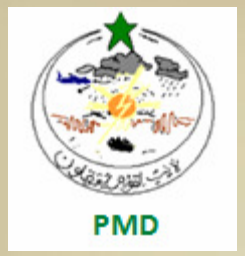


UNESCO Project

Strategic Strengthening

of

Flood Warning and

Management Capacity of Pakistan

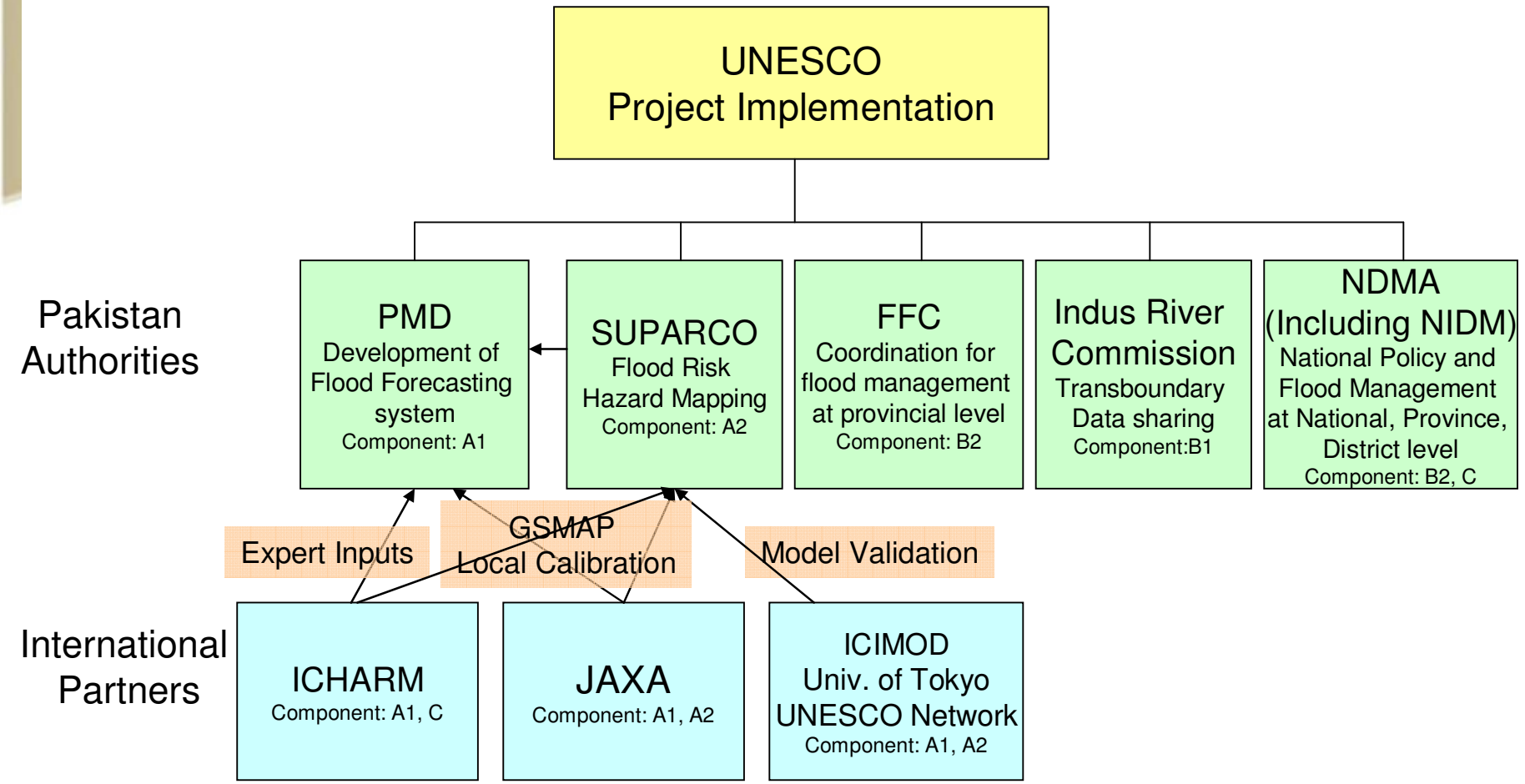
OBJECTIVES

a) Strengthening of the country's flood early warning system to ensure safe recovery and return to livelihoods of the affected population.

b) Development and implementation of flood hazard maps at the community level.

c) Developing both international and local platforms for timely sharing of hydrometeorological observations.

Implementation Framework



PMD Pakistan Meteological Department

SUPARCO Pakistan and Upper Atmosphere Research Commission

FCC Federal Flood Commission

NDMA National Disaster Management Authority

NIDM National Institute of Disaster Management

ICHARM International Centre for Water Hazard and Risk Management under the auspices of UNESCO

ICIMOD International Centre for Integrated Mountain Development

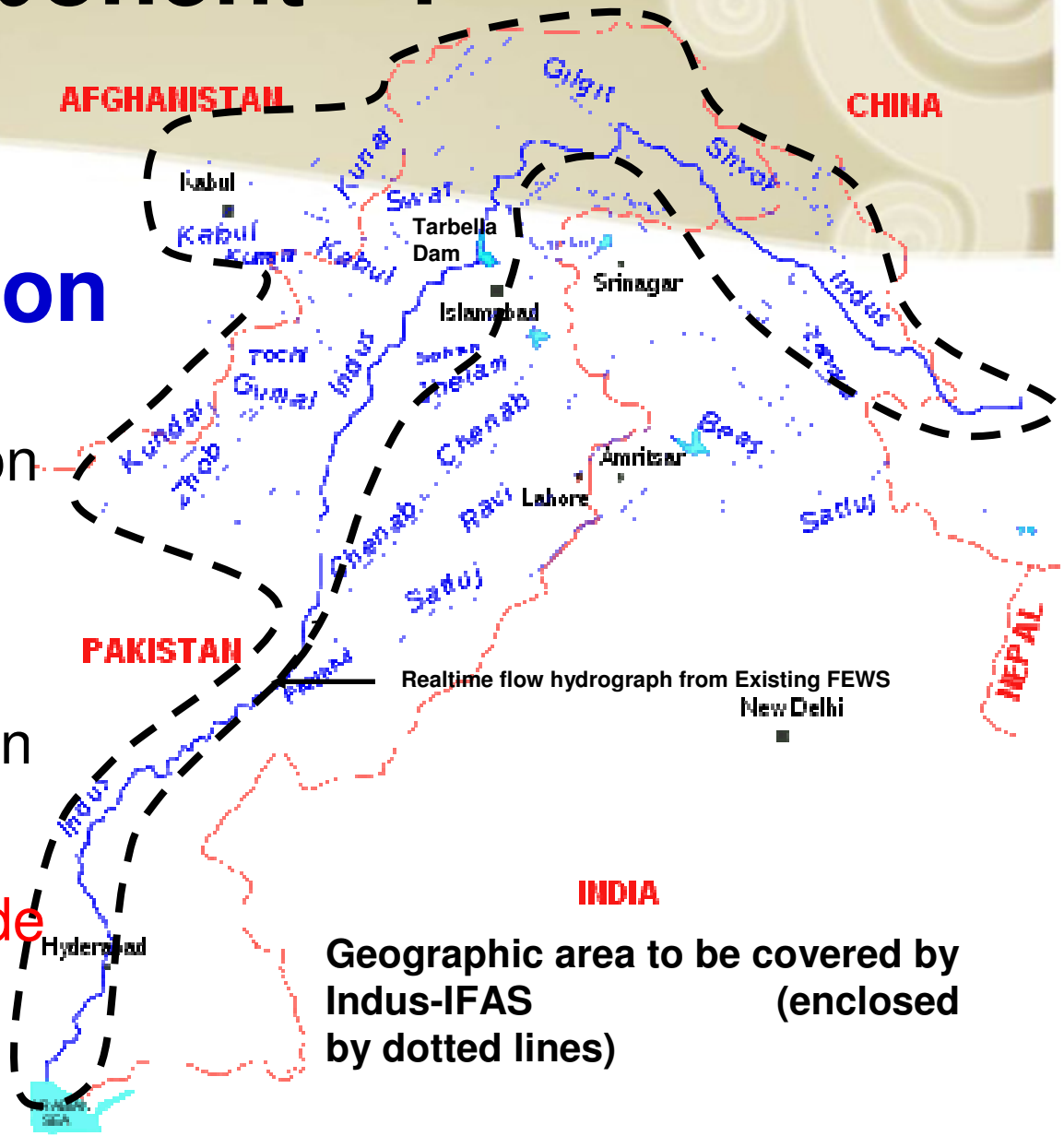
JAXA Japan Aerospace Exploration Agency

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



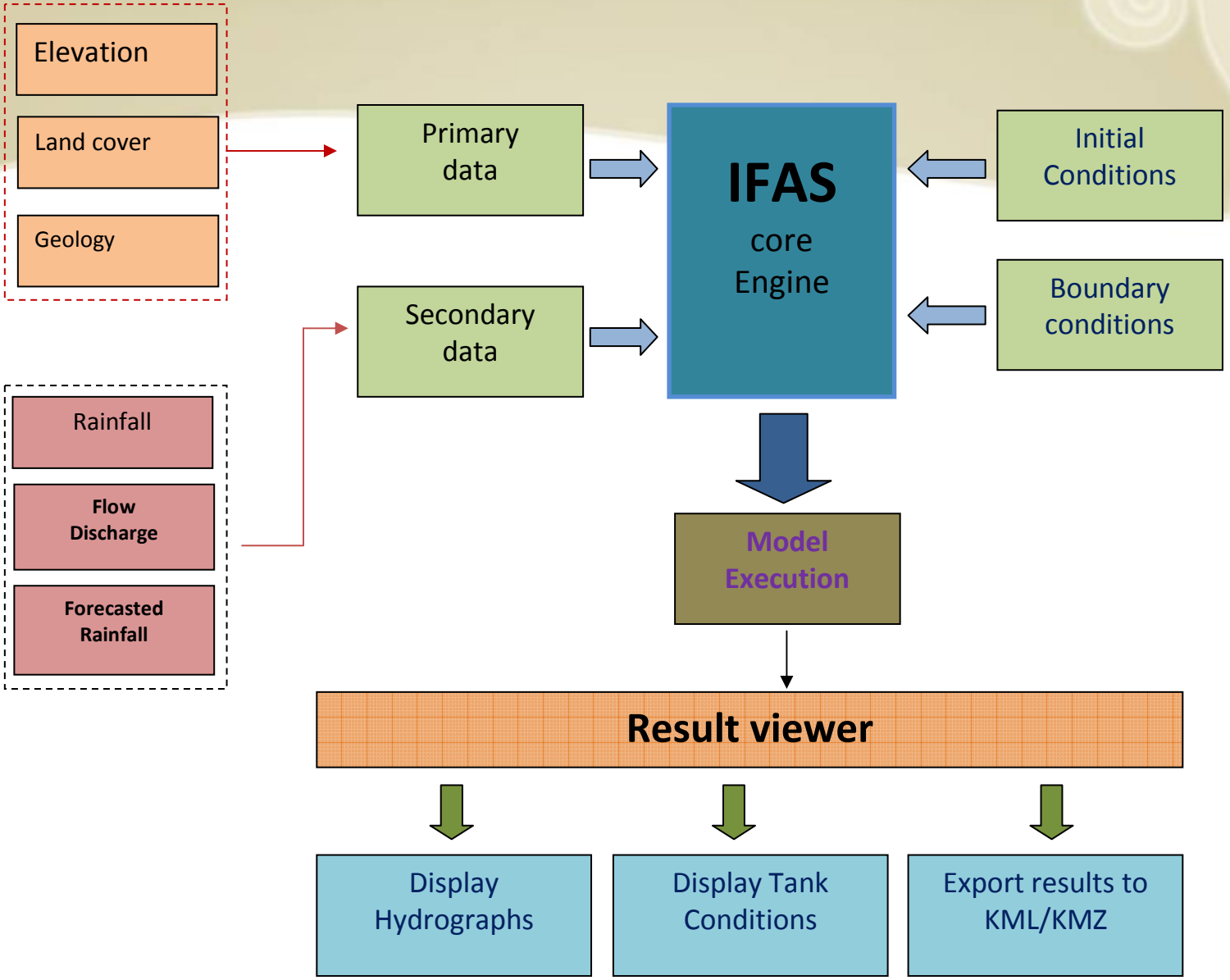
Geographic area to be covered by Indus-IFAS (enclosed by dotted lines)

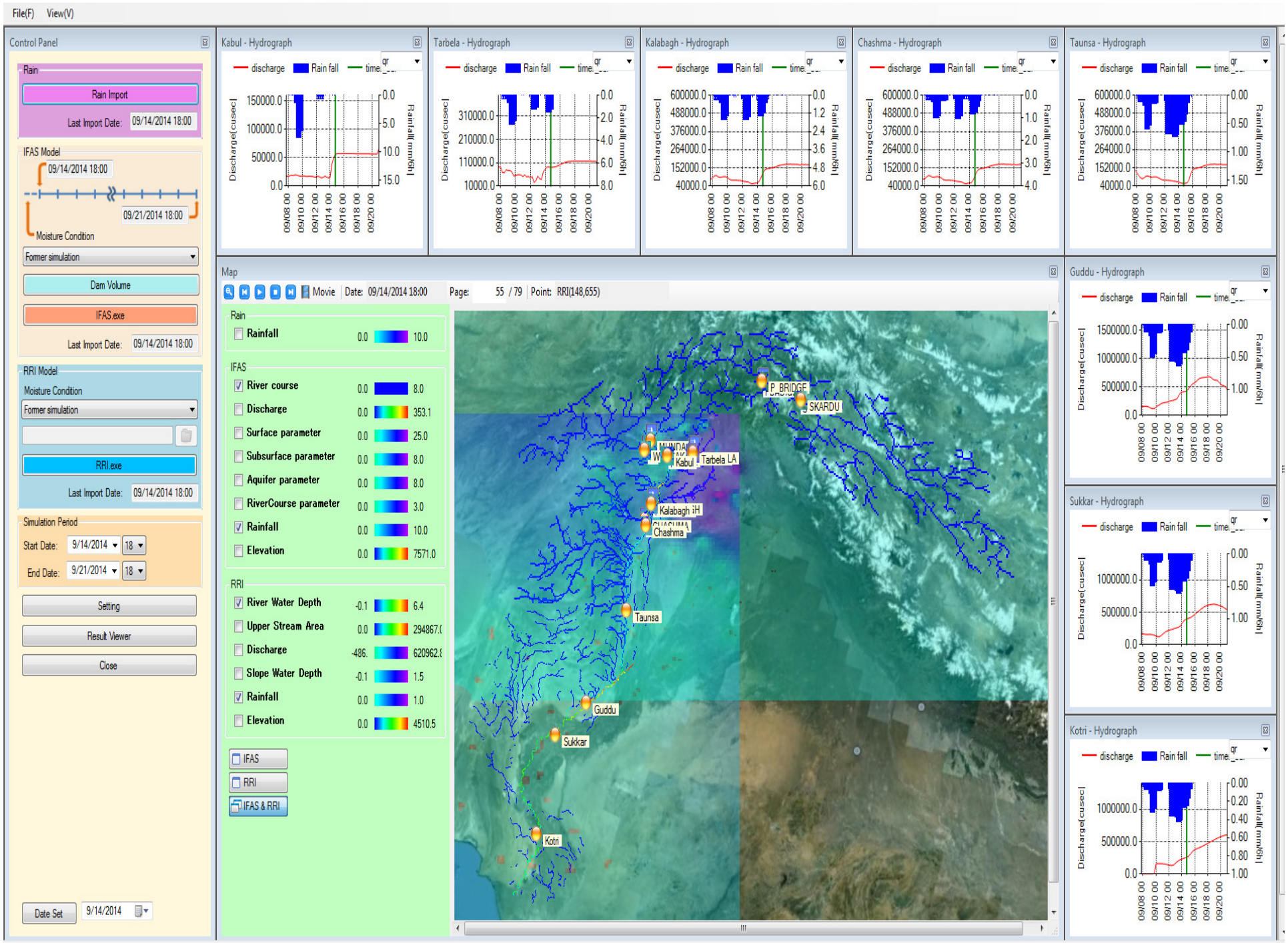
Project Component – 1 (A1)

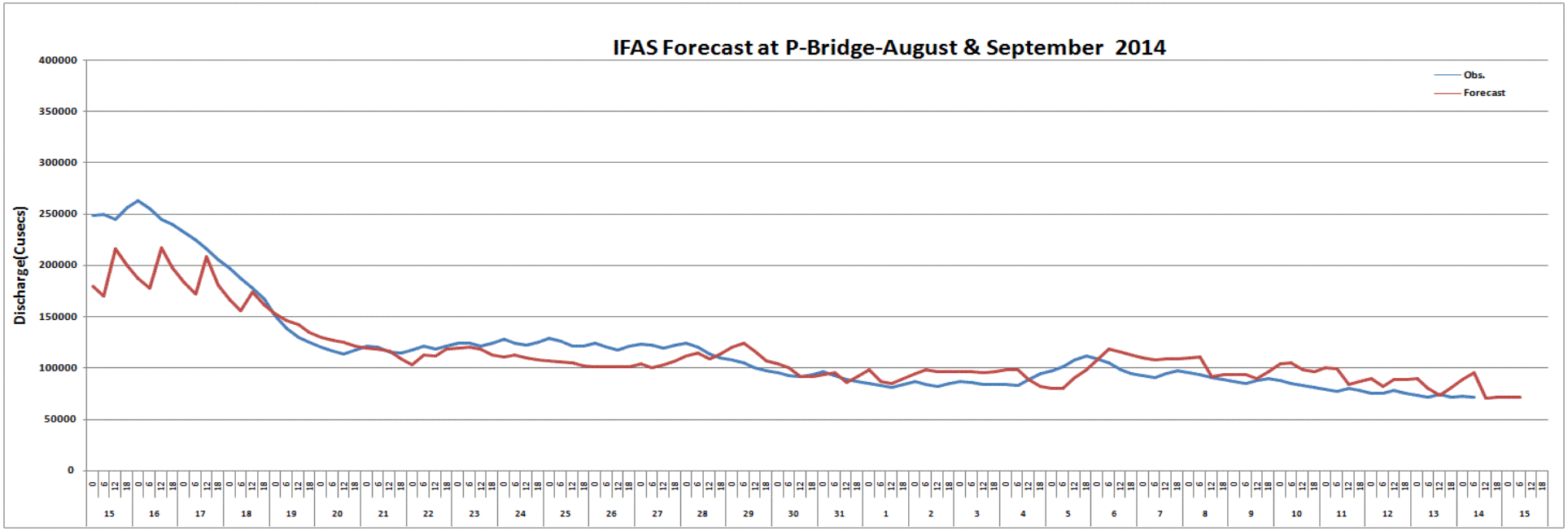
- Indus-IFAS was to be developed and calibrated by ICHARM in collaboration with the government of Pakistan

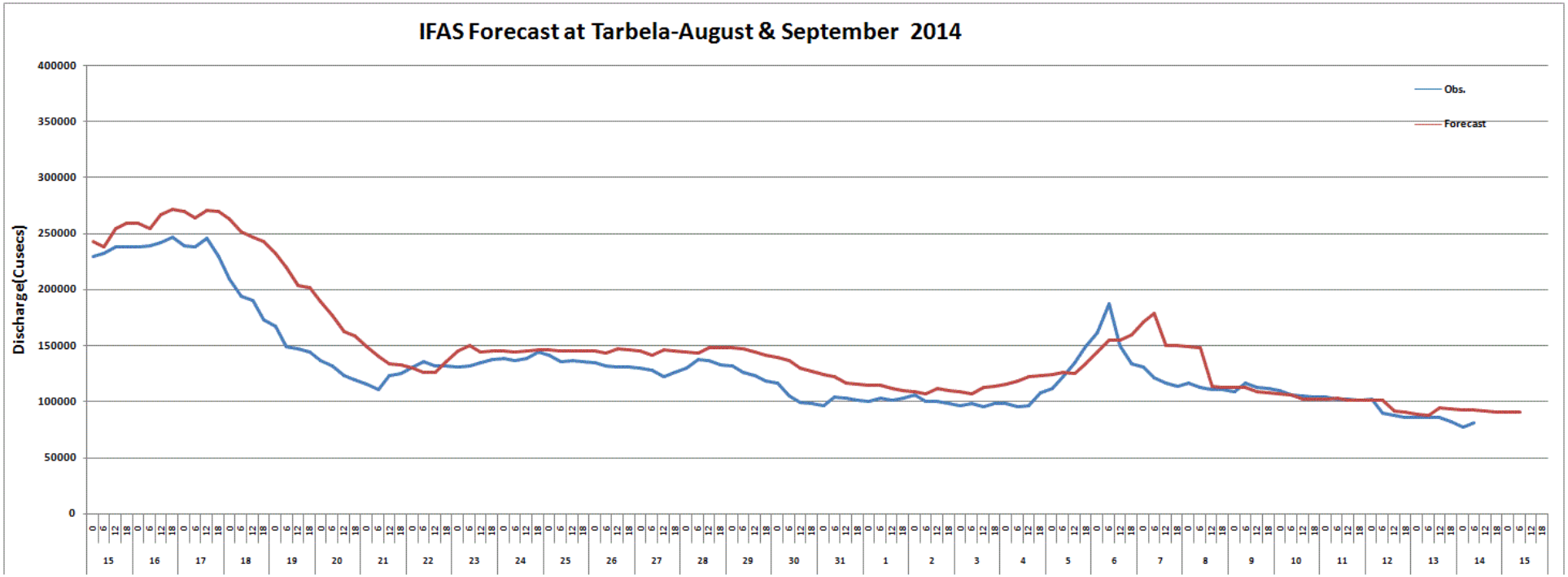
- Version 1.0 has been handed over to PMD-FFD Lahore and test simulations are being carried out and Models have been made operational

Work FLOW of Indus IFAS




File(F)
View(V)
Control Panel
Rain
Rain Import
Last Import Date: 09/14/2014 18:00
IFAS Model
09/14/2014 18:00
09/21/2014 18:00
Moisture Condition
Former simulation
Dam Volume
IFAS.exe
Last Import Date: 09/14/2014 18:00
RRI Model
Moisture Condition
Former simulation
RRI.exe
Last Import Date: 09/14/2014 18:00
Simulation Period
Start Date: 9/14/2014 18
End Date: 9/21/2014 18
Setting
Result Viewer
Close
Date Set 9/14/2014
Kabul - Hydrograph
Tarbela - Hydrograph
Kalabagh - Hydrograph
Chashma - Hydrograph
Taunsa - Hydrograph
discharge
Rain fall
Discharge(cusec)
Rainfall(mm/6h)
Map
Movie
Date: 09/14/2014 18:00
Page: 55 / 79
Point: RRI(148,655)
Rainfall 0.0 10.0
River course 0.0 8.0
Discharge 0.0 353.1
Surface parameter 0.0 25.0
Subsurface parameter 0.0 8.0
Aquifer parameter 0.0 8.0
RiverCourse parameter 0.0 3.0
Rainfall 0.0 10.0
Elevation 0.0 7571.0
River Water Depth -0.1 6.4
Upper Stream Area 0.0 294867.(
Discharge -486. 620962.8
Slope Water Depth -0.1 1.5
Rainfall 0.0 1.0
Elevation 0.0 4510.5
IFAS
RRI
IFAS & RRI
P_BRIDGE
SKARDU
Tarbela LA
Kalabagh
Chashma
Taunsa
Guddu
Sukkar
Kotri
Guddu - Hydrograph
Sukkar - Hydrograph
Kotri - Hydrograph


IFAS Forecast at P-Bridge-August & September 2014
Obs.
Forecast
Discharge(Cusecs)
400000
350000
300000
250000
200000
150000
100000
50000
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

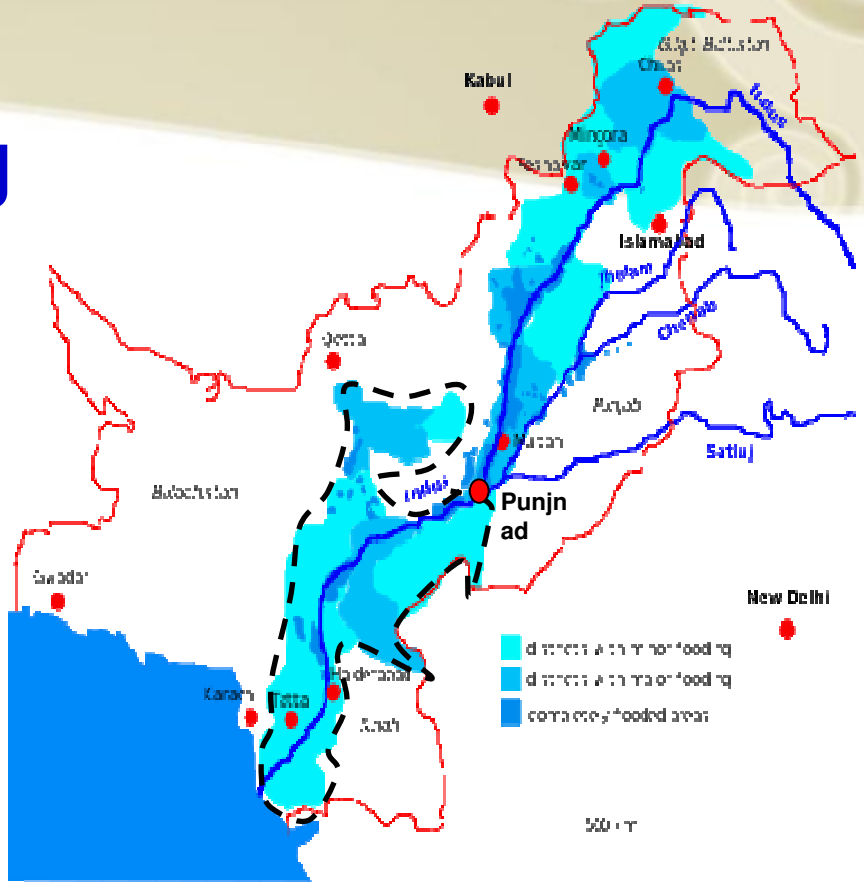

IFAS Forecast at Tarbela-August & September 2014
Obs.
Forecast
Discharge(Cusecs)
400000
350000
300000
250000
200000
150000
100000
50000
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Project Component - 1

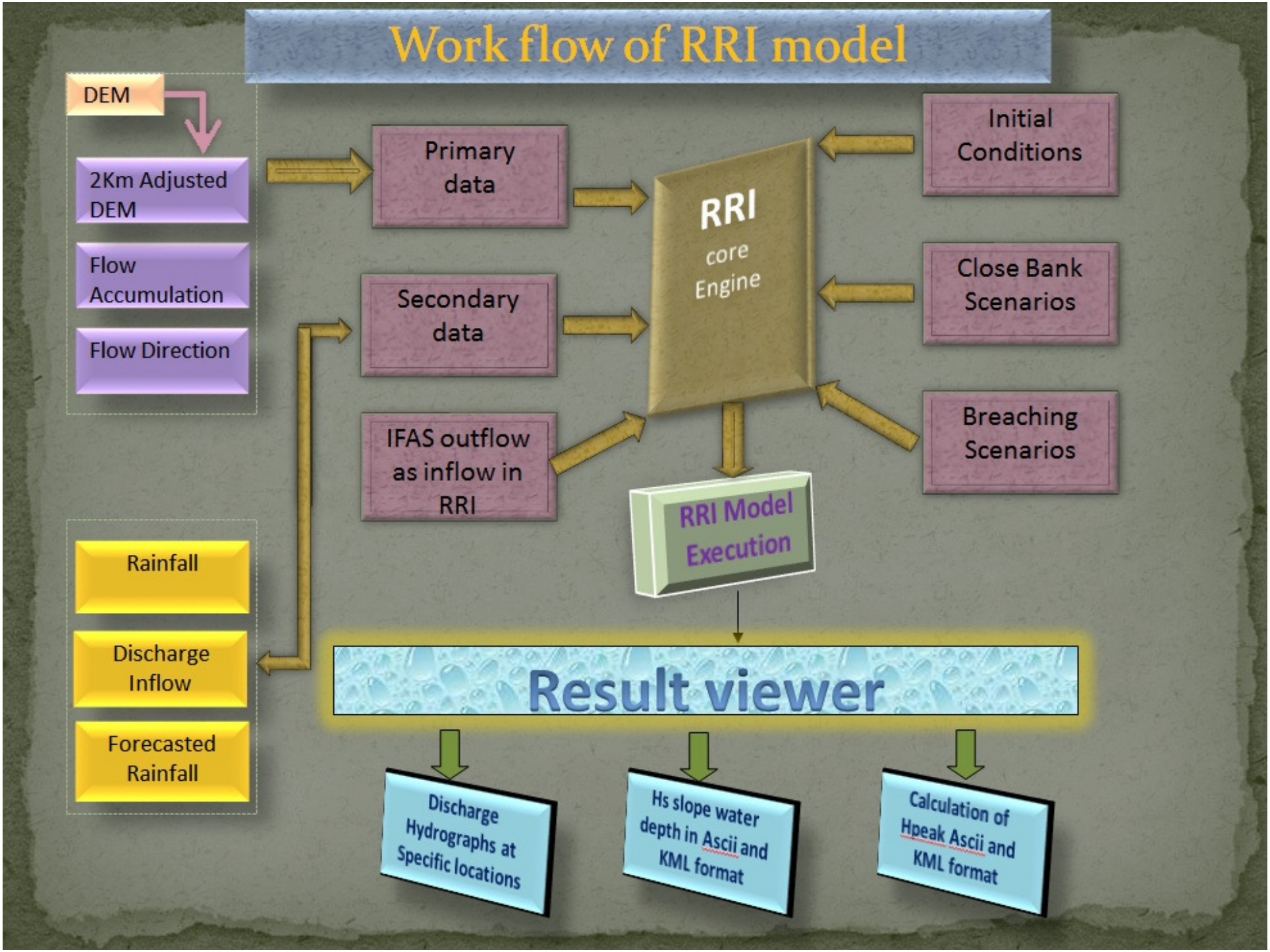
A2

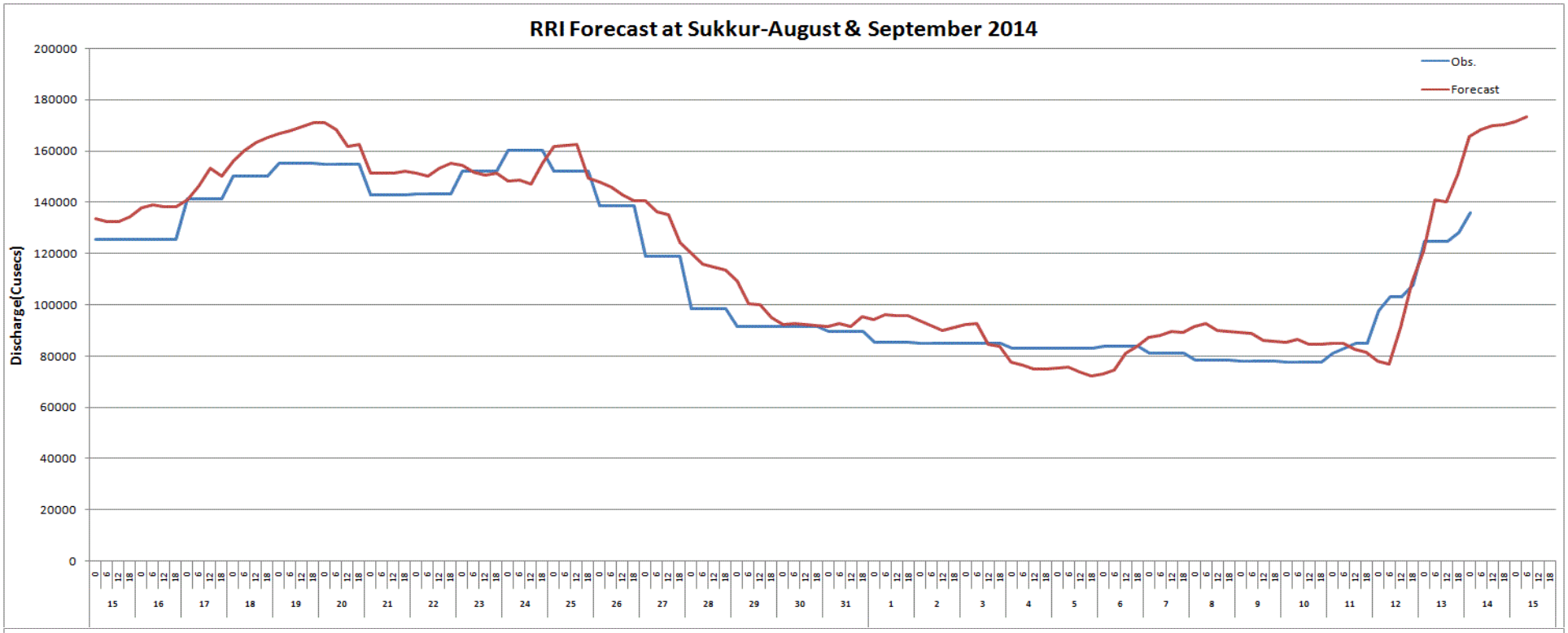
Flood Hazard Mapping

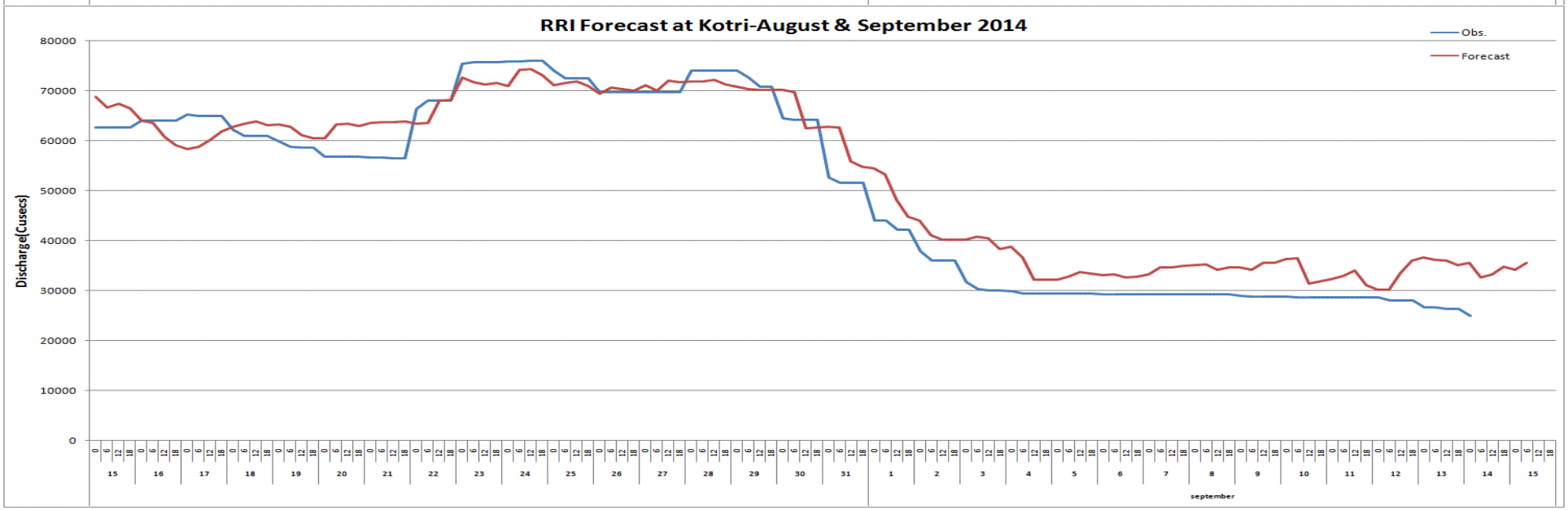
- Final and updated version of RRI integrated with Indus-IFAS has been provided.
- Cover lower Indus including newly affected areas by the flood 2010
- Version 1.0 has been handed over to PMD-FFD Lahore and test simulations are being carried out.

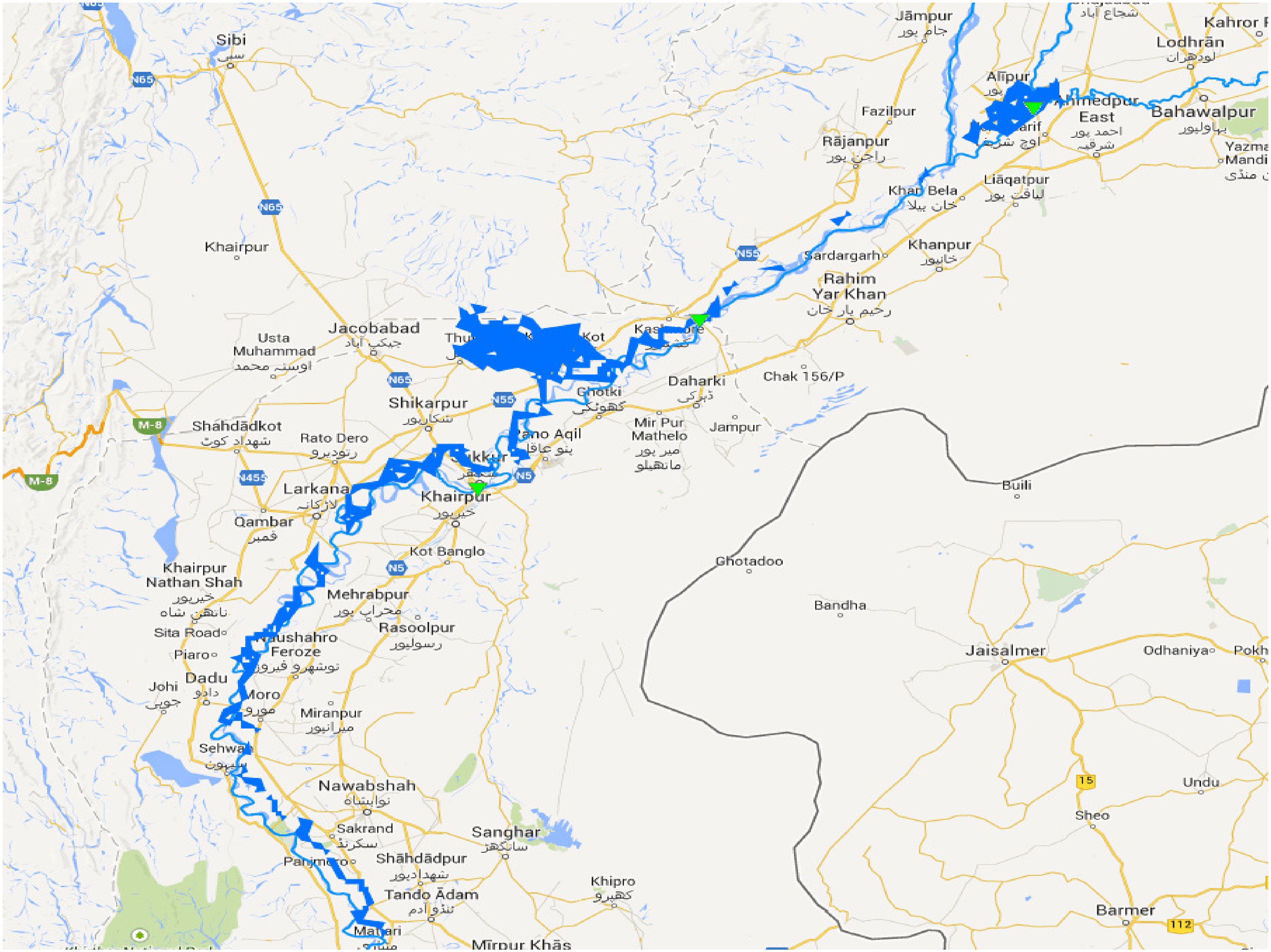


Proposed Flood Hazard Mapping Area (enclosed by dotted lines)


Work flow of RRI model
DEM
2Km Adjusted DEM
Flow Accumulation
Flow Direction
Primary data
Secondary data
IFAS outflow as inflow in RRI
RRI
core Engine
Initial Conditions
Close Bank Scenarios
Breaching Scenarios
RRI Model Execution
Rainfall
Discharge Inflow
Forecasted Rainfall
Result viewer
Discharge Hydrographs at Specific locations
Hs slope water depth in Ascii and KML format
Calculation of Hpeak Ascii and KML format


RRI Forecast at Sukkur-August & September 2014
Obs.
Forecast
Discharge(Cusecs)
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15


RRI Forecast at Kotri-August & September 2014
Obs.
Forecast
Discharge(Cusecs)
80000
70000
60000
50000
40000
30000
20000
10000
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
september


Sibi
N65
Jāmpur
Kahror P
Lodhrān
Alīpur
Fazilpur
Ahmedpur East
Bahawalpur
Rājanpur
Yazman Mandi
Liāqatpur
Khan Bela
Khairpur
Khanpur
N55
Sardargarh
Rahim Yar Khan
Jacobabad
Usta Muhammad
Kot
N65
Daharki
Chak 156/P
Shikarpur
N55
Ghotki
M-8
Shahdādkot
Rato Dero
Rano Aqil
Mir Pur Mathelo
Jampur
N455
Larkana
Khairpur
N5
Buili
Qambar
M-8
Kot Banglo
Ghotadoo
N5
Khairpur Nathan Shah
Mehrabpur
Bandha
Sita Road
Rasoolpur
Piaro
Feroze
Jaisalmer
Odhaniya
Pokh
Johi
Dadu
Moro
Miranpur
Sehwan
Nawabshah
15
Undu
Sakrand
Sanghar
Sheo
Shāhdādpur
Khipro
Tando Ādam
Barmer
112
Mīrpur Khās

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.

TRAININGS

- **Training (at ICHARM Japan)**

  Five PMD Professionals have received training up to MS Level and worked on IFAS Model from Japan

- **Training in GIS**

  Six PMD professionals are doing their MS in GIS/Remote Sensing at SUPARCO Institute Karachi

➢ Follow up training at ICHARM & JAXA Japan

Three officers from PMD/FFD have completed 10 days training at ICHARM & JAXA at Japan for resolving the problems in Indus-IFAS, RRI Models and GSMaP in the month of January 2014

International Workshop

- First International workshop on the "Accuracy & Reliability of Flood Forecasting Models using remote Sensing Techniques" was organized in Lahore on 17-18 July 2012.

- Proceedings have been published.

- More than 80 participants from various organizations have been benefited.

Second International Workshop

The second workshop was held in Avari hotel Lahore from 18 to 19 December 2013 followed by Board meeting on 20th December 2013. The title of 2nd workshop was "Reliable Flood Forecasting – A Challenge for Data, Models or Forecaster Skills". More than 70 participants from various organizations attended.

Media Centre at Lahore

1. The media centre at Lahore has been setup and is operative. The flood warnings and alerts will be on air during the Flood Season 2014 on regular basis at 0500 UTC daily and six hourly in critical situation.

2. The audio/video forecast/warning will be sent to national television & radio stations and the same will be updated on the PMD/FFD website. The private television & radio stations will download.

Media Centre at Lahore

Need to Extend IFAS to other river Basins in Pakistan

Representatives from PMD, SUPARCO, NDMA, FFC, WAPDA, UNESCO Islamabad & Paris, ICHARM, JICA, Planning Division have recommended and agreed that the project should be extended to include other tributaries of Indus River Basin .i.e. Jhelum, Chenab, Ravi & Sutlej up to downstream Kotri.

THANK YOU