



# Rapid Flood Damage Assessment in Kacchi Plain (Balochistan) and Immediate and Early Recovery Program

With a Focus on Nari Spate Irrigation System

6 September 2022

*version 1*

**Assessment conducted/compiled by:**

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MetaMeta/ Flood Based Livelihoods Network

## AT GLANCE:



**100,000+**

people affected

(Shortage of food, fodder and shelter)



**80,000 ha**

Kharif crop is lost



**(>3000)**

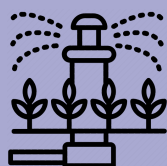
Collapse of houses



Possibility to capture rabi crops on

**140,000 ha**

and restore livelihoods



Need to restore the spate irrigation system in  
lower Nari and rebuild back better



Provide improved drinking water systems and  
village flood protection bunds

# 1. BACKGROUND OF THE AREA

The lowland Kachhi Plains stretches over 8000 km<sup>2</sup> in Balochistan and covers part of the districts of Kachhi/ Bolan, Jhal Magsi and Dera Murad Jamali. The area has been most hard hit by the floods of July-August 2022. This report provides a first overview of the damage and losses in this epicenter of the flood disaster and the activities for urgent recovery. This information and broad assessment is based on communication with contact persons - as the area remains until recently inaccessible. The affected population tops 100,000 persons. This is an area with a highly vulnerable population at best of times, but now badly affected by the climate-change induced events.

In the Kachhi Plain six main rivers (Bolan, Nari, Chakar, Kashuk, Mula, Sukleji) of Balochistan and several smaller streams discharge, all originating from the highlands of the Nari Basin. The accumulated floods especially of the Nari, Bolan, Mula, and Chakar Rivers have inundated large parts of the area: not less than 300,000 hectares was affected.

This has caused major losses of human settlements, agricultural lands, livestock, drinking water resources and heavy damage to the traditional spate irrigation infrastructure. The floods submerged villages (78 in Bhag Tehsil only), agricultural fields (at least 200,000 ha) and spate irrigation canals and broke road connections. Not a single place has been left dry except elevated road embankments where one can take refuge.



Extensive lands inundated kharif crop loss



Local seeds supply partially destroyed



Adobe mud houses partially or totally collapsed



Livelihoods temporarily suspended

In normal years the area is a main grain basket of Balochistan Province irrigated through a network of spate irrigation canal in the area. This system is dependent on moderate seasonal floods (not the catastrophic ones of this year) mainly from the Bolan, Nari, Chakar and Lehri Rivers that enter in the area from the North-West and east and then flow to the south passing Naseerabad and Jaffar Abad District in Balochistan. Finally, the water disperses in Manchar Lake in district Dadu in Sindh Province.

The seasonal water from these otherwise dry rivers is intercepted through earthen diversion bunds (so-called ghandas) and then conveyed through broad flood canals before it is applied on the field to create the moisture for crop cultivation. There are two seasons depending on the timing and availability of these seasonal flood flows: kharif starting June/July with sorghum being the main crop and rabi, starting October, with oilseeds, chickpeas and wheat being the main commodities. Part of the water is stored in earthen reservoirs providing drinking water for both human and livestock, as groundwater in the Kachhi Plains is mostly saline. The system is almost entirely farmer built and farmer managed.

Local farmers have traditionally defined flood water distribution starting from Mithri Weir to downstream Aeri, Haji Shahar, Tuk, Ghazi, Khokhar, Fatwani, Bhand, Musa Wah, Mahram Wah, and Buledi Wah. After the Buledi wah, the Nari floods enter the Jhal Magsi district and are utilized in and around the Landhi and Mirpur villages in Jhal Magsi District. In the year 2012-2016, the Provincial Irrigation department constructed the Mini Barrages at 5 locations (Aeri, Haji Shahr, Ghazi, Tuk, and Khokhar), that substantially improved control on water distribution. The remainder of the lower areas diversions are still earthen and constructed on annual basis by the users collectively. The opportunity to use the seasonal flood water in the Kachhi Plain varies from year to year and also depends on the scouring and condition of the flood channels and the diversion and guide bunds. Several parts of the spate irrigated areas could not be irrigated for the last years, causing considerable hardship and forcing some people to leave the area.

This year Balochistan has received excessive and extended rainfall, several times the normal rainfall of 135 mm per year. From 14 August 2022 onwards in particular, rains were more incessant and generated

heavy floods in all of the rivers mentioned above. The recurring floods have washed away all the highway bridges in Bolan pass which connect the project area with Quetta and Sibi, Jacobabad, and Sukkur which are the main markets for the supply of merchandise and daily needs supplies on a routine basis. The heavy rain in the Kachhi Plain itself caused damage to many of the adobe houses even when they were not flooded. It has also greatly hampered the immediate relief efforts.

Below an overview is given of the damages, losses and the immediate priority needs.

## 2. DAMAGES

### 2.1 Damage to private assets

There are around 120 small to medium villages along both banks of the Nari and Bolan Rivers and the further downstream in Jhal Magsi and Khatan area (in Dera Murad Jamali). Since the large flood in the Nari River was diverted by artificial cuts, no major damage to houses is reported in the upstream part of Bolan/Kacchi/Bolan districts. Recurring rains nevertheless damaged houses, and boundary walls in all villages in District Bolan. Most damages occurred in the villages that are situated on the Bolan Riverside in Tehsil Bhag, with the Rehanzai area receiving a major and extensive impact. Apart from houses property was lost and grain storage for instance was damaged, In the Jalal Khan and Mahra, some houses were already ruined even without floods. Following is the detail of the damaged houses in some of the union councils for which data is available

Union Council	Damaged houses
Jalal Khan	500
Mahram	700
Naushara	840
Chalgri	40
Bala Nari	25

### 2.2 Crop damage

The main kharif crop has been largely lost in the lower Nari area in the reported sections of Kachhi/Bolan, Jhal Magsi and Dera Murad Jamali. The kharif crop consist of sorghum, pulses, and guar beans that are cultivated with the usual moderate seasonal floods in the month of June-July. This year, the entitled land under command of Nari River received the irrigation water well on time and land preparation started. The subsequent rains obstructed sowing particularly in the Lower Nari. As a result only land in the Upper part of the Nari flood system was fully prepared in total some 40,000 acres and in the other areas the Kharif season can be considered as lost. The video below portrays the extent of the damage: <https://thewaterchannel.tv/videos/flood-damage-in-kacchi-plains-balochistan-pakistan-2022/>

### 2.3 Livestock damage

Estimated 1500 sheep and goats and 150 big animals drowned in the floods. The remaining livestock is facing an acute shortage of fodder and hungry for the last weeks and surviving on the thatches from the collapsed rooftops.

## 2.4 Damage to spate irrigation infrastructure

The floods, the inundation and the recession of the water has created a huge impact on the spate irrigation infrastructure by wash-outs and siltation. The scale of the damage may only become apparent once the inundation recedes and the area becomes accessible. The current understanding is as follows:

- The five mini barrages including Mithri Weir are intact and no damage has been reported to the main structures. However, the main earthen canal (i) Pir Sabir Shah and (ii) Pir Tiar Ghazi that was dissected from the Khokhar barrage are silted up.
- The Lulai guide bund upstream of Aeri mini-Barrage is also reported breached or cut by the irrigation department to protect the barrages from high floods. Numbers of cuts were made to the Nari River in the upper reaches near Kulachi village to divert the major flood to the eastern side, the purpose was to protecting the mini barrages.
- Musa Wah and Mahram Wah at are also reported silted up. The diversion gate that is under construction may be damaged too. The further silting of Musa Wah and Mahram Wah risks that these large command area there becomes even more difficult to serve.
- On Bolan River, the Rehanzai irrigation system with its four branch canals (serving 40,000 acres) is also damaged. The main 1.2 km flood diversion bund is washed away. In addition, there are five more earthen-off takes beyond Rehanzai that are also reported ruined. Large numbers of field embankments are also washed away by the floods.
- There are several breach and damages particularly where the natural drains intersect with earthen guide bunds.

## 2.5 Drinking water

In the absence of a functioning water reticulation system domestic water in the area – a long standing problem – domestic water use depends on stored surface water. As estimated, dozens of drinking water reservoirs are either breached, washed away, or filled up with the silt and unwanted trashes carried by the flood.

## 2.6 Roads

Accordingly, sections of links roads and small bridges connecting rural settlements with tehsil are damaged. An estimate 50 km of road sections are damaged and 20 small bridges and culverts are washed away.

## 3. LOSSES

### 3.1 Failed Harvest

The kharif season started promising and all farmers throughout the area arranged seeds and tractor hours on credit. Later at the start of the sowing season rains started again and proper seeding was only possible on 50,000 acres in Bala Nari Area, whereas in the Lower Nari there is no cultivations. As a result, the farmer's incomes will be affected and animal fodder shortage will happen in the winter months. Similarly, nomads coming to this area in search of green fodder for their animals will also suffer in the current season.

### 3.2. Access to Drinking Water

Due to floods, there is no shortage of animal drinking water. The drinking water ponds are still filled with fresh water but transportation of flooded trash and uncontrolled animal intrusion will spoil the drinking water quality in the times to come.



## 4. NEEDS

Below the very immediate needs to address the damaged livelihoods and recover the system with elements of building back better are described. The immediate recovery may make use of the extensive soil moisture left behind after the water is expected to recede.

### 4.1 Immediate Needs (0-8 weeks from now, i.e., before early November 2022)

#### 4.1.1 Food and fodder

There is an urgent relief need for shelter and food, but also fodder.

#### 4.1.2 Seeds

The kharif crops is largely lost. However the inundation is bringing soil moisture to a large area and can be used to grow a rabi crop. Providing seeds to capture the soil moisture and grow a rabi may compensate for the extensive losses that people have suffered.

An area estimated at 500,000 acres will be moist enough to grow a rabi crop, sowing of which should start between end of September and end of October. Of the 500,000 acres, 200,000 acres was under regular cultivation in the last five years, whereas 300,000 acres suffered from drought condition and failure of the spate water to reach. This has caused several people to relocate. It is estimated that 150,000 acres of this land will be cultivated by the landowners/ hereditary tenants, provided they have access to seeds and equipment.

The seeds required for the 350,000 acre based on estimated cropping patterns would be as follows:

<b>Crop (rabi)</b>	<b>Estimated area to be cultivated in acres</b>	<b>Kg seeds/ acre</b>	<b>Total seed requirement in tons</b>
<b>Wheat</b>	70,000	40	2800
<b>Argula</b>	175,000	8	1400
<b>Mustard</b>	35,000	8	280
<b>Chick pea</b>	52,500	40	2100
<b>Coriander</b>	17,500	5	88
<b>Total</b>	350,000		

Of this volume it is estimate that 20-50% may be sourced by existing stocks of farmers – though the flood damage also affected the seed storages. The exact proportion needs to be assessed. Particularly

for farmers who had not been in a position to cultivate a rabi crop for several years providing access to seeds is essential.

#### **4.1.3 Land preparation**

Land preparation is another requirement. It takes a tractor one hour to plough 1.5 acres. This would translate in to 230,000 tractor hours or the availability of 1000 tractors over the period of one month. The local availability of tractors should included in such, as needs to be assessed. A first estimate is that 10-40% of the tractor requirement is available locally.

#### **4.1.4 Livestock vaccination**

The damp conditions that has come with the floods and the lack of fodder has weakened the livestock, making it vulnerable for diseases. There is a need for emergency vaccination. It should be checked whether such is available.

### **4.2 Early Recovery Needs (from week 8-38, before May 2023)**

There are several early recovery needs that may need to be handled soon. Current wisdom is that there is a short continuum from relief to recovery, and that recovery should start as soon as possible - following a rebuilding back better philosophy. As much of these activities should be concluded before May 2023, at the onset of a new agricultural/flood season.

Priorities in early recovery are:

#### **4.2.1 Restore and improve drinking water systems**

As mentioned due to absence of fresh groundwater and functioning water reticulation systems, the population depends on stored surface water. There are quality and reliability issues with these and water supply is often highly problematic in the area, particularly towards the end of the dry period and in the early floods when the storage reservoirs are empty.

An important improvement and emergency investment at this time is the installation of shallow wells, equipped with a bore pipes and a tank in the near vicinity of storage tanks and flood waterways. These shallow wells well capture the water in the small water lenses. The sandy soil will provide a degree of filtering. A single unit can serve 100 people and comes at a cost of USD 500.

At the same the potential for subsurface dams in the waterways (wadi, flood channels) should be investigated. Such subsurface dams are clay or concrete barriers that impede the subsurface flows making it easier to access these with shallow wells.

#### 4.2.2 Support to house reconstruction

Due to either/or the heavy rainfall or the exposure to flood a large number of adobe houses collapsed. The moisture makes the lower part of the houses weak. By encouraging the rebuilding of the collapsed houses with 4-6 layers of bricks from the ground level this risk can be reduced. Families may be encouraged to rebuilt houses with improved design against a financial contribution.

#### 4.2.3 Rehabilitation of the spate irrigation system

Rehabilitation of the spate irrigation system is required – preferably with the introduction of better water control so as to serve a larger area more reliable even under normal conditions.

More detailed assessment is awaited but priorities that are obvious are:

- i. Reconstructing the earthen Rehanzai Dam, repairing damage to its four channels and provide an outlet structure to allow controlled water supply to the downstream area
- ii. Rehabilitation and construction of Lulai Guide Bund to restore the functionality of the mini-barrages
- iii. Construction of Dour with plug and outlet
- iv. Reconstruction of five earthen diversion bunds with tertiary canals beyond Rehanzai to improve water control
- v. Rehabilitation of Musa and Mahram Wah including the completion of the work on the gated outlets and the guide bund and the widening of the flood channels so as to ensure proper distribution of water in the tail section of the Nari spate system
- vi. Repairs to the Sonwa Dam that retains the flood water from the Sharkal branch in the east of the area, whereas the service area is in the West, in particular the reinforcement with stone pitching of the vulnerable sections, to prevent that water will escape eastward
- vii. De-silting of 80 numbers of drinking water ponds
- viii. Repair of field embankments for 50,000 acres' lands
- ix. Construction of 25 road culverts in different sizes to allow proper cross drainage but also guidance of flood water to productive lands following the Green Roads for Water approach
- x. Desilting of sections of a number of flood channels

These works should be co-implemented with the different farming communities.

#### 4.2.4 Village flood protection bunds

The nature of the spate irrigated areas is that over time land rises, as the flood water brings sediments to the fields. In contrast the hamlets do not rise and over time: as a results their position has often become lower than that of the surrounding fields and canals, making them vulnerable to flooding events.

Following the floods of 2019 fifteen village flood protection bunds were constructed in Teshil Bagh, so as to protect the settlement from flood spills. These consist of earthen walls with some brushwood protection. It appears that 12 of these bunds helped to protect the settlements, but three were breached.

As part of recovery it is proposed that more settlements are provided with protection bunds. In Teshil Bagh 40 more of such village protection bunds could be prepared with community involvement.

#### **4.2.5 Improved resilient farming systems**

The farming systems in the lower Nari have evolved over many years and have a high resilience to drought and the special conditions under spate irrigation. At the same time from recent experience under the NEWARBI program of MetaMeta and SPO it is clear that there is scope for improvement and renewal with new varieties (in mung) and new crops even (like chick pea).

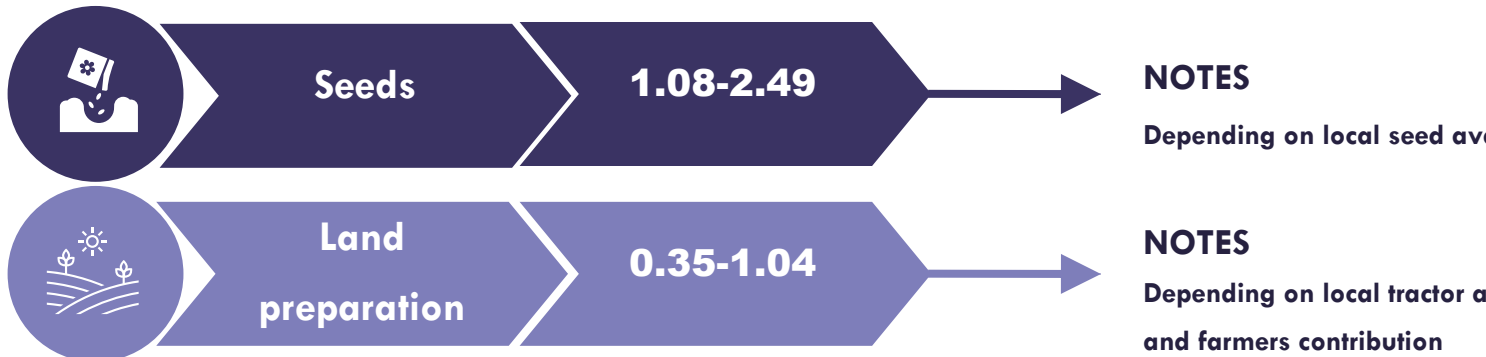
The uncontrolled floods (that also partly occurred in 2019) create the imperative for more resilient and diverse farming systems. Promising practice that may be introduced are improved storage (hermetic bags, improved grain silos), new crops (castor) or farm activities that generate income for women (improved poultry, improved animal fattening).

## 5. COSTS\*

Below is a tentative estimate of costs for the main activities under immediate and early recovery. They are given as bandwidths – with more detailed assessment in the coming days. A more detailed working breakdown is available.

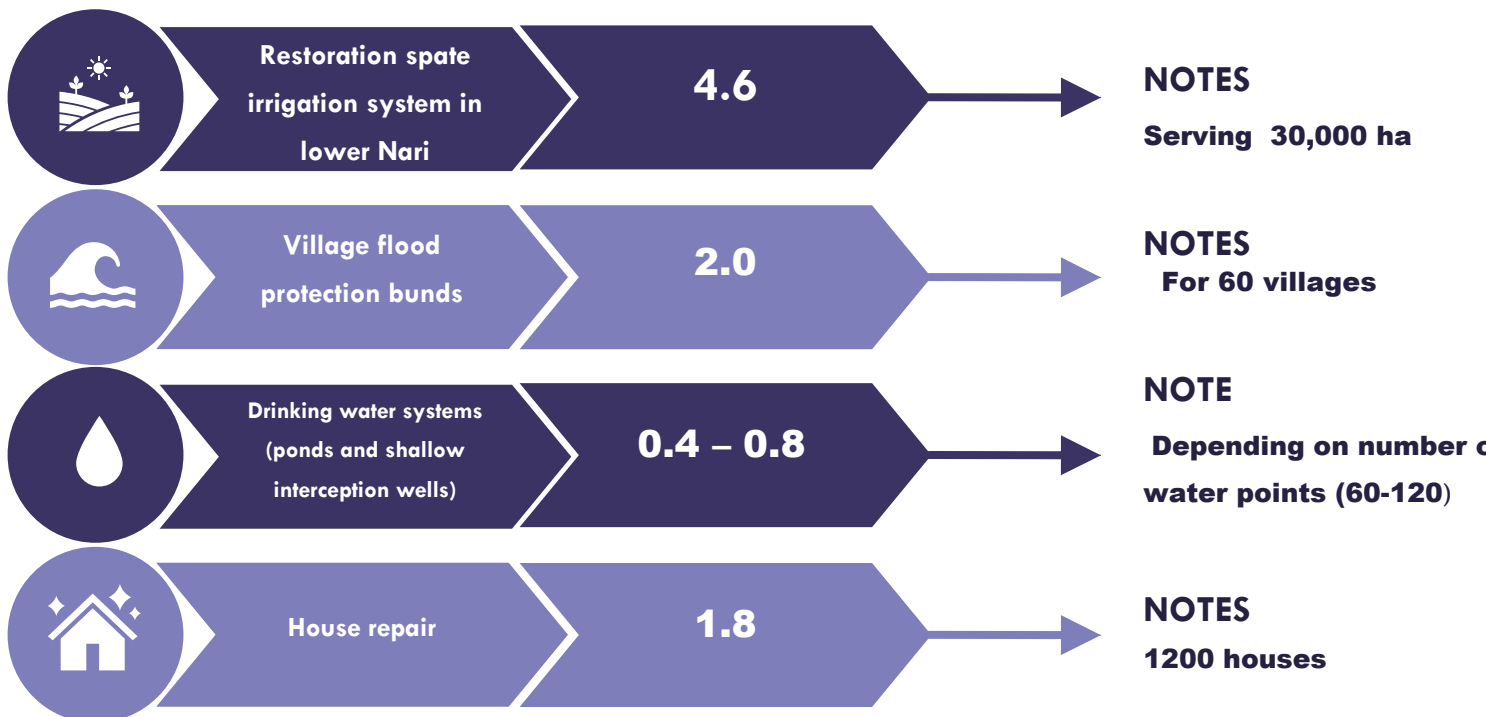
### Immediate recovery

Cost range in USD Million



### Early recovery under building back better

Cost range in USD Million



\* These are from a detailed budget that can be provided, and are constantly updated.