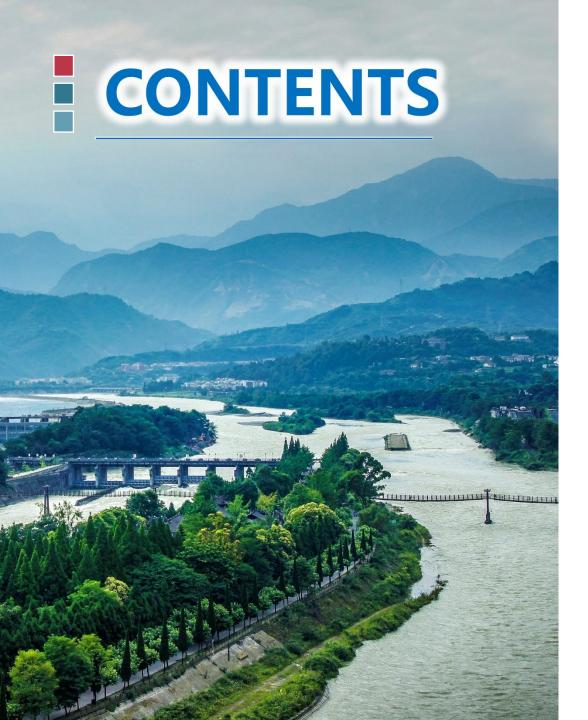


Dongya SUN





China Institute of Water Resources and Hydropower Research Research Center on Flood & Drought Disaster Reduction of the MWR



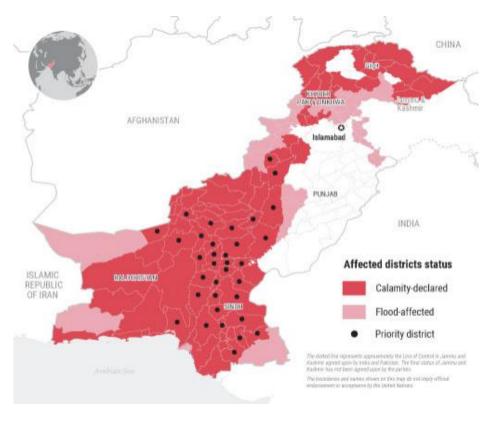
- 1. Introduction
- 2. Challengers
- 3. Possible Countermeasures





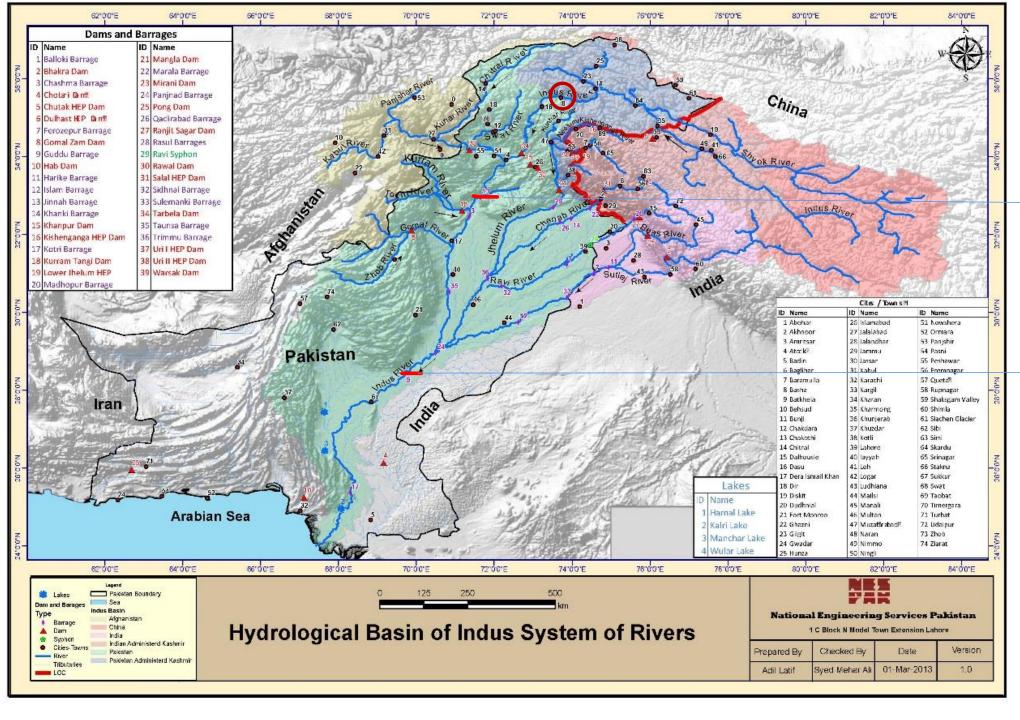






- 84 districts notified as "calamity hit" mainly in Balochistan (32), Sindh (23) and Khyber Pakhtunkhwa (17).
- Around 33 million people have been affected.
- More than 2 million houses have been affected.
- More than 1.1 million livestock have reportedly been killed
- National poverty rate increase by 4.5 to 7.0 percentage points



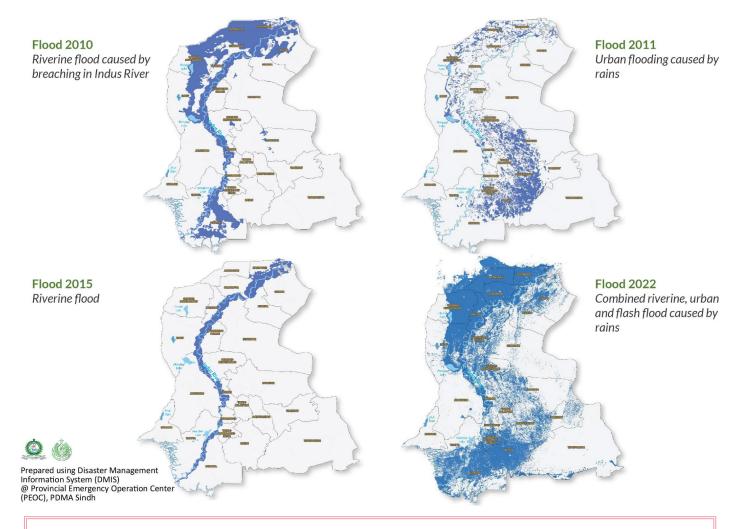


Hilly catchment

Upper floodplains area, a braided pattern of channels and tributary inflows

Flat topography, a meandering channel pattern and deltas

Different Scenario









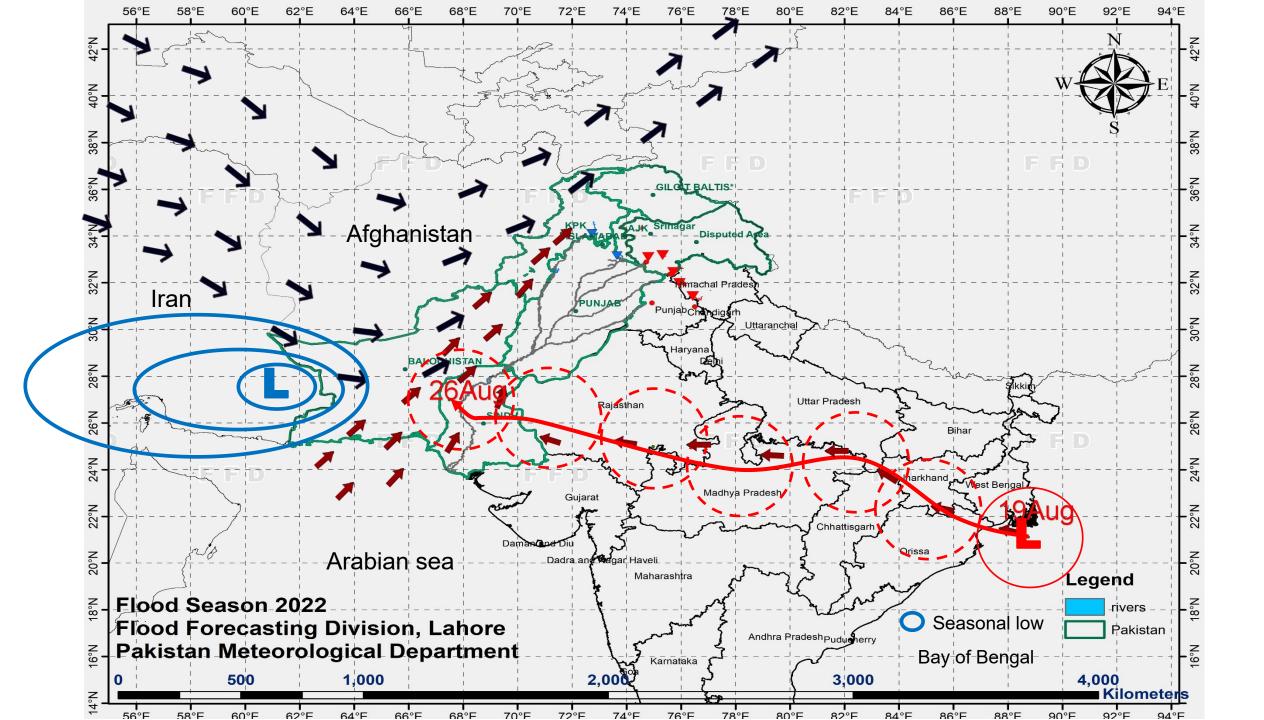


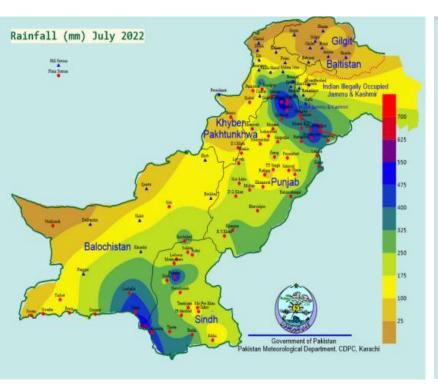


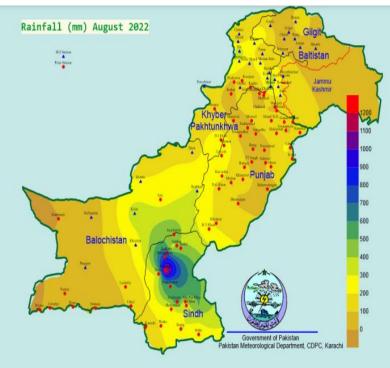


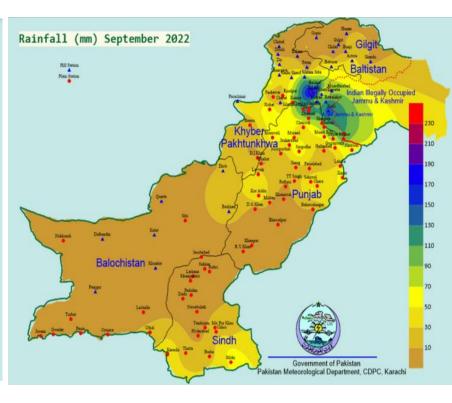


Dadu and Jamshoro are expected to remain at least partially inundated until the end of the year









July-2022

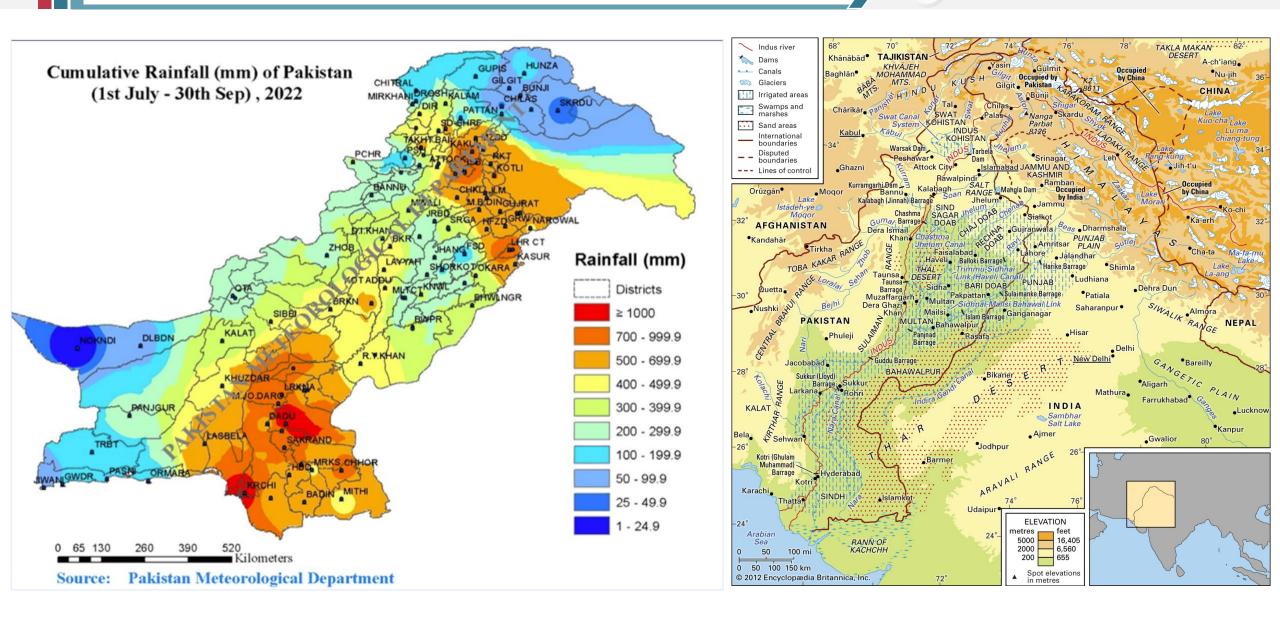
Aug-2022

Sep-2022

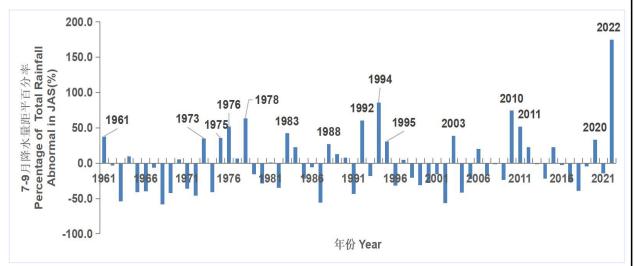


1. Introduction

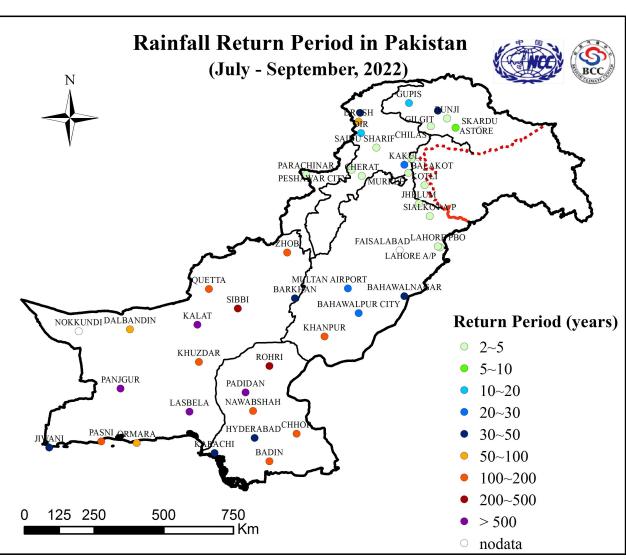
4 Abnormal heavy rainfall



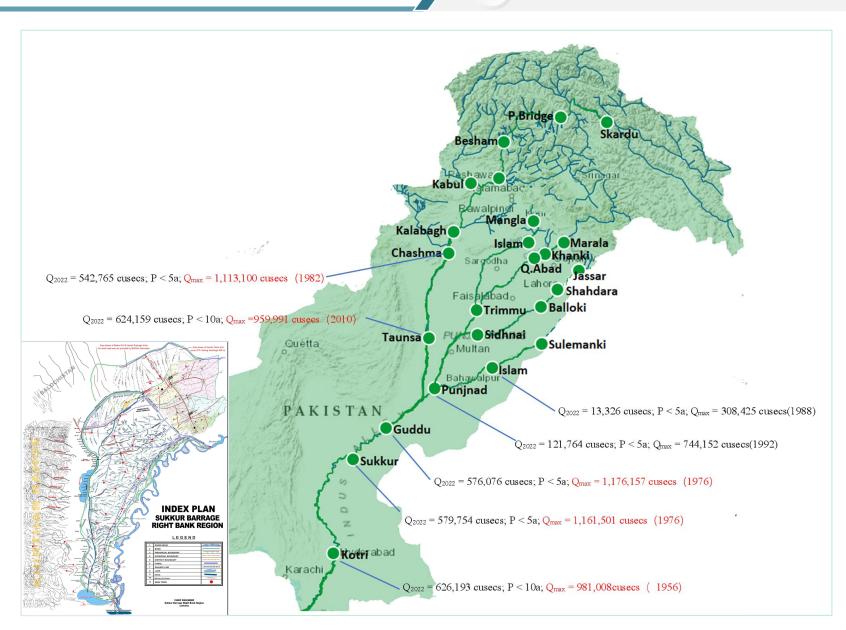
- Rainfall in July-August in the southern exceed 50 years of return period, and at some rainfall stations it exceed 200 years
- The average rainfall in July-September is 175% more than that in the same period of normal years



Percentage of rainfall anomaly from average in July-September, 1961 to 2022



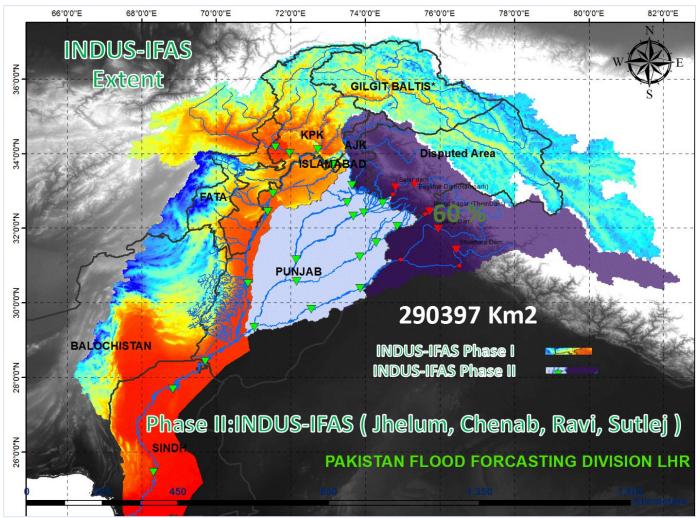
- Flood return period of the mainstream and tributaries is less than 5 years
- Extreme heavy rainfall resulting in severe inundation in Balochistan and Sindh
- Flash floods broke out in many places in Balochistan and western Sindh
- The high water level of the mainstream negatively impact drainage for the nearby plain areas



2. Challengers

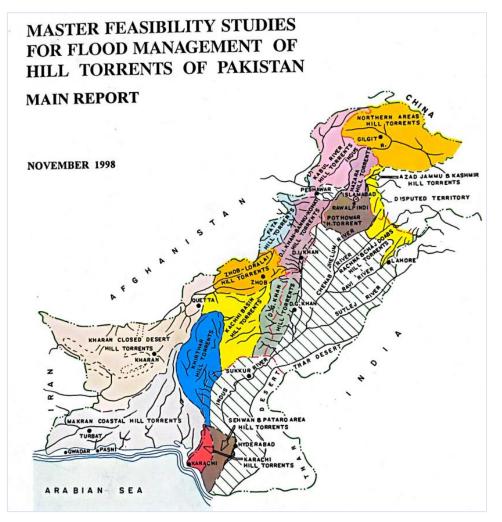
2.1 The flood monitoring, forecasting and early warning system needs to be refined

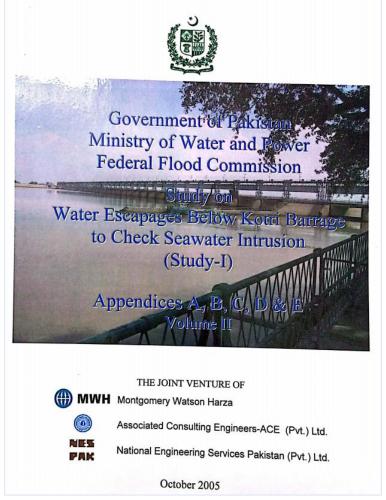




2. Challengers

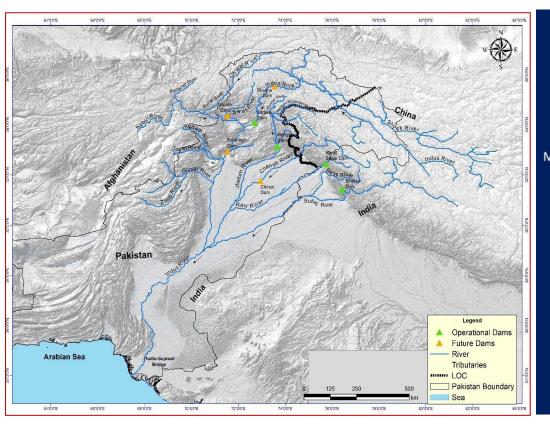
2.2 The systematicness of flood control planning and the coordination of flood control standards in the Indus River Basin need to be strengthened

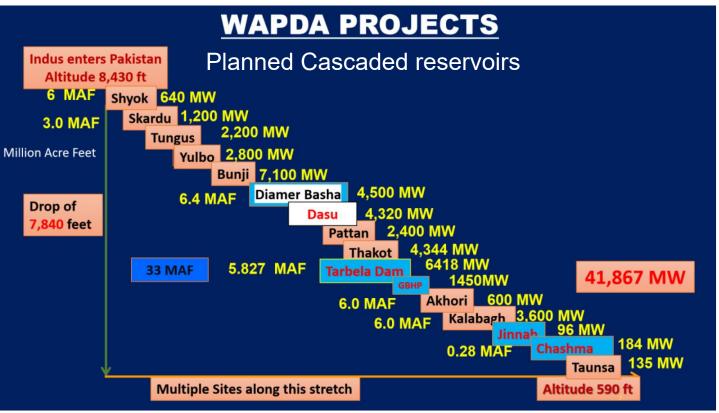




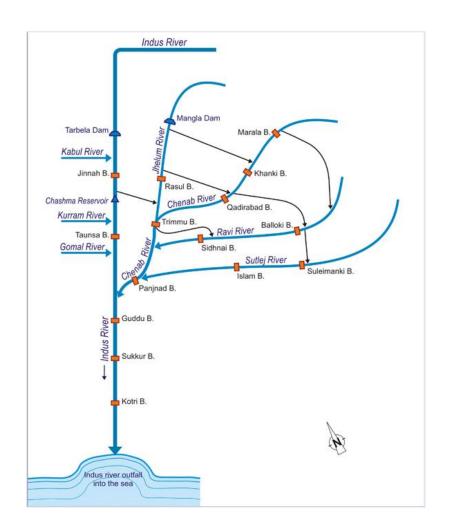
Studies to Enhance Capacity Building of Federal Flood Commission-FFC Development of National Flood Protection Plan-IV (NFPP-IV) and Related Studies to Enhance Capacity Building of Federal Flood Commission-FFC NATIONAL FLOOD PROTECTION PLAN-IV (Ten Years Plan) TABLE OF CONTENTS LIST OF FIGURES PROJECT PLANNING TEAM BACKGROUND ENGAGEMENT OF CONSULTANTS AND MAIN TASKS. PAKISTAN FLOOD MECHANICS AND HISTORY OF FLOODS 131 Flood Mechanics 1.3.3 Historic Flood Damages Since 195 REVIEW OF PREVIOUS NATIONAL FLOOD PROTECTION PLANS 2.2.1 Federal Flood Commission 2.2.2 National Disaster Management Auth 2.2.3 Provincial Irrigation Departments 2.2.8 Provincial Relief Organization/Provincial Disaster Management/District Administration 2.4.2 Shortcomings in Design Flood Limits and Design Criteria 2.4.3 Limitations in Barrage/Bridge Capacities 2.4.4 Constraints in Flood Early Warning System 2.4.5 Financial Limitations and Constraint 246 Gaps and Lapses 3. PLANNING STRATEGY, OBJECTIVES AND GOALS OF NFPP-IV NATIONAL WATER POLICY .. PLANNING OBJECTIVE AND GOALS PLANNING STRATEGY 4. INTEGRATED FLOOD MANAGEMENT

2.3 Lack of pivotal flood control reservoirs in the upper reaches of the Indus River, and river basin-scale flood control regulation needs to be strengthened urgently





2.4 Flood prevention scheme and flood regulation scheme of Indus River Basin need to be compiled urgently



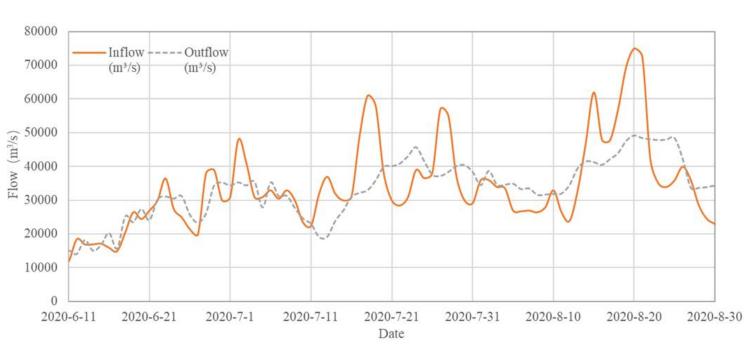
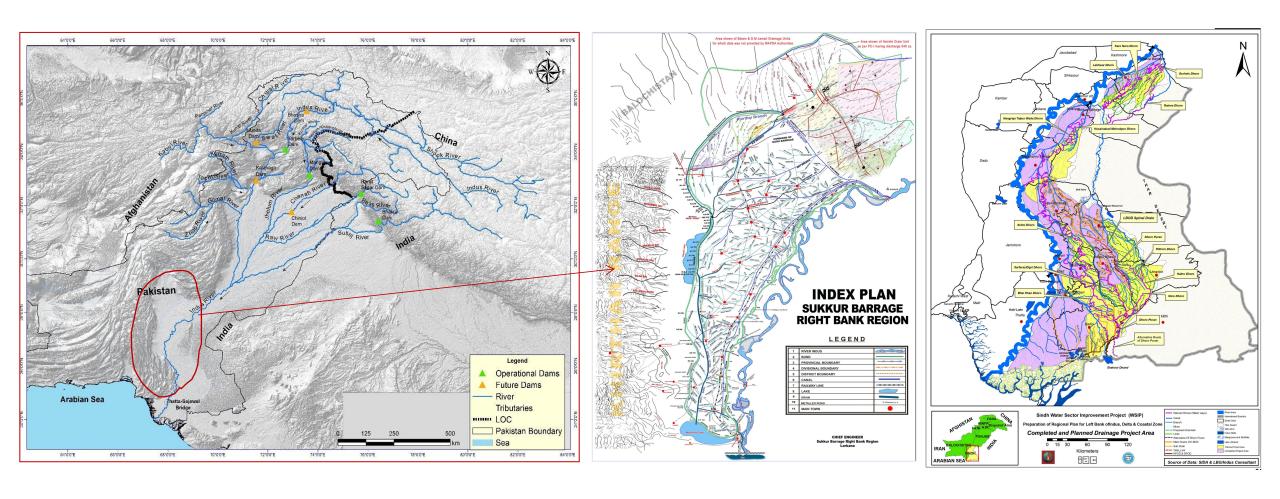
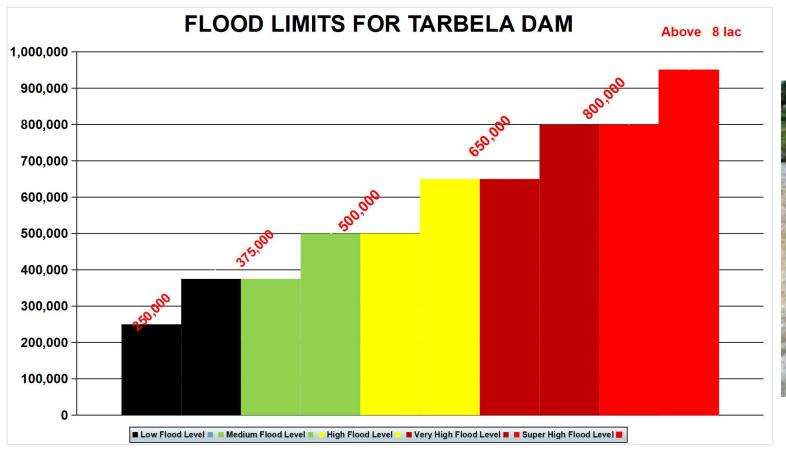


Illustration of flood regulation by using pivotal reservoir

2.5 The drainage system in areas below the upper reaches of Indus River has deficiency and the gravity drainage capacity or design standard is low



2.6 Lack of effective means and emergency plans to deal with rainstorms and floods exceeding design standard



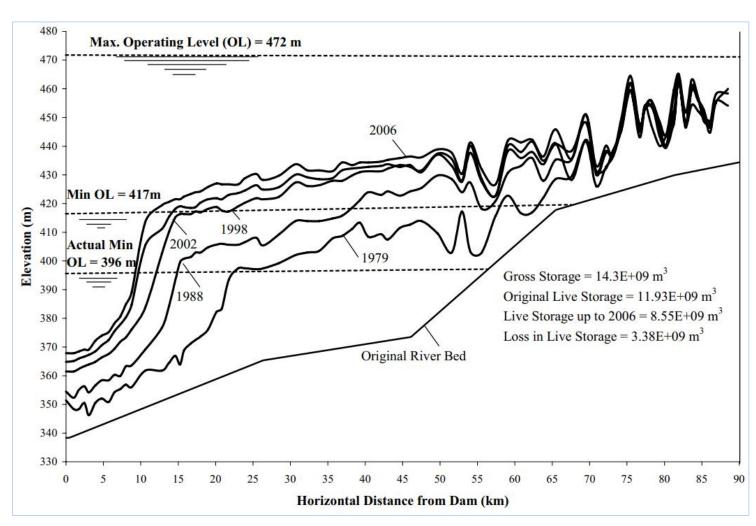
Temporary Bund overflow



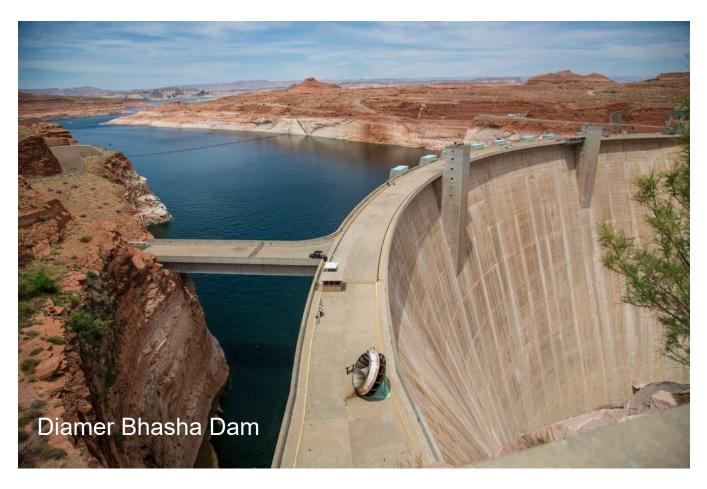
2.7 The problems of sediment deposition and river regime stability become increasingly prominent

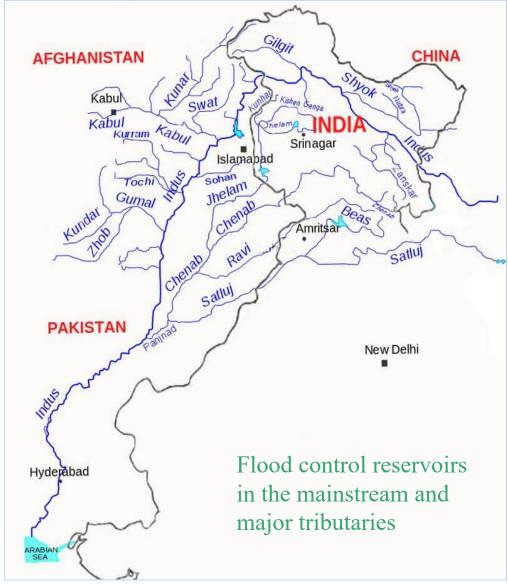
TARBELA RESERVOIR LOSS OF STORAGE CAPACITY			
Storage	1974 (MAF)	2022 (MAF)	Reduction (MAF)
Gross	11.62	6.574	5.046 (43%)
Live	9.679	5.827	3.852(39%)





3.1 Accelerate the construction of multi-purpose reservoirs in the upper reaches of the Indus River

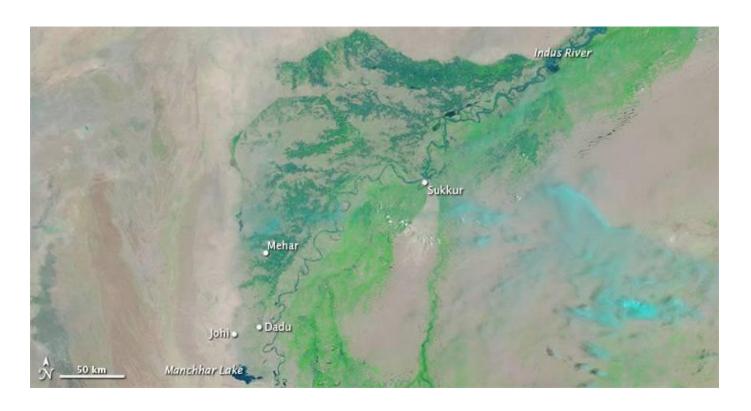




Dike upgrading

3. Possible Countermeasures

3.2 Implement main dike reinforcement and standard upgrading in key areas

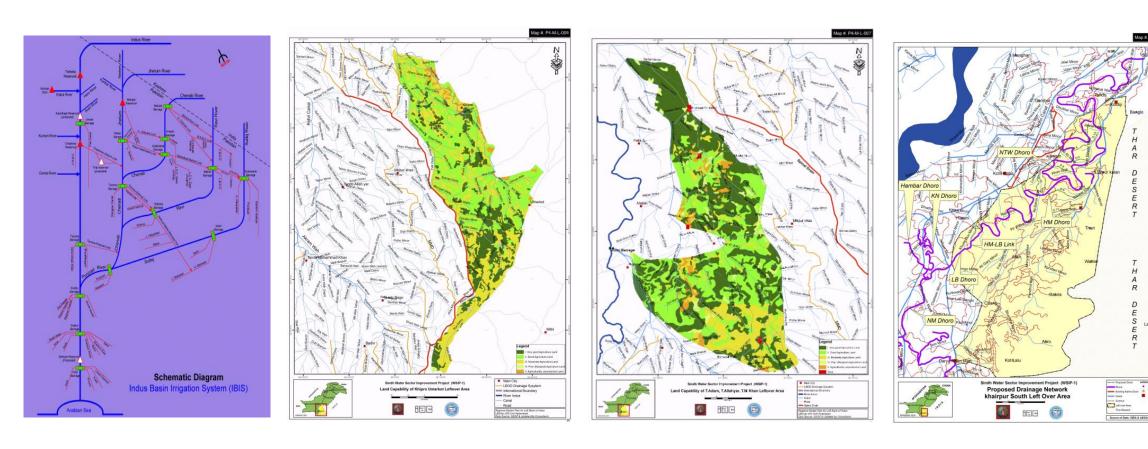


Different flood control standards should be set according to the importance of the dike protection objects



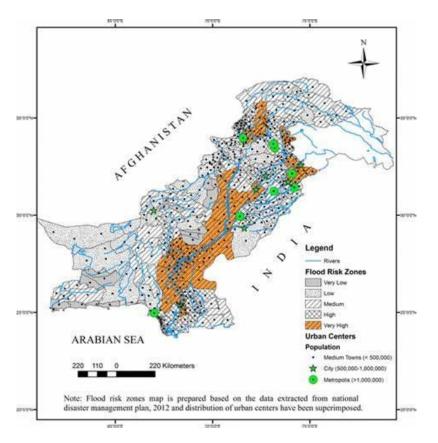


3.3 Gradually construct Indus River basin water network engineering system



To construct pivotal project and water system connection project to realize the integrated effects of flood control system, irrigation system and drainage systems

3.4 Strengthen the management of river-related projects





Management of across river projects, residential areas, farmland dikes or other water-blocking structures to prevent disorderly encroachment on river courses and flood pathways

3.5 Construction of river regime control and deflection structures for key river sections in the lower reaches of the Indus River







- Spur dikes and revetments to preventing the near-bank scour and concave bank scour
- Dredging or narrow the wandering range of the main channel to reduce sediment deposition

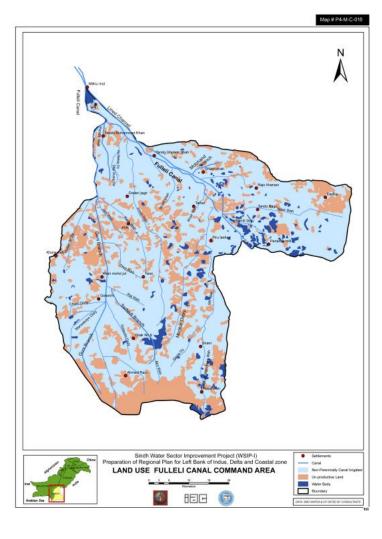
3.6 Implementation of soil and water conservation projects in the upper reaches of the Indus River





- Rational land use and development
- Forest and grass restoration
- Grazing management
- Check dams
- Terrace farming





3.7 Continuously promote building of emergency rescue force and emergency response capacity

- Specialization and professionalization
- Rescue skills training
- Grass-roots emergency management
- Awareness raising

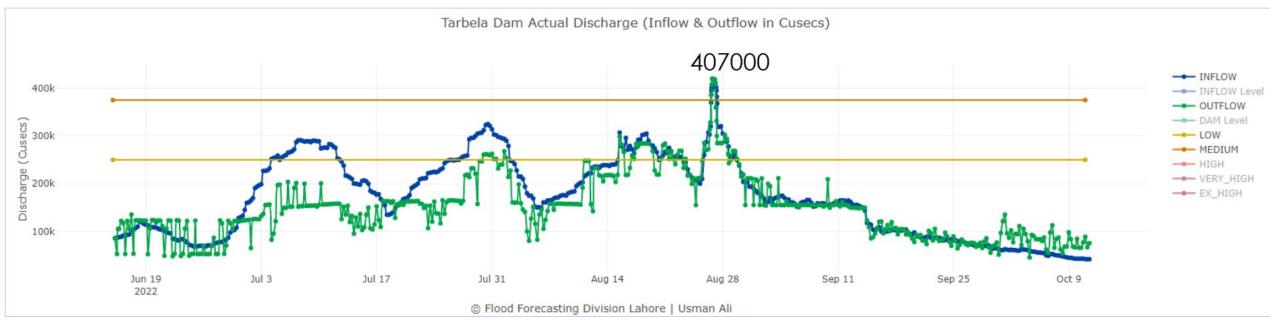








3.8 Establish a complete national flood forecasting and early warning system



- Supplementary meterological and hydrological monitoring stations
- Real-time and accurate sharing of all kinds of forecasting and monitoring information
- National high-resolution comprehensive database
- Hydrological and hydrodynamic models
- The application of short-term forecasting, nowcasting and real-time rainfall monitoring data

4. Conclusions

Strategy

- In line with global climate change and future socio-economic development, the frequency and disaster risk of extreme rainstorms and floods tend to rise, It is necessary to:
- Improve the structural and nonstructural measure system, esp.
 major flood control and drainage projects
- Further improve disaster reduction capacity and performance of the whole society.

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