entered in Sindh from Balochistan and smashed the infrastructure and caused havoc in left bank districts of Sindh including Kambar, Larkano, Dadu and Jamshoro. Right bank was inundated due to breaches / overflow in LBOD and irrigation network. Presence of over capacity water overloaded drainage and irrigation network which is the only safe route for dewatering from crop fields and settled areas. Presence of stagnant water over vast lands of the province disturbed life and livelihood of thousands of people and families.

During entire event, PDMA played active and untiring role. All efforts were made to bring life to normal in shortest possible time. National and international forums were approached by PDMA to bring ease in life of people of the province. 941,538 shelters, 2,553,421 ration bags (food) and other major necessities were provided to affected people for early recovery. Joint damage assessment survey was completed and Government of Sindh initiated rehabilitation phase to reduce the sufferings of affected population.

Chapter 1

Monsoon 2022

According to Pakistan Meteorological Department (PMD), Pakistan has experienced one of its wettest monsoon season this year since 1961. Continuous, torrential rain caused heavy flash flood in Eastern and Southern Balochistan, Sindh, Southwest Punjab and Khyber Pakhtunkhwa. The Sindh Province was not only impacted by rains but also due to flash floods caused by heavy rain in mountains (Kirthar and Suleman Range) lying along the border of Sindh and Balochistan.



Heaviest monsoon season rainfall records from the past

Seasonal Forecast

Pakistan Meteorological Department (PMD) informed in its seasonal forecast report, that due to weak La-Niña conditions and negative phase of Indian Ocean Dipole (IOD) above normal rains were expected in the region. According to the outlook issued, following were the likelihoods for this monsoon season (July- September):

- Above Normal rainfall expected over Sindh and Punjab
- Slightly above normal rainfall in the remaining parts of the country
- First phase (1st July to mid-August) of monsoon is expected to be wet as compared to the last phase (mid-August to end of September).

In a consensus, issued in SASCOF-22* there was strong agreement among the experts that La-Niña conditions are likely to be favorable for normal to above normal southwest monsoon rainfall over parts of South Asia.

Based on the seasonal forecasts as mentioned, PDMA Sindh issued alerts to relevant departments for necessary preparation in view of likely impacts.



Monsoon 2022- Sindh

Onset of monsoon in Sindh was observed earlier from normal i.e., 1st July. First rains in Sindh occurred on 29, 30 June. This season brought one of the heaviest rains in Sindh causing overflows and inundations in 24 of 30 districts.



June

Pre-Monsoon rains started in Sindh Province from 20th June and lasted till 23rd June 2022. The rains mainly occurred in northern and southern districts i.e. Jacobabad, Larkana, Sukkur in the North and Karachi and Tharparkar in the South.





Cloud formation over northern and southern regions of Sindh on 20th June, 2022 03:00 UTC

These lighter rains lasted in end of June and normalized the high temperatures.

The heaviest rainfall recorded in one day was:

82mm at Sukkur on 20th June, 2022

July

Three main spells were received in Sindh during the month of July as a result of seasonal low over West Balochistan and Iran along with moist currents from Arabian Sea and Bay of Bengal. Heavy rains were recorded in Sindh, Balochistan and parts of Khyber Pakhtunkhwa and South Punjab.

Wet Spells 03 • 5th - 8th • 13th - 16th • 20th - 27th Rainfall Departure Dense rain bearing clouds entering Sindh from the sea 307% 5th July, 2022 13:00 UTC above normal Highest Rainfall 584.8 535 462 348. 665

Impacts

Heavy rain caused urban flooding in low lying areas of all the major cities i.e. Karachi, Hyderabad, Sukkur, Larkana. Karachi being metropolitan city with low or insufficient storm drainage was mostly affected during these spells.



August

Four monsoon lows were developed in August, two of them resulted in significant rain spells. Presence of depression in south of Sindh resulted in formation of huge cloud mass over entire province.



Impacts

The earlier spells saturated soil permeability and rainfall during August resulted in runoff or stagnated in low lying areas. Most of damages, losses and displacement of people occurred during these spells. Additionally, huge quantum of water from Balochistan province overloaded the drainage and irrigation networks of the province which developed domino effects and resulted in breaching / overflowing of the systems on right bank of Indus.

September

September remained relatively calm. Four spells occurred over the the country. Out of 4 spells, one affected South eastern Sindh.





Impacts

Despite September's lower-than-average rainfall, large tract of land on right bank of Indus was inundated due to breaches in Manchar and other drainage system. Situation in Dadu, Kamber and Jamshoro districts was further aggravated by breaches / overflowing of water in irrigation and drainage channels. Balochistan saw 450% more rain than usual.

Areal Extent of Flood Water



Consecutive and continuous heavy rain spells flooded almost entire populated area of the province. Map shows flood inundation as of August 28, 2022. As a result, homes in millions were damaged leaving thousands of families dispersed in camps and other safe places. A large number of livestock was lost in addition to crop loss in millions. Secondary problems like malaria, cholera, diarrhea, dengue, and other infectious diseases were raised due to abundance of water around human settlements.

Losses and Damages

Initial data on losses and damages was collected through DDMA's for estimation and organization to disaster response. Synoptic state of losses and damages is presented below;





Deaths and Injuries

Segregation of deaths and injuries and district-wise distribution remained as;



Livestock

Livestock plays important role particularly in rural economy. It is does not only support local consumption of diary and meat but also large number of population depends on livestock business. Sindh. Loss of livestock results in loss of survival and livelihood for population engaged in this business. A large number of livestock losses were reported. Details are;

Most Affected Districts

Khairpur	222	60	34,373
Shikarpur	111	124	7,802
N. Feroze	96	61	36,588





		Human D	eaths	Injuries	Animal Deaths
					\langle / \rangle
ĺ	Larkana	•••••	71	7,207	25,451
Ja	Kamber Shahdadkot	•••••	52	161	26,568
rkaı	Kashmore	•••	31	-	24,201
La	Shikarpur	••••••	111	124	7,802
Į	Jacobabad	••••	38	35	15,680
ĺ	Hyderabad	•	13	01	4,735
	Jamshoro	••••	50	26	17,169
	Dadu	•••••	61	-	57,569
bad	Tando Allahyar	••	20	-	2,635
lera	Tando M. Khan	•	07	-	2,603
Hyo	Badin	••••	41	03	23,433
	Matiari	••	16	104	6,788
	Thatta	•	13	22	7,833
Į	Sujawal	•	05	02	7.677
-	Sukkur	••••	39	19	12.011
ikku	Khairpur	••••••	222	60	34.373
SL	Ghotki	••	20	16	32.616
ĺ	Shaheed Benazirabad	•••••	67	05	32.737
SBA	N. Feroze	•••••••	96	61	36.588
	Sanghar	••	22	15	31.899
has	Mirpurkhas	••	14	14	7.211
urkl	Umerkot	•	10	02	10 722
Mirp	Tharparkar	•	08	10	2,306
<	Karachi	••••••	66	525	5 828
	i (di dolli		00	000	5,020

Affected and Displaced Population:

Rains along with cumulative effect of water flowing in Sindh occurred in most populated lands of Sindh. The main agrarian belt also lie in same plains therefore, rains and accompanied floods resulted in large scale suffering for population. Population in millions were affected and displaced to safer places due to unlivable conditions in native residences. Details are;



Most Affected Districts

	S Z	
Khairpur	1,265,477	1,218,177
Larkana	1,217,428	1,071,333
Sanghar	1,292,603	315,444
Mirpurkhas	925,880	472,168
Kamber Shahdadkot	890,891	390,245





Affected Population









			~ /		
	Larkana	************* *****	1,217,428 79.1%	1,071,333	
Ja	Kamber Shahdadkot	************* ****	890,891 66.8%	390,245	
rkar	Kashmore	************** ***	679,756 69.5%	311,262	
La	Shikarpur	** *****	400,000 32.40%	120,000	
	Jacobabad	**** ***	545,230 54.9%	256,584	
	Hyderabad	* ******	30,240 1.42%	33,700	
	Jamshoro	***** *****	382,295 38.04%	263,286	
	Dadu	************* * * ******	849,380 57.4%	804,271	
ıbaa	Tando Allahyar	* *******	126,511 14.4%	36,700	
dera	Tando M. Khan	* *******	63,081 8.94%	15,500	
Hy	Badin	* ******	277,502 16.1%	32,278	
	Matiari	** ******	250,000 34.7%	51,000	
	Thatta	*** ******	227,156 23.5%	198,547	
	Sujawal	*** *	154,000 19.5%	142,196	
ur	Sukkur	***** ******	393,810 27.8%	376,109	
ukkı	Khairpur	********* * * *****	1,265,477 51.9%	1,218,177	
S	Ghotki	********* * * *****	907,059 54.6%	86,590	
T	Shaheed Benazirabad	****** ***	580,989 34.8%	389,529	
SB/	N. Feroze	*** *****	234,168 14.2%	221,001	
	Sanghar	*********** ****	1,292,603 60.8%	315,444	
thas	Mirpurkhas	፟፟፟፟፟፟፟፟፟፟ጞ፟፟፟፟፟ጞ፞ጞ፞ዂ፞ዂ፞ዂ፞ዂ፞ዂ፞ዂ፞ዂ፞ዂ፞ዂ፞ዂ፞	925,880 62.0%	472,168	
burk	Umerkot	******** ***	557,280 50.2%	557,280	
Mir	Tharparkar	* *******	88,987 5.4%	19,315	
	Karachi	<u>****************</u>	17,137 0.003%	508	

Crop Damaged:

Flood 2022, caused by monsoon rains triple the usual severity, wiped out huge track of crops, leaving already poverty-stricken families struggling to obtain food.

Sindh faced an unprecedented food security crisis due to devastating effects of flood. The aggregated 11% of crops , 42% rice, 23% cotton and 31% of sugarcane productions were damaged. The breakdown of crops damages are as follows;



Houses Damaged:

More than million of homes were damaged. Around a half million of displaced population remained in organized camps and tent cities. The total of 1,610,826 houses are damaged breaking up in partially and totally damaged houses.

Most Affected Districts

Khairpur	356,582	54,820	224,346
Larkana	157,323	30,455	102,163
N. Feroze	251,875	43,688	105,110





		Crop	s	Partial House	Full House
ſ	/ Larkana		157,323	30.455	102.163
kana	Kamber Shahdadkot		194,327 24 61%	29.478	118.132
	Kashmore		159,731 35.06%	32,027	44,540
Lar	Shikarpur		153,623 29.96%	19,047	72,212
Į	Jacobabad		255,678 44.77%	24,073	89,784
ĺ	Hyderabad		61,465 35.67%	11,119	9,069
	Jamshoro		25,527 6.29%	18,460	43,290
	Dadu		97,330 09.85%	34,714	133,295
ibao	Tando Allahyar		114,906 33.93%	9,555	20,597
dera	Tando M. Khan		145,781 37.70%	9,628	18,801
Ę	Badin		226,044 17.65%	49,125	62,124
	Matiari		140,833 44.08%	20,043	26,662
	Thatta		47,682 7.66%	13,084	11,684
Į	Sujawal		86,670 14.14%	27,168	25,531
ur (Sukkur		133,900 32.06%	32,958	51,334
ukk	Khairpur		356,582 42.61%	54,820	224,346
ပါ	Ghotki		346,863 47.03%	32,668	52,152
- [Shaheed Benazirabad		248,773 33.52%	41,588	72,791
SB	N. Feroze		251,875 44.80%	43,688	105,110
	Sanghar		310,039 27.79%	39,443	66,464
khas	Mirpurkhas		169,353 27.98%	36,516	49,943
und.	Umerkot		88,885 11.43%	36,811	31,797
Mir	Tharparkar		4,082 0.19%	3,786	5,056
	Karachi	****	-	18	37

Infrastructure Damaged

The Flood 2022 is an eye opener and it is right time to implement disaster risk reduction in development planning. If business is continued as usual, event of such scale will bring damages to civil infrastructure in billions on occurrence of each event. Proper infrastructure planning is required prior to any of the constructions. Reported infrastructure damages are given as;

UC's Affected	1,330
Roads Affected	8,463
Causeway Affected	2,125
Bridges Affected	165

	UC's	Roads (km)	Causeway (Rft)	Bridges
	Affected	Affected	Affected	Affected
Larkana	260	1,078	-	05
Hyderabad	487	3,221	1,375	122
Sukkur	221	1,055	-	03
Shaheed Benazirabad	201	1,965	-	27
Mirpurkhas	95	1,136	-	06
Karachi	66	08	750	02
	1 220	9 162	2 1 2 5	165
lotal	1,330	0,403	2,123	103

Chapter 3

Relief Activities

The flood 2022 is one of its kind disaster in known history of the province. The devastation was compounded by mixed effects of rain, riverine flood and flash floods from hills torrents. 23 out 30 districts of the province were simultaneously paralyzed and organization and management of such a large scale response was a challenge for Provincial Disaster Management Authority. The situation was further complicated by unavailability of relief goods in required quantity, damaged roads and links, law and order situation and at some extent relief snatching incidents. However, even in presence of all difficulties, PDMA extended its 24/7 support in disaster response. Details of initial relief and response are;



Shelter:

During flood emergency in Sindh, thousands of families were shelter-less on roadsides or on elevated places around their villages waiting for tents as the number of villages were severely disturbed by floods.

PDMA provided tents for shelter to the displaced families in flood-affected areas of Sindh Province. Shelters were provided to 7.3 million displaced / homeless people. With average family size comprising of 6 people about 1.2 million persons were facilitated through shelters and establishment of 2992 relief camps by DDMAs. In addition to tents, tarpaulins, mosquito nets, animal mosquito net, jerry cans, bed sheets, pillows and kitchen sets were provided to flood affectees.

Tents	941,538
Tarpuline Sheets	622,070
Mosquito Nets	3,976,600
Animal Mosq. Nets	91,654

Most Recipient

		·/	*	×
Kamber Shahdadkot	175,597	85,042	264,434	900
Larkana	83,442	70,332	396,950	11,798
Khairpur	96,613	68,785	358,266	9,851

Major Contributors

	$\langle \rangle$	•/	*	×
PDMA	711,560	506,071	2,372,920	91,654
NDMA (ARMY)	191,398	46,333	1,567,232	-
UNHCR	14,793	53,956	4,000	-





		Tents	Tarpaulin	Mosquito Nets	Animal Nets
ſ	Larkana	83,442	70,332	396,950	11,798
kana	Kamber Shahdadkot	175,597	85,042	264,434	900
	Kashmore	10,801	6,579	133,795	-
La	Shikarpur	20,339	12,500	192,948	800
Ĺ	Jacobabad	55,801	18,443	199,444	16,800
Í	Hyderabad	8,984	6,100	162,925	-
	Jamshoro	55,297	23,063	204,092	1,386
_	Dadu	81,828	60,646	253,954	11,117
abac	Tando Allahyar	16,411	8,600	57,700	9,944
dera	Tando M. Khan	8,756	9,050	77,500	800
Ę	Badin	23,210	22,701	153,726	-
	Matiari	17,619	15,655	145,907	451
	Thatta	22,190	16,500	138,055	800
Ĺ	Sujawal	19,728	13,800	99,465	800
ъ	Sukkur	39,154	30,036	118,547	-
lukk	Khairpur	96,613	68,785	358,266	9,851
νĺ	Ghotki	12,318	4,500	58,500	-
_ (Shaheed Benazirabad	50,111	41,918	146,235	-
SB	N. Feroze	62,662	50,750	269,039	1,251
	Sanghar	28,379	25,200	209,905	16,702
khas	Mirpurkhas	28,284	14,777	239,357	4,000
bur	Umerkot	8,326	9,300	65,690	4,254
Mir	Tharparkar	11,603	7,750	23,450	-
	Karachi	1911	-	500	-

Food & Security

During disaster and emergencies survival of people is utmost important. For survival, supply of food and clean drinking water matters the most. During initial phase of disaster PDMA provided / arranged cooked food to families and over the time supplied ration bags to flood victims. Items in ration bags with essential commodities were sufficient for an average family for 15 days. For safe drinking water, families were provided drinking water bottles during initial phase and afterwards PDMA arranged portable water treatment plants for uninterruptible supply for safe water to families.

Jerry Cans

Aug - Mar

2,553,421
112,075
812,773

Most Recipient

Jamshoro	97,996	12,850	173,335
Dadu	260,295	14,564	76,922
Khairpur	170,330	13,434	-

Major Contributors

PDMA	1,908,706	62,527	200,217
UN-WFP	347,293	-	-
District Admin	155,320	-	-





Ration Bags





		Ration Bags	Jerry Cans	Water (Litres)
ſ	/ Larkana	194.029	8.787	<u> </u>
a	Kamber Shahdadkot	233.187	12.154	12.404
kan	Kashmore	43.823	600	-
Lar	Shikarpur	90.677	400	-
Į	Jacobabad	156.042	4.520	79.995
ſ	Hyderabad	79,625	1,000	-
	Jamshoro	100,759	12,850	173,335
	Dadu	268,545	14,564	76,922
bad	Tando Allahyar	37,950	500	-
dera	Tando M. Khan	24,160	2,200	-
Hyd	Badin	104,914	400	10,240
	Matiari	65,130	5,178	2,815
	Thatta	64,010	800	-
Į	Sujawal	83,231	4,942	-
5	Sukkur	120,020	6,850	20,691
nkki	Khairpur	180,530	13,434	-
S (Ghotki	23,500	1,890	-
_ (Shaheed Benazirabad	186,080	8,008	72,550
SBA	N. Feroze	159,025	5,510	-
ļ	Sanghar	140,284	858	-
thas	Mirpurkhas	141,981	4,318	-
purk	Umerkot	44,079	1,600	-
Mir	Tharparkar	17,000	500	-
	Karachi	-	212	4981

Household

Other than ration bags and clean drinking water families were provided essential household items like pillows and bed sheets. Though flood occurred in summer season but PDMA was aware that, water recession will take time and effects of water will continue till winter, therefore, PDMA planned procurement of warm blankets for flood affectees well in advance. Before the the occurrence of winter, affected population was facilitated with blankets to avoid effects for cold weather.



Most Recipient

		ik)	
Kamber Shahdadkot	3,500	635	157,980
Naushahro	400	885	139,000
Khairpur	855	1,425	147,930

Major Contributors







		Bedsheets	Pillows	Blankets
ſ	Larkana	400	885	139,000
a	Kamber Shahdadkot	3,500	635	162,980
rkar	Kashmore	200	200	14,300
La	Shikarpur	-	-	138,000
l	Jacobabad	-	159	147,775
ſ	, Hyderabad	-	-	-
	Jamshoro	3,500	635	81,200
	Dadu	-	485	163,551
abac	Tando Allahyar	-	124	41,000
dera	Tando M. Khan	1,500	1,500	16,000
Ę	Badin	-	159	24,640
	Matiari	1,500	2,075	38,000
	Thatta	-	159	30,000
l	Sujawal	500	624	50,000
5	Sukkur	500	500	132,345
ukk	Khairpur	855	1,425	163,920
ς	Ghotki	1,050	139	53,750
- (Shaheed Benazirabad	-	-	72,000
SB/	N. Feroze	500	1,135	167,750
	Sanghar	-	276	70,000
khas	Mirpurkhas	-	159	70,000
purt	Umerkot	-	-	55,000
Mir	Tharparkar	-	-	5,000
	Karachi	-	-	-

Machinery

Low gradients coupled with human interactions have made poor drainage system in the province. Most the times water suction is required to dewater from settled areas. During each rainy season, PDMA provide portable machinery to concerned quarters for removal of stagnant water from low lying areas. This year water suction pumps of variable sized and capacities were provided to DDMAs and other authorities for removal of water.

Truck Dewatering Pump	113
Small Dewatering Pump	175
RO Plant	28

Most Recipient

	÷.	, Ī	
Khairpur	20	10	01
Larkana	11	18	09
Matiari	11	07	01

Major Contributors

	(È	,Ī	
PDMA	113	85	-
NDMA	-	90	-



Truck Dewatering Pump



Small Dewatering Pump





	Truck Mounted	Small Dewatering Pump	RO Plants
Larkana	11	18	09
Kamber Shahdadkot	04	03	02
Kashmore	02	02	-
Shikarpur	01	04	-
Jacobabad	03	06	-
Hyderabad	08	06	-
Jamshoro	05	02	03
Dadu	02	04	01
Tando Allahyar	02	15	-
Tando M. Khan	02	12	-
Badin	06	18	01
Matiari	11	07	01
Thatta	03	04	-
Sujawal	06	04	-
Sukkur	14	-	-
Khairpur	20	10	01
Ghotki	03	03	-
Shaheed Benazirabad	-	06	06
N. Feroze	-	07	01
Sanghar	03	10	01
Mirpurkhas	10	04	02
Umerkot	-	06	-
Tharparkar	-	-	-
Karachi	-	19	-
	Larkana Kamber Shahdadkot Kashmore Shikarpur Jacobabad Hyderabad Jamshoro Dadu Tando Allahyar Tando Allahyar Tando M. Khan Badin Badin Matiari Thatta Sujawal Sujawal Sukkur Khairpur Ghotki Shaheed Benazirabad N. Feroze Sanghar Mirpurkhas Umerkot	Larkana11Kamber Shahdadkot04Kashmore02Shikarpur01Jacobabad03Hyderabad08Jamshoro05Dadu02Tando Allahyar02Tando M. Khan02Badin06Matiari11Thatta03Sujawal06Sukkur14Khairpur20Ghotki03Shaheed Benazirabad-N. Feroze-Sanghar03Mirpurkhas10Umerkot-Tharparkar-Karachi-	Truck MountedSmall DewateringPumpPumpPumpPumpPumpRamber Shahdadkot0403Kashmore0202Shikarpur0104Jacobabad0306Hyderabad0806Jamshoro0502Dadu0204Tando Allahyar0215Tando M. Khan0212Badin0618Matiari1107Thatta0304Sujawal0606N. Feroze-07Sanghar0310Mirpurkhas1004Umerkot-06TharparkarKarachi-19

Lesson Learned

Good Practices Established:

- In follow-up of PMD Advisory, proactive approach was exercised by deploying truckmounted and ground standing dewatering pumps along with trained manpower at vulnerable points well before each rain spell in major cities.
- Despite damaged and inundated road structure, Relief & Rescue equipment was mobilized effectively and timely.
- Thousands of lives saved through timely evacuation.
- Digital relief distribution system was put in place for tracking and monitoring of relief activities.
- Business intelligence tools were put in place for data collection, analysis and visualization and portals developed for information sharing.
- Satellite imagery and GIS databases were extensively used for situational awareness, initial damage assessment and monitoring of flood inundation.

Weakness Observed:

- Estimated caseload (i.e. 62,496 households) on the basis of expected 20- 25% above normal rains was far low from the actual caseload (i.e. 2,058,349 households).
- Need of Relief and Rescue Equipment / Heavy Machinery was more than the availability which reduced the capacity of PDMA to respond.
- Lack of trained / disaster management qualified human resource observed.
- Security issues were observed during relief activities.
- Due to lack of space / warehouse available at Districts, relief trucks took longer time in unloading.
- High prices of relief items due to shortage of required items in market.
- PDMA had limited management control at district level, due to non-actualization / establishment of DDMAs with separate staff under direct control of PDMA

Conclusion

Flood 2022 in Sindh is a historic event. Record breaking precipitation was observed in most parts of the province. Due to various human and natural causes dewatering process in province is slow. The rain water accumulation was further aggravated due to coincided water flows from Balochistan and flooding in river Indus. Overloaded irrigation and drainage networks breached and dewatering process became more difficult. Cumulative effects caused large tract of most populated lands of the province went under water and the population and livestock in millions and crops in thousands of acres affected. The situation during flood 2010 was much alike but this year both right and left banks of Indus were simultaneously affected hence resulted in large scale human disturbance. Resources of government were stretched to the limits and the international community came to assist the government and its affectees.

Impacts of climate change and changing weather systems and patterns are visible all around the globe. In recent years, record breaking severe weather have had occurred in different parts of the world. This change is likely to continue in one form or other and will manifest in heavy rains, severe weather, heatwaves and alike hazards. Sindh is situated in cross roads of weather and may likely to receive more impacts of climate change. In this scenario, disaster management paradigm of the province needs to be changed. Currently, disaster management in the province is inclined more towards disaster response which should be focused and aligned to disaster risk reduction. Disaster risk reduction can only be achieved when all efforts are directional and cohesive to meet the future challenges. All actors of the society including public sector are required to act and implement disaster risk reduction in development for sustainable growth. All public departments are required to prepare disaster management plans in line with national and provincial plans.

Further, some permanent disaster threats exist in the province, which must be addressed for permanent remedies. The unattended rain water from Balochistan is a permanent threat for the population living on the right bank of the Indus. Similarly, well-planned, eco-friendly and holistic drainage system on the left bank is important for the safe conveyance of excessive water. Roads and other lateral structures require the inclusion of well-studied culverts/bridges to allow flow of water on natural routes. Depression require restoration to natural condition and above all major cities and town should have separate storm water systems. Permanent solution to such problems is only means for meaningful disaster management, otherwise, occurrence of each major event will exhaust government resources as adhoc solutions mostly waste resources.

Provincial Disaster Management Authority, Sindh with its limited resources is trying its best to bring disaster management on contemporary lines and gradually results of initiates taken by the authority will be on surface. However, disaster management requires due role to be played by all actors related to development and disaster management.



