

# SPACE BASED SUPPORT TO NDMA/PDMAS DURING FLOOD 2022

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# Space Application Centre for Response in Emergency and Disasters (SACRED)

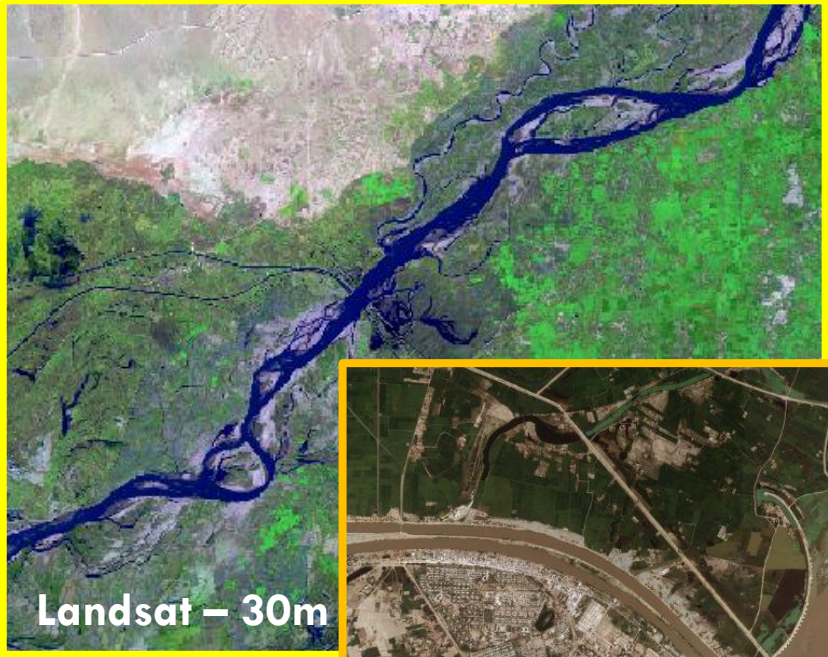
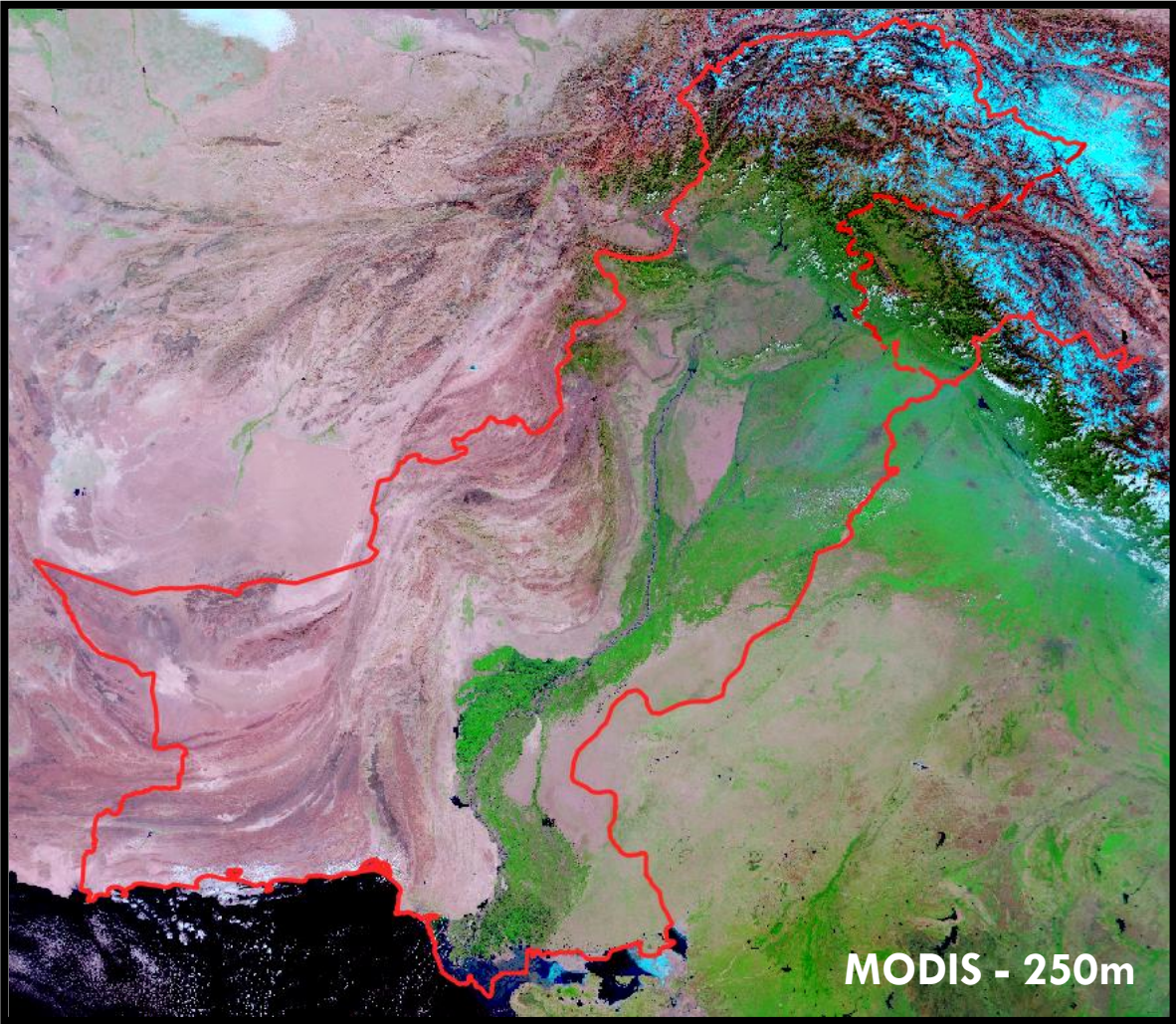


- **THE CENTRE PROVIDES SPACE BASED INFORMATION TO NATIONAL/PROVINCIAL DISASTER MANAGEMENT AGENCIES TO RAPIDLY ASSESS THE EXTENT OF NATURAL DISASTERS AND DAMAGES TO HUMAN LIVES, PROPERTY AND INFRASTRUCTURE.**
- **THE CENTRE ALSO PROVIDES ASSISTANCE TO REGIONAL COUNTRIES IN CASE OF NATURAL DISASTERS.**

# Support to National / Provincial Departments

- Ministry of Planning Development and Special Initiatives
- Ministry of Water
- National Disaster Management Authority
- Chief Secy, Govt of Balochistan
- Punjab, Sindh, Khyber Pakhtunkhwa and Balochistan Provincial Disaster Management Authorities
- Chairman Senate Standing Committee on Climate Change

# Space in Aid



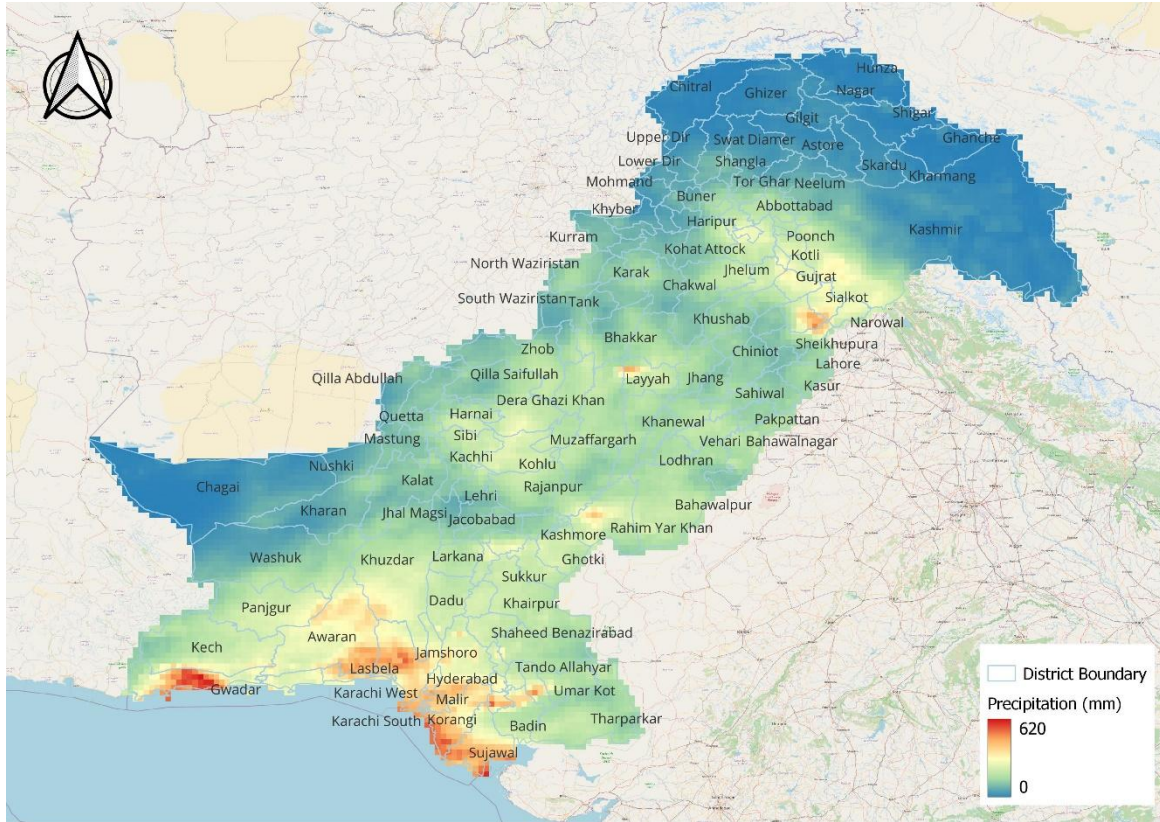
**Satellites can provide information at Regional, National and Local level**

# Space based support to NDMA/PDMAs

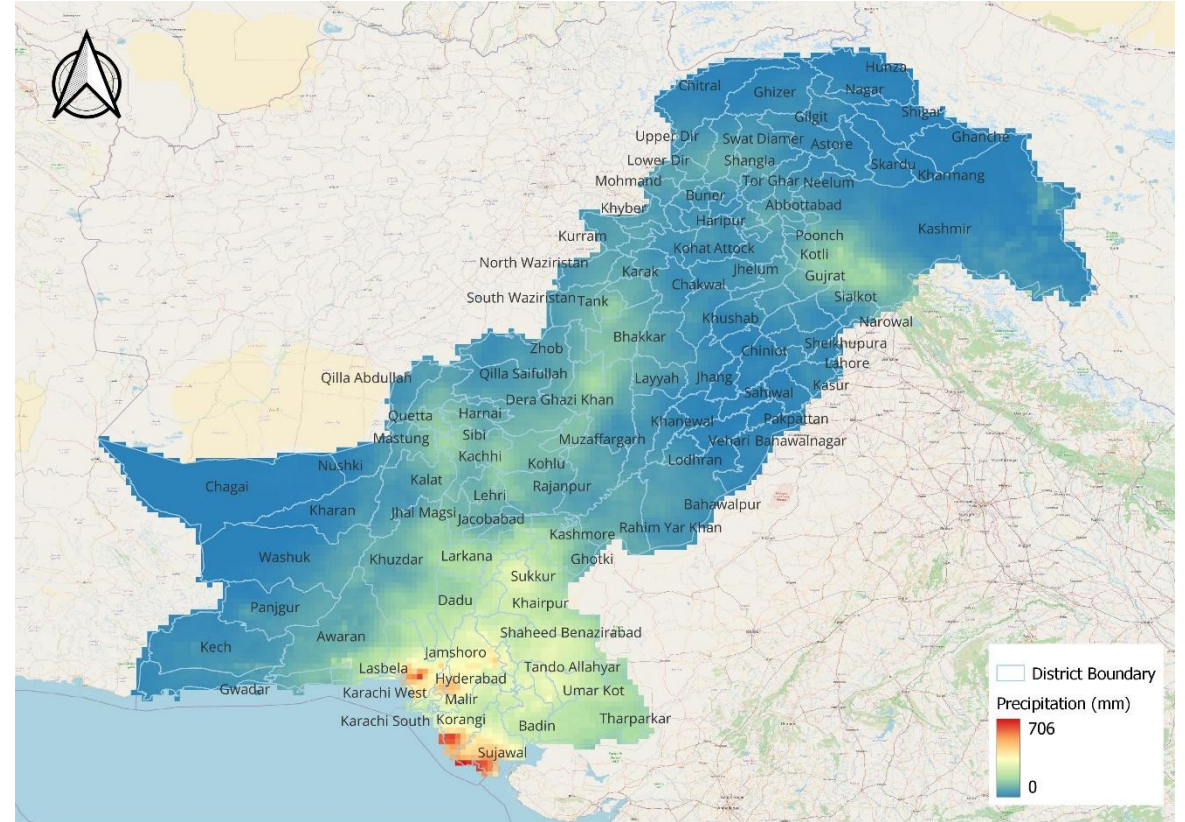
- Regular monitoring of Rivers, Trans-boundary dams, Glaciers
- Torrents / Flash floods – Balochistan, DG Khan, DI Khan, Rajanpur
- House / settlements damage assessment
- Road / bridges damage assessment on major highways
- Crops damage assessment
- Dams breach assessment / identification in Balochistan

**SUPPORT TO NATIONAL / PROVINCIAL  
DEPARTMENTS DURING FLOOD 2022**

# Monsoon Rains – GSMaPs

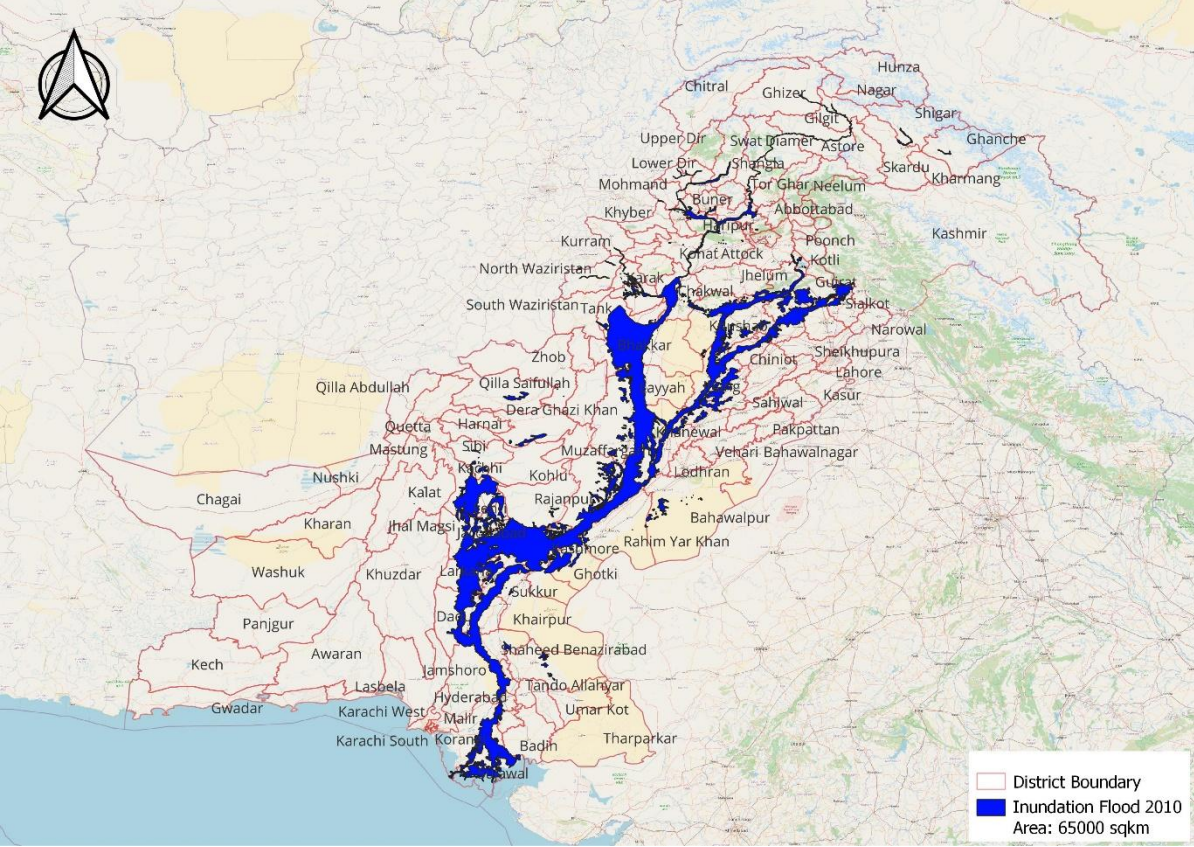


**First Spell (01 July till 07 Aug 2022)**

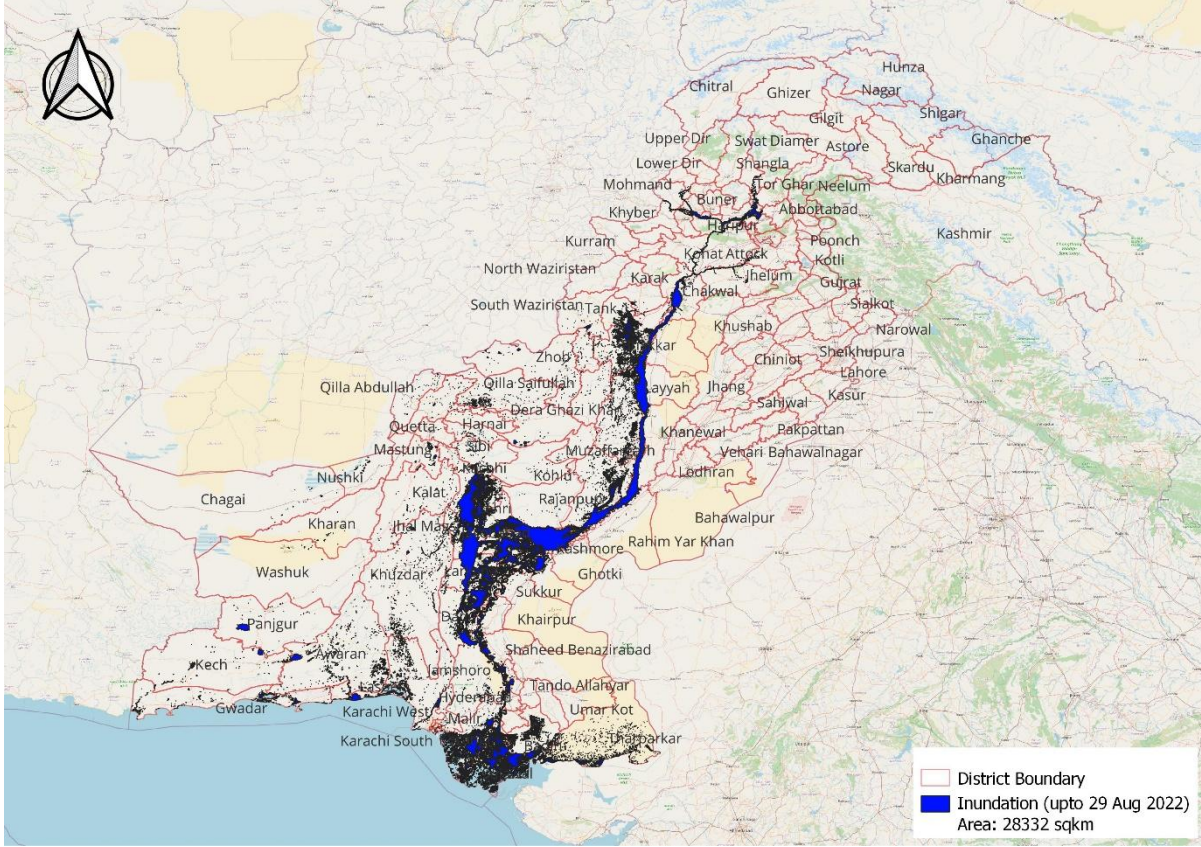


**Second Spell (08 Aug till 29 Aug 2022)**

# Inundation Situation - Flood 2022 vs Flood 2010



**2010**

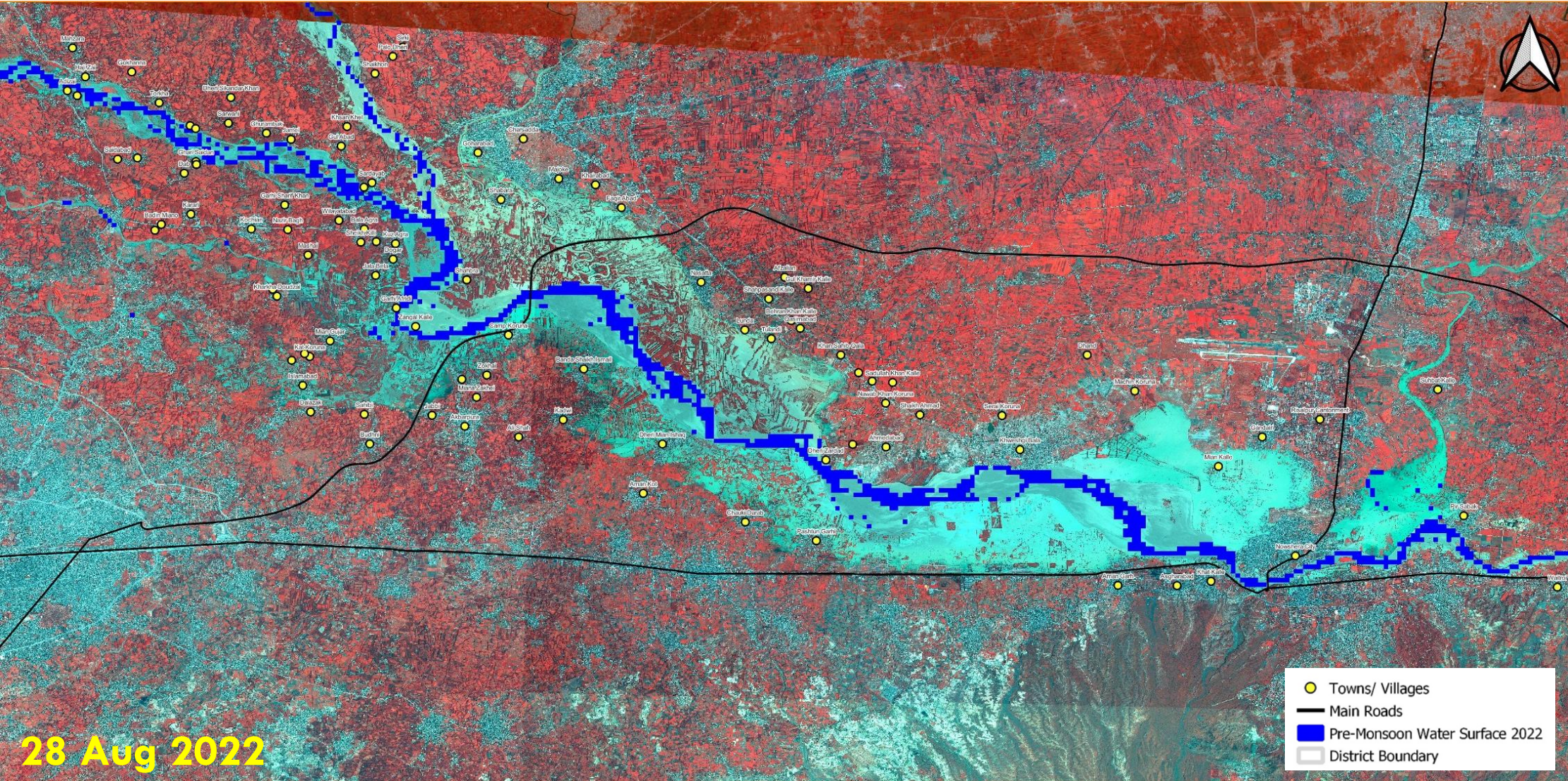


**2022**

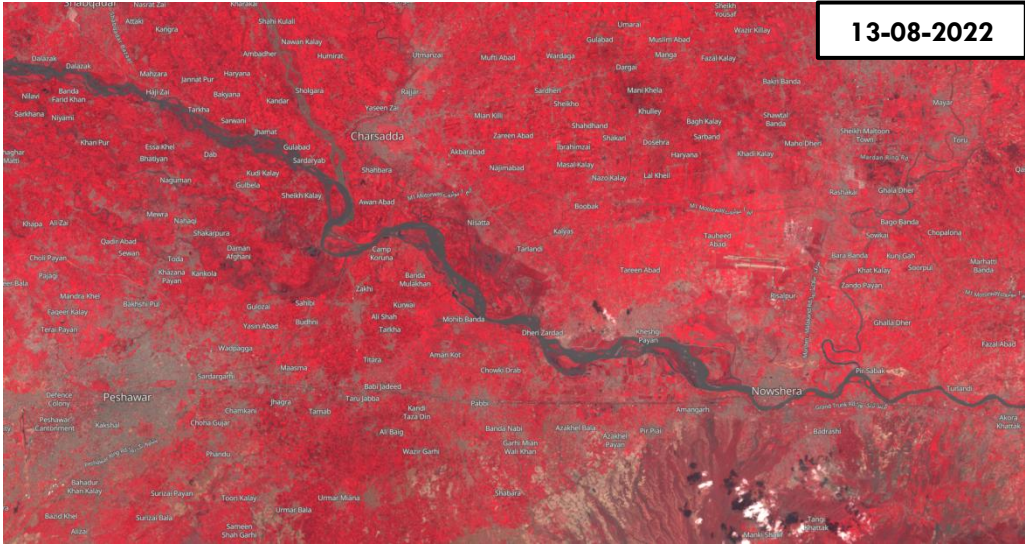


# **Rapid Flood inundation Mapping**

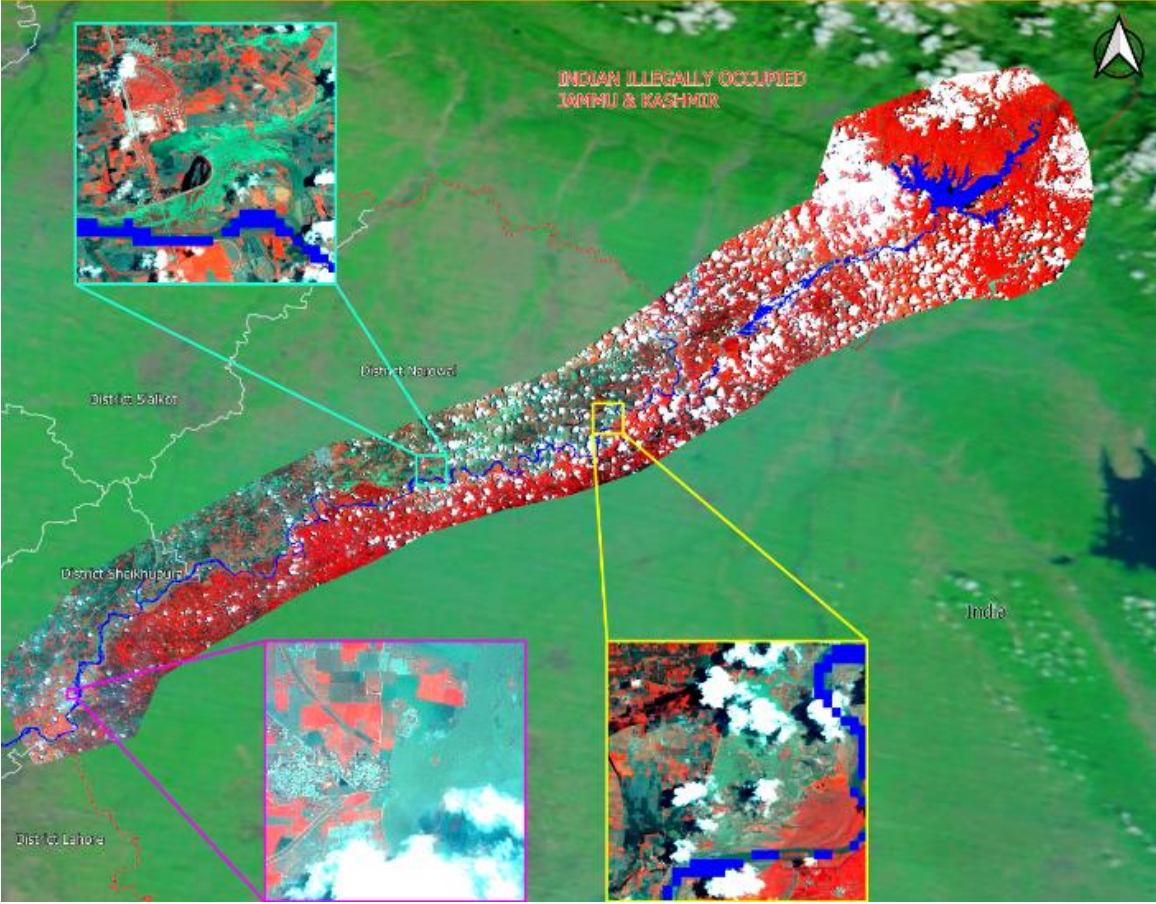
# Flooding in Kabul and Swat Rivers at Nowshera



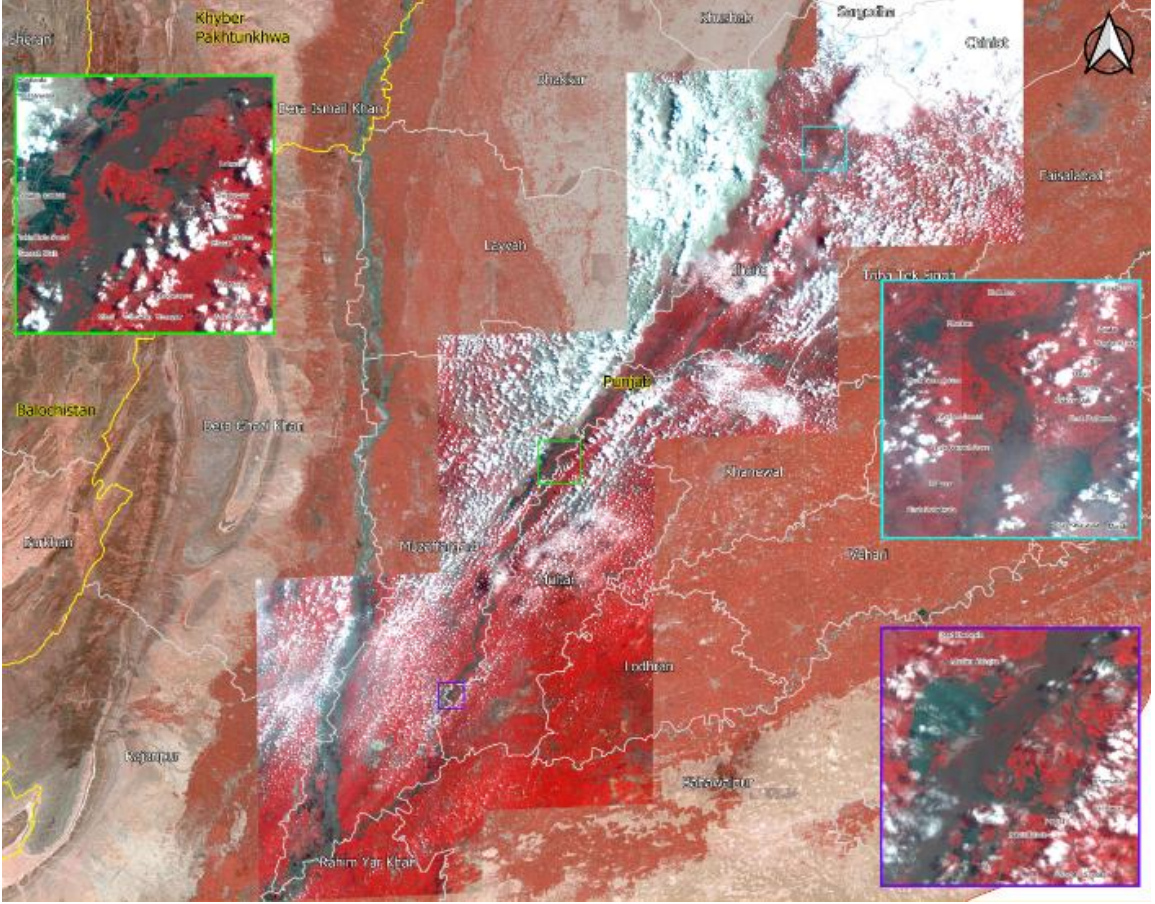
# Flooding in Kabul and Swat Rivers at Nowshera



# Regular monitoring of Rivers – Chenab and Ravi

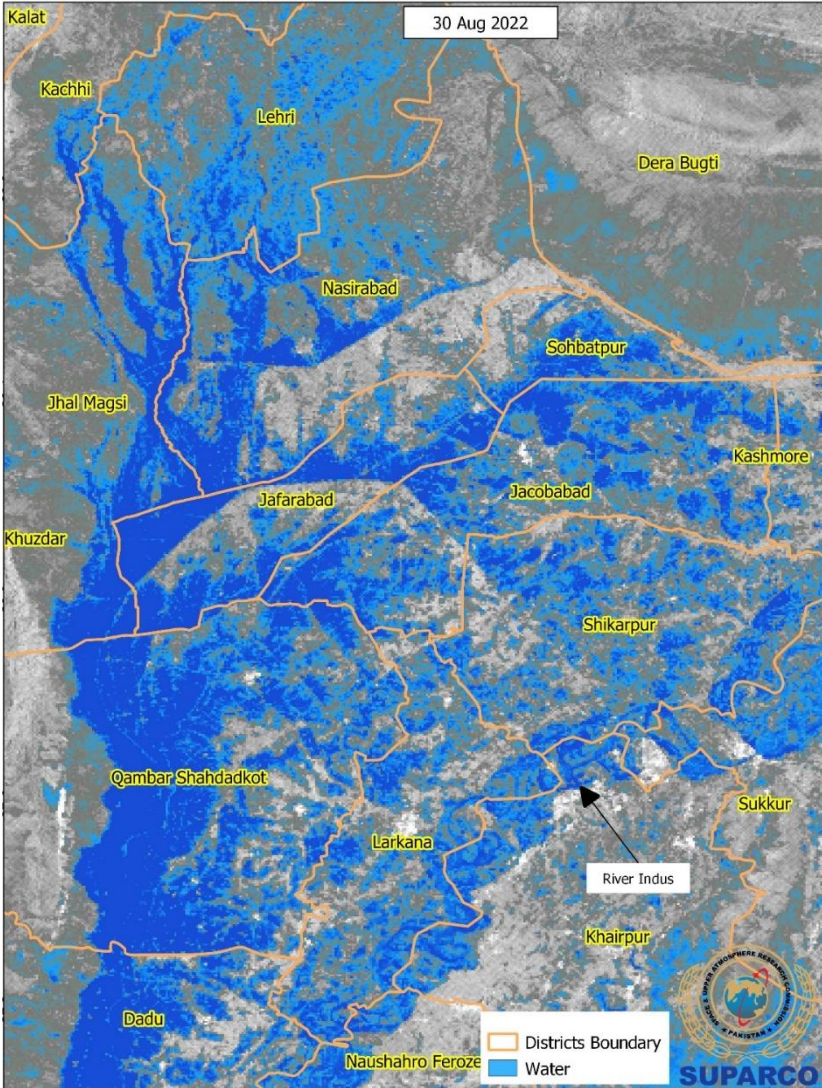
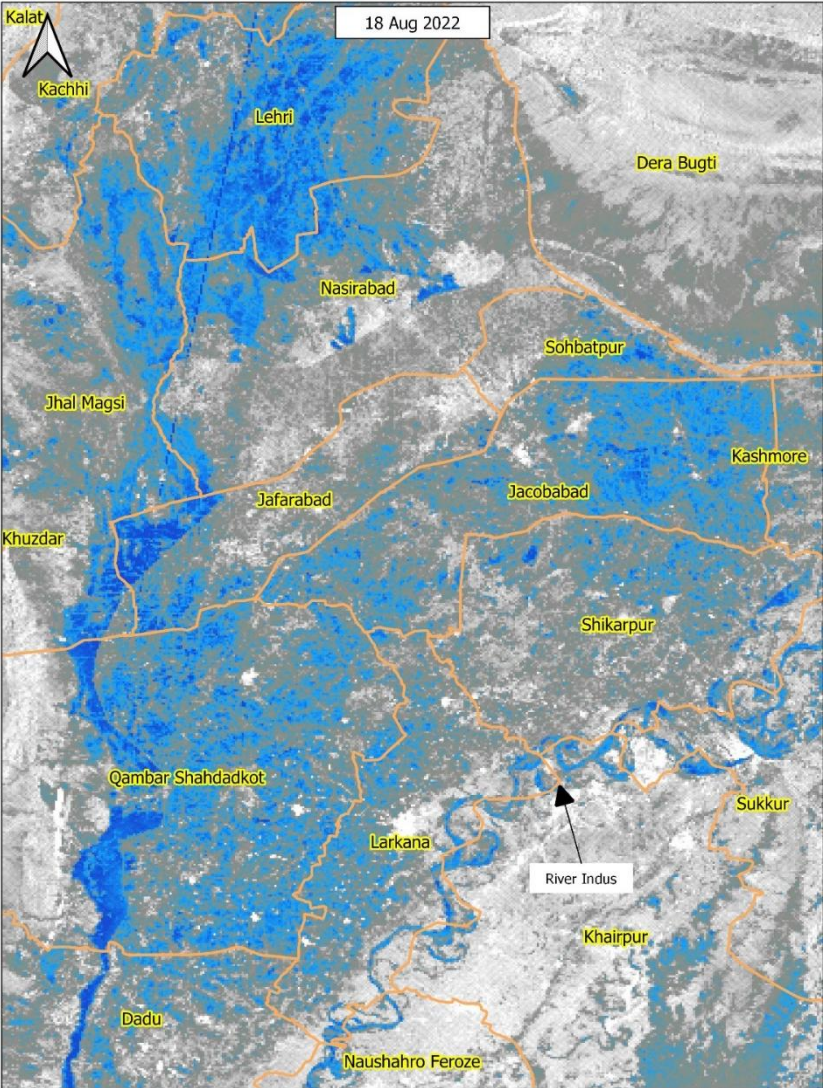


River Ravi – 02 Aug 2022

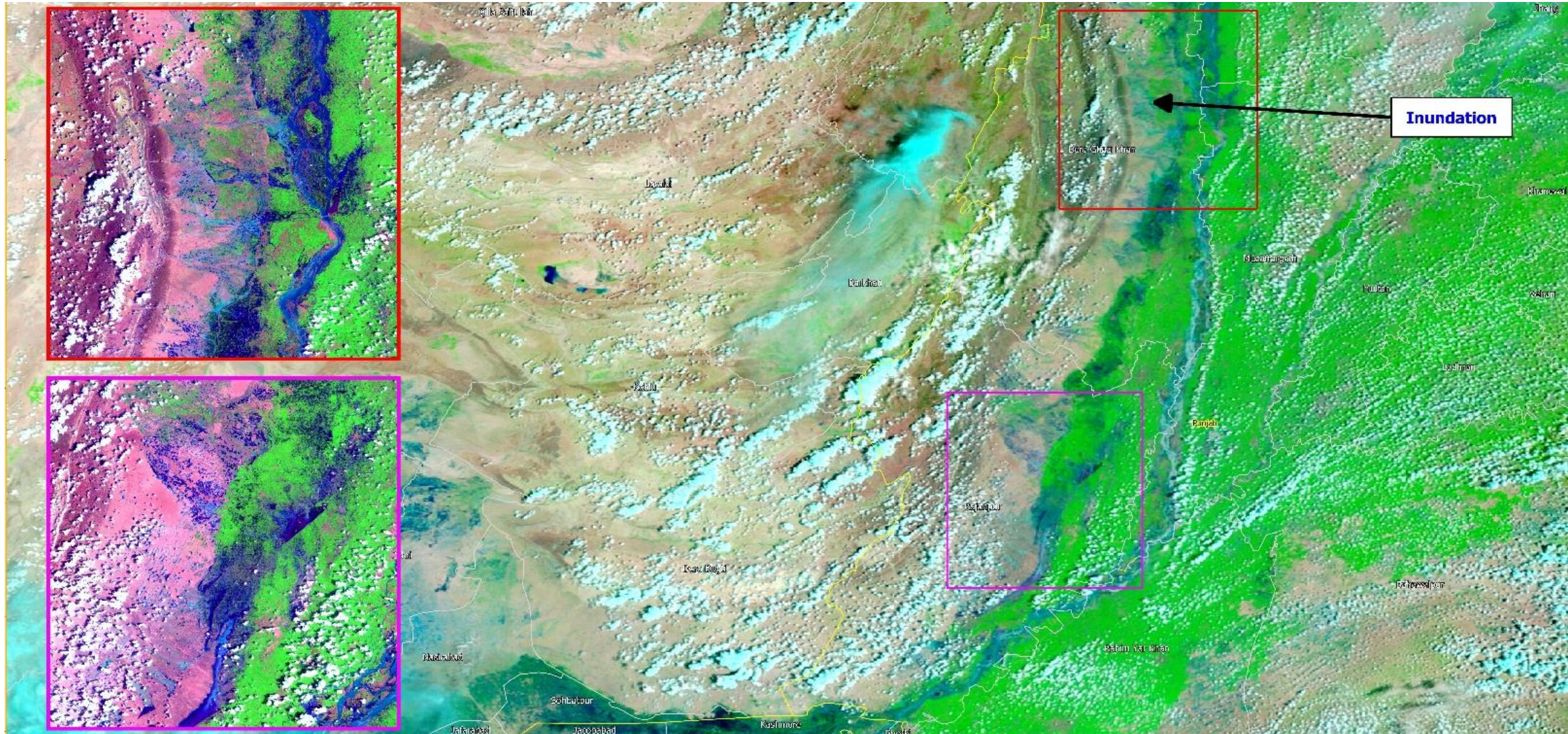


River Chenab – 30 July 2022

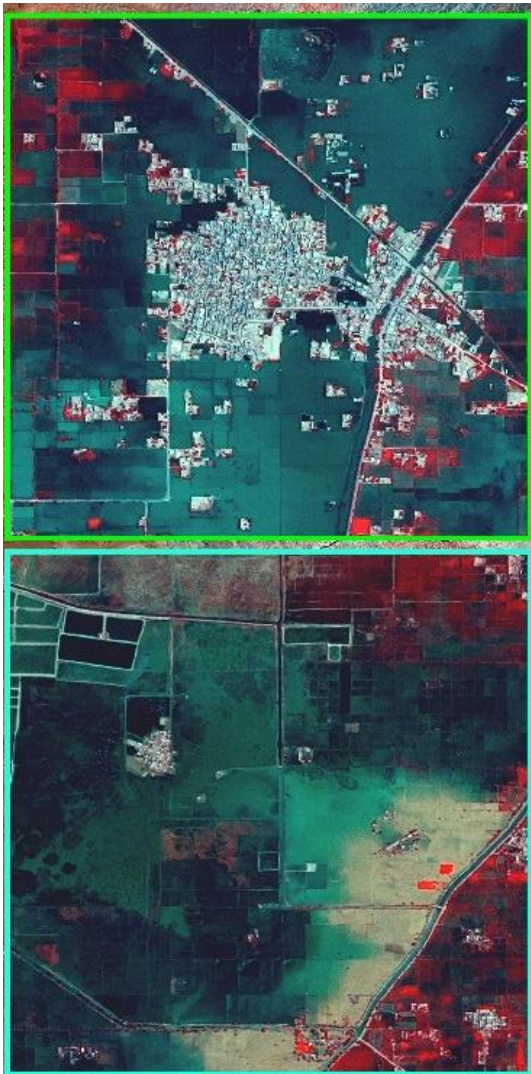
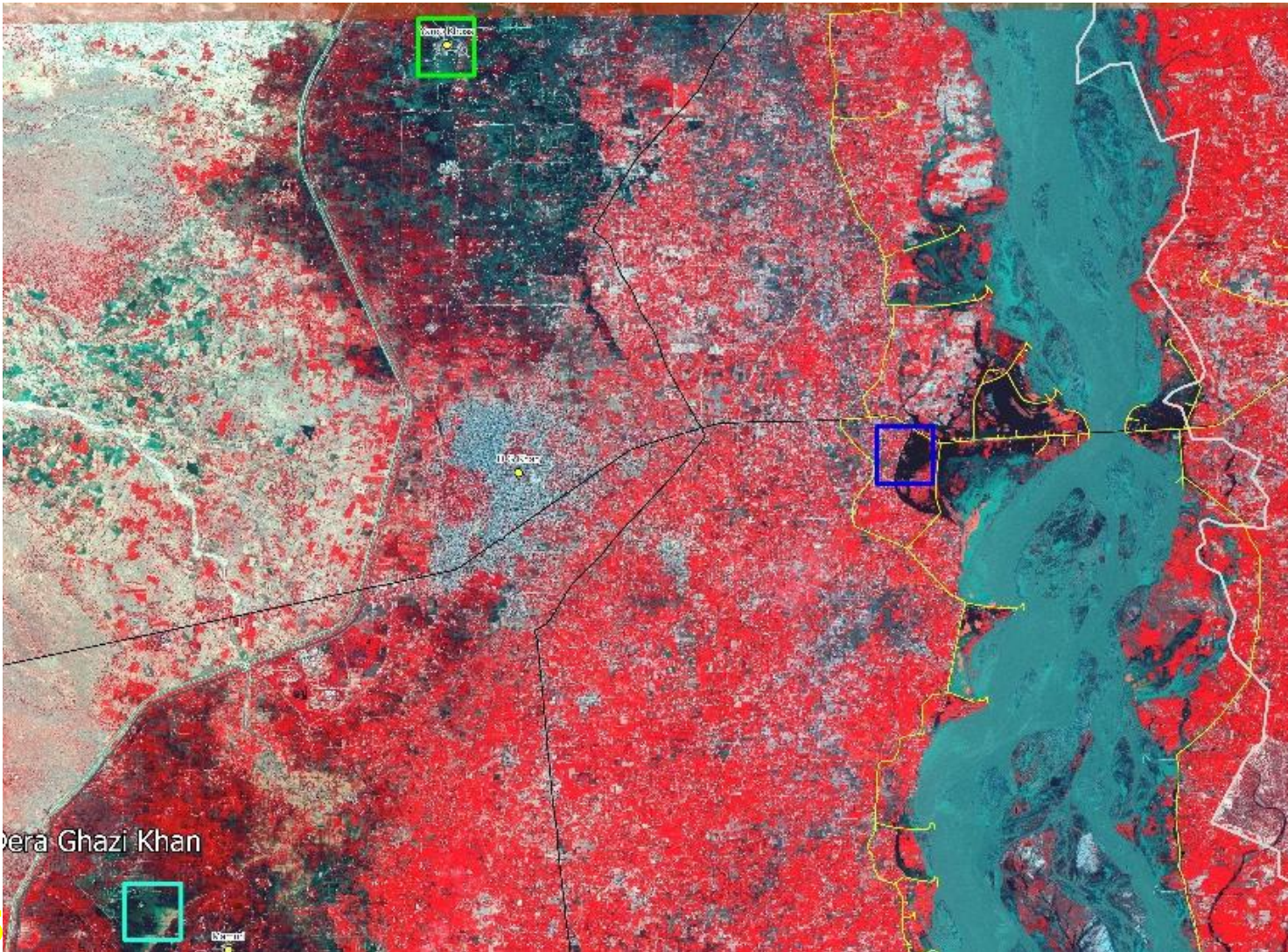
# Flood/Rain Inundation- Sindh & Balochistan



# Flash Flooding in Dera Ghazi Khan and Ranjanpur, Punjab



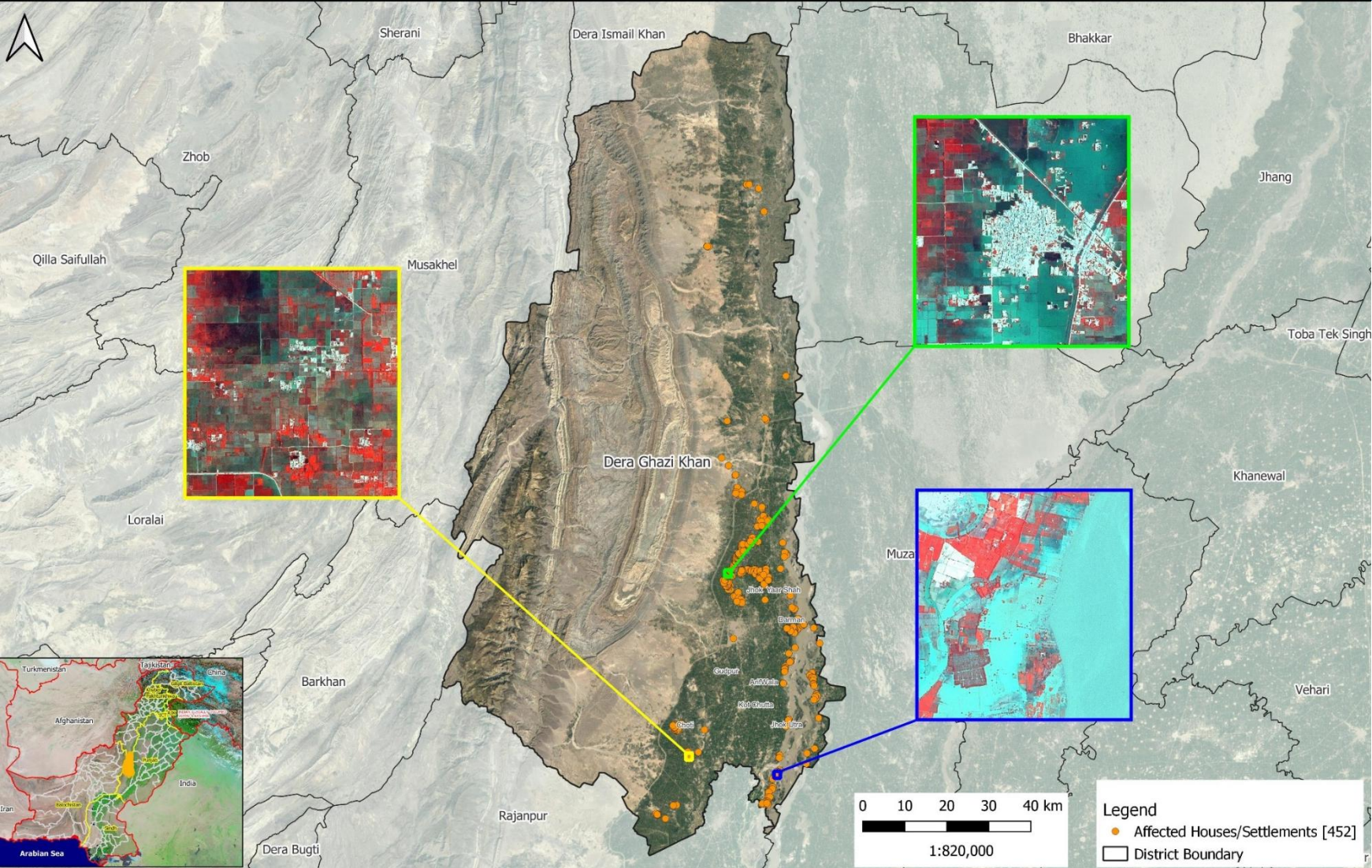
# Flash Flooding in Dera Ghazi Khan, Punjab



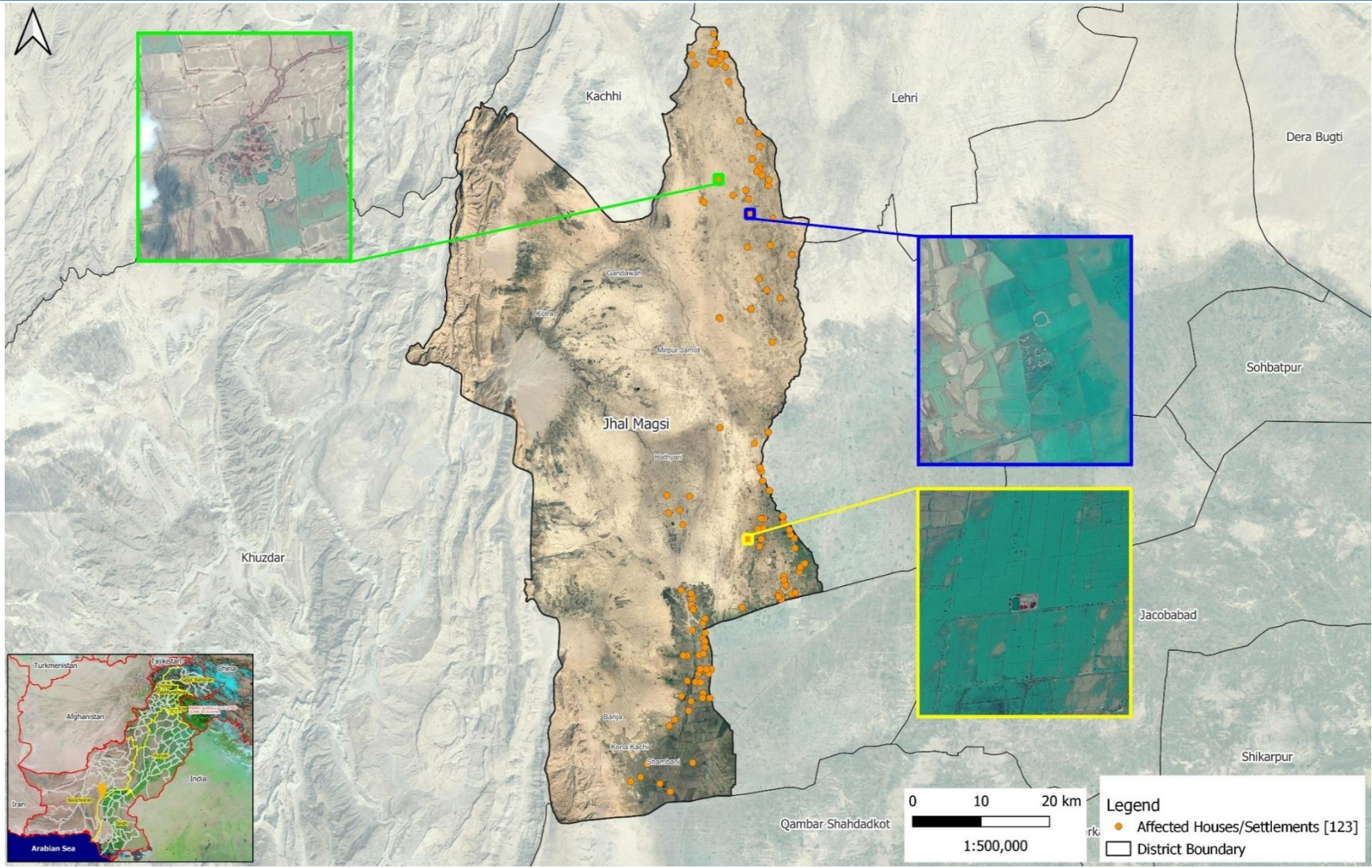
# Houses/Settlements Damage Assessment



# Rapid Damage Assessment – DG Khan



# Rapid Damage Assessment – Jhal Magsi



# Infrastructure Damage Assessment

# Flooding in Swat Rivers at Mohmand Dam Site



# Flooding in Swat Rivers at Munda Headwork



# Flooding in River Swat – Bridge Damages



Collapsed Bridge on N-35

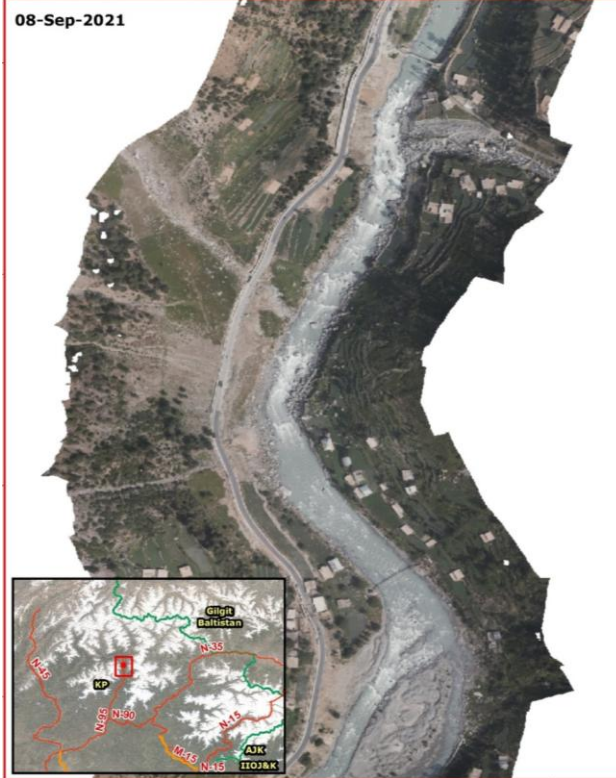


Hub River Bridge on N-25, Lasbela

# Flooding in River Swat – Building Damages



# Flooding in River Swat – Road Damages





# Small Dam Breaches in Balochistan



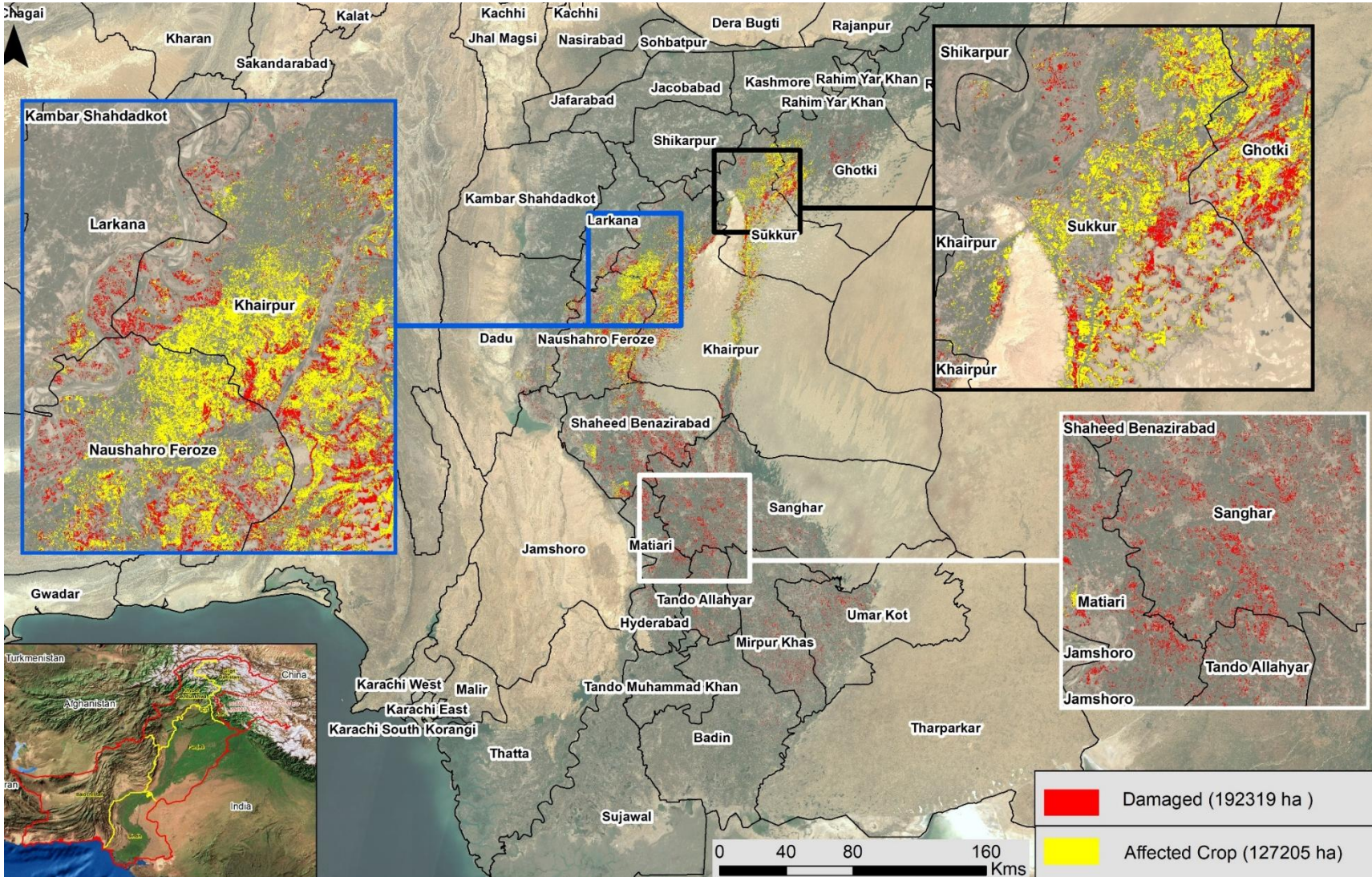
Sherjan Khadda Dam – Loralai, Balochistan



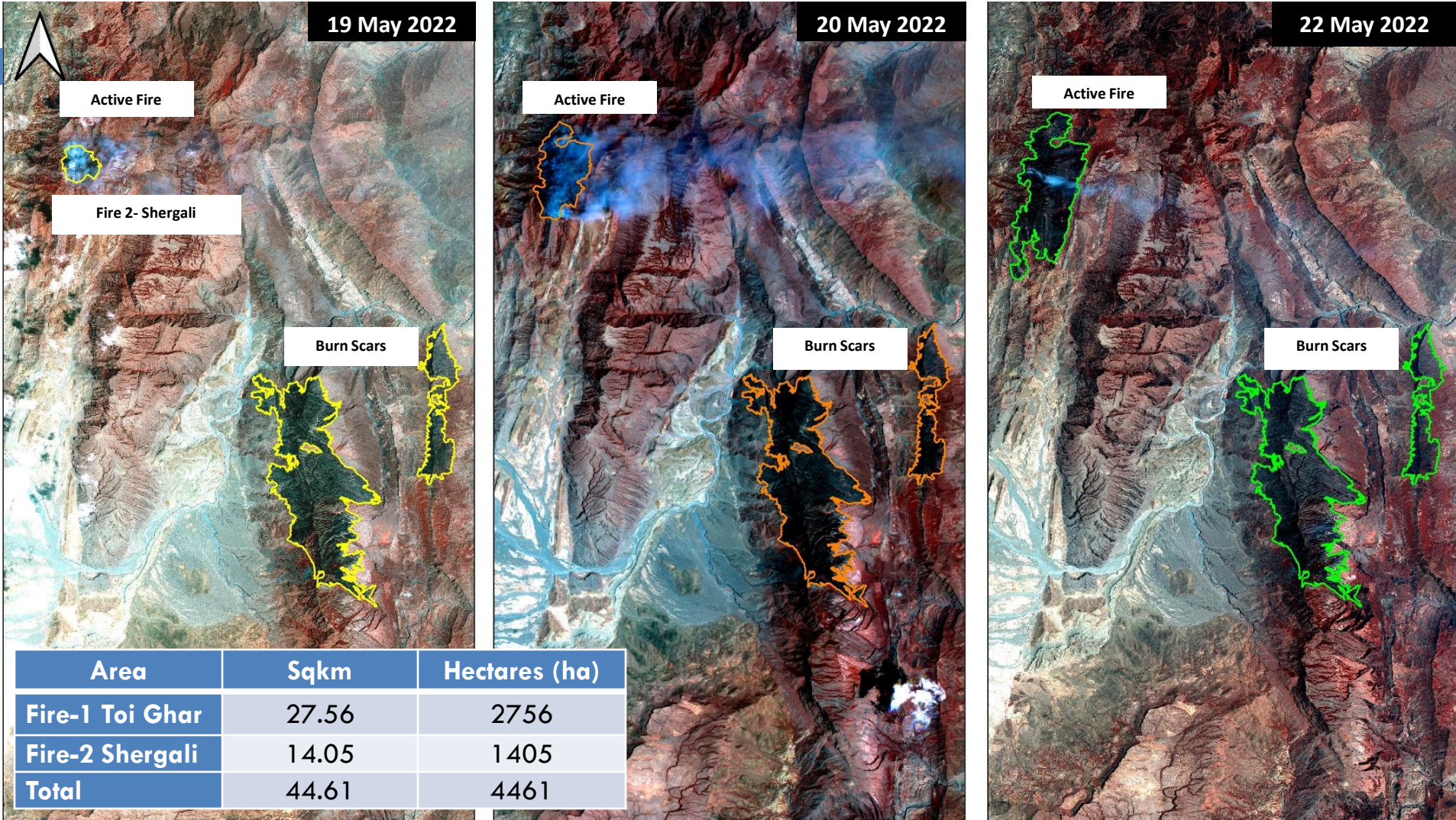
Dam Breach – Qilla Abdullah, Balochistan

# Crops Damage Assessment

# Cotton Crop Damage Assessment - Sindh

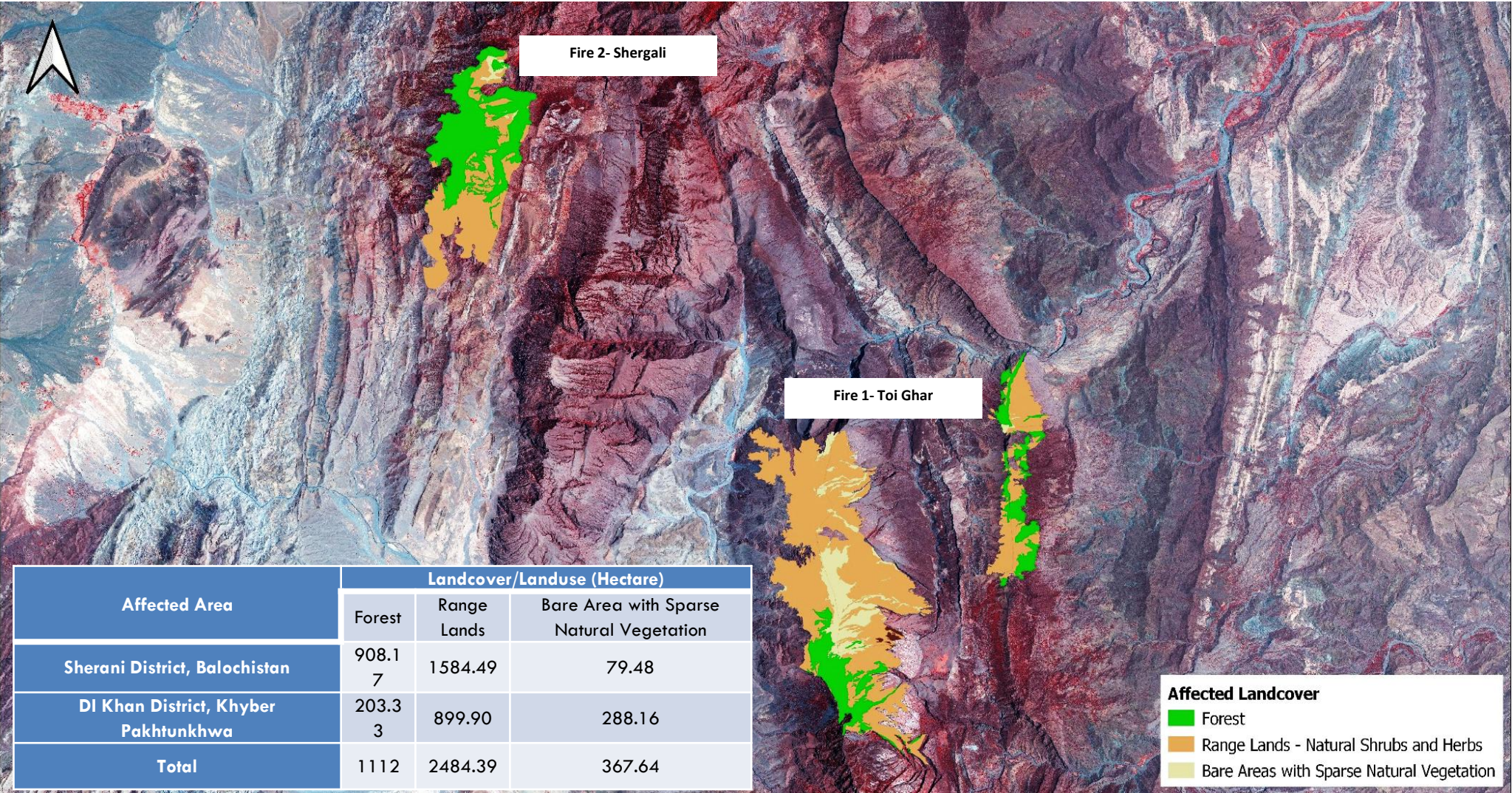


# Balochistan Forest Fire 2022 - Toi Ghar and Shergali Forest



SPOT 1.5m satellite imagery acquired on 19, 20 and 22 May 2022

# Balochistan Forest Fire 2022 – Affected Landcover



**Affected Landcover**

- Forest
- Range Lands - Natural Shrubs and Herbs
- Bare Areas with Sparse Natural Vegetation

# Near Real Time Support via DisasterWatch

The screenshot displays the DisasterWatch web application interface. At the top, the browser address bar shows the URL `disasterwatch.sgs-suparco.gov.pk`. The application header includes the SUPARCO logo, the text "DISASTERWATCH", and a "Page Views" counter showing "013765". Navigation buttons for "FLOOD", "EARTHQUAKE", "LANDSLIDE", "DROUGHT", "GLOF", and "FOREST FIRE" are visible.

The main interface is divided into several sections:

- Info and Tools:** Contains map navigation controls and an "Object identification: Active Layer" dropdown.
- Map Layers:** A tree view on the left side of the map showing various layers:
  - Floods:** Includes "Supporting Layers", "Monitoring of Rivers" (with sub-layers for "River Morphology", "Regular River Monitoring", "Dams Monitoring (Surface Water Extent)", and "River Monitoring (Surface Water Extent)"), "Earth Observation", and "Monsoon" data for years 2021 through 2016.
  - Background Layers:** Includes "Bing Aerial", "OpenStreetMap", and "Sentinel-2 (2020)".
- Map:** A satellite map of Pakistan with a red outline indicating a specific region. A gallery of 12 small image thumbnails is overlaid on the map, showing different views or time-series data.

At the bottom of the application, there is a footer with the text: "SPACE APPLICATION CENTRE FOR RESPONSE IN EMERGENCY AND DISASTERS (SACRED-SUPARCO) SUPARCO is host to UN-SPIDER Regional Support Office in Pakistan (PAK-RSO)". The Windows taskbar at the very bottom shows the system time as 10:21 AM on 8/3/2022.

# Near Real Time Support via DisasterWatch

← → ↻ Not secure | disasterwatch.sgs-suparco.gov.pk/?map=floods/downloadMaps

Central Water Com... eSWIS - Map Viewer Central Water and P... India- WRIS Version... Flood Forecast Central Water Com... Water wars: India pl... User Guides - Senti... Services overview /... Copernicus Masters »

**DISASTERWATCH** SUPARCO Page Views **013766**

FLOOD EARTHQUAKE LANDSLIDE DROUGHT GLOF FOREST FIRE

Inundation Maps Hazard Maps

River Ravi Situation Analysis – 02 August 2022

Flooding Situation Analysis SPOT-6 – Kachhi, Balochistan 02 August 2022

Flooding Situation Analysis SPOT-6 – Loralai, Balochistan 02 August 2022

Flooding Situation Analysis – Kalat, Balochistan 30 July 2022

Flooding Situation Analysis – Khuzdar, Balochistan 30 July 2022

Flooding Situation Analysis SPOT-6 – Jhal Magsi, Balochistan 30 July 2022

Flooding Situation Analysis Sentinel-2 – Jhal Magsi, Balochistan 30 July 2022

River Chenab Situation Analysis – 30 July 2022

Flooding Situation Analysis – Lasbela, Balochistan 30 July 2022

Flooding Situation Analysis - Balochistan 30 July 2022

Flooding Situation Analysis – Jhang,

Flooding Situation Analysis – Fazilpur, District Rajanpur,

Flooding Situation

Flooding Situation

Flooding Situation

SPACE APPLICATION CENTRE FOR RESPONSE IN EMERGENCY AND DISASTERS (SACRED-SUPARCO) SUPARCO is host to UN-SPIDER Regional Support Office in Pakistan (PAK-RSO)

# Global Agenda's - Shifting of focus from Reactive to Proactive Approach

- ❖ Sendai Framework for Disaster Risk Reduction 2015-2030 Priorities for action
  1. **Understanding disaster risk;**
  2. Strengthening disaster risk governance to manage disaster risk;
  3. Investing in disaster risk reduction for resilience;
  4. **Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction.**
- ❖ Climate Change Agreement (COP21) – **Article 8**
- ❖ Sustainable Development Goals (SDGs) 2015-30 – **SDGs 6, 13, and 15**  
**SDG13: TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS**
- ❖ National Disaster Management Plan (NDMP) Implementation Roadmap **2015-30**



# National Catastrophic Model (NatCat) for NDRMF

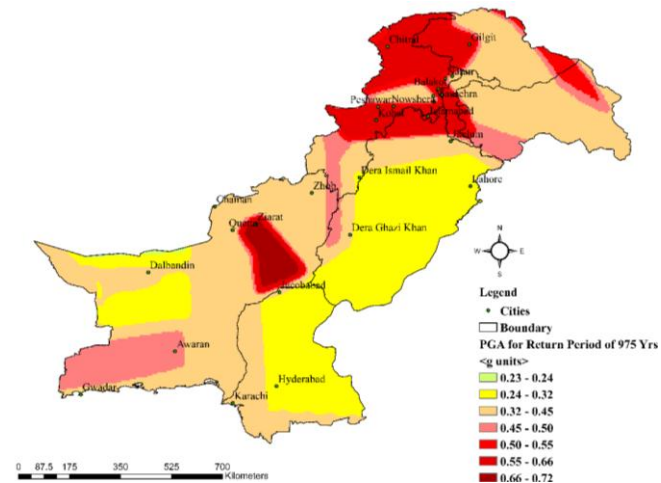
## Scope of Work

- Development of Database and Web Application
- Hydro-meteorological Hazard Assessment (Flood, Drought, Cyclone)
- Geo-physical Hazard Assessment (Seismic)
- Exposure of Landcover, Crops and Infrastructure to Hydro-meteorological and Geo-physical Hazards
- Loss and Risk Assessment Model for Hydro-meteorological and Geo-physical Hazards
- Integrated Risk Assessment

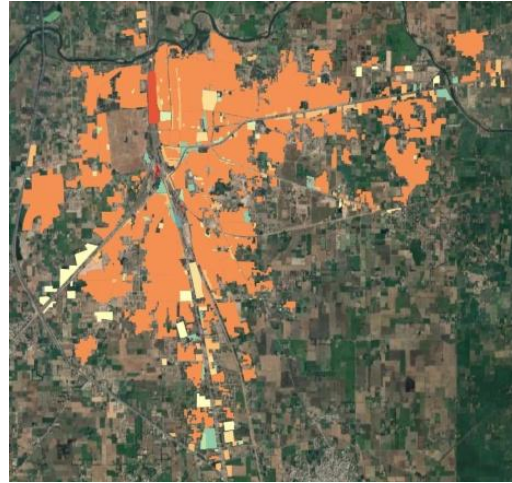
## Project Significance

- The risk modeling work will provide quantitative information on the expected levels of loss for hazard events of varying types, intensities, and return periods
- It will provide the basis for a national DRF strategy for Pakistan and pilot disaster risk financing products

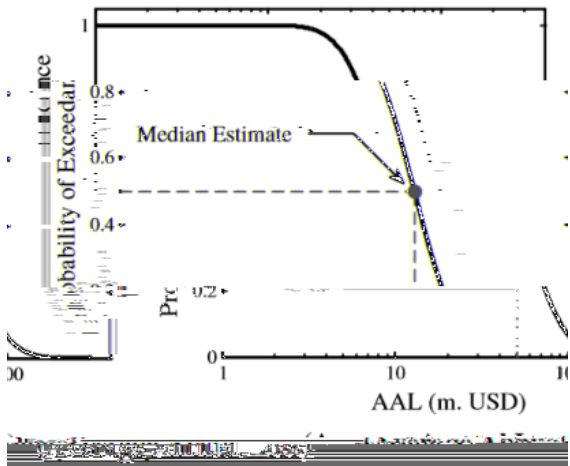
# NatCat Model Overall Approach



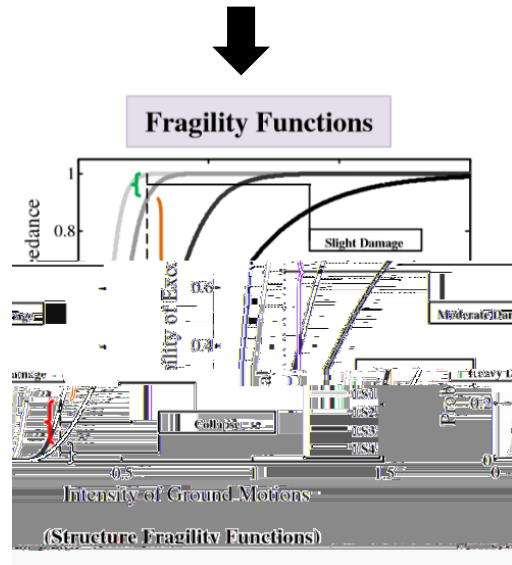
Hazard



Exposure



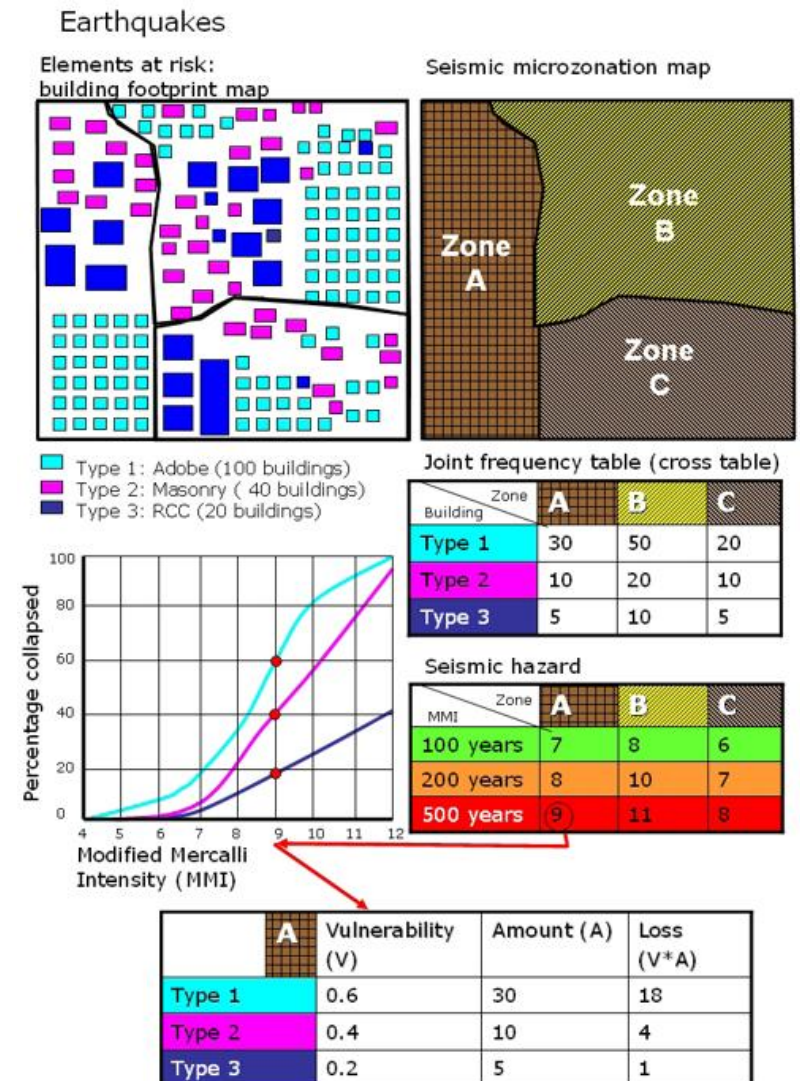
Loss/Risk



Vulnerability

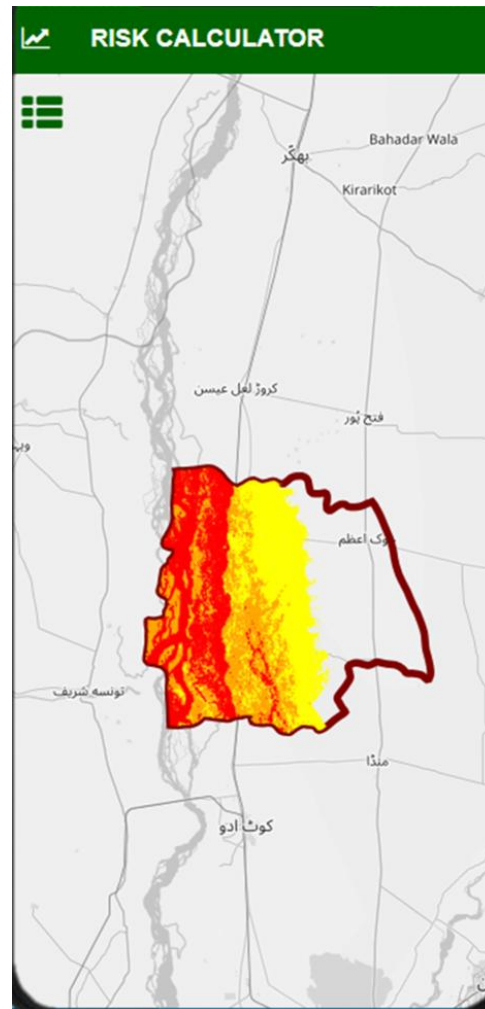
# Complete Spatial Picture

- NatCat Model will provide baseline data for exposure, vulnerability and loss assessment at Tehsil level against 4 x natural disasters namely earthquake, flood, drought and cyclone
- NatCat Model Risk Calculator will help in identification of potential vulnerable population and infrastructure against future events
- Insurance industry will be able to assess losses for estimation of premium via NatCat Model Risk Calculator
- NatCat Model will help in assessment of reconstruction / rehabilitation cost



# NatCat Risk Calculator - Demo Version

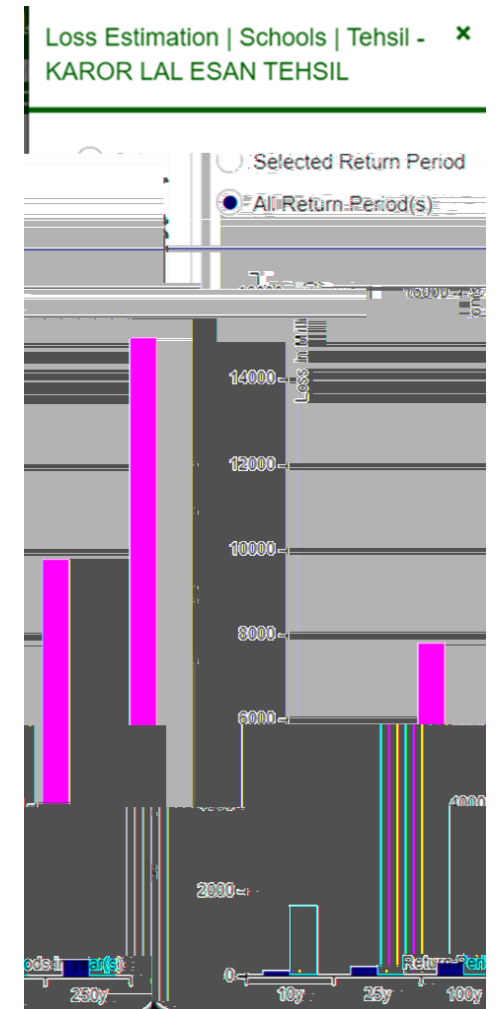
The screenshot displays the 'RISK CALCULATOR' interface. The 'Hazard Module' is active, showing two options: 'Flood' and 'Seismic'. Under 'Flood', a return period slider is set to 50 years, with a legend for water depth: < 3 ft. (Low), 3 - 6 ft. (Medium), 6 - 9 ft. (High), and > 9 ft. (Very High). Under 'Seismic', a return period slider is set to 5 years, with a legend for Peak Ground Acceleration (PGA): PGA < 3 (Low), PGA 3 - 6 (Medium), PGA 6 - 9 (High), and PGA > 9 (Very High). The interface also shows buttons for 'AOI', 'Element at Risk Module', 'Exposure Module', and 'Loss Estimation Module'.



Hazard Module

The screenshot displays the 'RISK CALCULATOR' interface with the 'Exposure Module' active. The 'AOI' is set to 'LEIAH TEHSIL -> LEIAH TEHSIL'. The 'Element at Risk Module' is active, showing a legend for 'Schools' and 'Health Facility'. The 'Schools' legend includes: High (Green), Primary (Red), Middle (Orange), MPS (Yellow), sMosque (Blue), and H.Sec. (Brown). The 'Health Facility' legend includes: BHU (Green), THQ (Yellow), Clinic (Blue), DHQ (Orange), Hospital (Red), Maternity Home (Yellow), RHC (Brown), and Strs. (Brown). The interface also shows buttons for 'AOI', 'Hazard Module', and 'Loss Estimation Module'.

Exposure Module



Loss Module

# Conclusion

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“Disaster Management is the shared responsibility”