

Identifying River Bank Erosion Hot Spots and Mapping River Discharge Data using Geo-spatial Technologies

Dr. Zahir Ali, SUPARCO

Hafiz Uzair Ahmed Khan, SUPARCO

Fahad Ahmed, SUPARCO

Project Aim

This project was funded by FAO and run by SUPARCO & the University of Southampton, UK. The project aimed to work with UNESCO IFAS flood model for estimating potential agricultural land loss associated with a given flood episode to produce decision support information for the planning of optimal river erosion defence infra-structure.

Key Activities Carried out in the Project

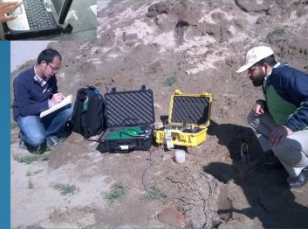
- ✓ Mapping of erosion based land loss and agricultural impact on the river Indus due to 2010 floods
- ✓ Statistical analysis of 20 years satellite data for trend analysis of historical erosion hot spots
- ✓ Conducting field tests of characteristic geotechnical properties of riverbanks to model likely impacts of given flood events on agricultural land & production as well as high potential for embankment breach
- ✓ Building capacity in the country to conduct analysis and field work with joint production of erosion models based upon flood work and associated reporting/publications

Project Overview

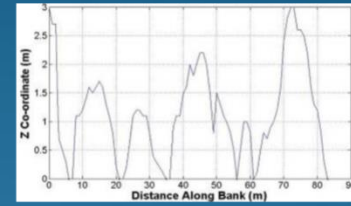


High flow Survey

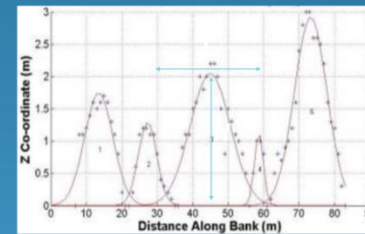
1 Field surveys



Low flow Survey

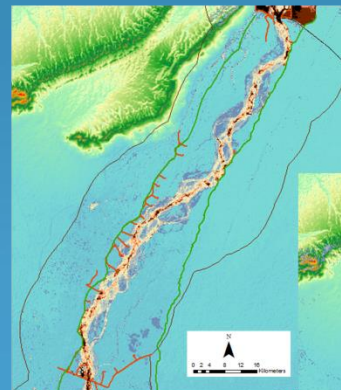


2 Transect

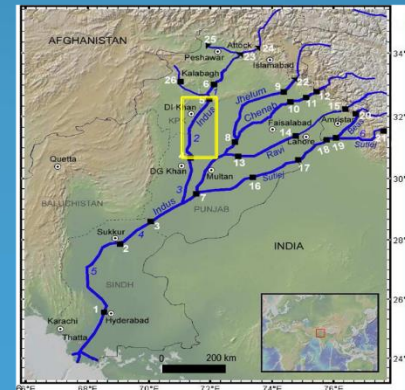
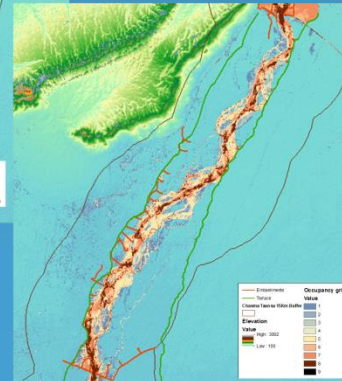


3 Model bank roughness elements as Gaussian shapes

4 Statistical model of bank roughness in terms of H , l , C_d



Low flow occupancy grid



Study Area

Project Rationale

IFAS – Flood
Extent Model

UNESCO/PMD

+

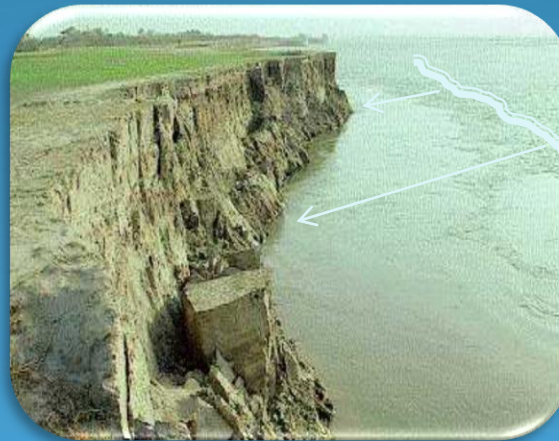
Bank Erosion
Modelling – Loss
of Agricultural
Land & Breach

FAO/SUPARCO/SOTON

=

Full
Warning
System

Govt. of Pakistan



Equipment used in Data Collection

Total Station



Low flow fieldwork

Cohesive Strength Meter

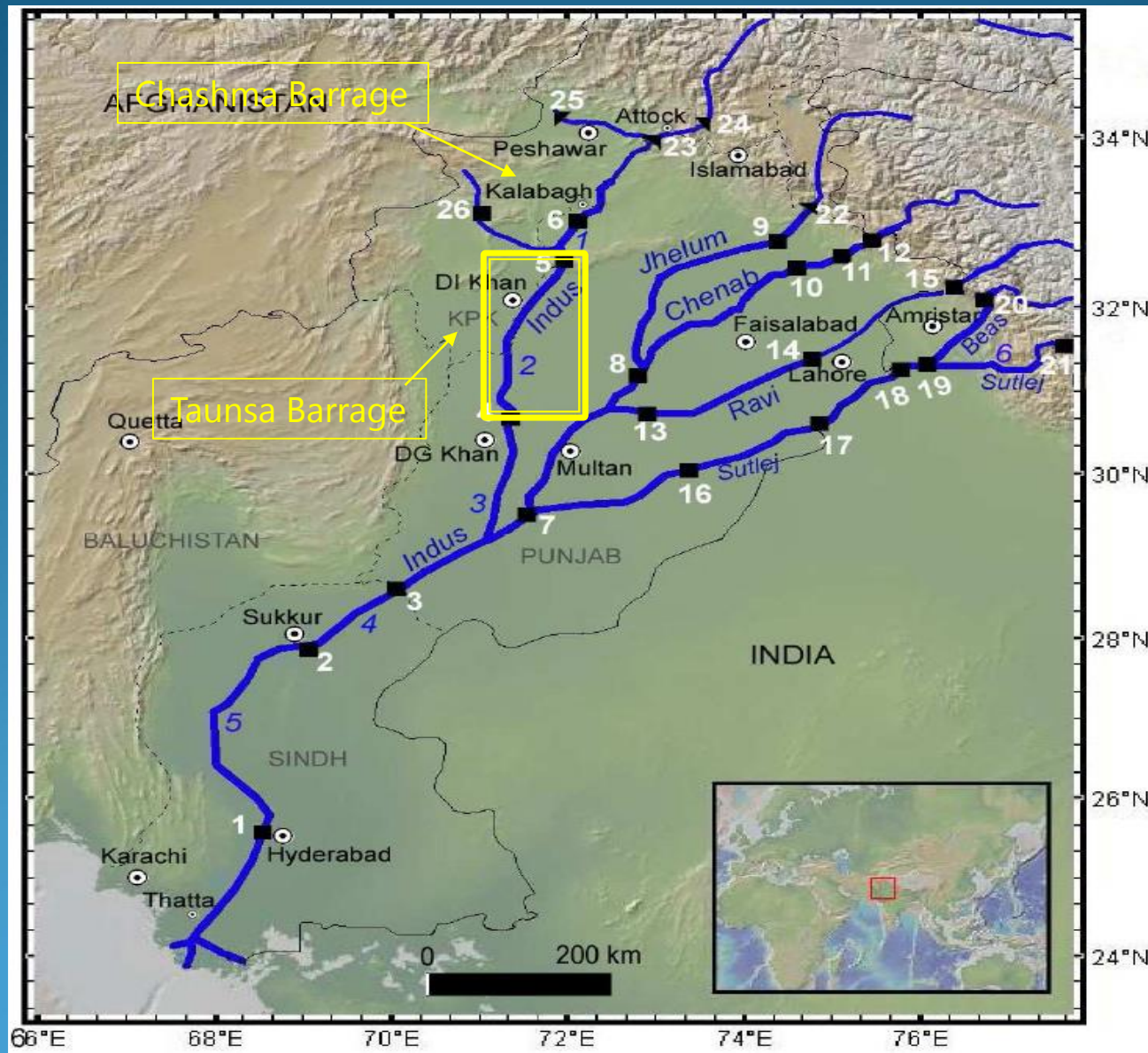


Differential Global Positioning System (GDPS) and Acoustic Doppler Current Profiler (ADCP)



High flow fieldwork

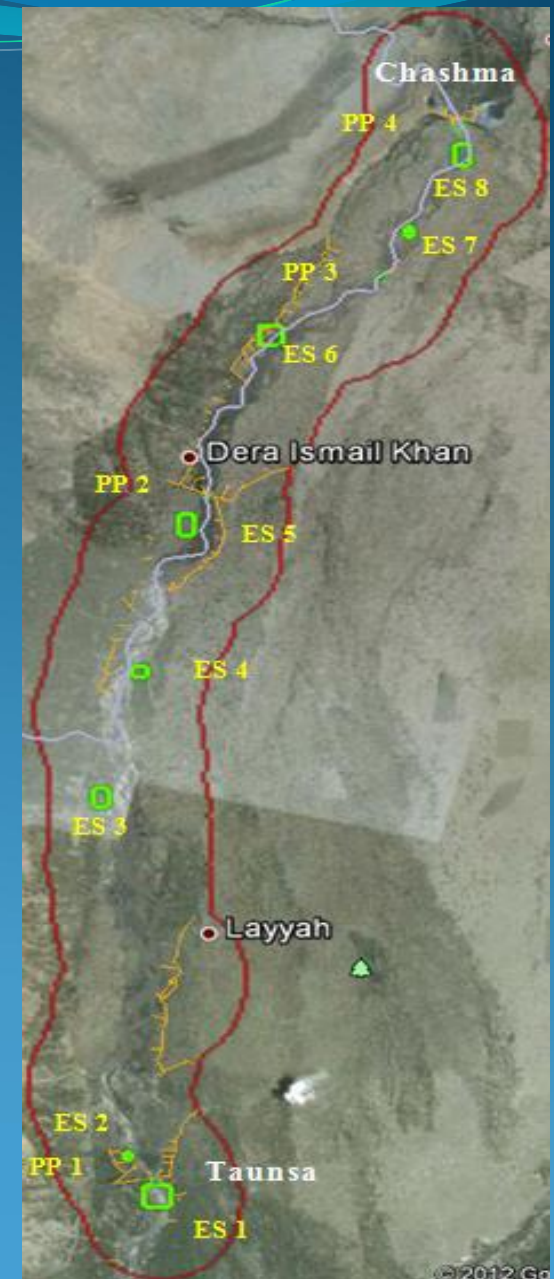
Study Sites



High Flow Data Collection

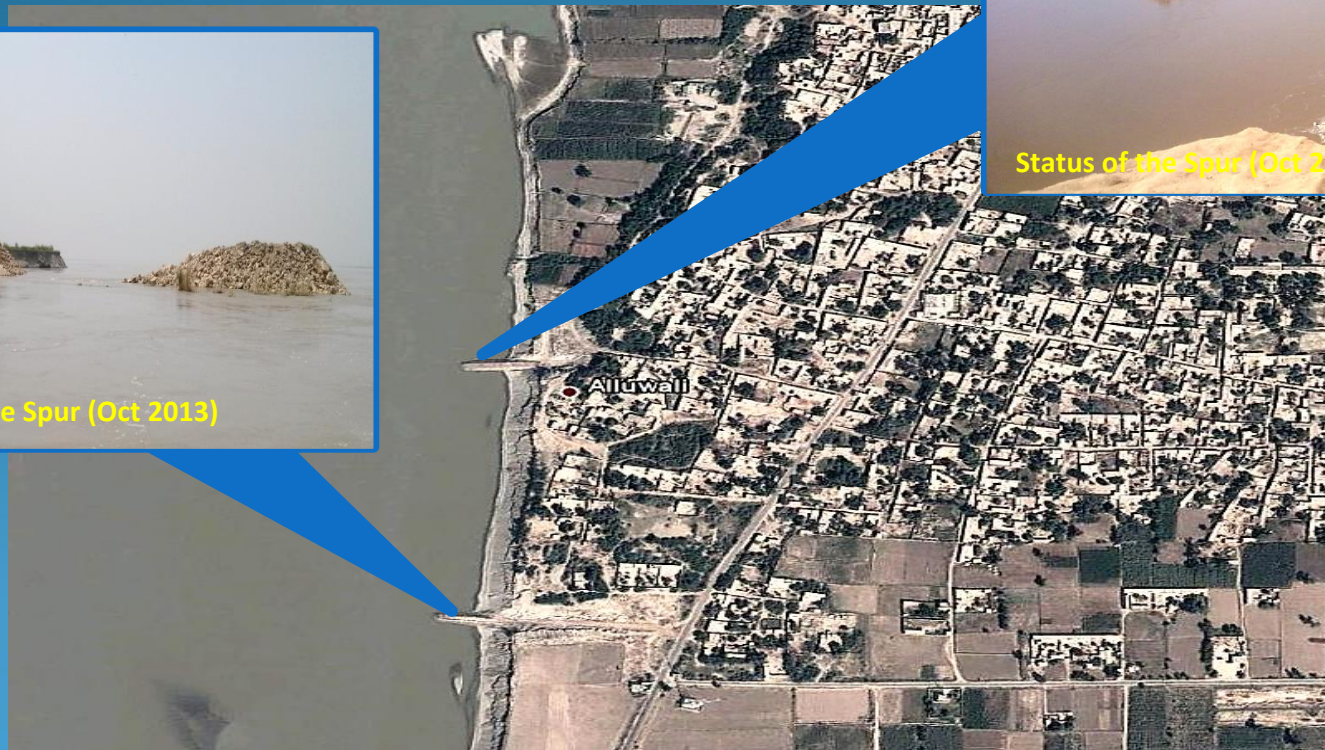
- **Three fieldworks campaigns**
 - 30th Aug - 6th Sep 2012
 - 22th Sep – 5th October 2012
 - July, Aug, Sep 2013
- **Sites visited**
 - Pinch Point 1: Downstream of Taunsa Barrage
 - Pinch Point 2: Dera Ismail Khan
 - Pinch Point 3: Musa Wali
 - Pinch Point 4: Downstream of Chashma Barrage

 - Eroding Site 1: Taunsa
 - Eroding Site 2: Taunsa
 - Eroding Site 7: Musa Wali
 - Eroding Site 8: Alluwali



Identifying Erosion Hot Spots over Time

Statistical analysis of 20 years satellite data for trend analysis of historical hot spots of erosion



Chashma Barrage Downstream - 2011

Identifying Erosion Hot Spots over Time

Aluwali, Punjab: Erosion based land loss



Chashma Barrage Downstream - 2002



Chashma Barrage Downstream - 2011

High Flow Fieldwork - Snapshots



Monitoring ADCP data



DGPS setup

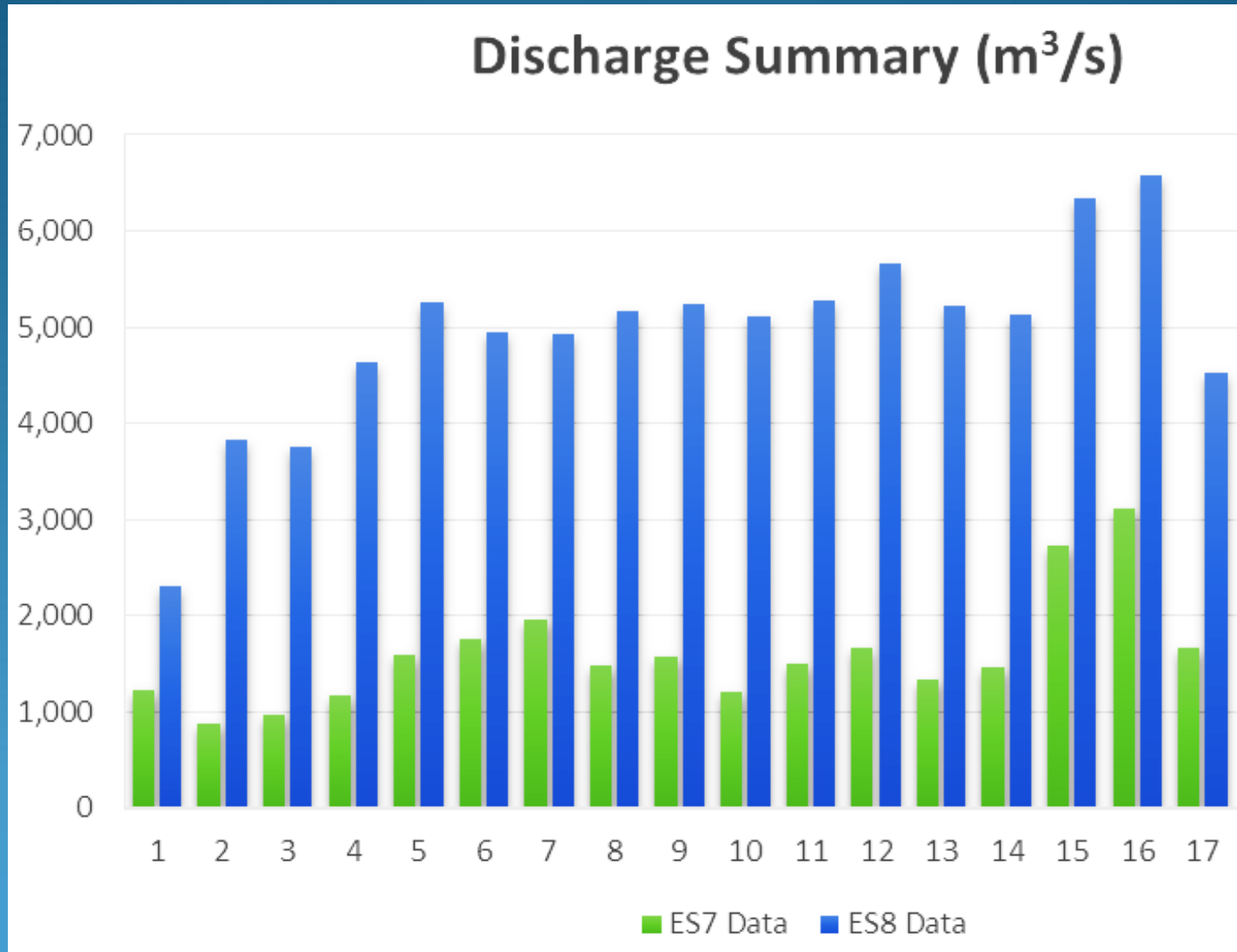


1st fieldwork, Sep 2012



2nd fieldwork, Oct 2012

Flood Discharge Data during High Flow Seasons (June-Sep 2013)

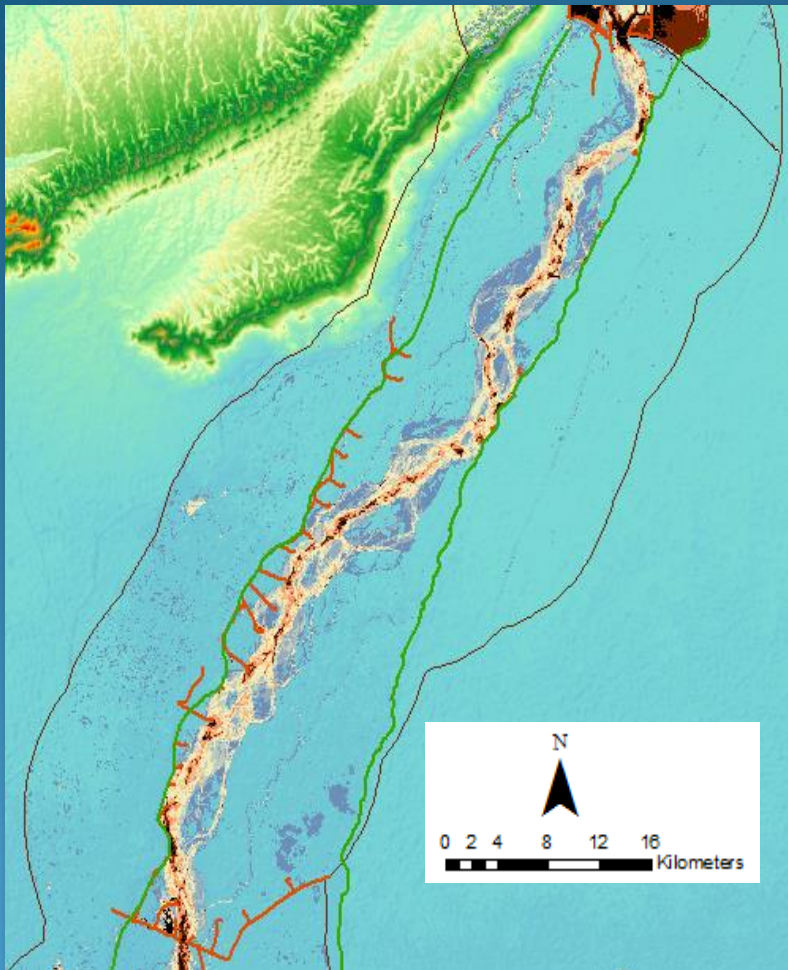


Low Flow Fieldwork - Snapshots

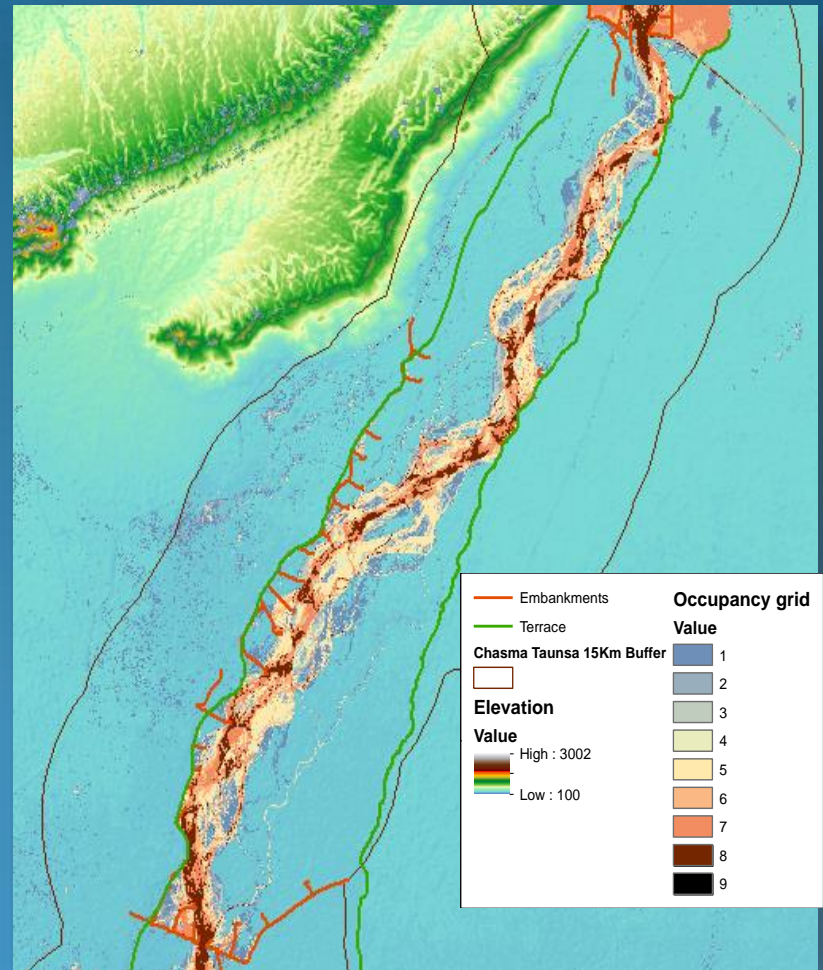
26th Feb – 6th March 2013



Floodplain Occupancy by channel & flooding



Low flow occupancy grid



High flow occupancy grid

Further Follow-up of the Project

- ✓ Extension of the project to test the flood erosion model along the River Indus in other study areas
- ✓ Further projects/studies on river mapping on all other major rivers in Pakistan on periodic basis
- ✓ Sharing of knowledge and expertise to collect river discharge data using latest technology and techniques in the future

Thank You