



PMD



ICHARM-Japan



United Nations
Educational, Scientific and
Cultural Organization

UNESCO.

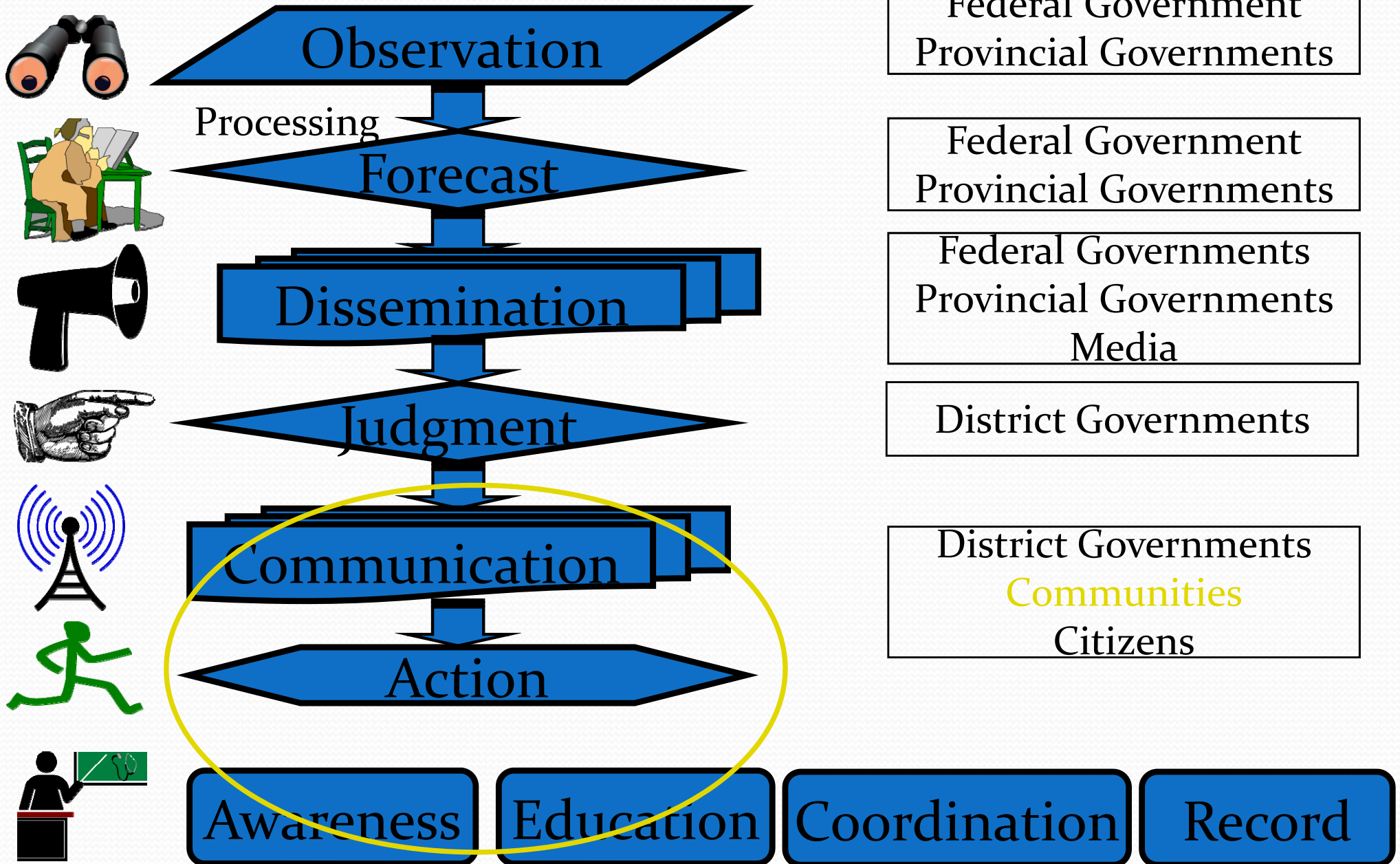
**“ STRATEGIC STRENGTHENING OF FLOOD WARNING AND
MANAGEMENT CAPACITY OF PAKISTAN ”**

(IFAS)

By

**HAZRAT MIR CHIEF MET
PMD**

Forecast and Early Warning System (EWS)

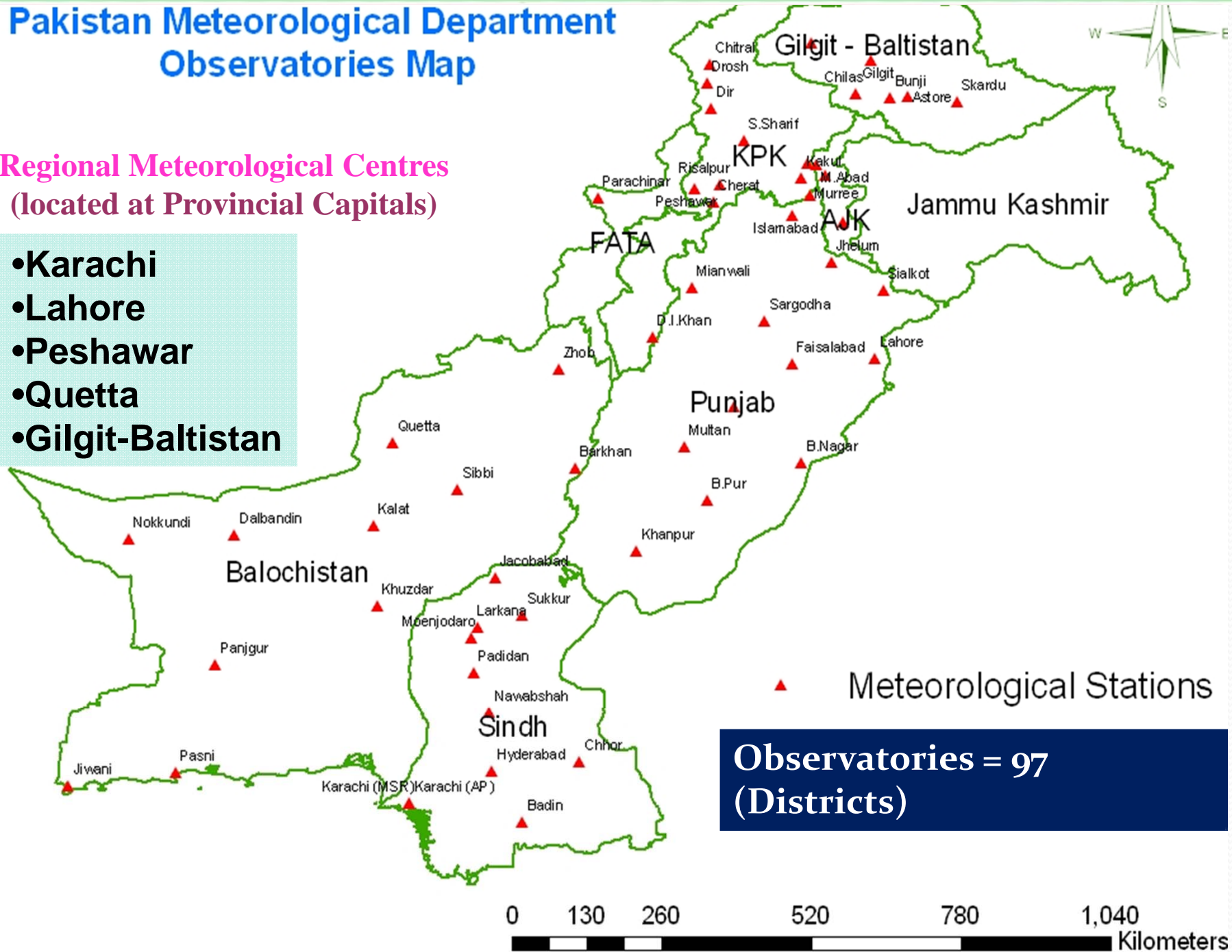




Pakistan Meteorological Department Observatories Map

Regional Meteorological Centres
(located at Provincial Capitals)

- Karachi
- Lahore
- Peshawar
- Quetta
- Gilgit-Baltistan



WESTERN RIVERS

AFGHANISTAN

KABUL

INDUS

JHELUM

CHENAB

Kashmir & D. J. Karakoram
Forests

D. J. Karakoram
Forests

RAVI

SUTLEJ

BEAS

INDIA

EASTERN RIVERS

AN



Flood Forecasting Division (FFD) Lahore is a specialized unit of PMD for this purpose.

Responsibilities

- i. Flood Forecasting**
- ii. River stream flow forecasting**
- iii. Water availability Forecast for Dams**
- iv. Assisting Water Management at Dams specially during Monsoon**

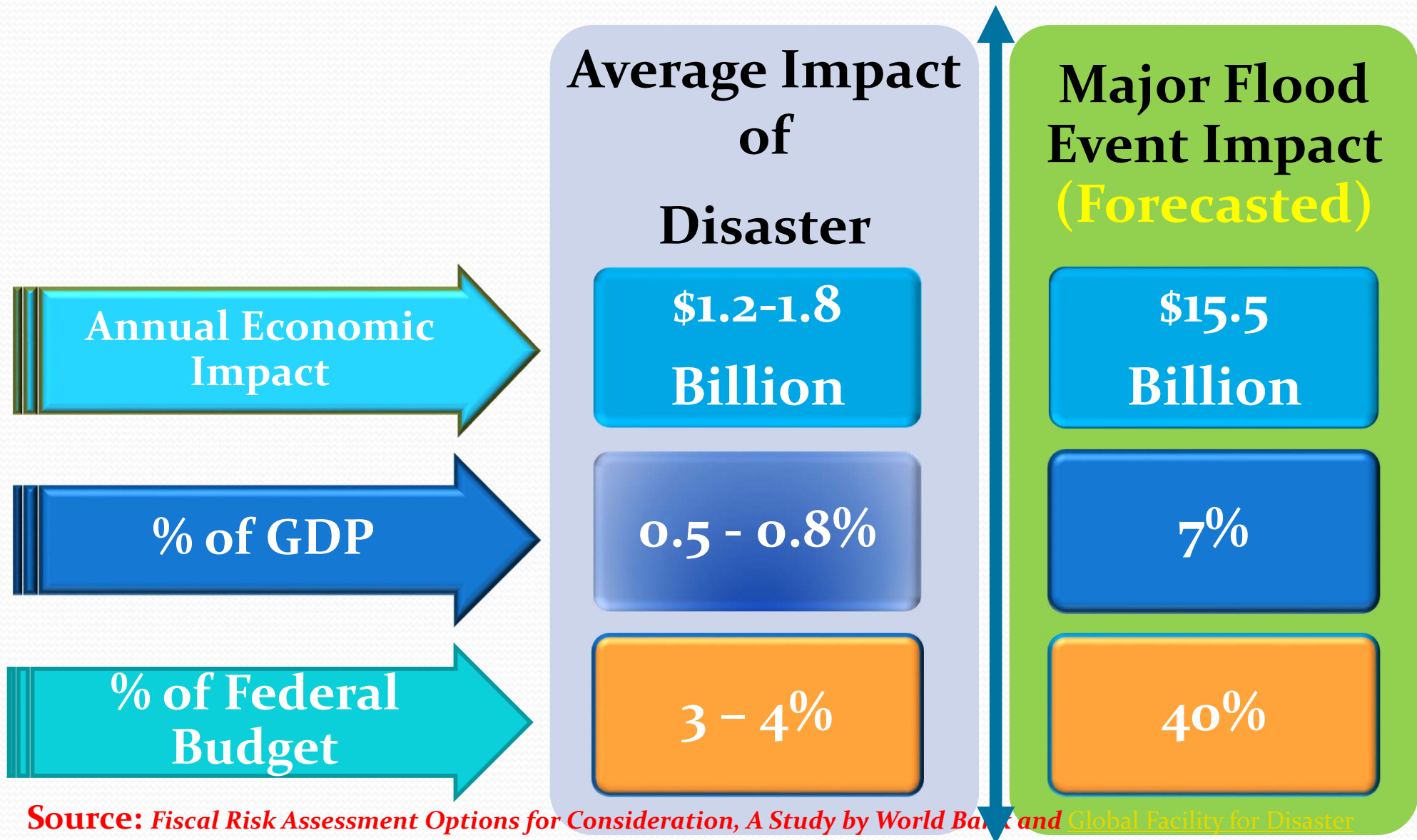
Floods - 2010



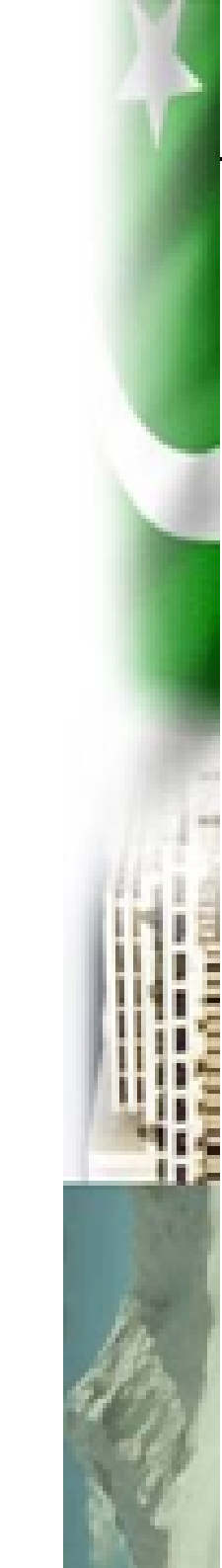
Floods - 2011



Economic Impact of Major Disasters Since 2005



Source: *Fiscal Risk Assessment Options for Consideration, A Study by World Bank and Global Facility for Disaster*



Projects related to Water Sector

- ✓ **IFAS Project Phase I**
- ✓ **IFAS Project Phase II**
- ✓ **GLOF Project Phase I**
- ✓ **GLOF Project Phase II**
- ✓ **Specialized Medium Range Forecasting Center (SMRFC) Project**
- ✓ **Drought Monitoring & Early Warning Project**

OBJECTIVES

- 1 Strengthening of the country's flood early warning system to ensure safe recovery and return to livelihoods of the affected population.**
- 2 Development and implementation of flood hazard maps at the community level.**
- 3 Developing both international and local platforms for timely sharing of hydro-meteorological observations.**

PROJECT MAJOR COMPONENTS

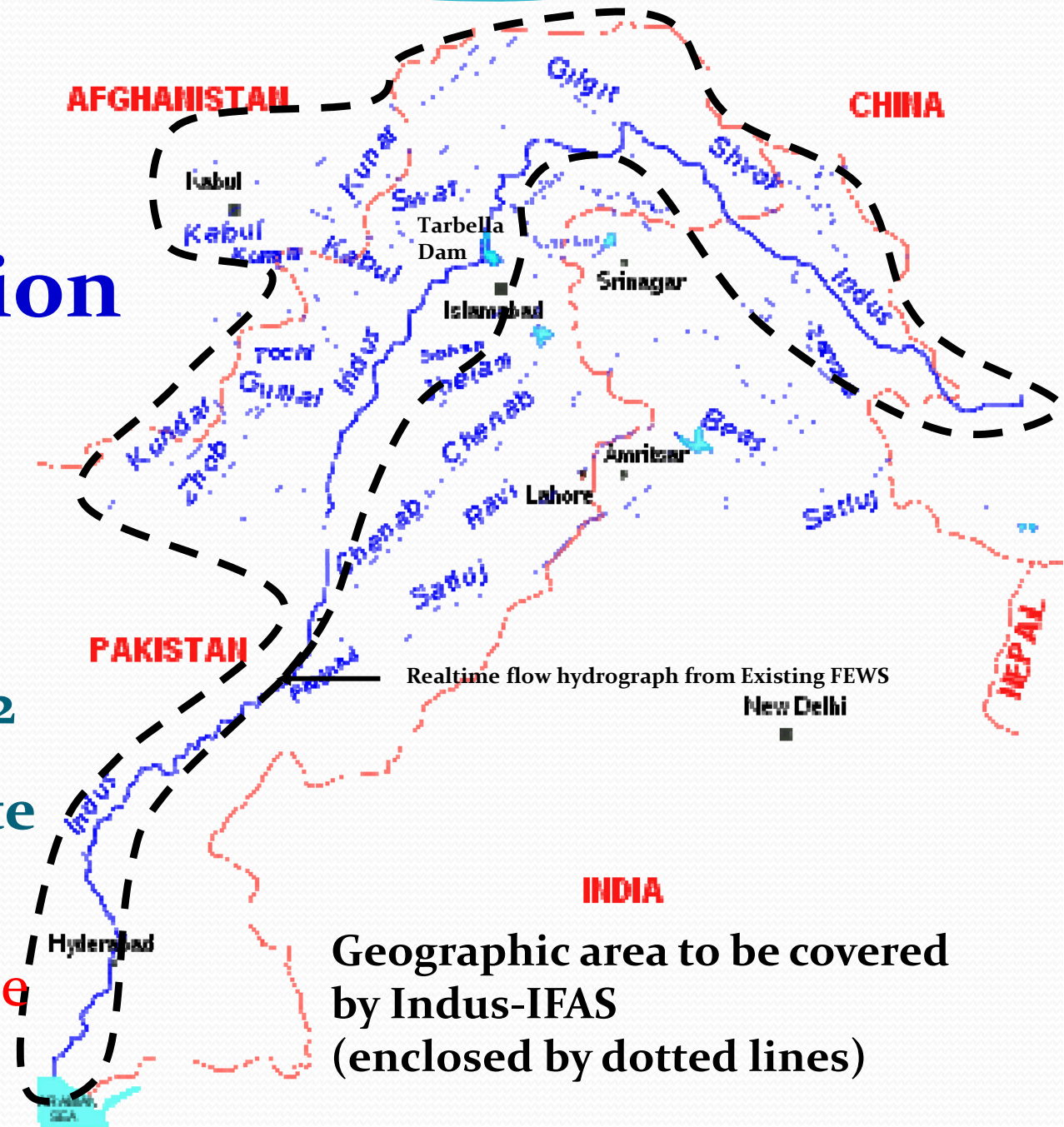
- 1-Strategic augmenting of flood forecasting and flood hazard mapping capacity.**
- 2-Building a knowledge platform for sharing trans-boundary databases and community flood management information.**
- 3-Capacity development for flood forecasting and flood hazard mapping.**

Project Component - 1

A1

IFAS Introduction

- Indus-IFAS has been developed in collaboration with UNESCO
- Test operation in 2012
- Validation and update in 2013
- Models have been made operational

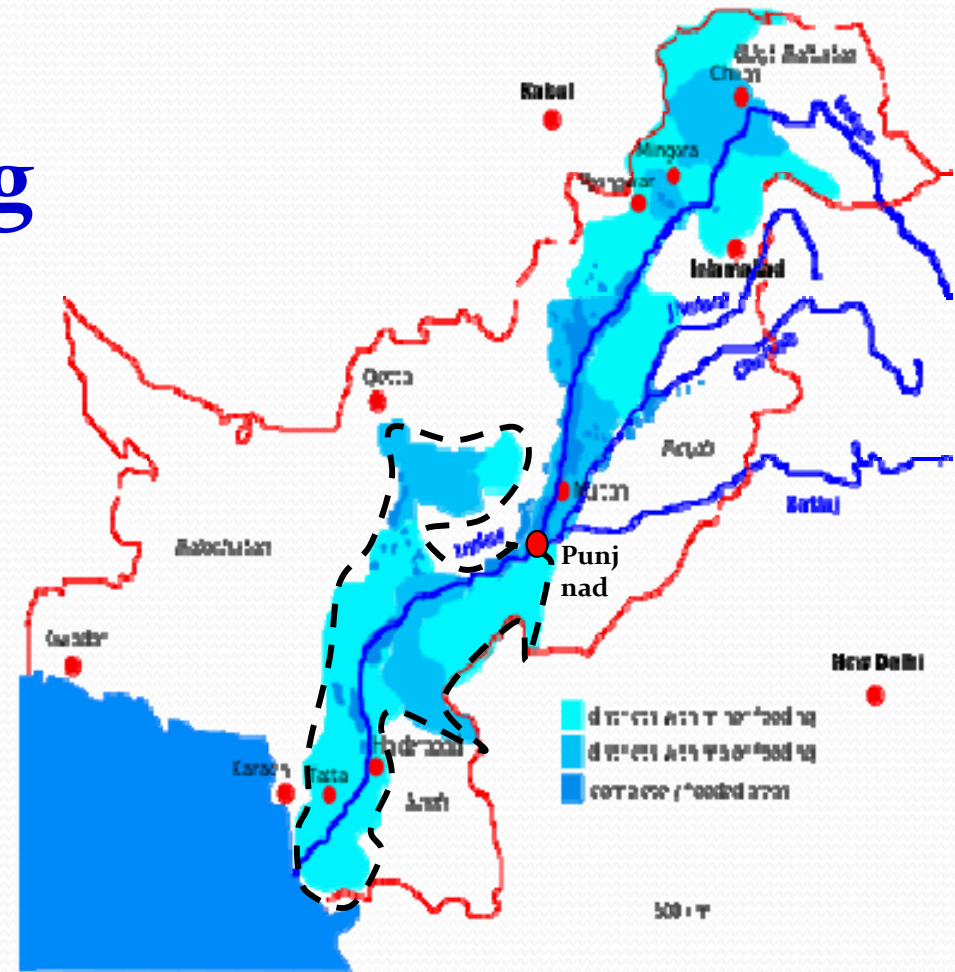


Project Component - 2

A2

Flood Hazard Mapping

- Updated flood hazard maps are now available using satellite data
- Cover lower Indus including newly affected areas by the flood 2010
- Version 1.0 has been handed over to PMD-FFD Lahore and test simulations are being carried out.
- Final and updated version of RRI integrated with Indus-IFAS has been provided.



Proposed Flood Hazard Mapping Area
(enclosed by dotted lines)

Project Component – 2 (B)

- **Software Platform for data sharing**
- **An interface of data sharing program has been provided which is being used to populate real time and historical data in centralized database**
- **Centralized data server has been installed and configured at PMD-FFD Lahore.**

Project Component – 3 (C)

- **Capacity development for Indus-IFAS and flood hazard mapping, as well as for their sustainable use**
- **This has been achieved in terms of Human resources, establishment of GIS Lab and Media Centre.**



TASKS COMPLETED

**IFAS Calibration on Eastern Rivers
by Using GSMaP_NRT (in progress)
PHASE-2**

Progress on points

- a) Process of calibration of Indus IFAS over eastern rivers (Jhelum, Chenab, Ravi, Sutlej) is in progress. FFD experts are tuning the model according to the ground realities.**

- b) Calibration of GSMaP_NRT is also in progress. 05 AWS have been developed purely on the self reliance techniques by FFD engineers. These five sets are ready for installation after these were inspected by Dr. Shahbaz Khan, Director UNESCO at Jakarta, Indonesia during his visit on 23rd December 2016.**



- **Technical studies** are being carried out by the FFD experts on all the five topics and some relationships have been formulated in this respect.

- **Five research associates**, who were especially recruited for this purpose are assisting the PMD experts in this job.

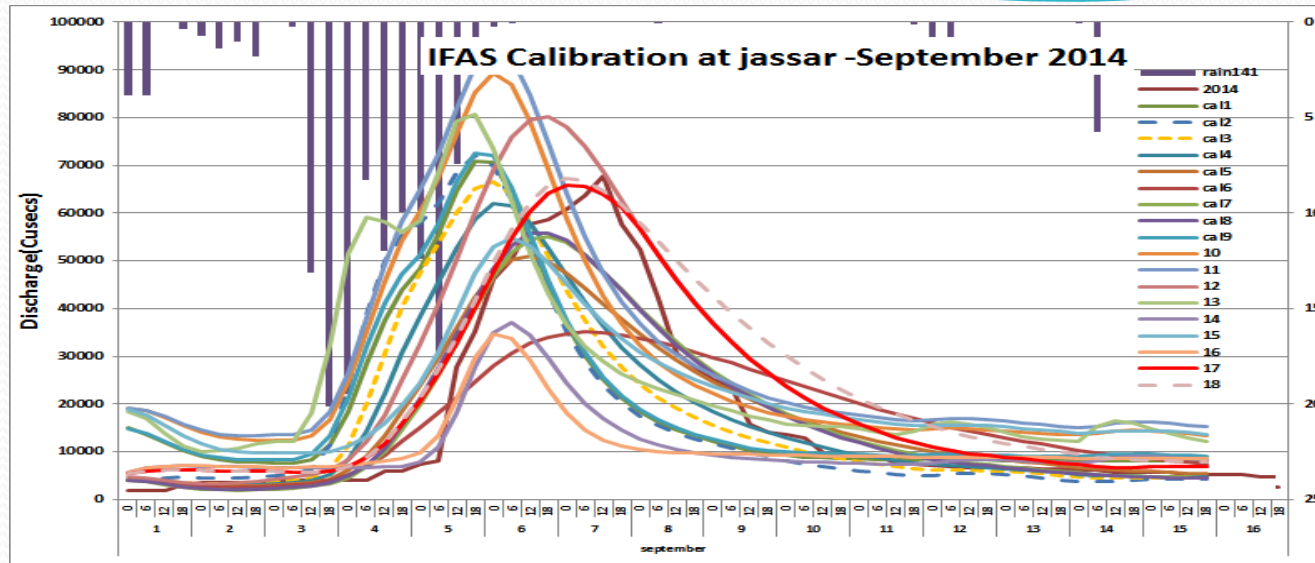


- **Two workshops** have already been organized by UNESCO at FFD Lahore which are detailed below:

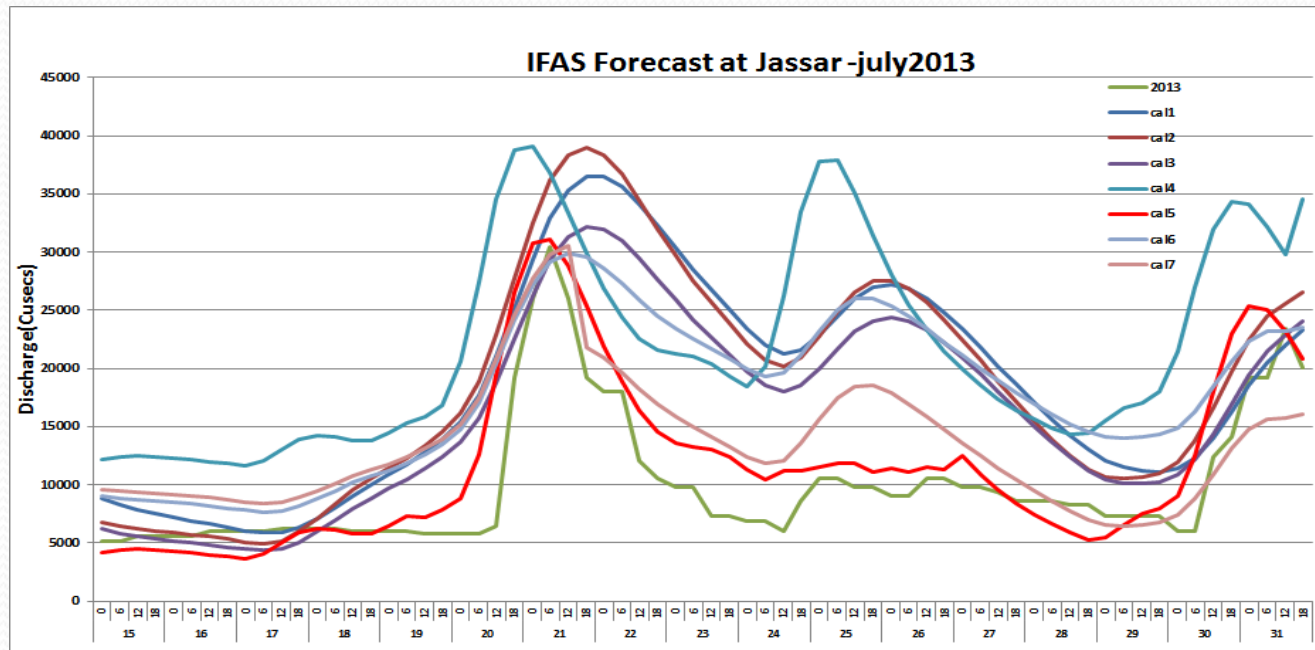
- **Standardizing Flood Forecasting and Warning Approaches in trans-boundary catchments, 19-20 April 2016.**

- **Efficient parameterization strategy of IFAS model for eastern rivers 19-21 December 2016.**

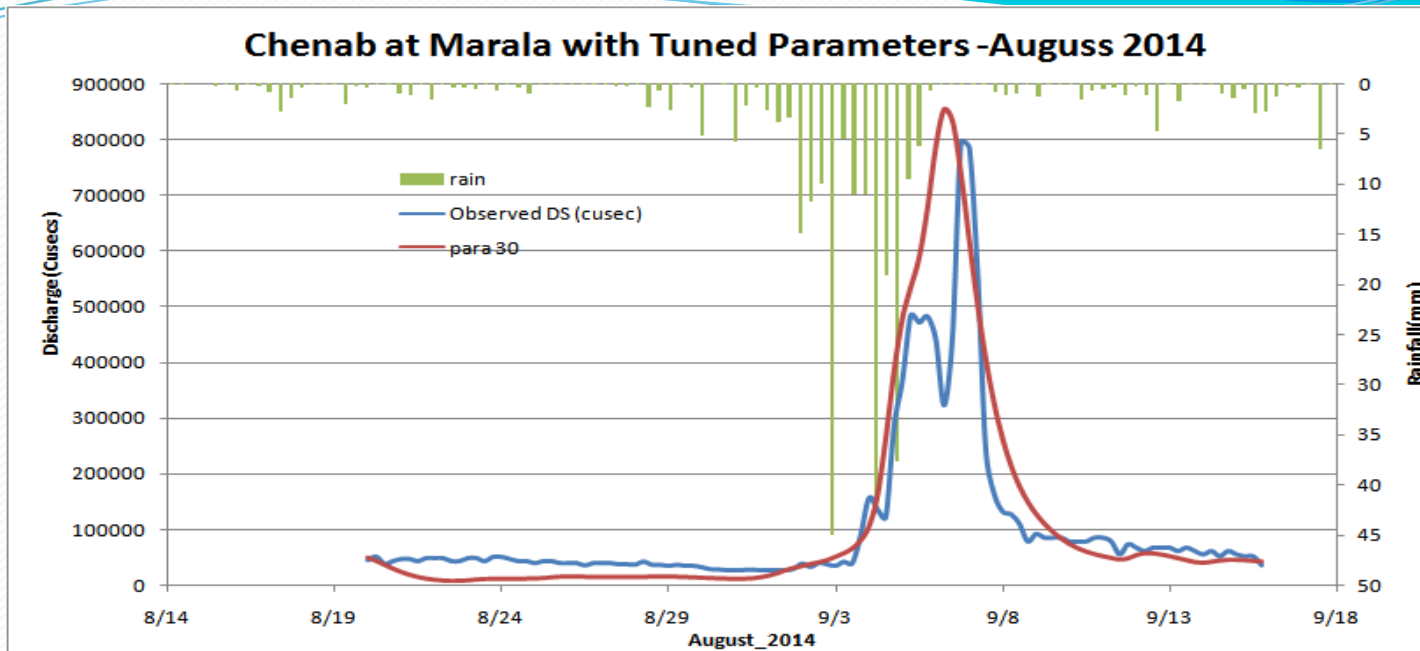
IFAS -River Ravi at Jassar 1st Event Calibration



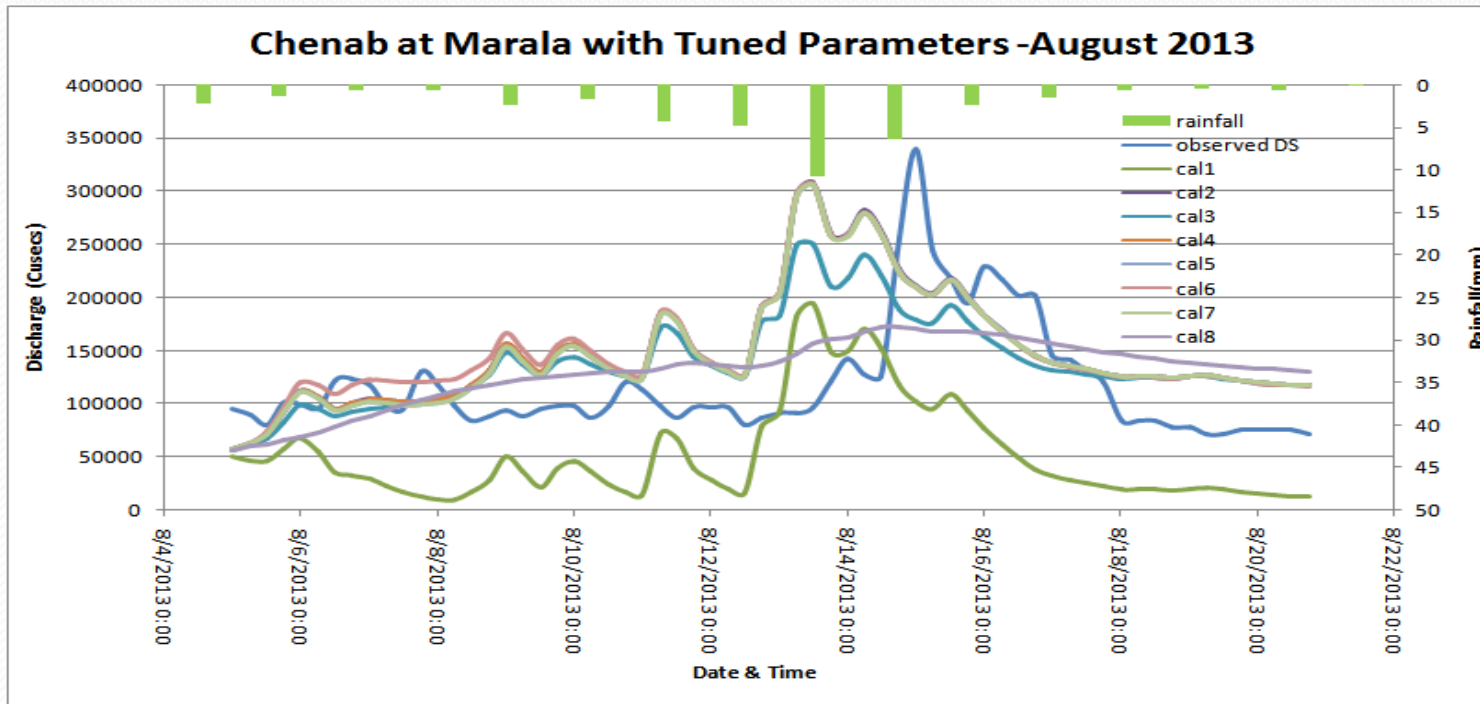
IFAS -River Ravi at Jassar 2nd Event Calibration



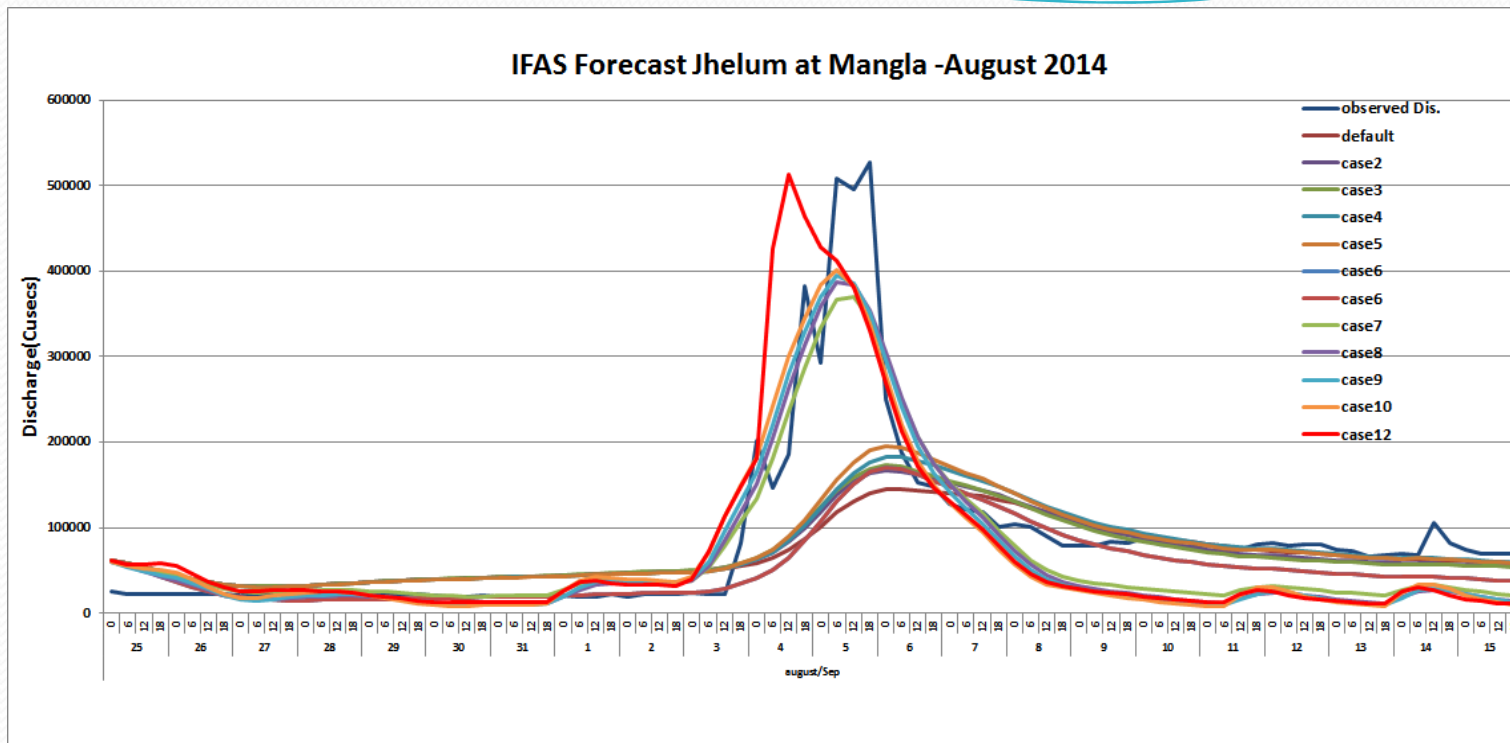
IFAS -River Chenab at Marala 1st Event Calibration



IFAS -River Chenab at Marala 2nd and 3rd Event Calibration In progress

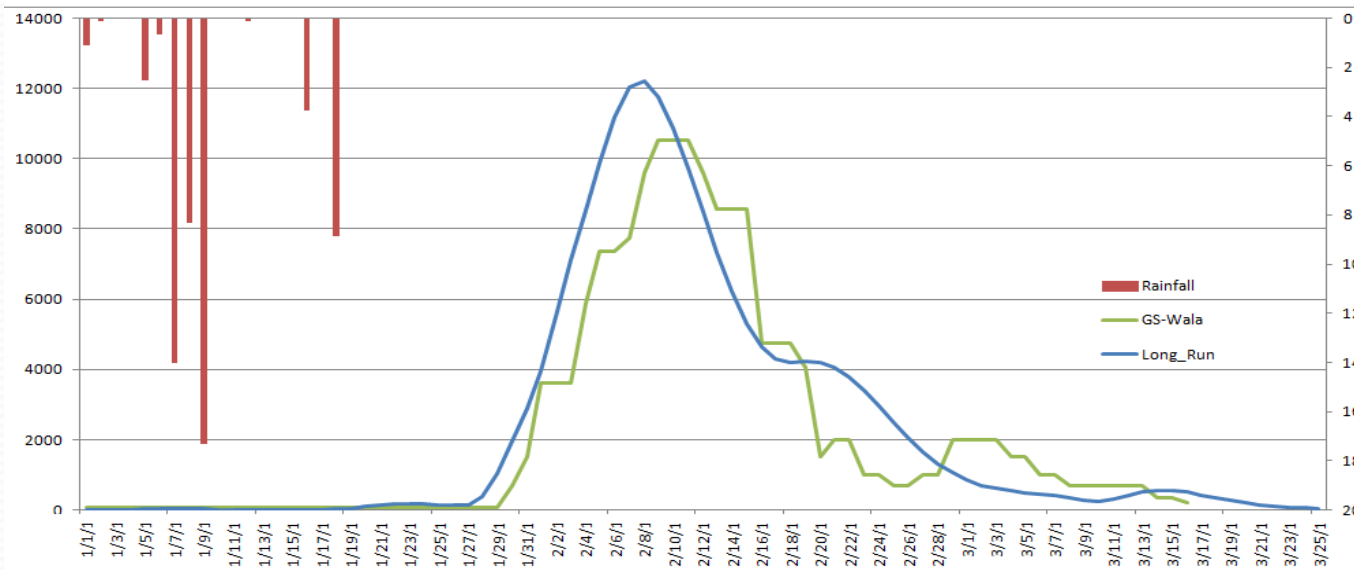


IFAS -River Jhelum at Mangla 1st Event Calibration



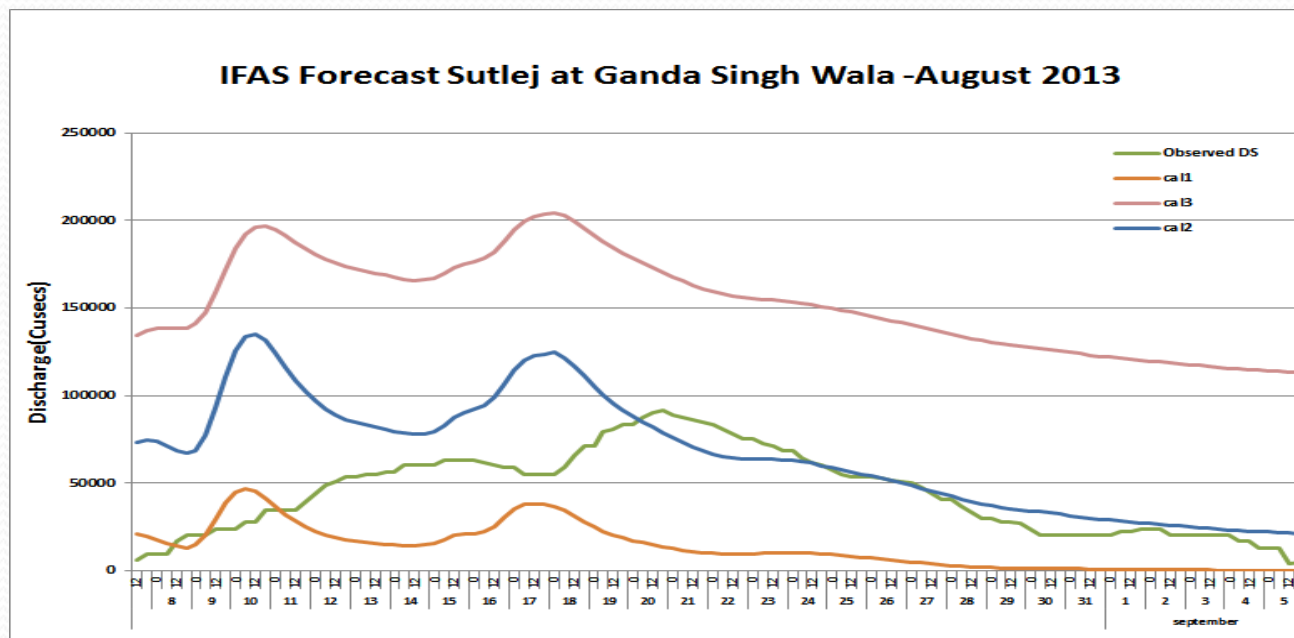
IFAS -River Jhelum at Mangla 2nd and 3rd Event Calibration In progress

IFAS CALIBRATION at GS.WALA- River Sutlej Sept-2014



IFAS -River Sutlej at G.S Wala 2nd and 3rd Event Calibration In progress

IFAS Forecast Sutlej at Ganda Singh Wala -August 2013

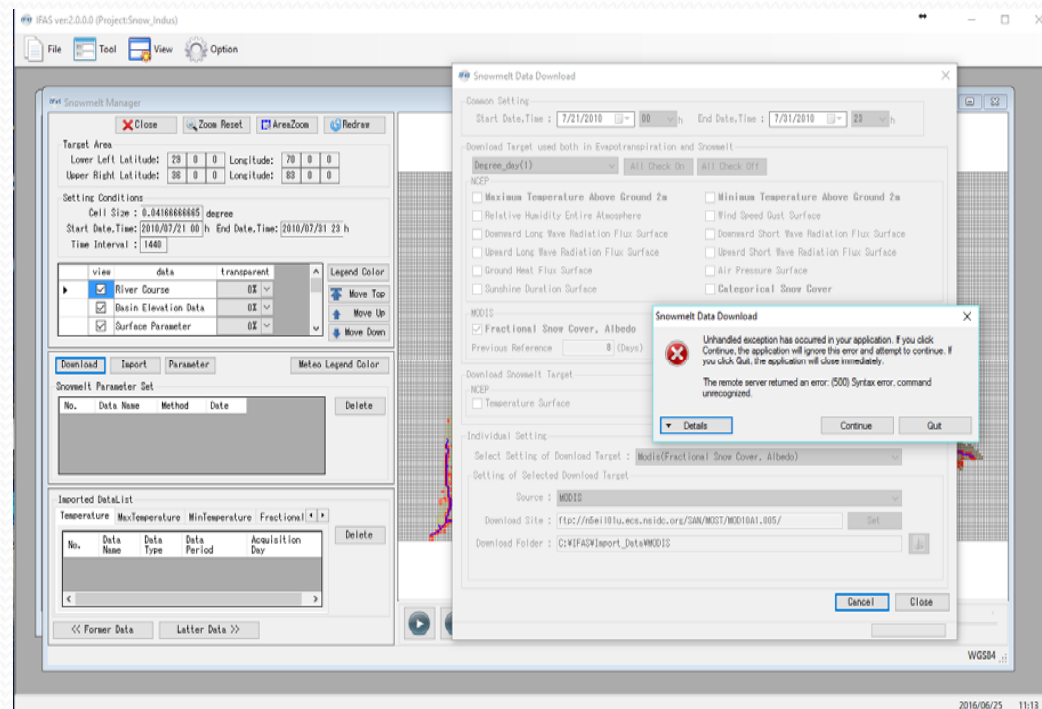


Problems

- Snow Data download Manager is not downloading the Snow Data

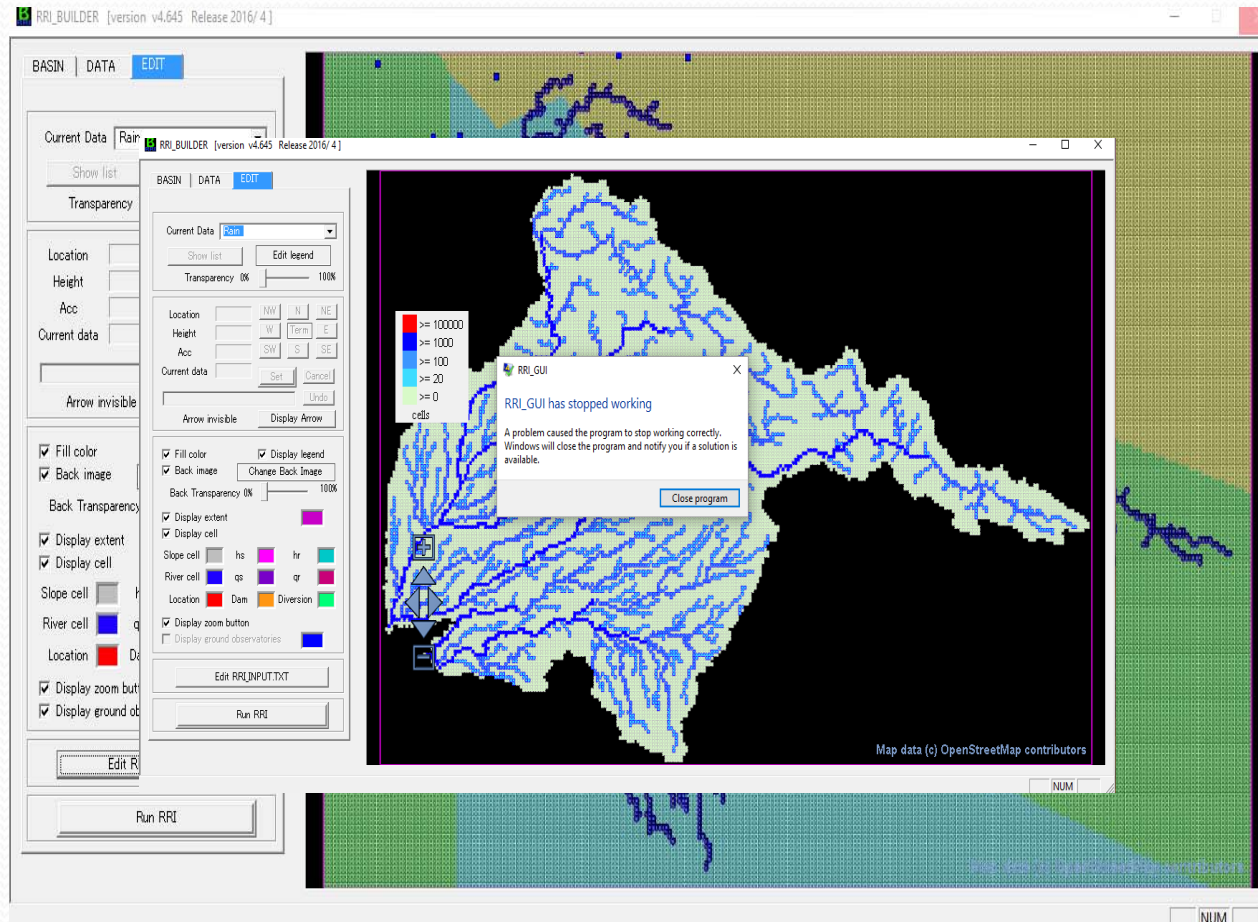
MODIS Snow Melt Error

The following are the issues of IFAS snow-melt component in IFAS model.



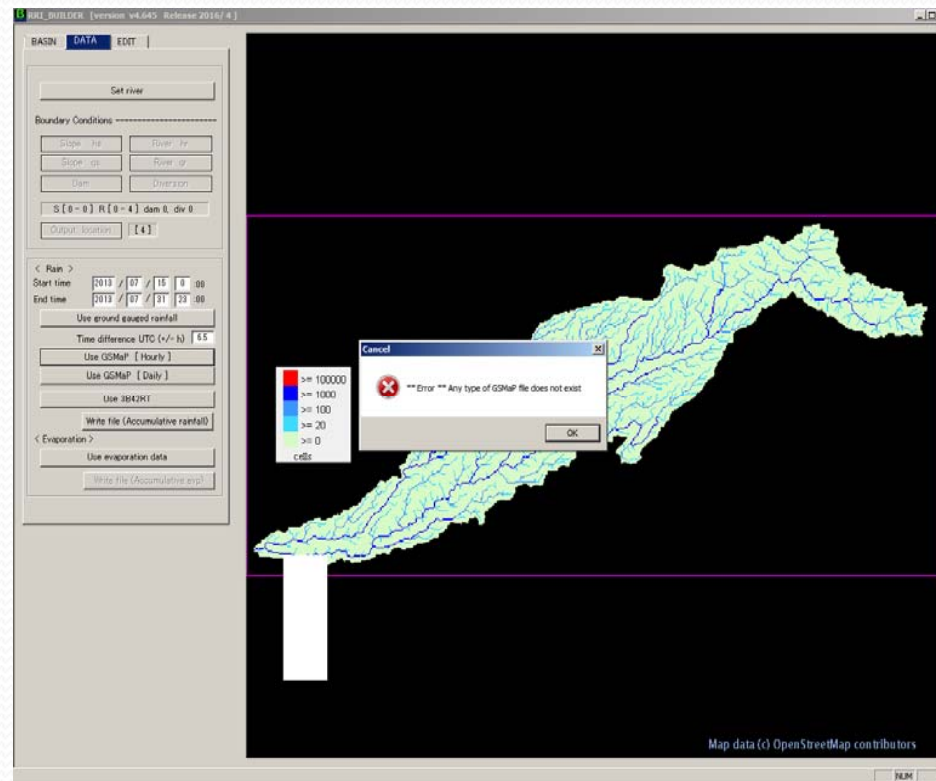
GUI RRI Model

- GUI of RRI Model Stop Working at different stages.



- Different Projects of the model working in Command Prompt but not in GUI (graphical user interface)

Error When Importing hourly GSMaP_NRT “Rain.dat” file.



- Furthermore GUI should make itself rain.dat by using GSMaP_NRT hourly rainfall(like in Inus-IFAS), rather than we have to make the file separately by using FORTRAN compiler
- In the manual no information available about the parameters and the calibration process of the models (like IFAS) is not available



South Asia Flash Flood Guidance System

1. SAFFGS Centre - Pakistan
2. SAFFGS Centre - India

- 2nd SAFFG India
- Who will be the members of both SAFFGS Centre .
- Option Free (WMO)

Pakistan Pakistan & Afghanistan

India Remaining Countries (if other countries Agreed)

Pakistan? When to install / establish the centers?

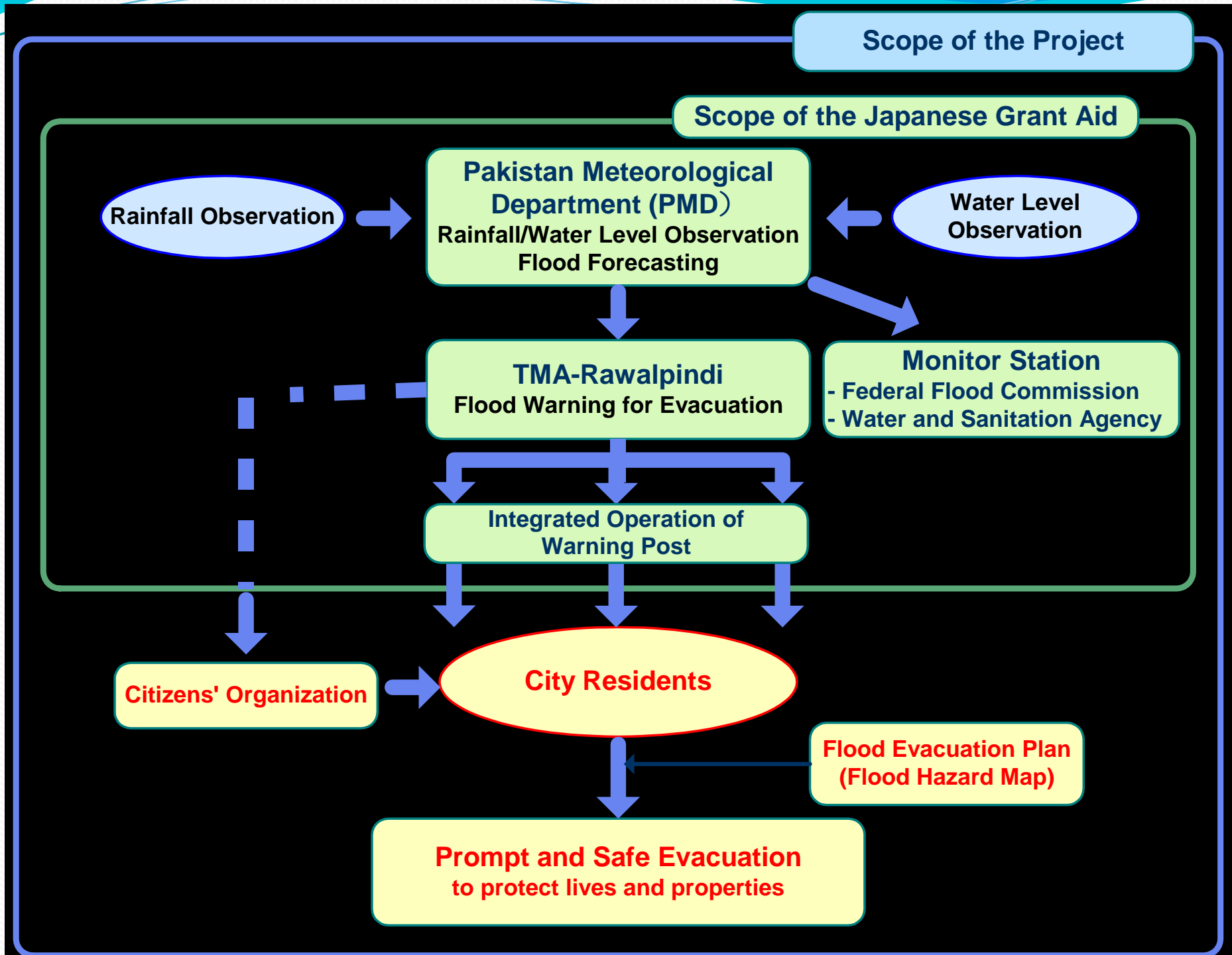
- Waiting for India's Server System develop

Next Meeting &

Training

- Not in India some where else
- Turkey Mediterranean Sea FFGS (Most suitable Place)

Scope of the Project



Potential Flash Flood Areas in Pakistan

KP

Azad Kashmir

Punjab

Balochistan

Sindh

Potential Flash Flooding

in KP & NAs

Upper KP

Chitral Valley

River Chitral

Swat Valley

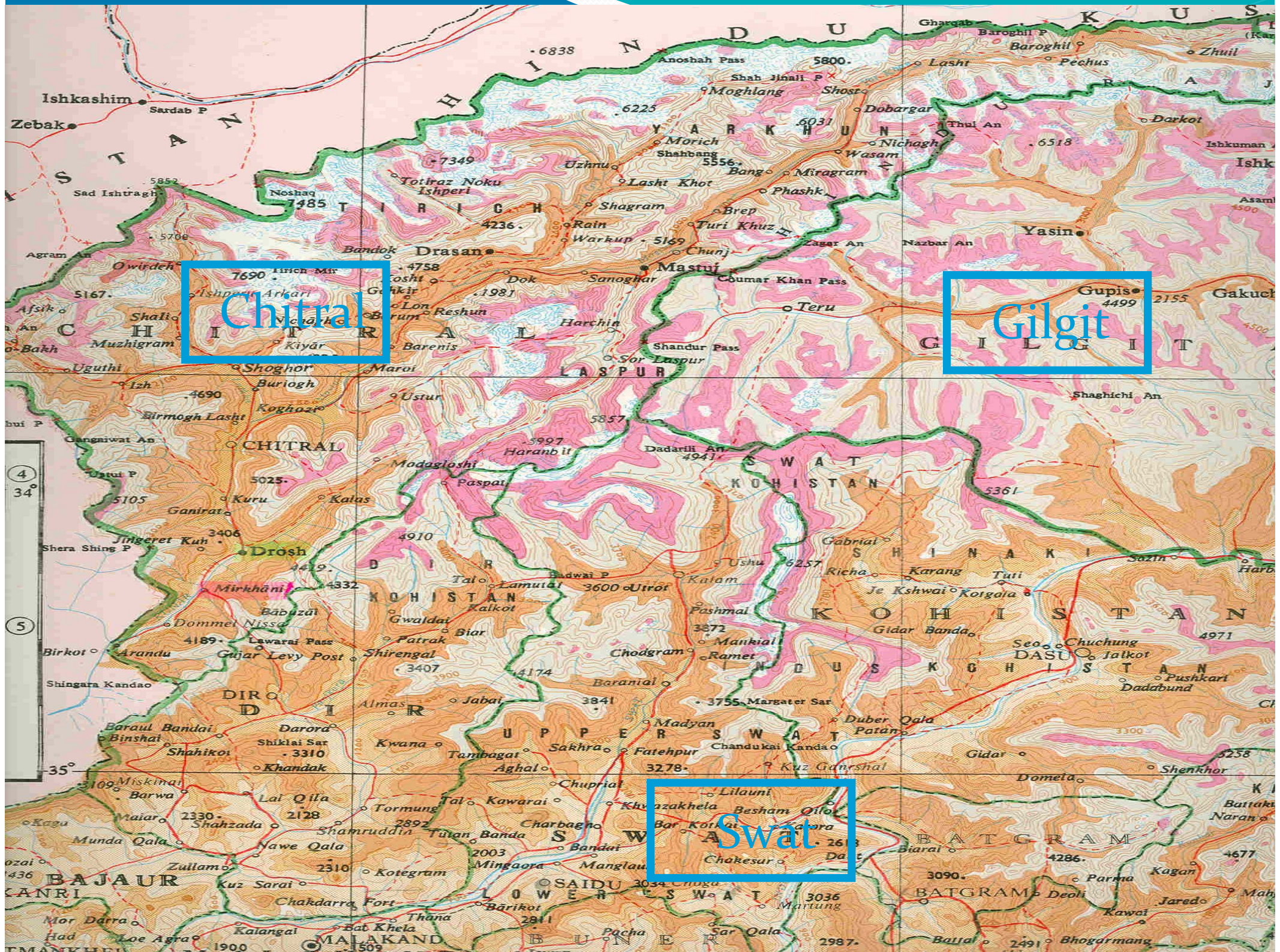
Swat River

Peshawar

**Kabul
River &
Tributaries**

Gilgit, Hunza &
Skardu Valleys

Manshera



Chitral

Gilgit

Swat

DFO Event # 2005-070 - Pakistan - Kabul River - Rapid Response Inundation Map

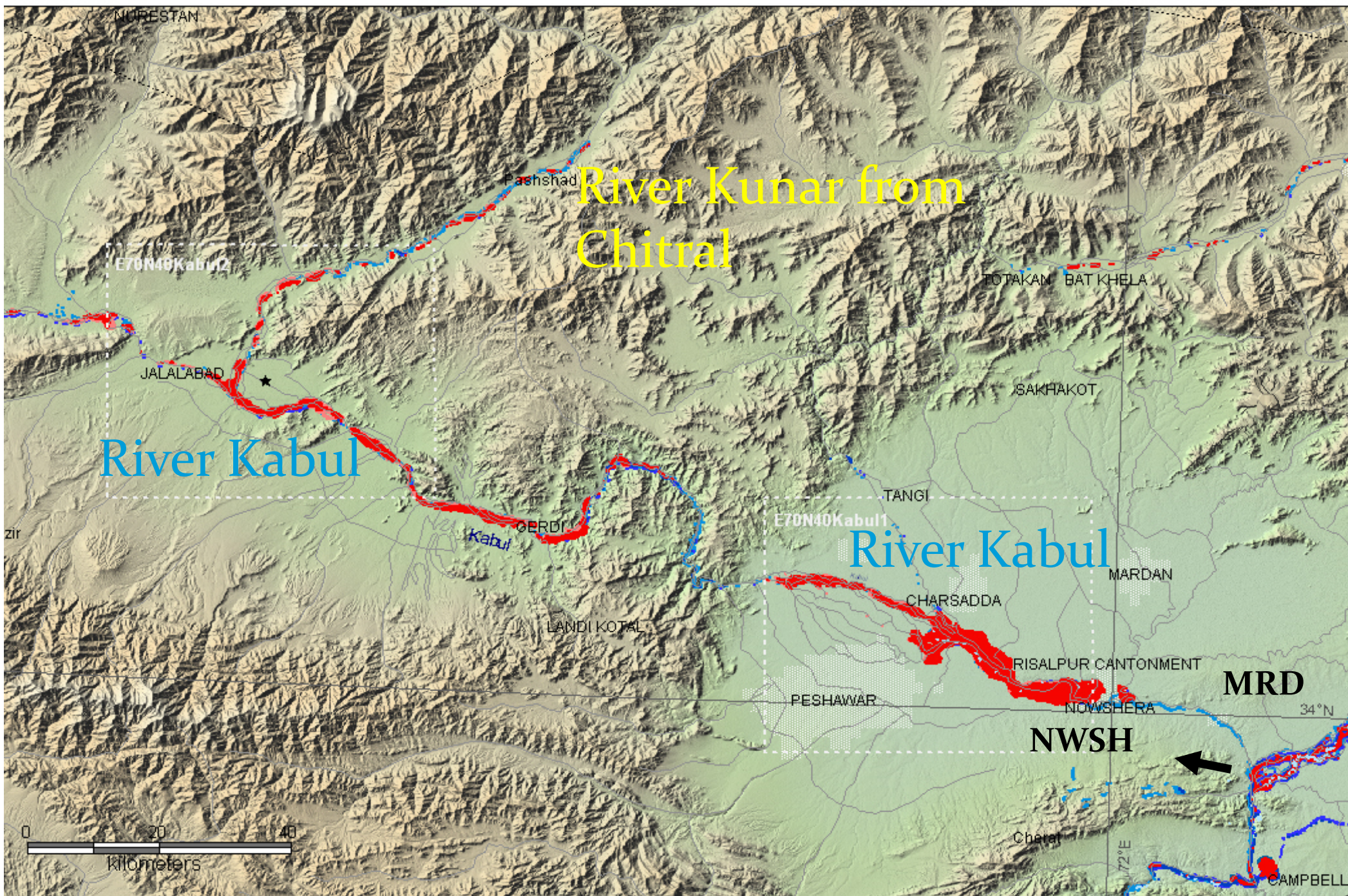
MODIS flood inundation limit
June 28, 2005: ■
MODIS flood inundation limit
June 26, 2005: ■

Flooded Lands in: 2005
2004
2003
2002

MODIS reference water: ■
DCW Rivers: ■
Urban Areas: ■

Universal Transverse Mercator
UTM Zone 43 North - WGS 84
Graticule: 2 degrees
Shaded relief from SRTM data

Copyright 2005
Dartmouth Flood Observatory
Dartmouth College
Hanover NH, 03755 USA
Elaine K Anderson - G. R. Brakenridge



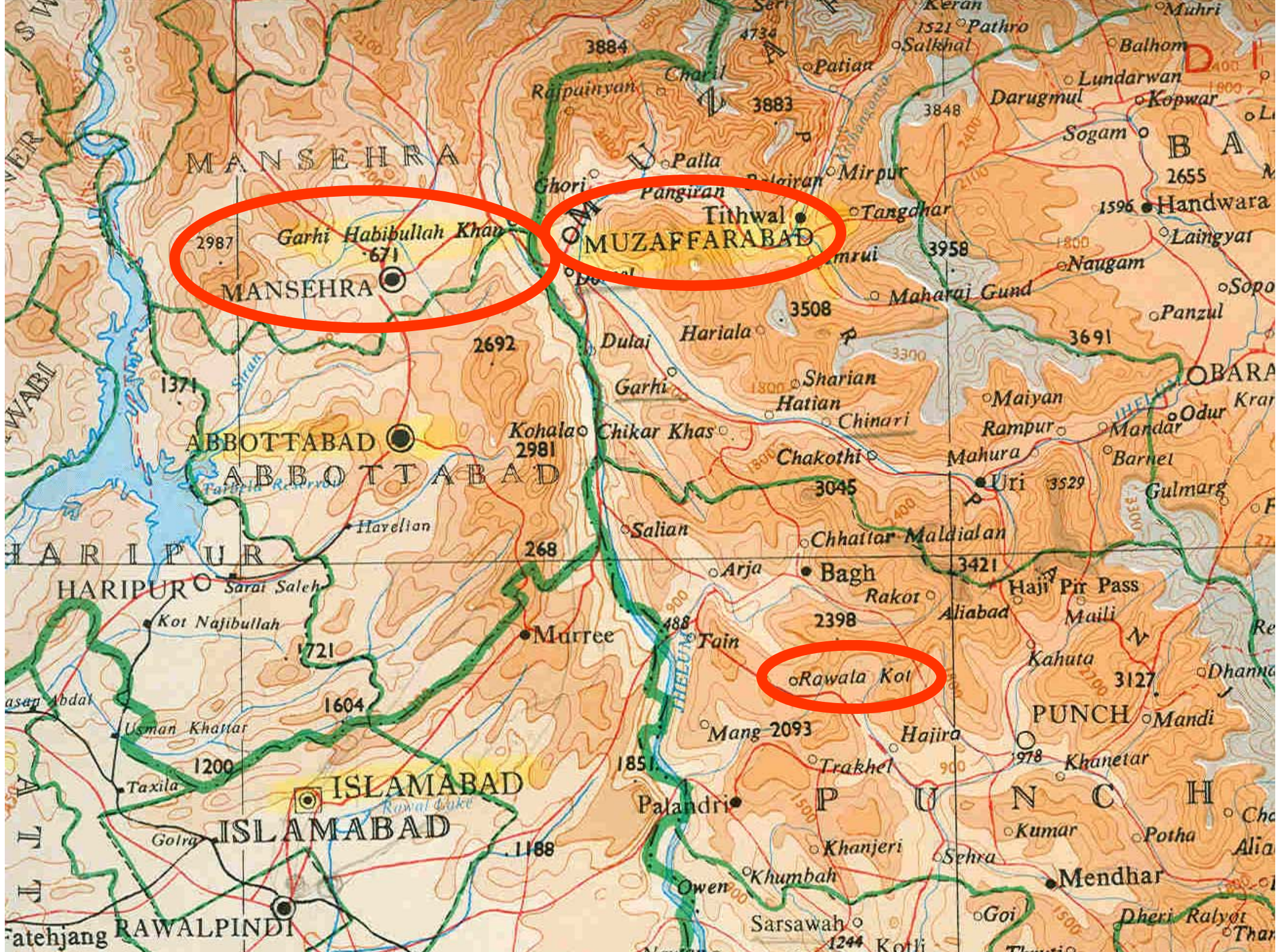
Potential Flash Flooding in Azad Kashmir

**Grahi Habib
Ullah**

Muzaffarabad

Rawlakot

Balakot



Garhi Habibullah Khan
MANSEHRA

MUZAFFARABAD

Rawala Kot

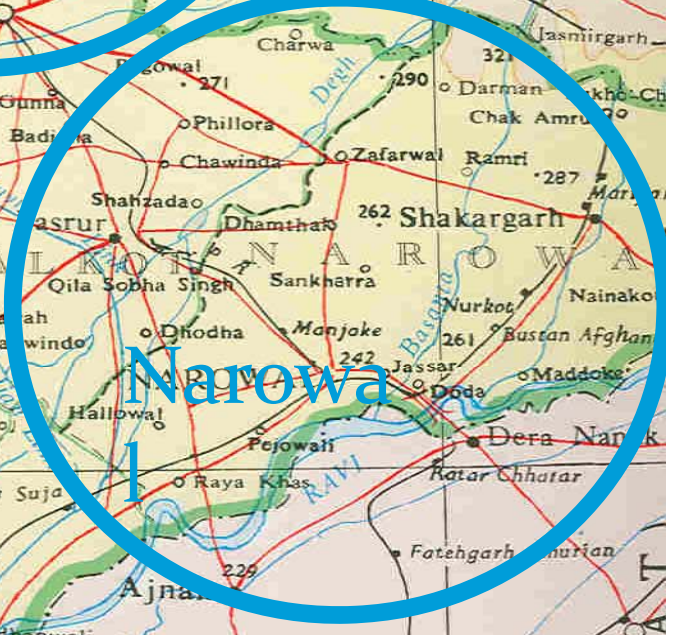
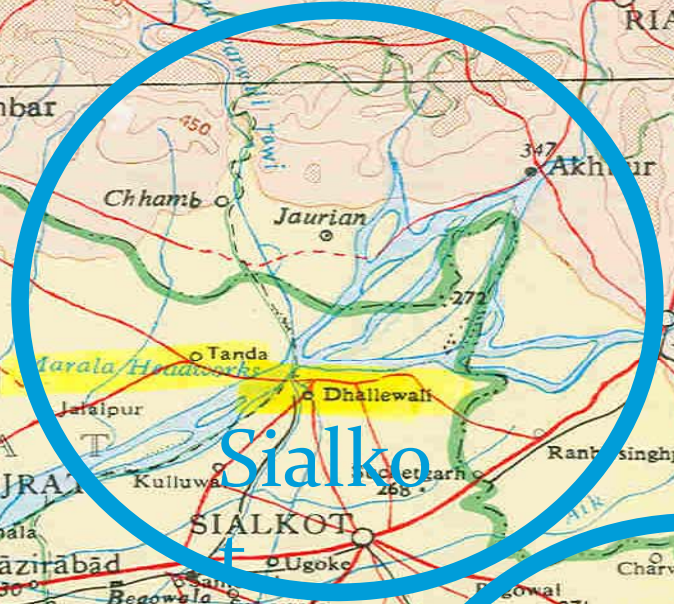
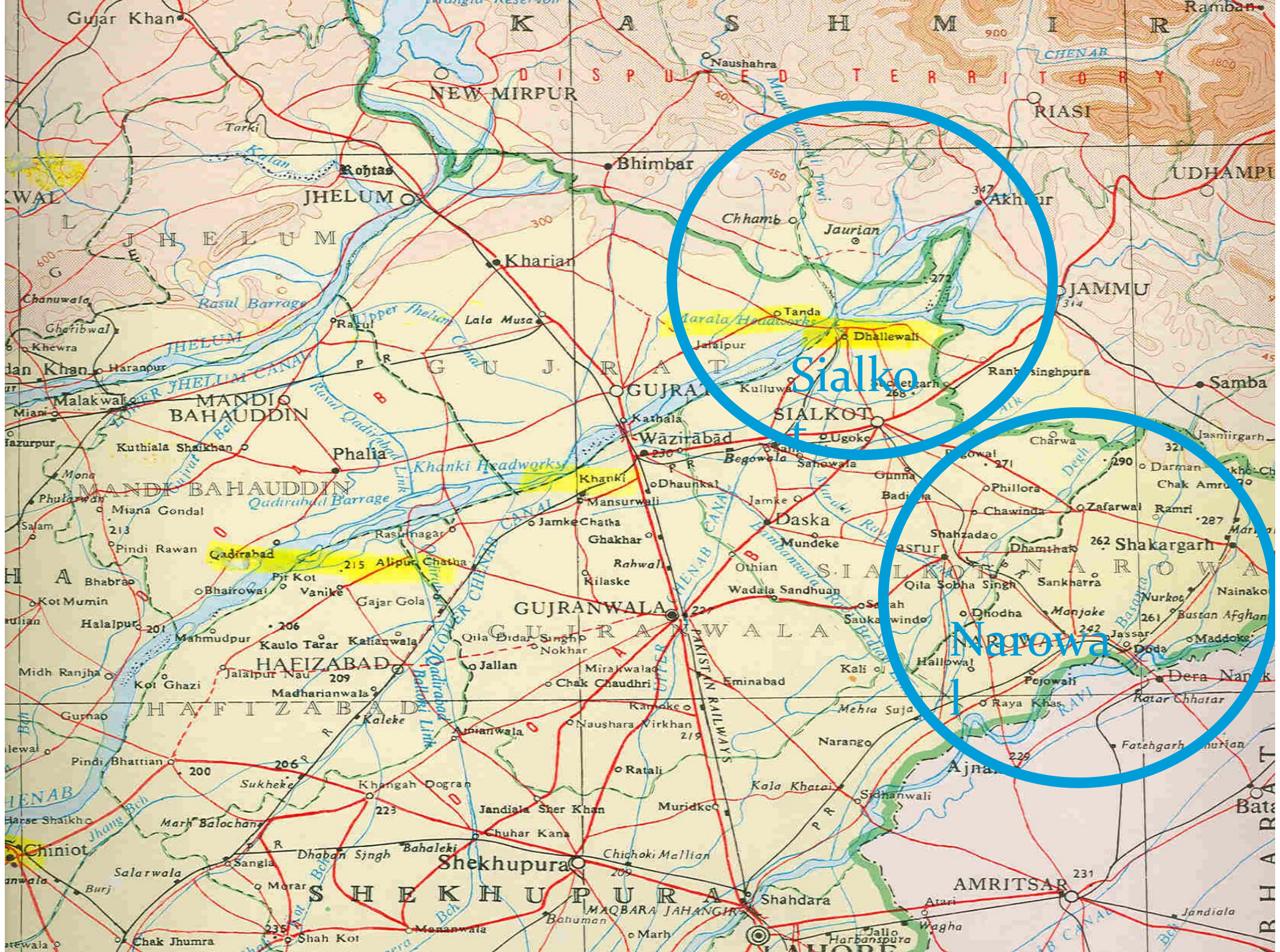
Potential Flash Flooding in Punjab

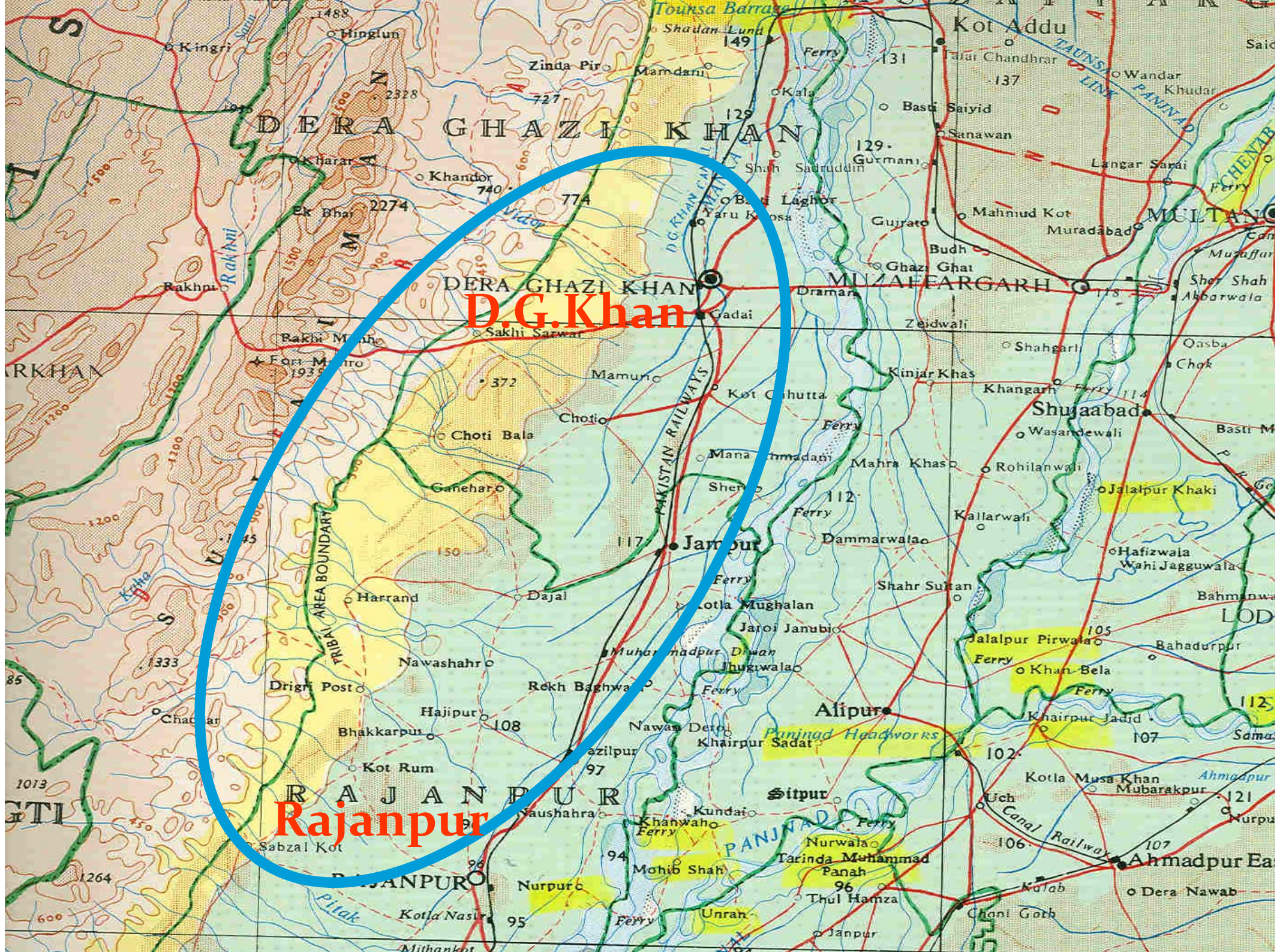
Sialkot (Head Marala), Bajawat, Bhimber at Wazirabad, Deg etc.

Zafarwal, Narowal

Bakkar, Mianwali

D.G.Khan





D.G.Khan

Rajanpur

Potential Flash Flooding in Balochistan

Hub Dam

Mirani Dam

Hingol River

Dusht

Kech

Quetta Valley

Coastal Areas
Pasni, Gawadar
Jiwani

Nihang Kec h

Dasht



Potential Flash Flooding in Sindh

Hyderabad

Badin

Sanghar

Karachi

Vulnerabilities of the region and Need for strengthening the early warning system

Climate of Pakistan

Pakistan is historically prone to Extreme Weather Events/Disasters, such as;

■ Snow-melt Flooding	■ Extreme Heat in May/June
■ Heavy Rains/River Flooding	■ Extreme Rainfall (Monsoon)
■ Torrential Rain/Flash Flooding	■ Extreme Rainfall (Monsoon)
■ Urban Flooding	■ Extreme Rainfall (Monsoon)
■ Cyclones/Coastal Flooding	■ Tropical Cyclones (Pre & Post Monsoon)
■ Water Crises/Droughts	■ Dry Spell (Deficient Monsoon/Winter rain)

In Pakistan, more than 70% Extreme Weather Events are associated with Monsoon Season



• Hydrological Issues

1. Lack of real time hydrological data (Radars, AWS, Telemetric...).
2. Trans-boundary data for eastern rivers not available.
3. Lack of GLOF monitoring & Flash Flood Warning System



UNDERSTAND the Climate Risk
COMMUNICATE the Climate Risk

Thank you!