Economizing Water Resources Using Geospatial Technologies Based Solutions In Pakistan

By

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SUPARCO

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- Introduction
- Aim of Presentation
- Case Studies
- Concluding Remarks

Introduction

- Agriculture economy
- Variability of water demand
  - Irrigation information system
  - River course monitoring
  - Flood vulnerability assessment
  - Thematic maps development

Aim of Presentation

To apprise participants on geospatial technology based solutions in water management including;

- Geospatial technology based solutions to address hindrances in management practices
- Time efficient means of information collection
- Accurate information to stakeholders
- Thematic solutions
- Capacity building of relevant departments

Water Management – Geospatial Perspective

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- Efficient management and planning demand on-time accurate information
- Spatial tools like GIS, remote sensing, GPS etc. drastically improve data collection time and minimize long delays involved in surveys
- Spatial database
- Data interoperability

CASE STUDIES

Development of GIS for National Program for Improvement of Watercourses (NPIW)

Objective:

To develop GIS system for monitoring improvement work of watercourses using geospatial technologies

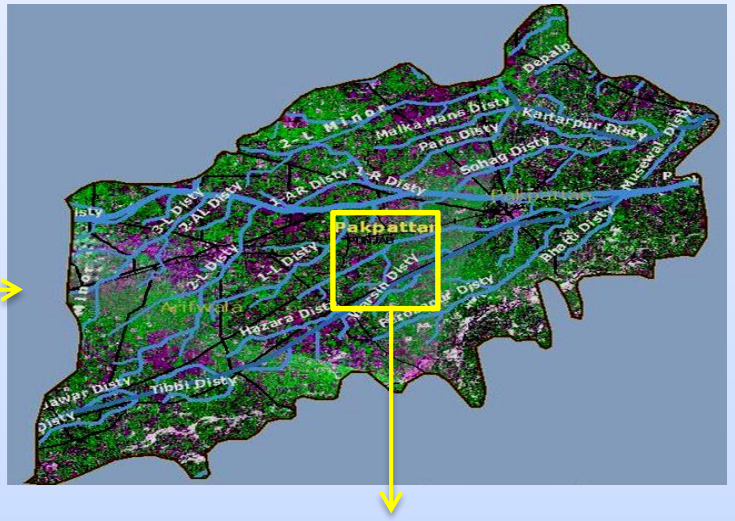
Scope:

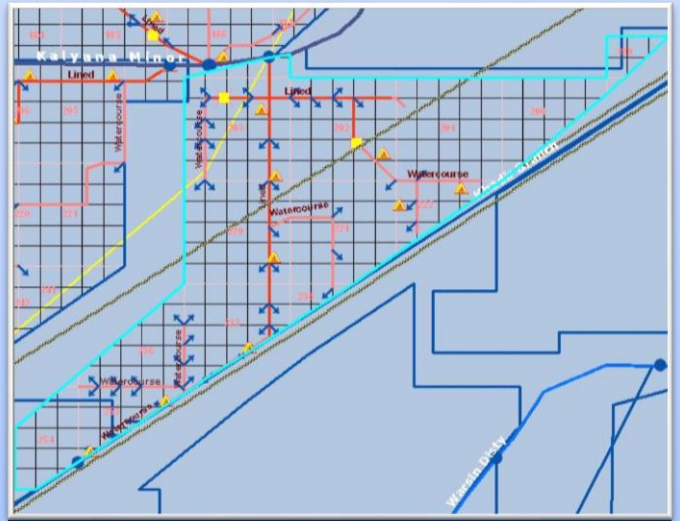
- GIS development of 45,000 watercourses in **Sindh**, 15,000 WCs in **Khyber Pakhtunkhwa** and 58,000 WCs in **Punjab**
- Satellite image based extraction of irrigation network (rivers, canals, branches, distributaries, minors and watercourses)
- Development of client/server GIS customized applications
- Development of LAN based GIS Control (centralized) Lab at PMU offices
- Real-time data dissemination from field and integration with database

User:

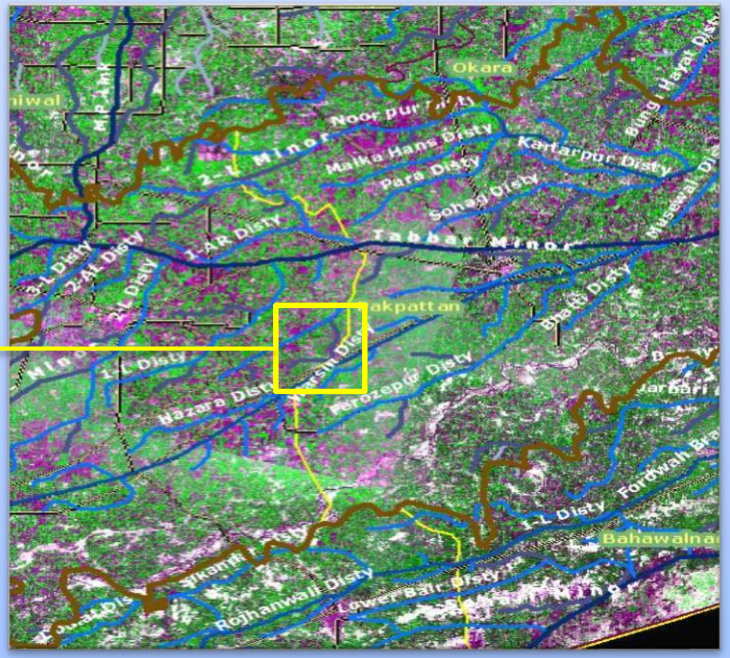
- Directorate General (Agriculture), Water Management, Govt of Punjab
- Program Monitoring Unit, NPIW, Govt of Sindh
- Program Monitoring Unit, NPIW, Govt of KP

Development of GIS for National Program for Improvement of Watercourses (NPIW)

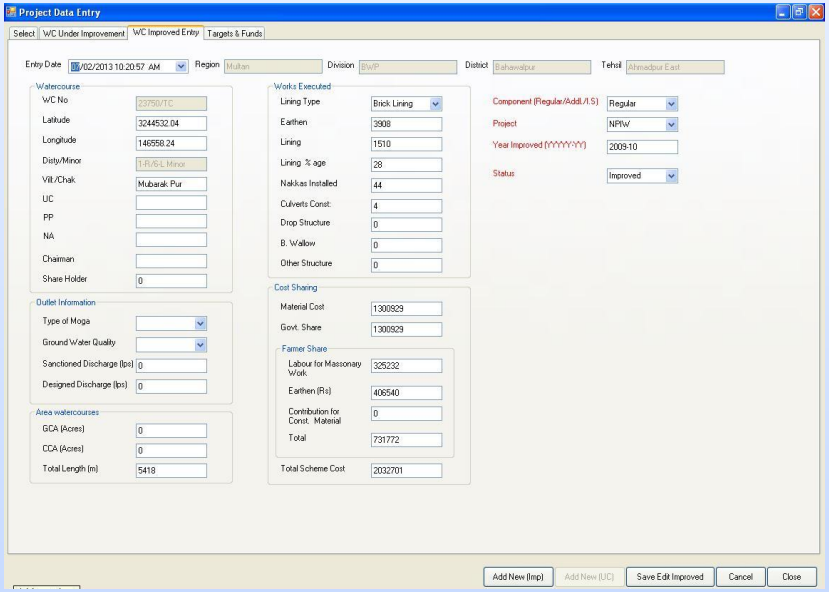


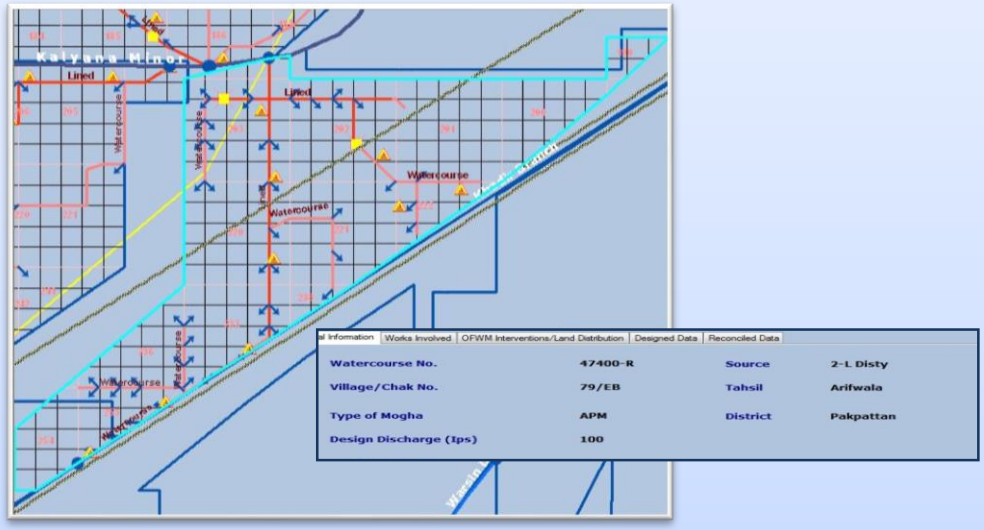


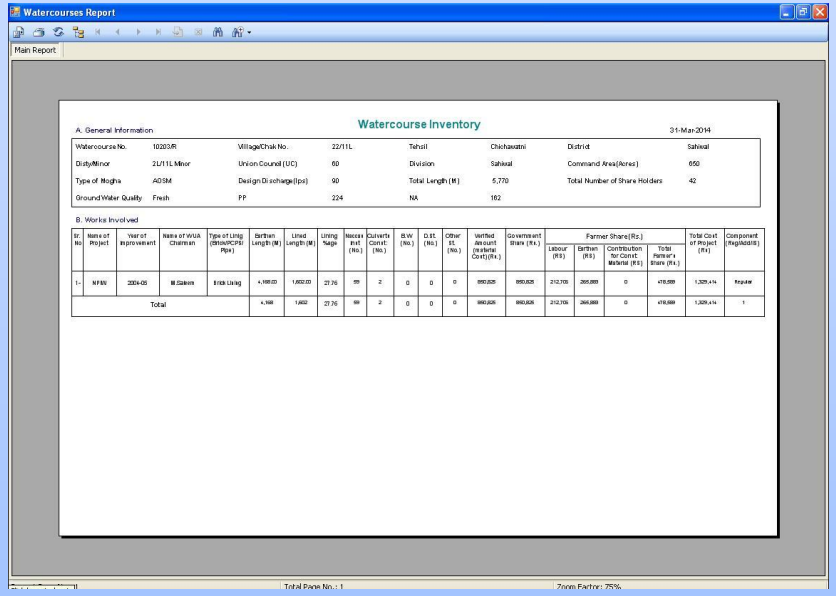
Watercourse No.	47400-R	Source	2-L Disty
Village/Chak No.	79/EB	Tahsil	Arifwala
Type of Mogha	APM	District	Pakpattan
Design Discharge (lps)	100		

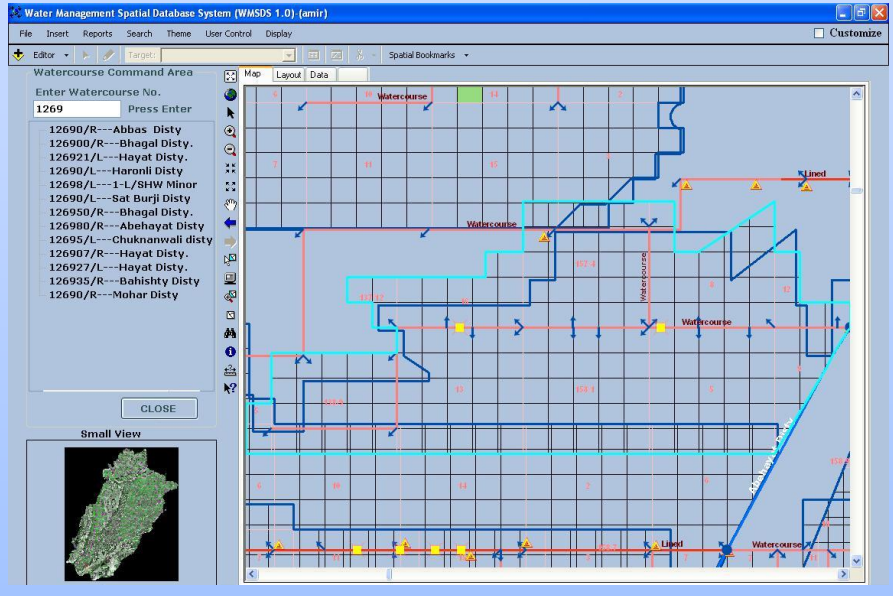


Development of GIS for National Program for Improvement of Watercourses (NPIW)









GIS for River Management (Case Study of Ravi River, Punjab, Pakistan)

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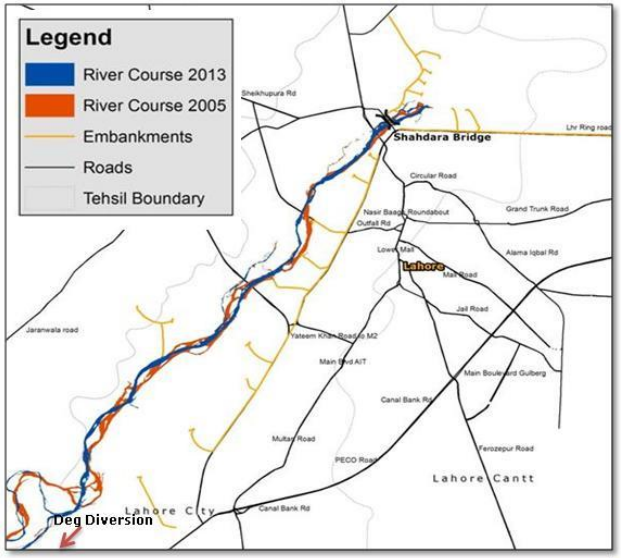
Objectives Use of modern techniques for river management to enhance survey accuracy and efficiency

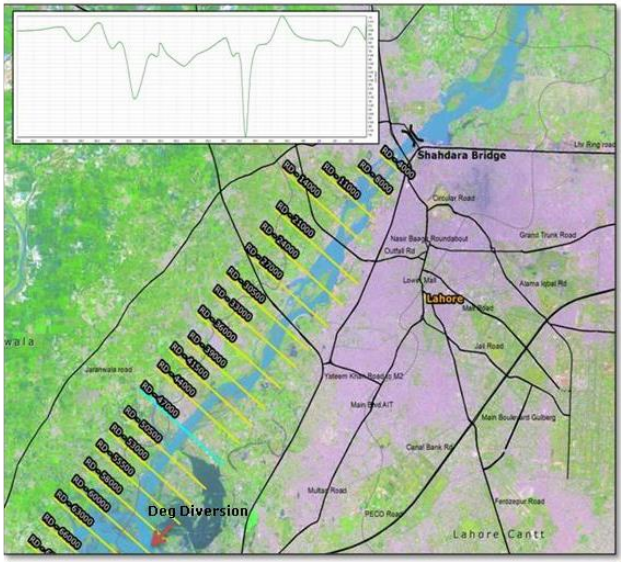
Scope Development of integrated database for plain table survey maps and satellite imagery

Synergy of ground data and GIS for preparation of engineering maps from field survey data

User Irrigation Department, Govt. of Punjab

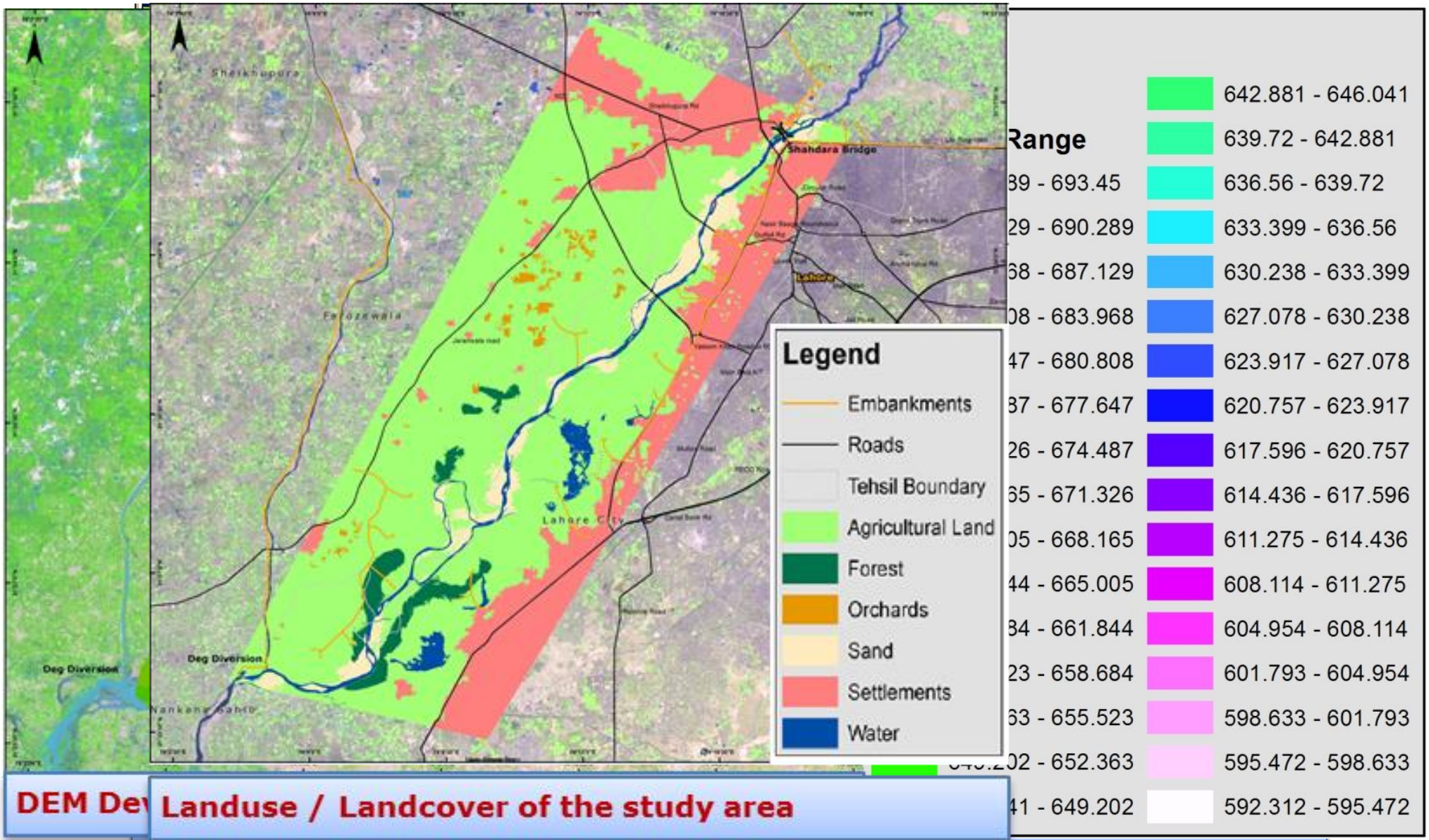


River Course Change



River cross sections on satellite image

GIS for River Management (Case Study of Ravi River, Punjab, Pakistan)



DEM De

Landuse / Landcover of the study area

Flood Vulnerability Assessment Using Geospatial Techniques

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Objectives: To determine flood vulnerability from Guddu to Sukkur Barrage using HEC-RAS and Geo-Spatial techniques

Scope: Geodatabase development of landuse / landcover, embankments, irrigation and road network, Cross sections, river banks and bridges etc.

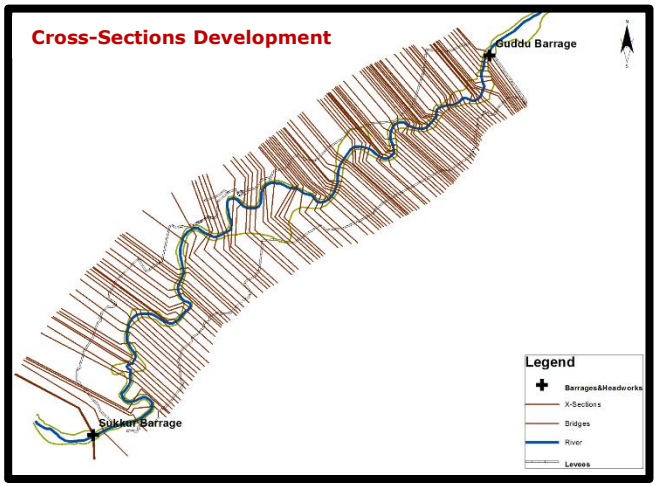
Hydrological analysis using HEC-RAS model on SRTM DEM

Simulation of water level in Indus river for different discharge / stream flows

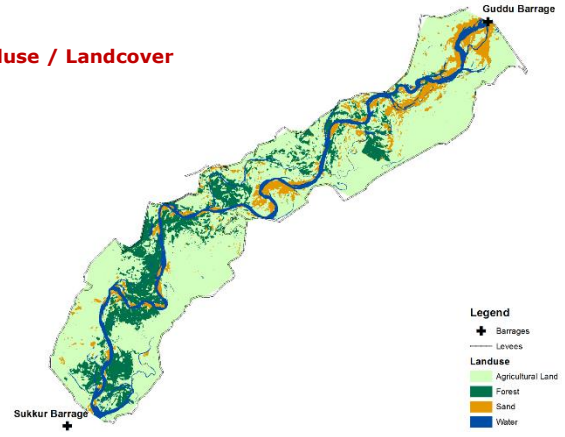
Identification of vulnerable embankments based on freeboard b/w water surface and top of the embankment

Users Govt of Sindh

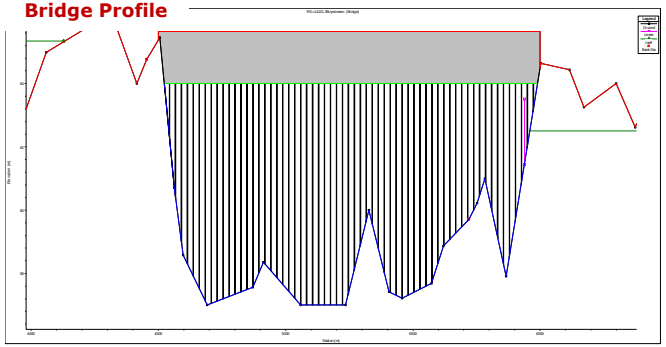
Cross-Sections Development



Landuse / Landcover

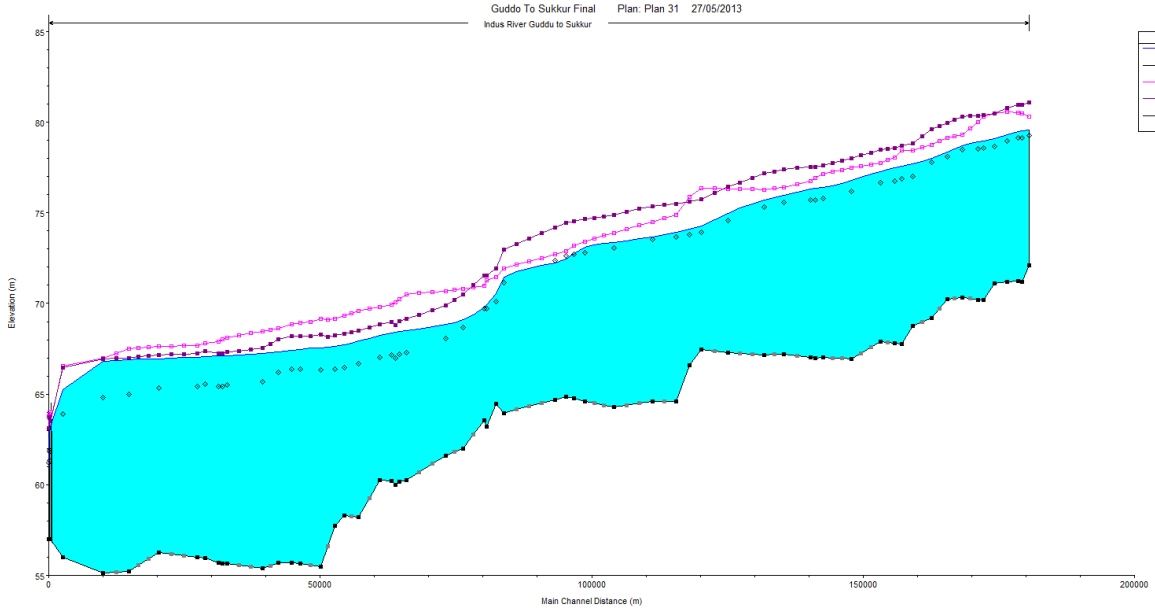


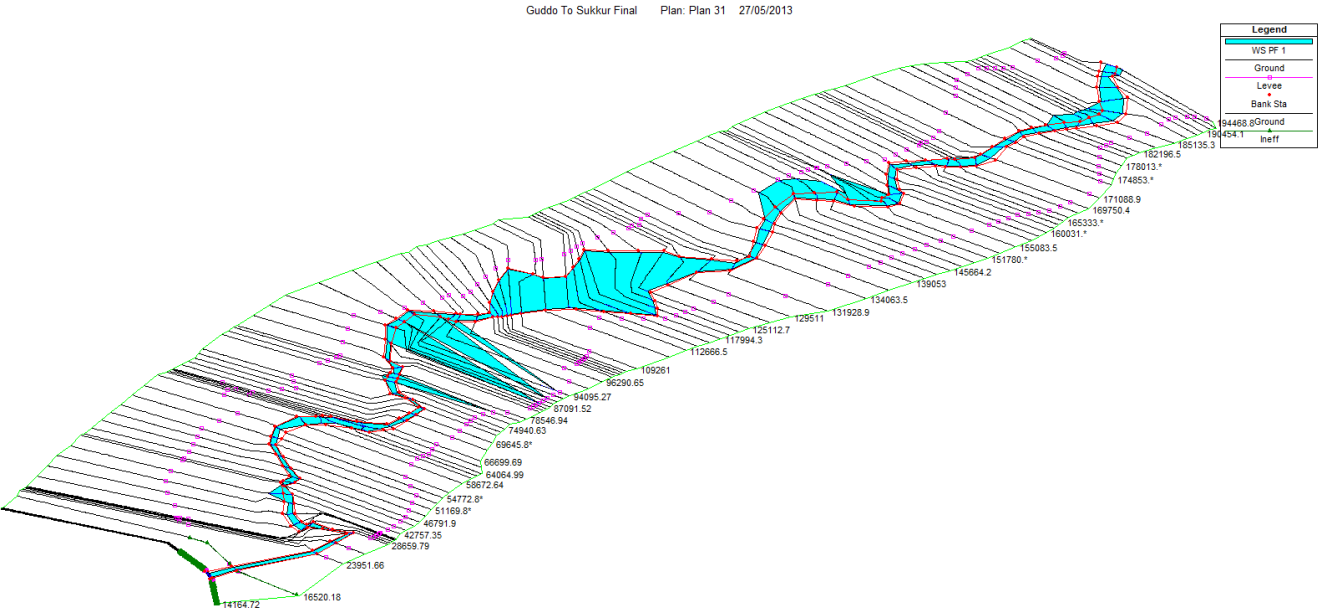
Bridge Profile



Stream Flow Simulation

LONGITUDINAL PROFILES





3D CROSS-SECTION PLOT

INUNDATION RESULTS

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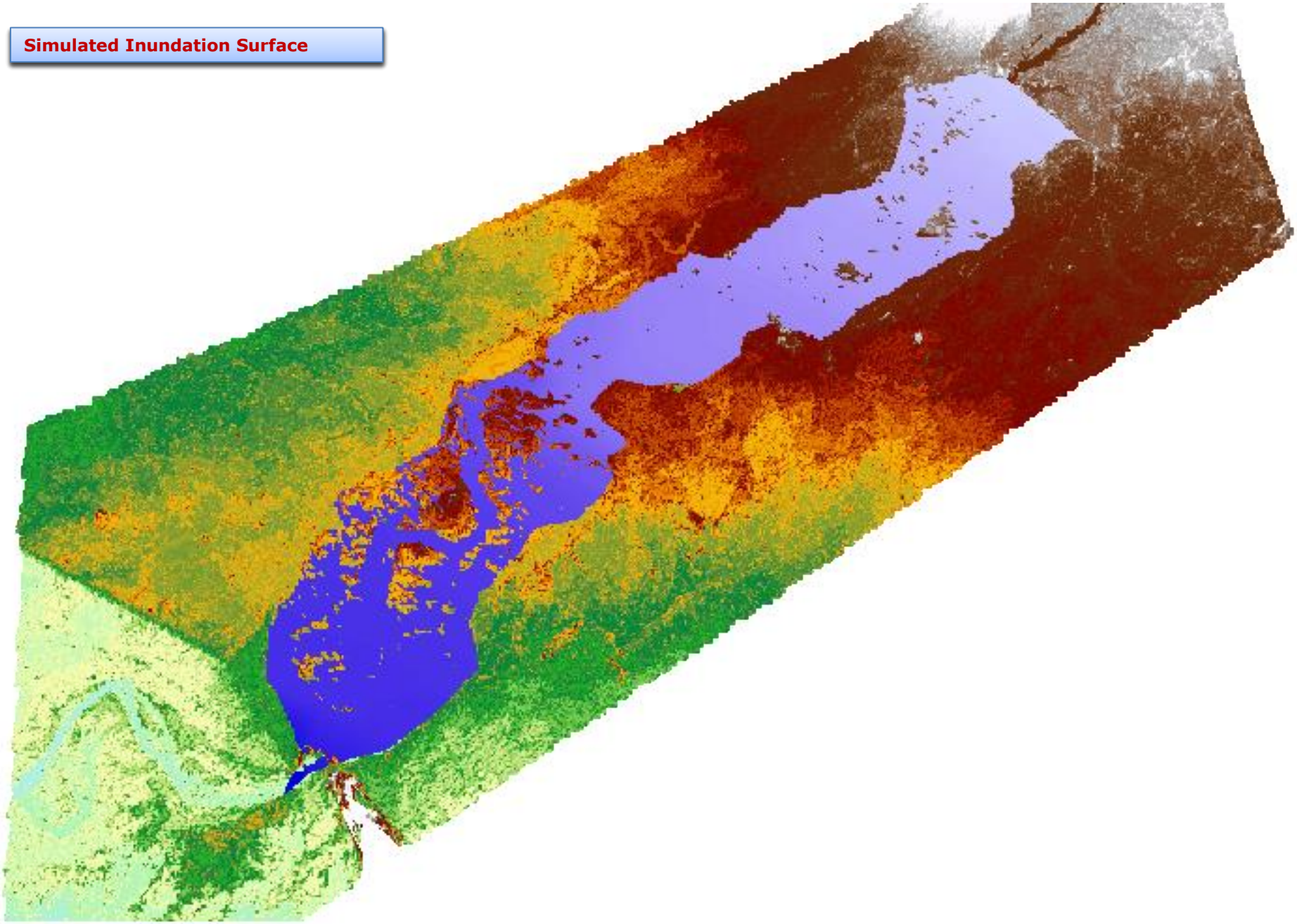

OBSERVED VS. SIMULATED

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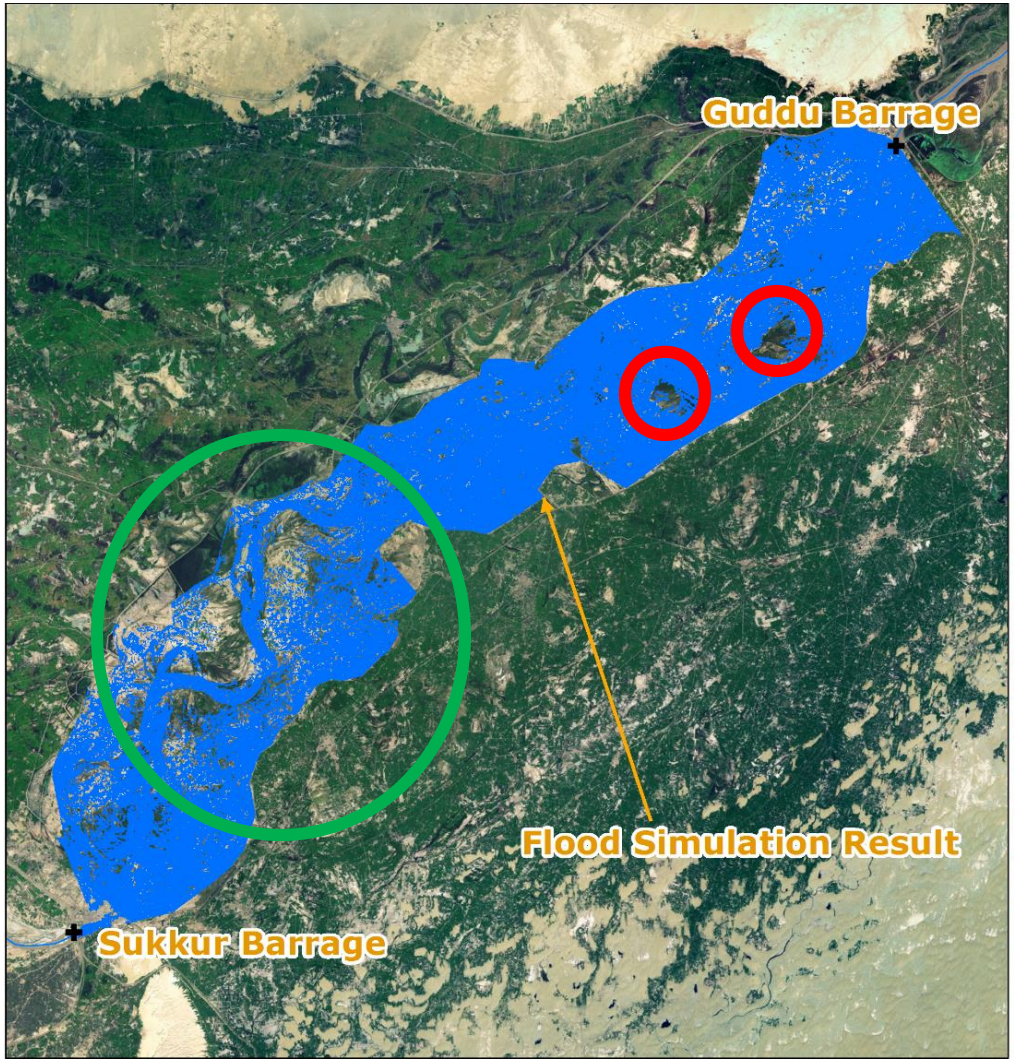

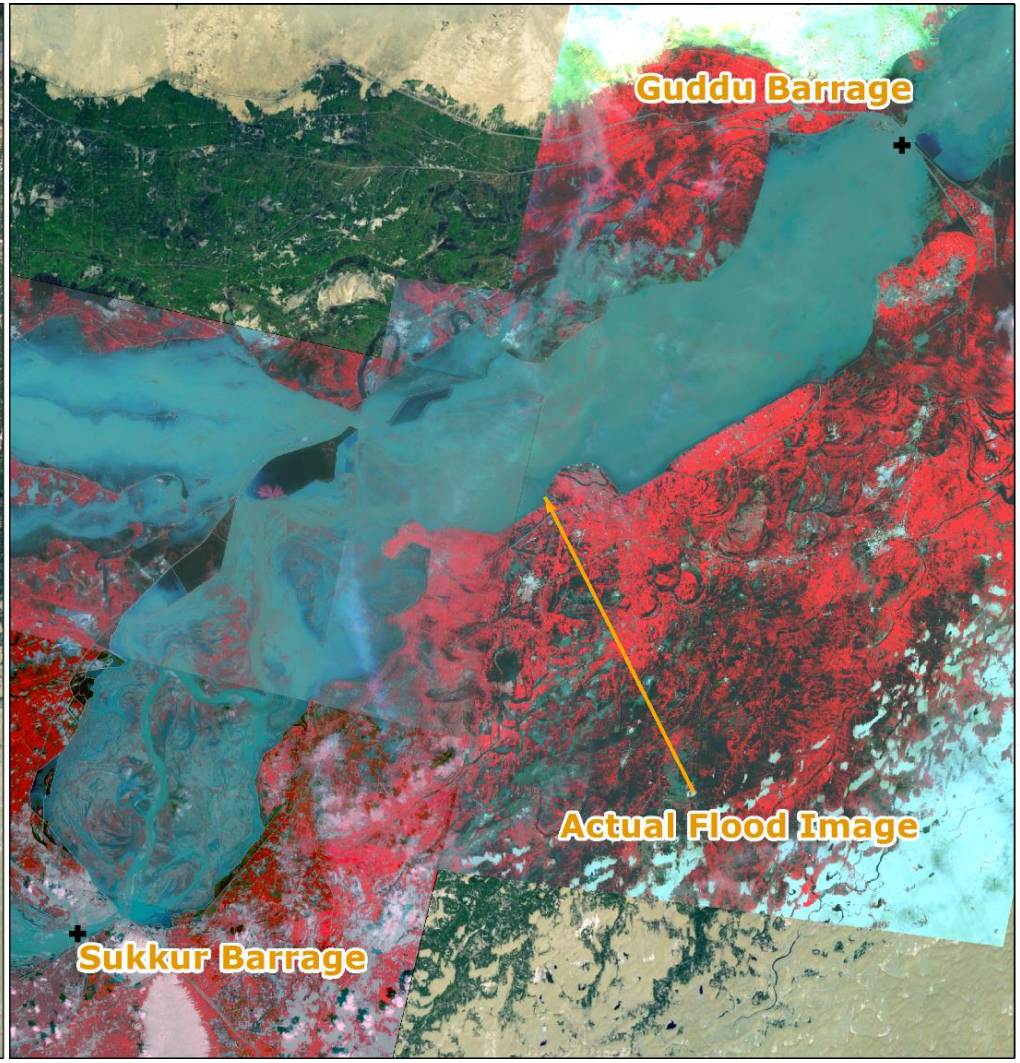

Pre (June) & Post (July) Monsoon Analysis

Flood Vulnerability Assessment and river course change monitoring

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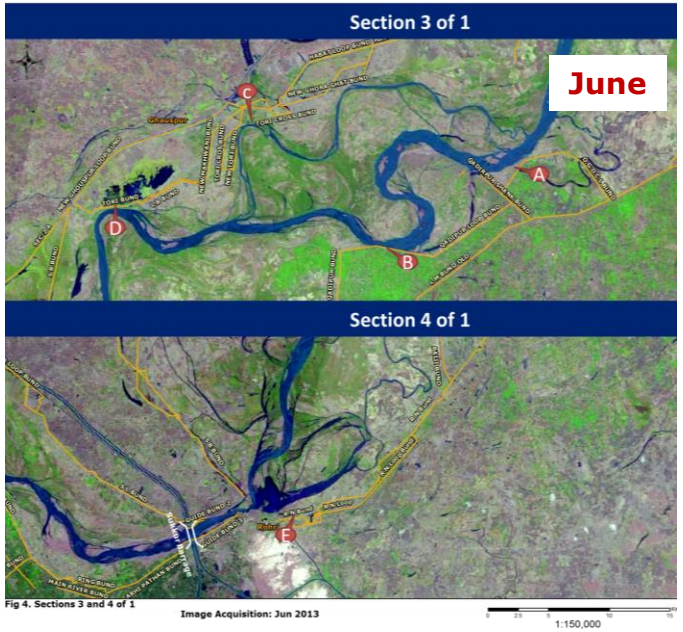
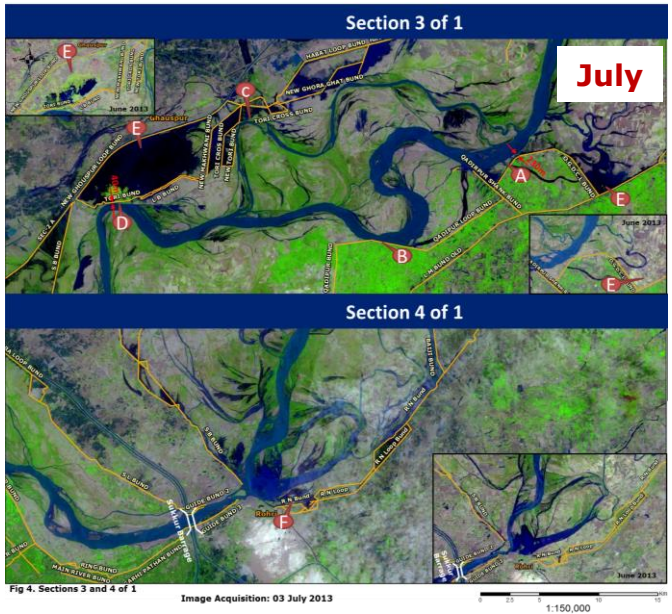
Objectives: Pre & Post monsoon assessment of flood protective infrastructure to predict vulnerable bunds during high river flows in Sindh

Scope: Mapping of Indus River course and flood plain before & after monsoon and timely reporting to the concerned departments for timely remedial measures

Mapping of major obstructions using high resolution satellite imagery and proposal for artificial channelization in floodplain

Users Govt of Sindh





Demarcation of Obstructions

Indus River Floodplain, Sindh

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Objectives: Identification of obstacles / Zamindari bunds in Indus floodplain for pre-monsoon preparedness in Province Sindh

Scope: Satellite image based identification of obstacles in floodplain

Imint and visual interpretation

DEM to delineate natural and artificial channels and depressions in floodplain

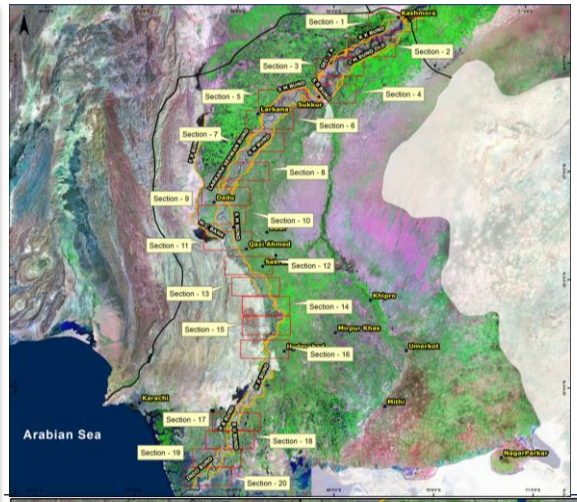
Users Govt of Sindh

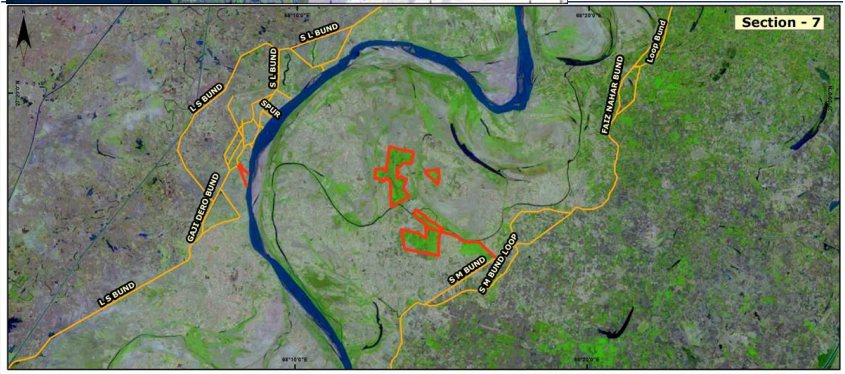
Recommended for consideration by PDMA:

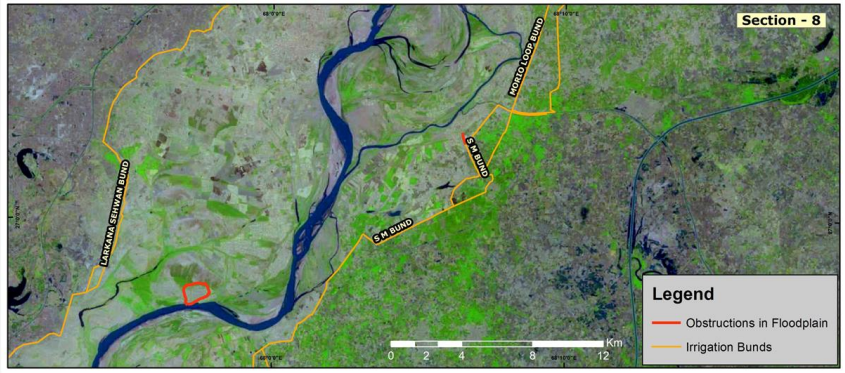
Minimize human interventions in floodplain

Restoration of floodplain in its natural form i.e. Depressions, channelization etc

During high flows through artificial channelization in order to avoid flooding beyond floodplain







Demarcation of Obstructions

Chenab River Floodplain, Punjab

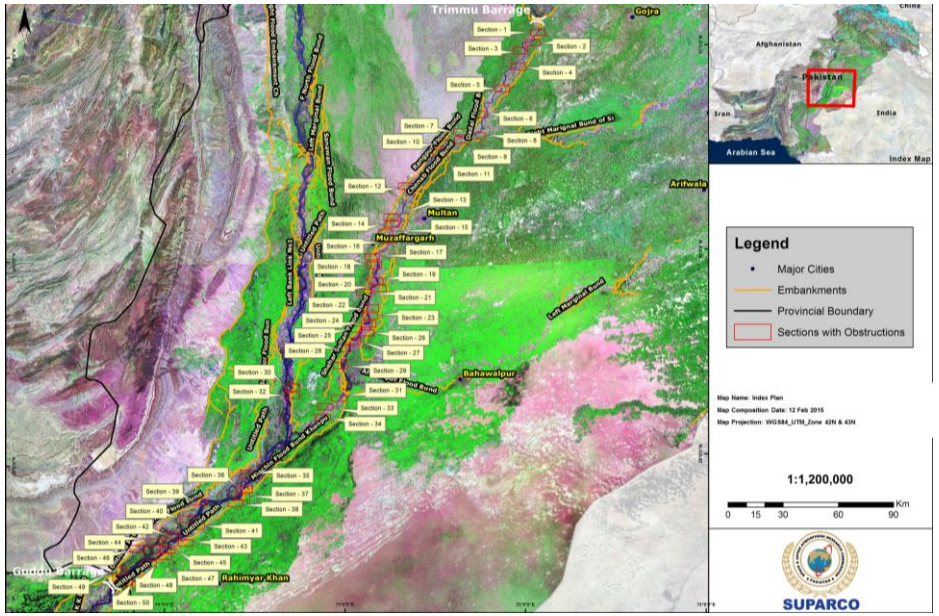
Objectives: Identification of obstacles / Zamindari bunds in Indus floodplain for pre-monsoon preparedness in Punjab

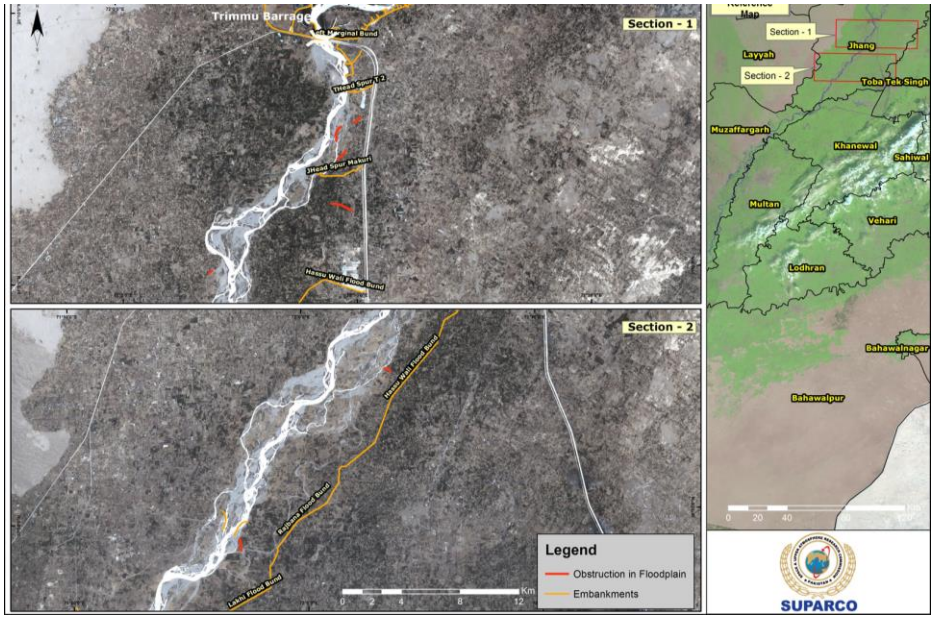
Scope: Satellite image based identification of obstacles in floodplain

Imint and visual interpretation

DEM to delineate natural and artificial channels and depressions in floodplain

Users Govt of Punjab





Development of GIS to Assist Groundwater Exploration in Thar Desert

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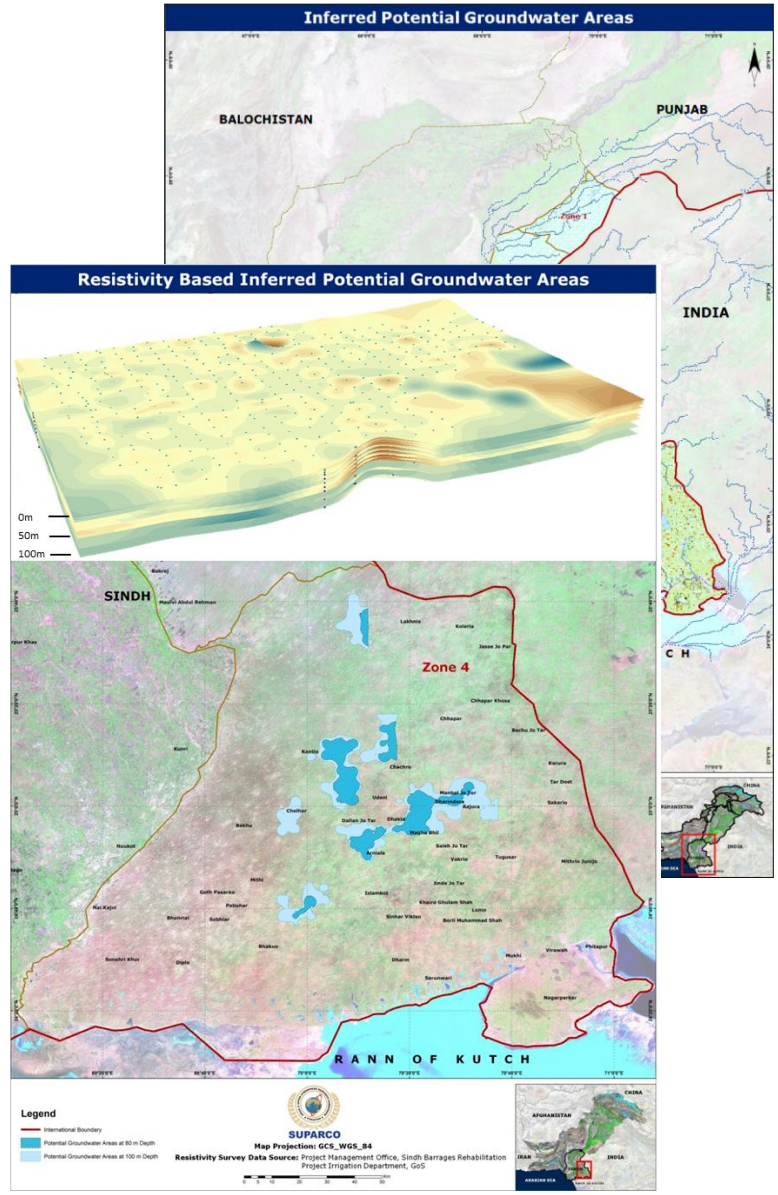
Objectives: Identification of potential groundwater areas using geospatial techniques to assist in field investigations for delineation of subsurface aquifers

Scope: Integration of RS & GIS with geophysical field survey data

Inferring groundwater potential areas survey data for provision of clean sweet water for public and Thar Coal Power Project

User: Sindh Barrages Rehabilitation Project (SBRP), Irrigation Deptt, Govt of Sindh



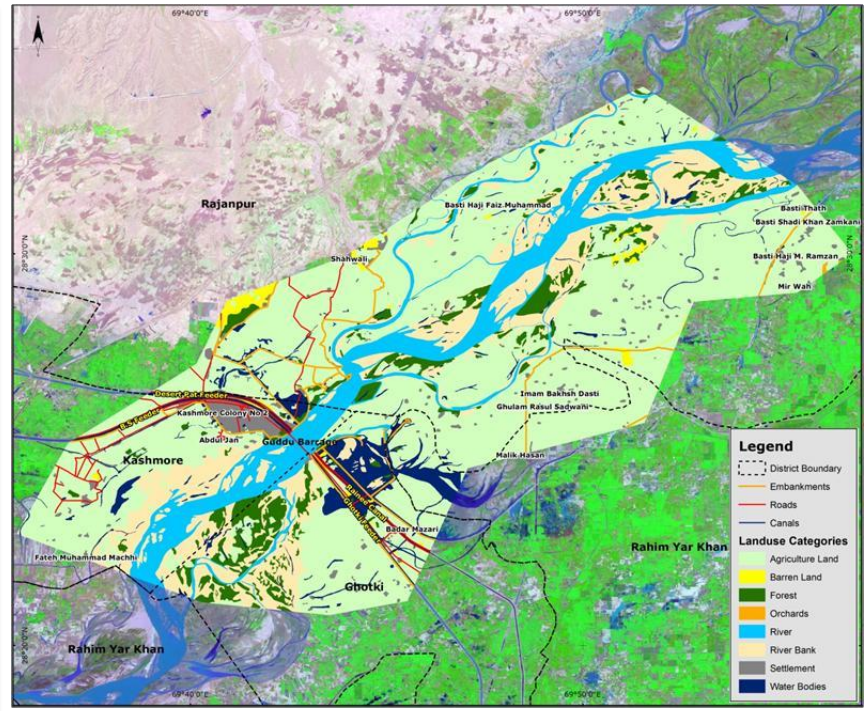
Landuse Mapping of Guddu Barrage Area

Objectives: Baseline mapping of Guddu Barrage area for environmental impact assessment

Scope: Preparation of detailed Landuse / landcover categories (infrastructure, forest, agriculture land, settlements and others) at 1:10,000 using very high resolution imagery

User Mott McDonalds (Pvt.) Ltd

Benefits: To help in Environment impact assessment of Guddu barrage rehabilitation project (World bank funded)



CONCLUDING REMARKS

- Time and cost efficient solutions
- Spatial database development
- Large scale mapping especially in distant areas
- Field scale measurements and data validation
- Capacity of building of concerned officials

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THANK YOU