

# SPACE BASED SUPPORT TO NDMA/PDMAS DURING FLOOD 2022

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

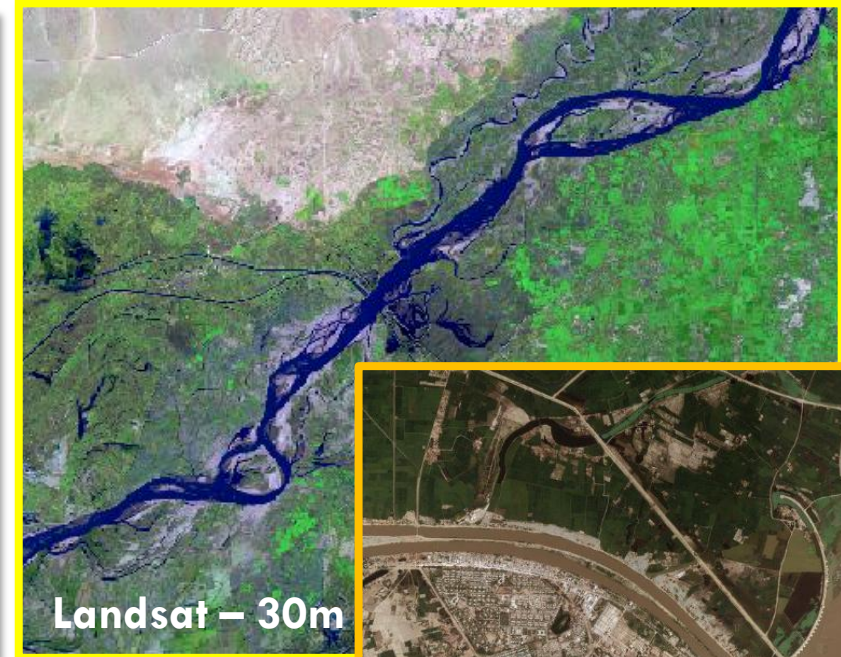
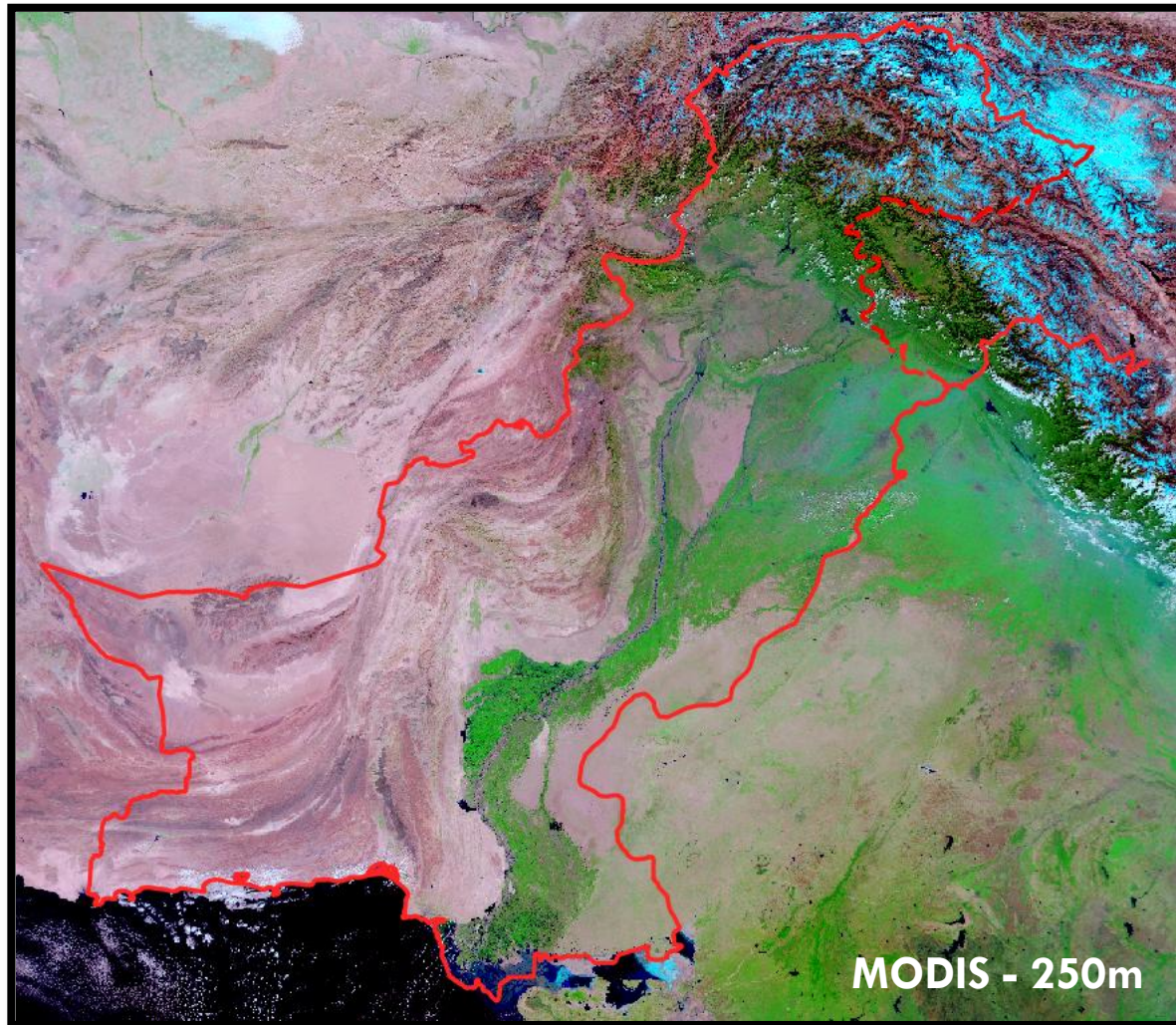


- **THE CENTRE PROVIDES SPACE BASED INFORMATION TO NATIONAL/PROVINCIAL DISASTER MANAGEMENT AGENCIES TO RAPIDLY ASSESS THE EXTENT OF NATURAL DISASTERS AND DAMAGES TO HUMAN LIVES, PROPERTY AND INFRASTRUCTURE.**
- **THE CENTRE ALSO PROVIDES ASSISTANCE TO REGIONAL COUNTRIES IN CASE OF NATURAL DISASTERS.**

# 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



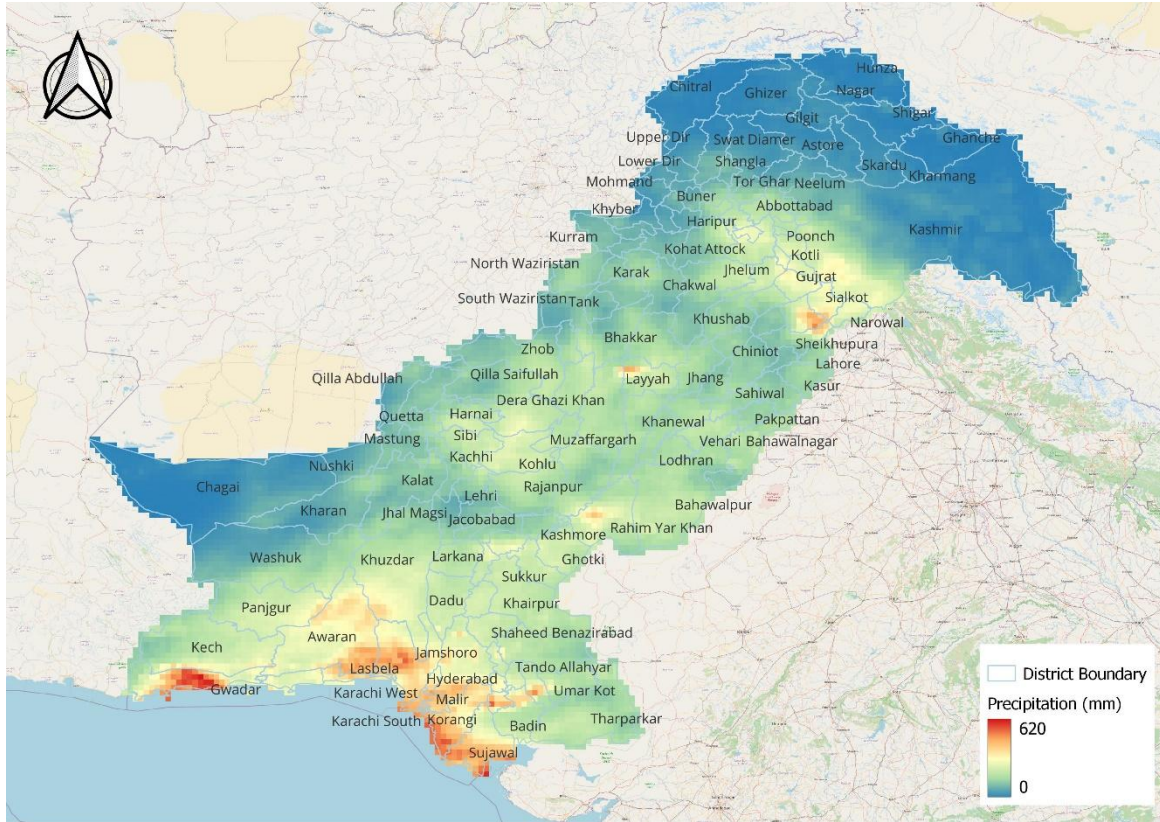
**Satellites can provide information at Regional, National and Local level**

# Space based support to NDMA/PDMAs

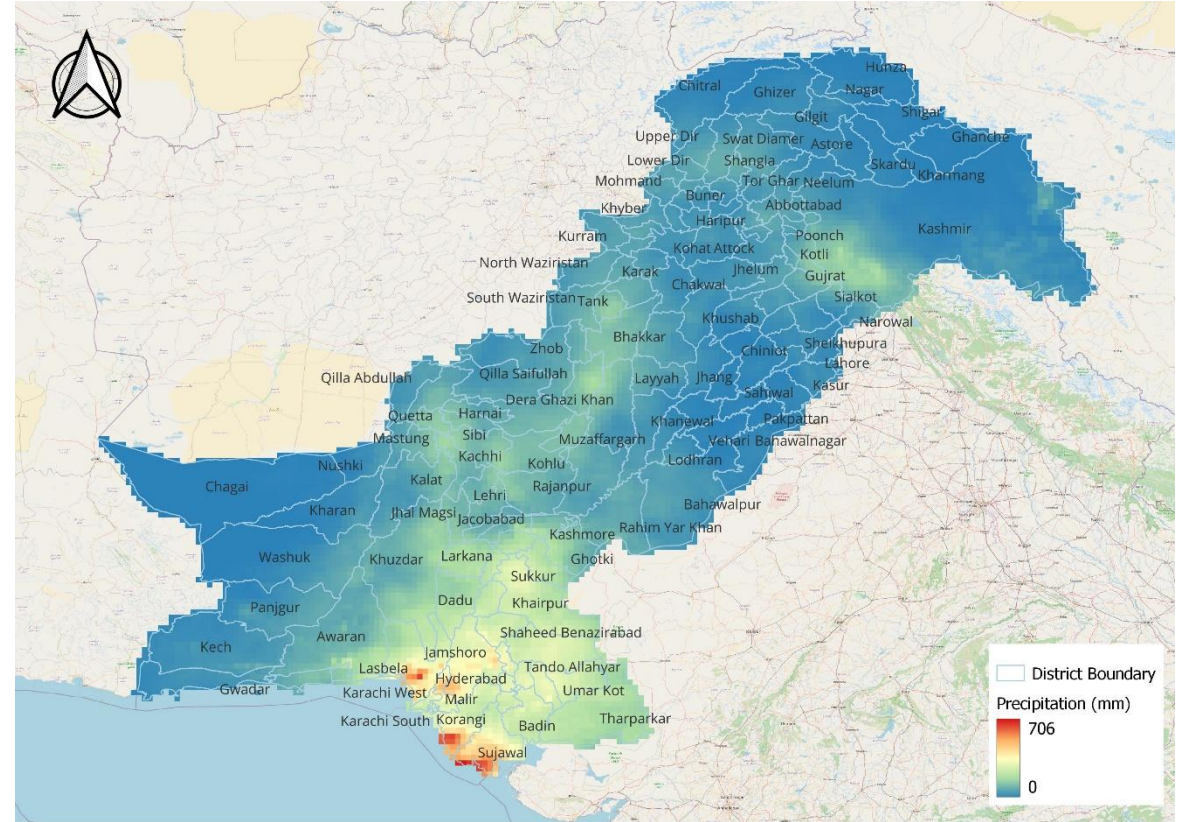
- Regular monitoring of Rivers, Trans-boundary dams, Glaciers
- Torrents / Flash floods – Balochistan, DG Khan, DI Khan, Rajanpur
- House / settlements damage assessment
- Road / bridges damage assessment on major highways
- Crops damage assessment
- Dams breach assessment / identification in Balochistan

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

# Monsoon Rains – GSMaPs

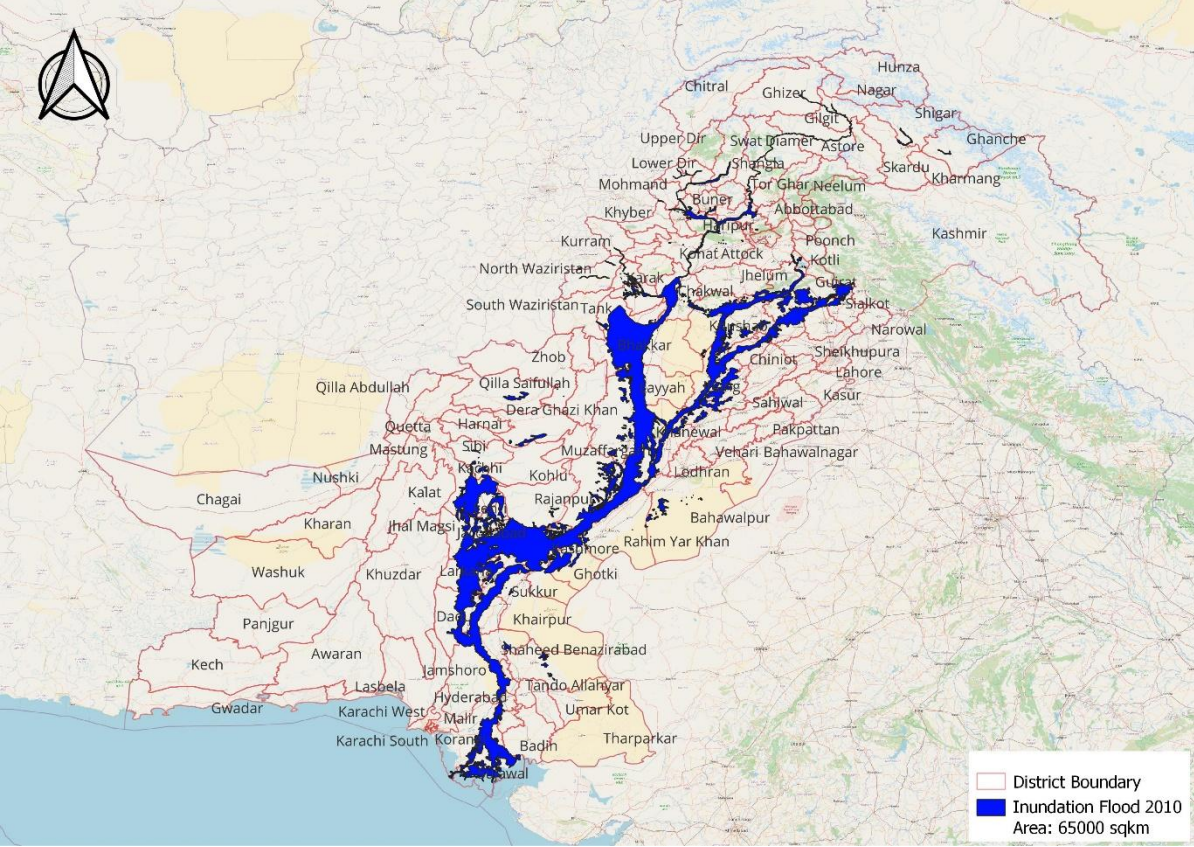


**First Spell (01 July till 07 Aug 2022)**

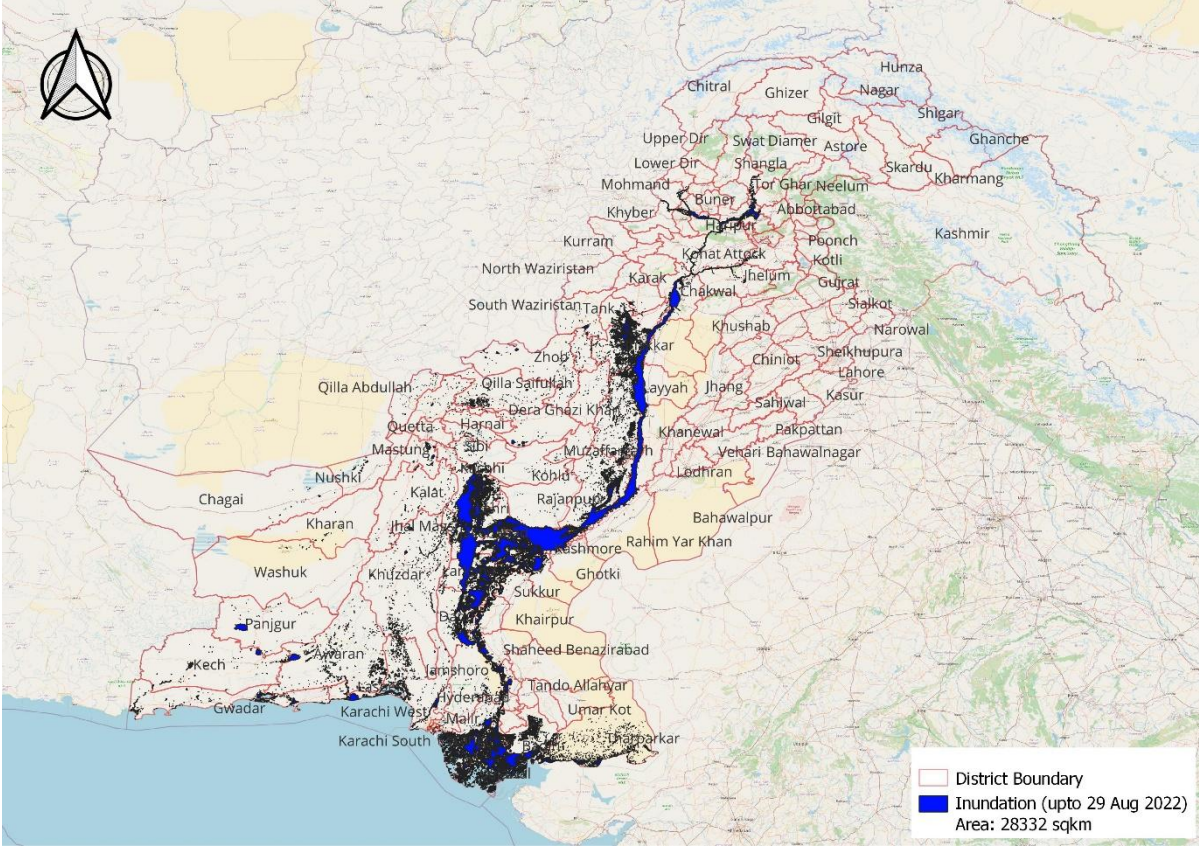


**Second Spell (08 Aug till 29 Aug 2022)**

# Inundation Situation - Flood 2022 vs Flood 2010



**2010**

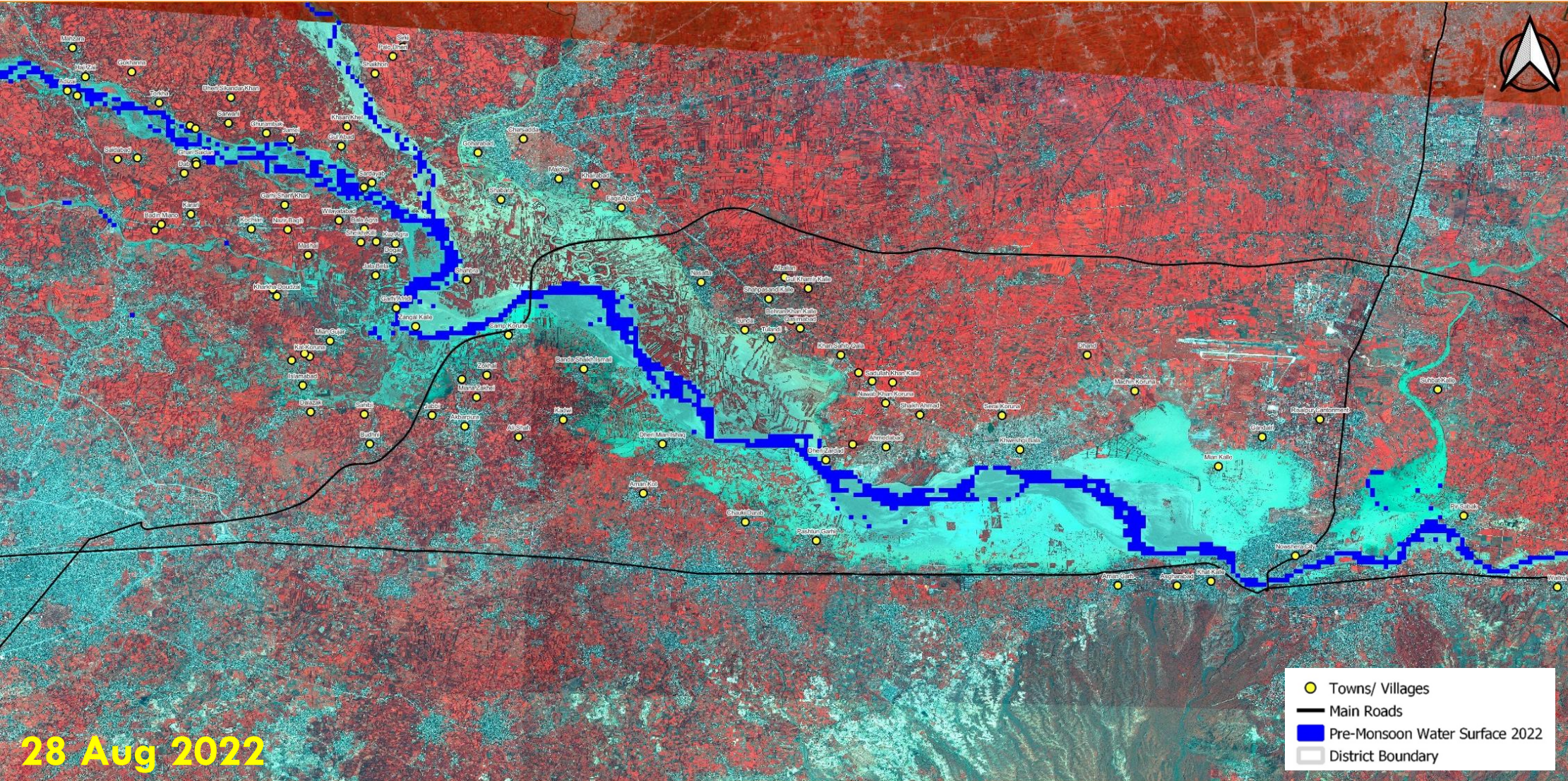


**2022**

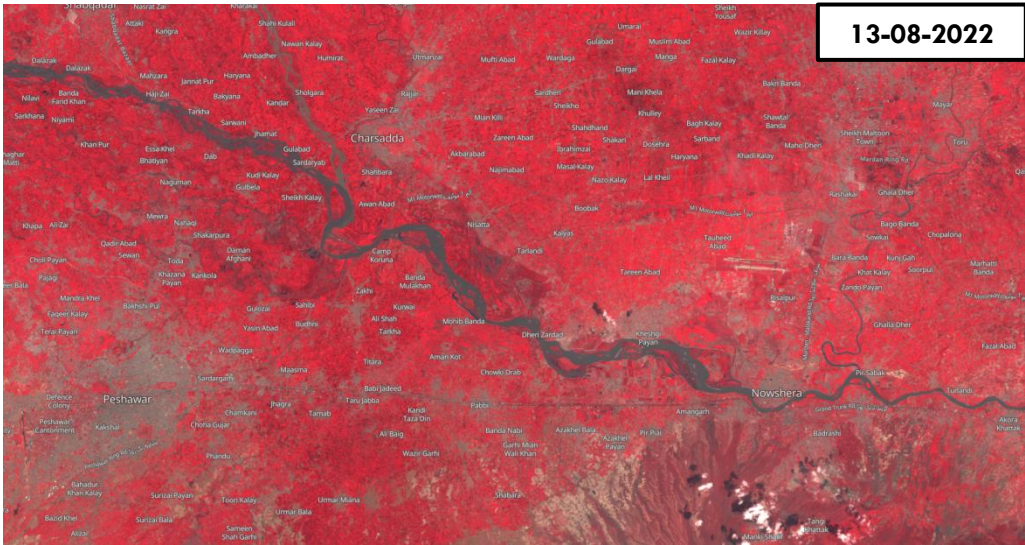


# **Rapid Flood inundation Mapping**

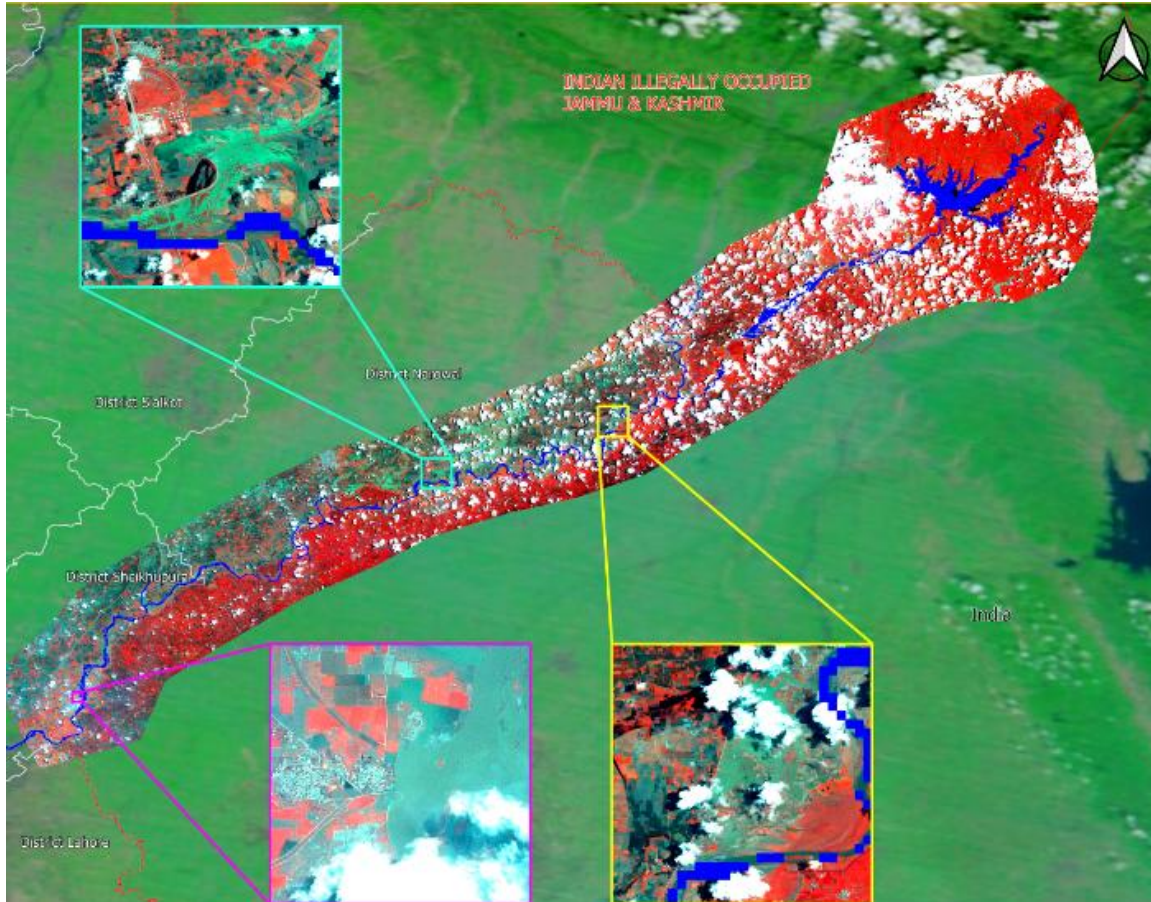
# Flooding in Kabul and Swat Rivers at Nowshera



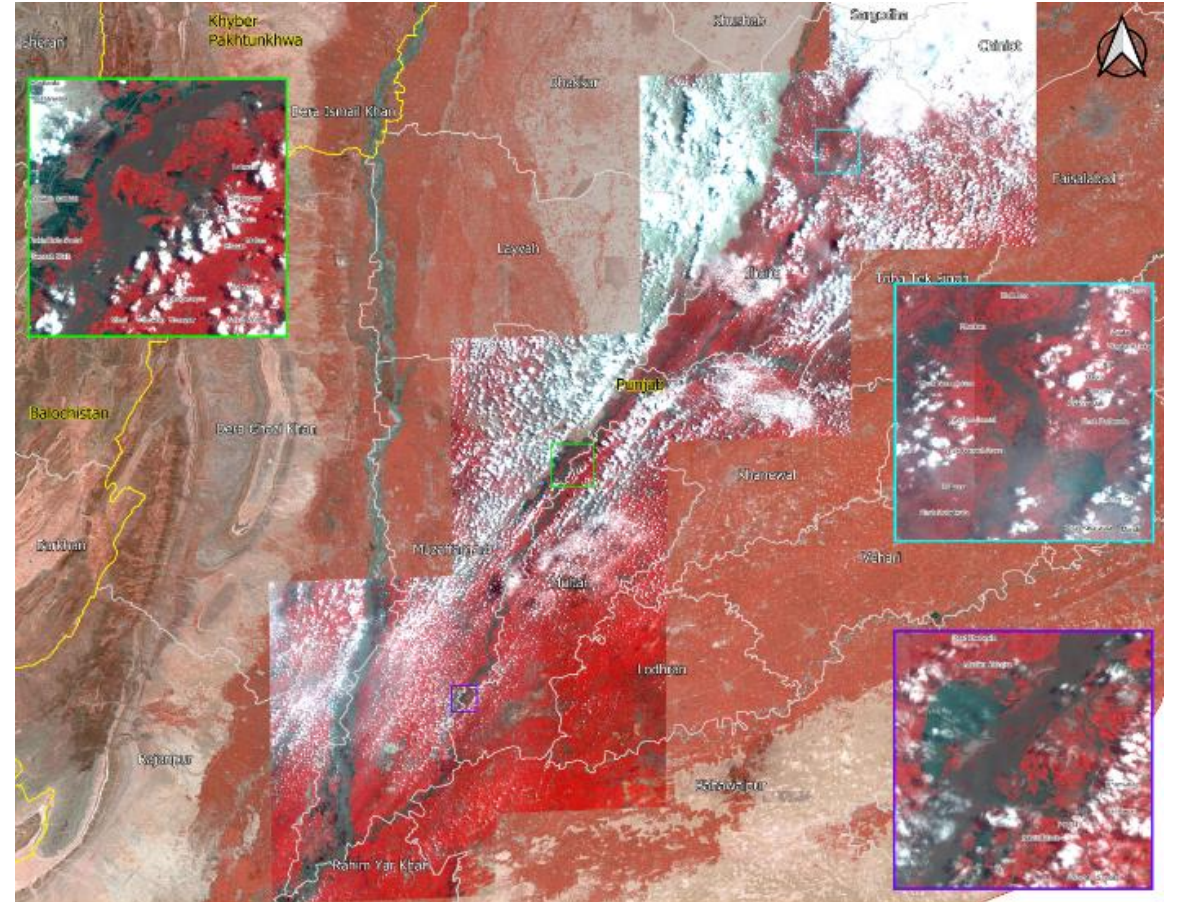
# Flooding in Kabul and Swat Rivers at Nowshera



# Regular monitoring of Rivers – Chenab and Ravi

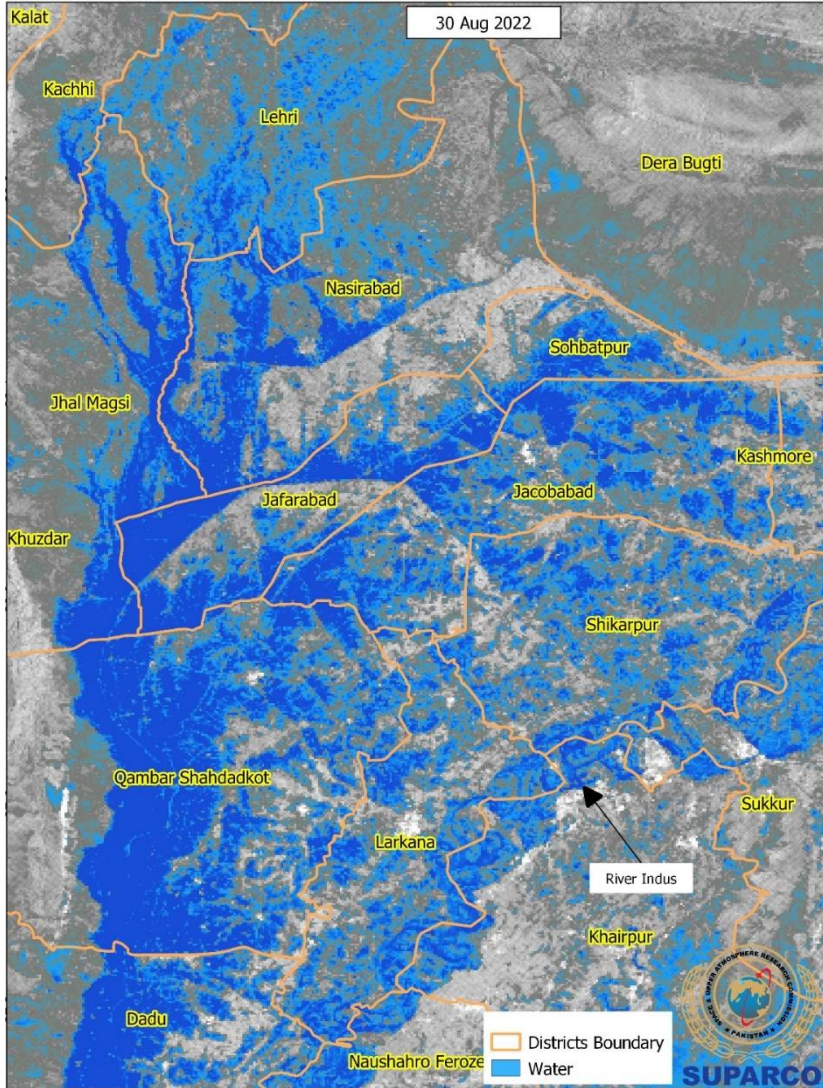
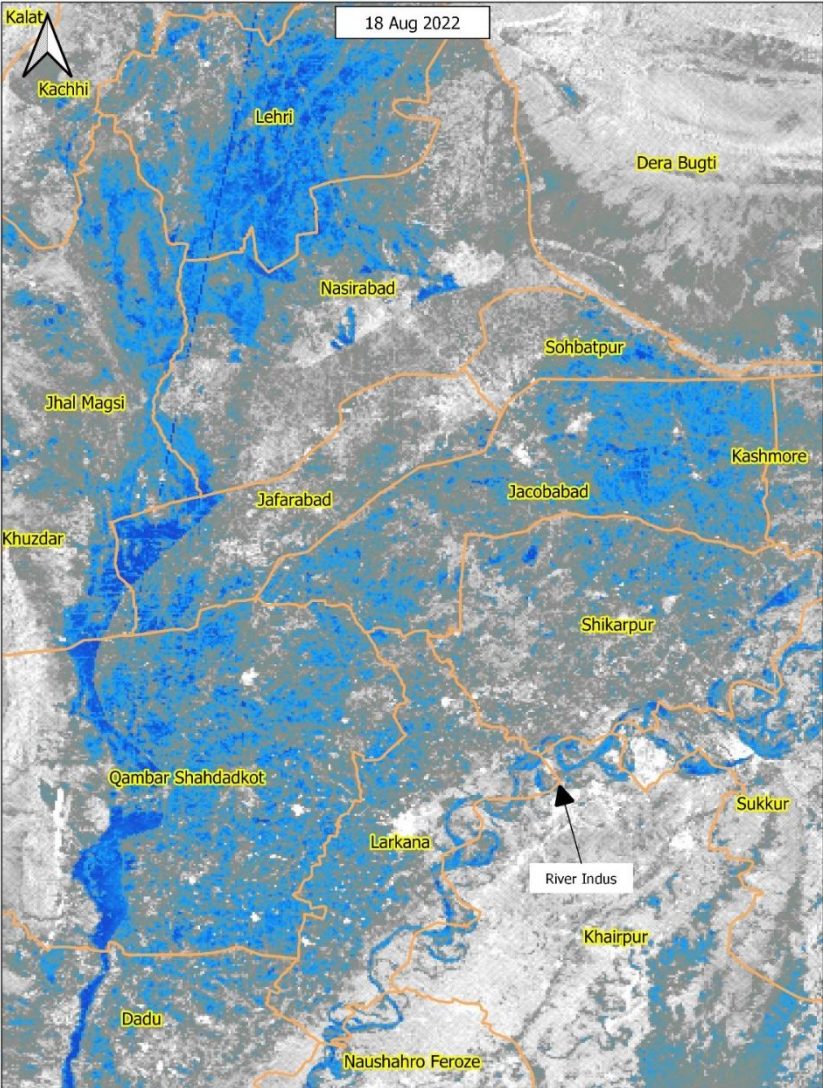


**River Ravi – 02 Aug 2022**

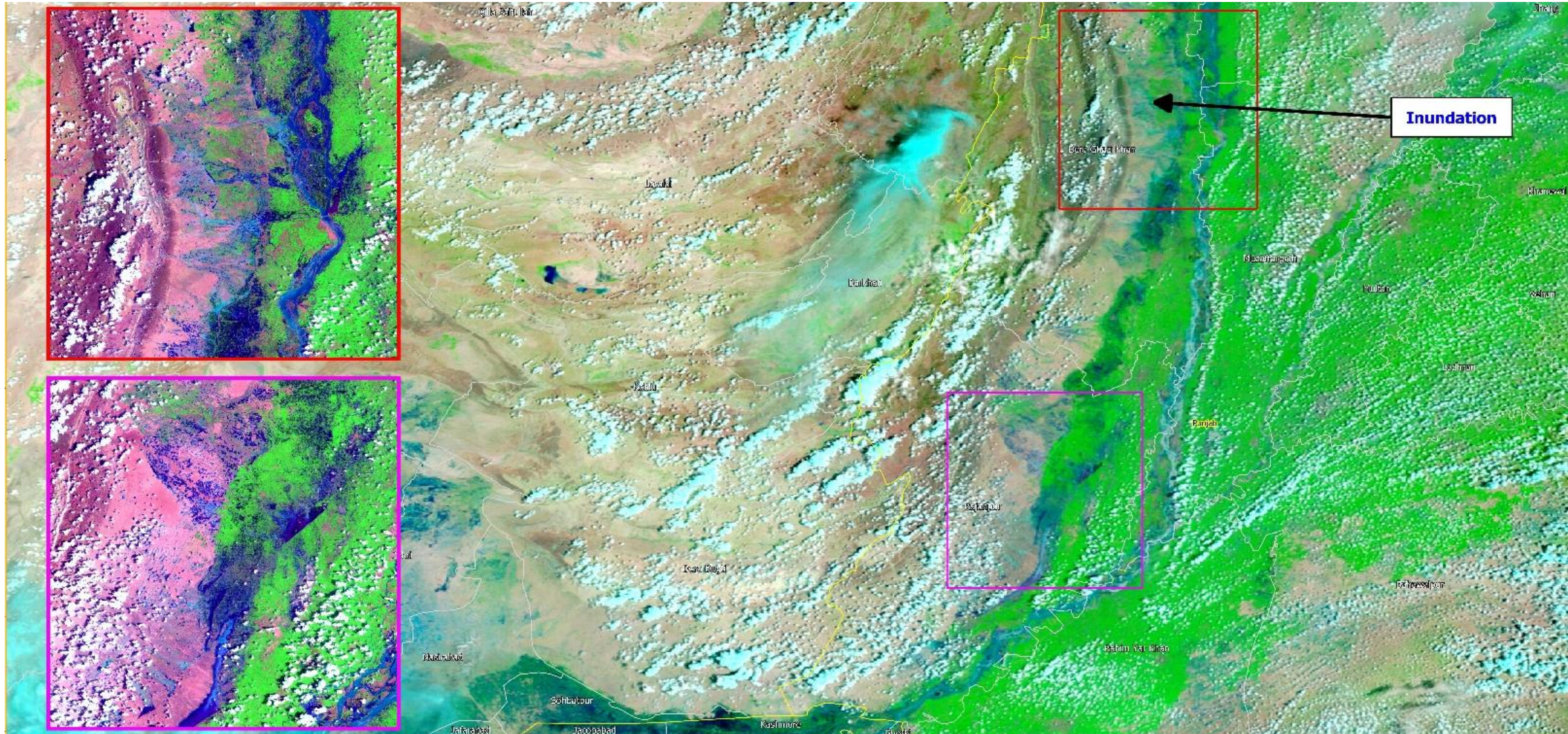


**River Chenab – 30 July 2022**

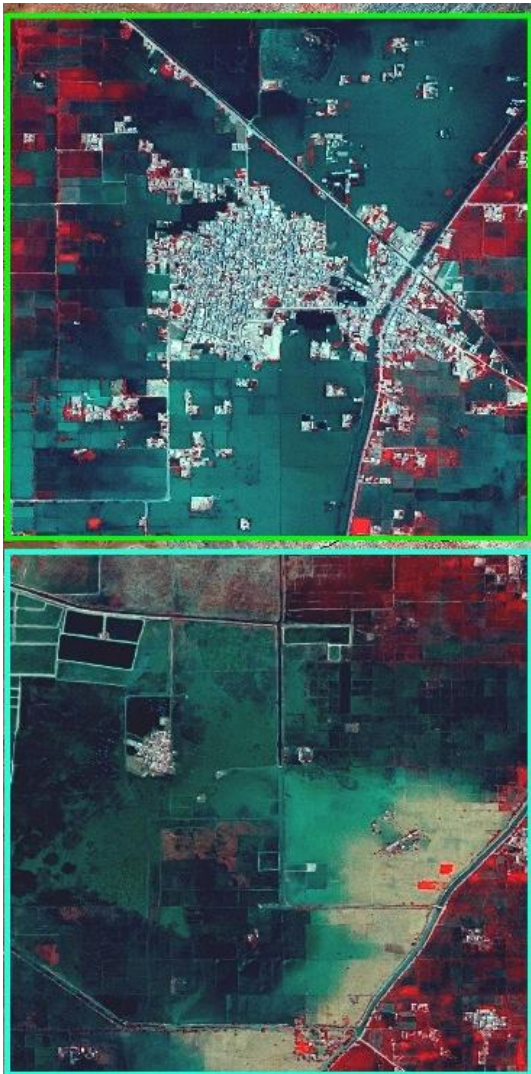
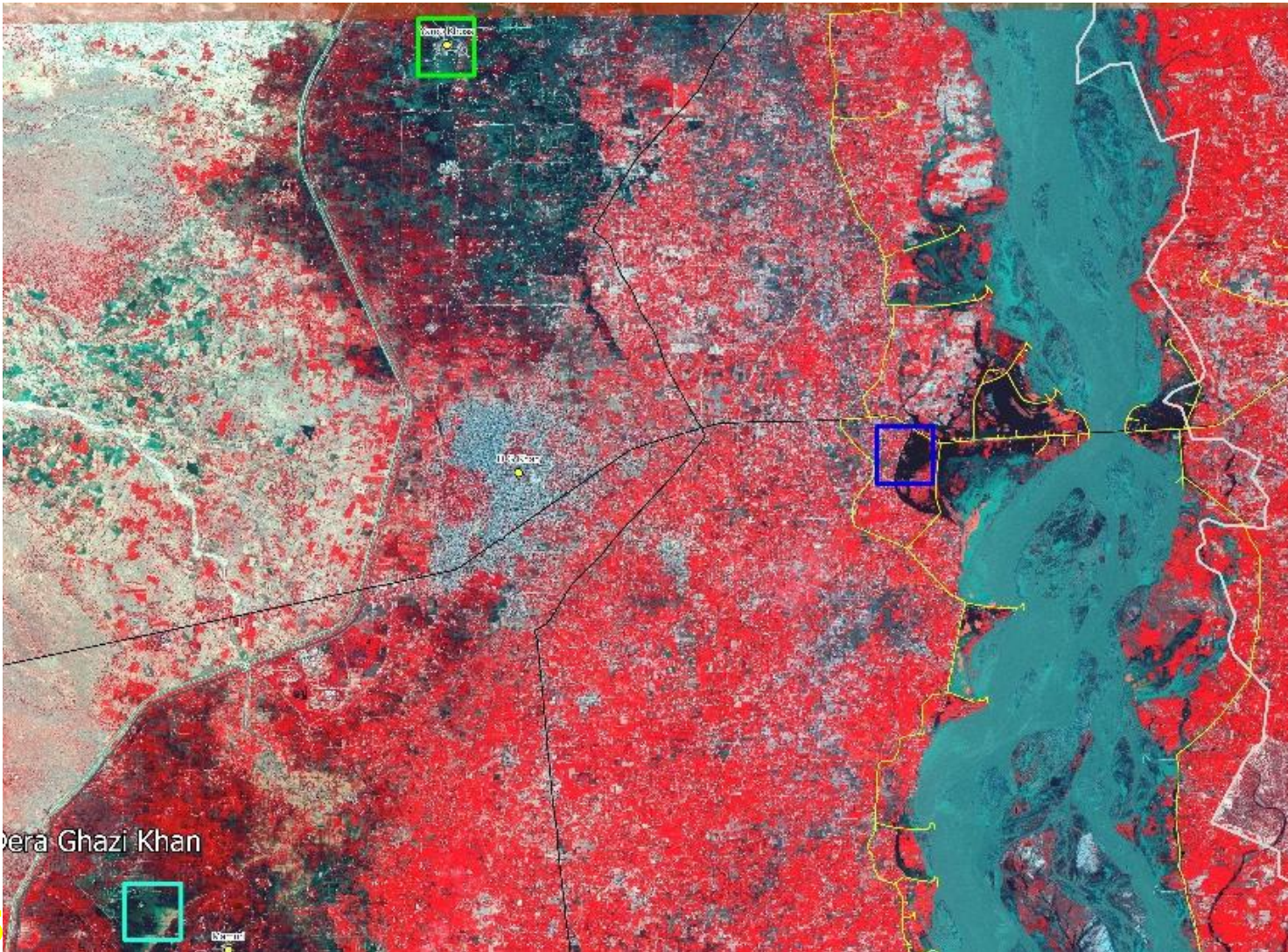
# Flood/Rain Inundation- Sindh & Balochistan



# Flash Flooding in Dera Ghazi Khan and Ranjanpur, Punjab



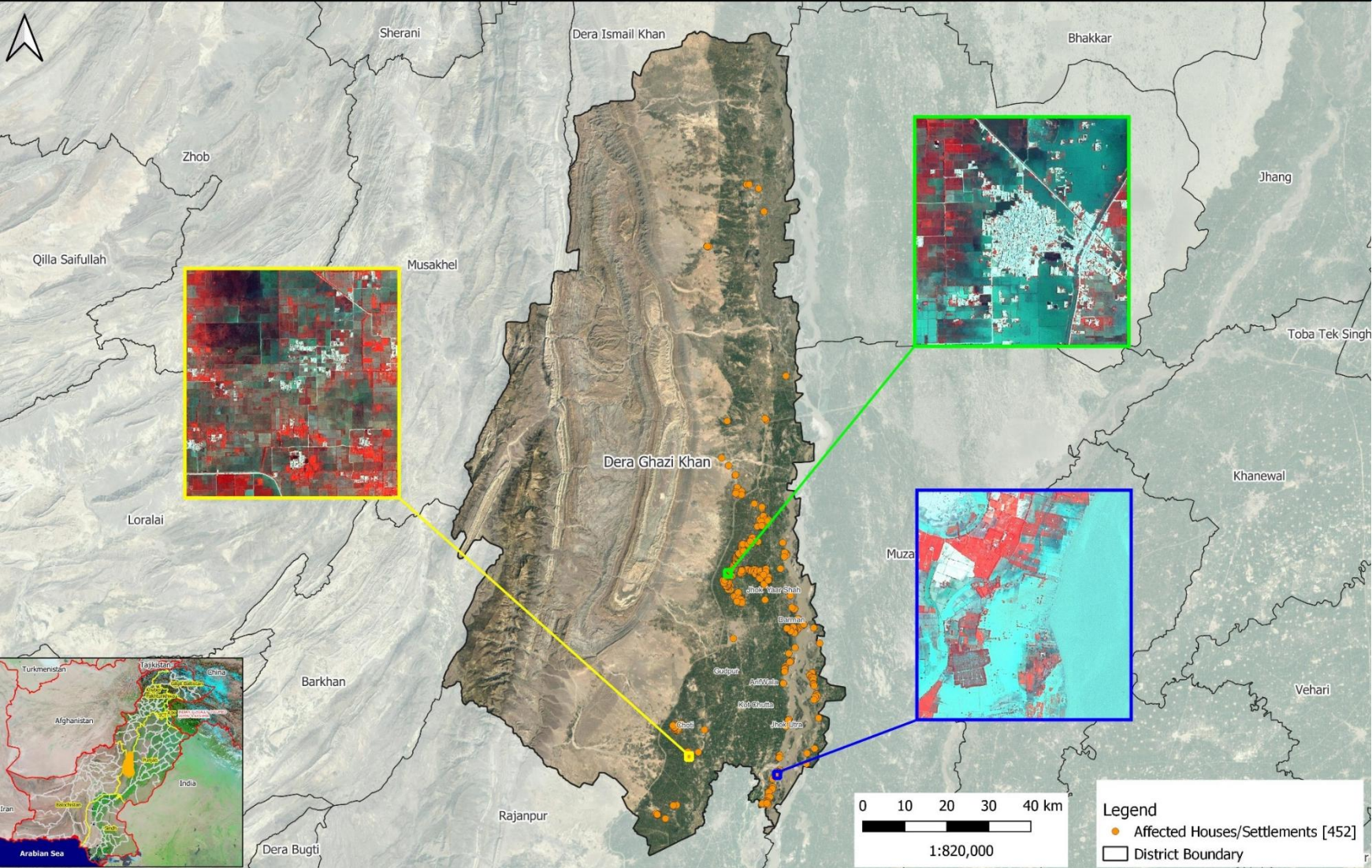
# Flash Flooding in Dera Ghazi Khan, Punjab



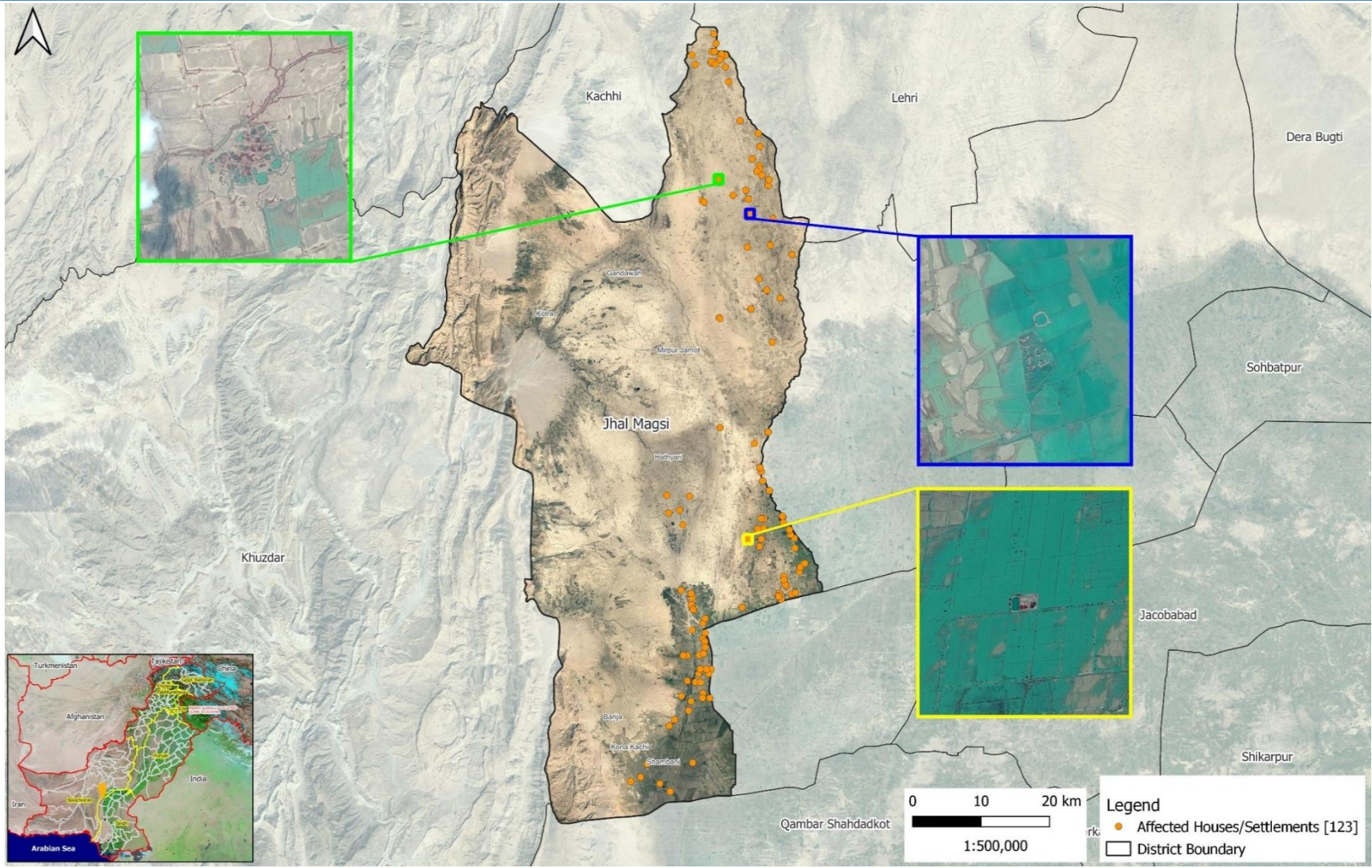
# Houses/Settlements Damage Assessment



# Rapid Damage Assessment – DG Khan



# Rapid Damage Assessment – Jhal Magsi



# Infrastructure Damage Assessment

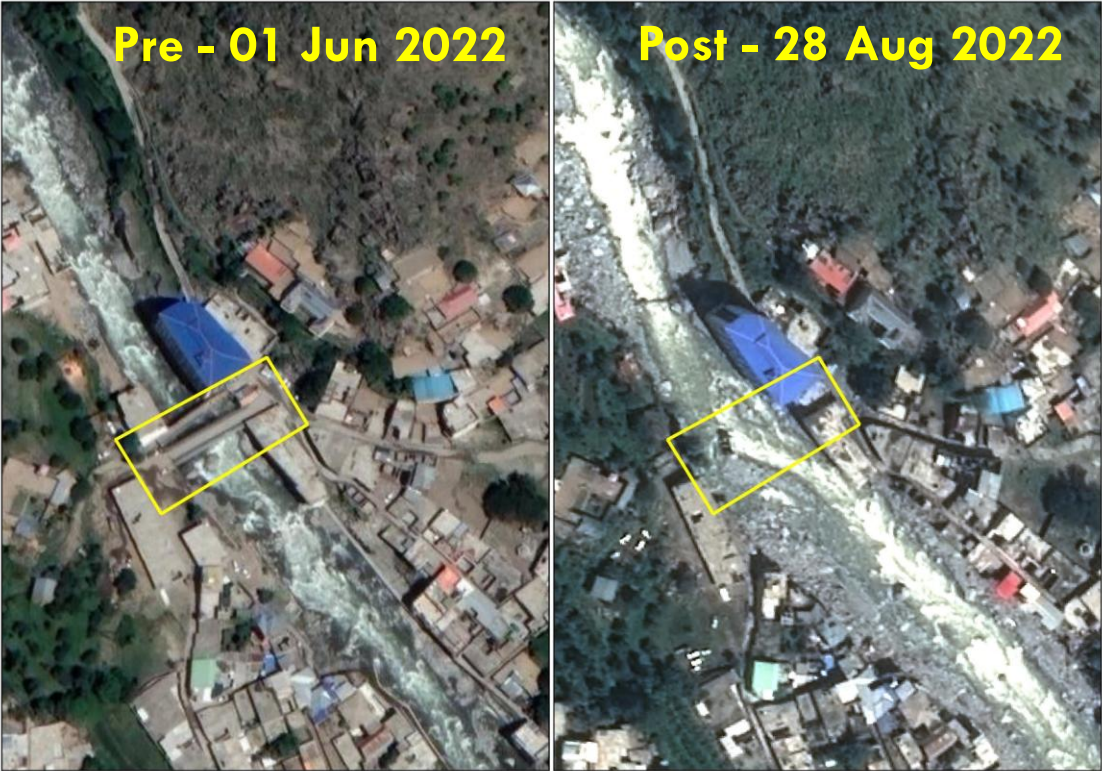
# Flooding in Swat Rivers at Mohmand Dam Site



# Flooding in Swat Rivers at Munda Headwork



# Flooding in River Swat – Bridge Damages



Collapsed Bridge on N-35

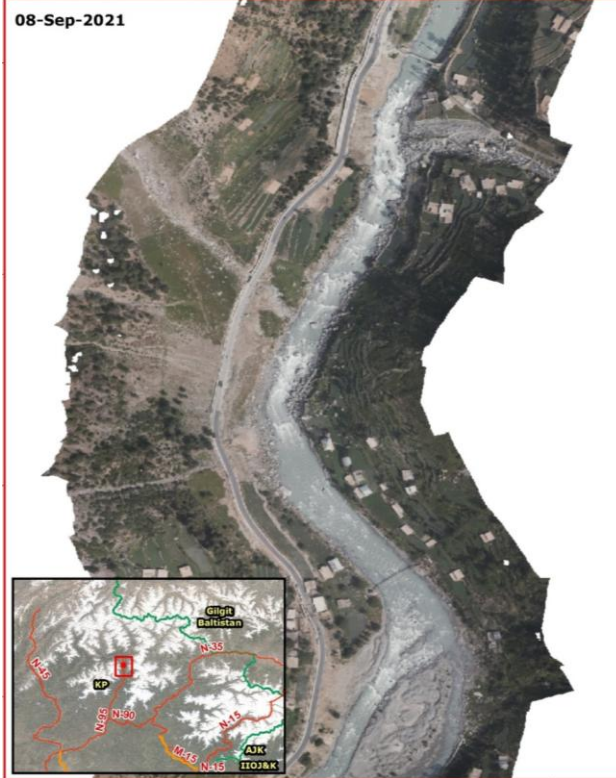


Hub River Bridge on N-25, Lasbela

# Flooding in River Swat – Building Damages



# Flooding in River Swat – Road Damages





# Small Dam Breaches in Balochistan



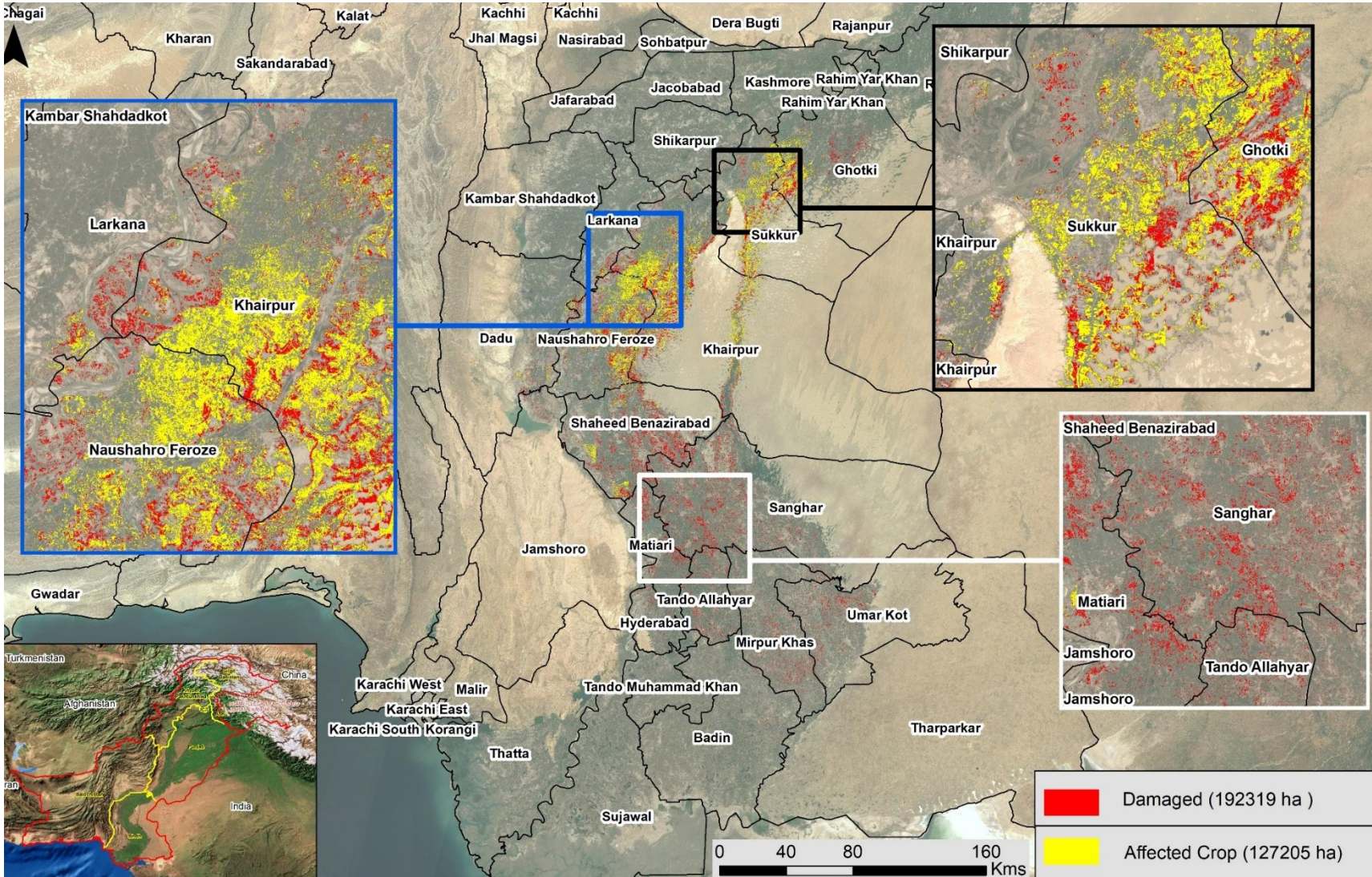
Sherjan Khadda Dam – Loralai, Balochistan



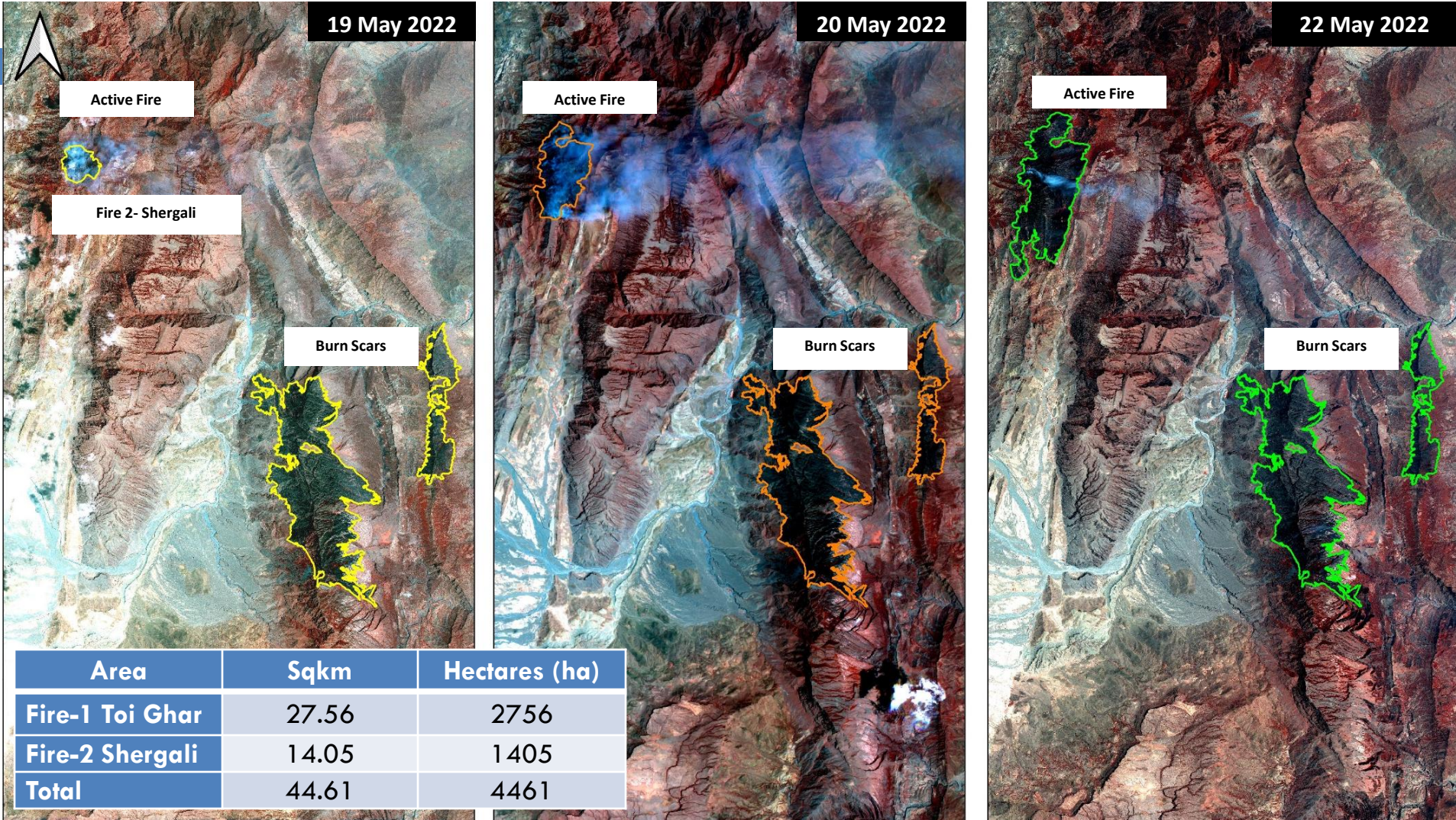
Dam Breach – Qilla Abdullah, Balochistan

# Crops Damage Assessment

# Cotton Crop Damage Assessment - Sindh

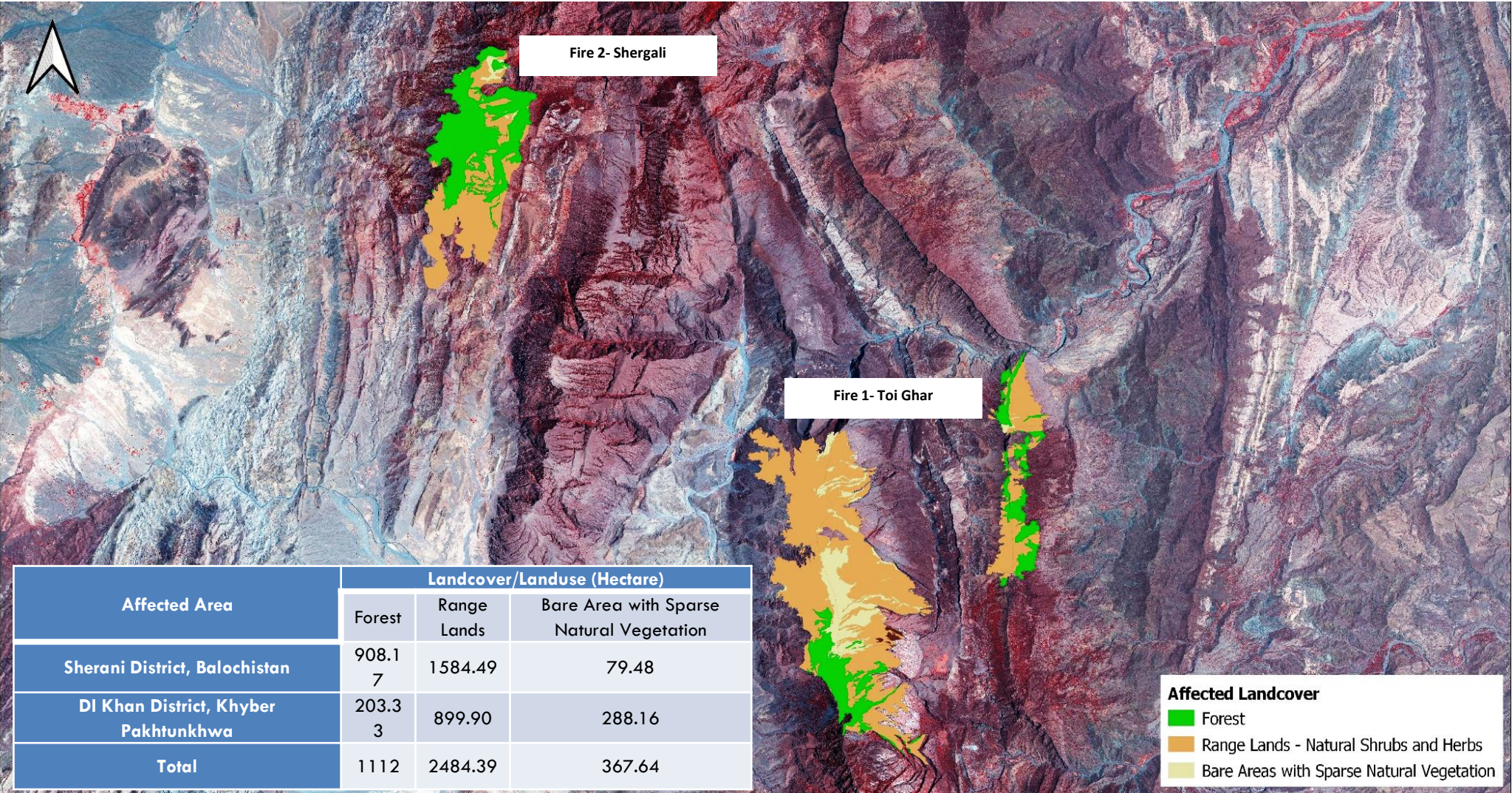


# Balochistan Forest Fire 2022 - Toi Ghar and Shergali Forest



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

# Balochistan Forest Fire 2022 – Affected Landcover



# 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 page 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 list of layers on the left side, including:
  - Floods
    - Supporting Layers
    - Monitoring of Rivers
      - River Morphology
      - Regular River Monitoring
      - Dams Monitoring (Surface Water Extent)
      - River Monitoring (Surface Water Extent)
    - Earth Observation
  - Monsoon (2021, 2020, 2019, 2018, 2017, 2016)
  - Flood (2015, 2014)
  - Historic Inundation Extents
  - Flood Hazard
  - Background Layers
    - Bing Aerial (checked)
    - OpenStreetMap
    - Sentinel-2 (2020)

- Map:** A satellite map of Pakistan with a red outline indicating a specific region. A gallery of 12 small thumbnail images is overlaid on the map, showing historical satellite imagery of the same area.
- Footer:** Text at the bottom reads "SPACE APPLICATION CENTRE FOR RESPONSE IN EMERGENCY AND DISASTERS (SACRED-SUPARCO)" and "SUPARCO is host to UN-SPIDER Regional Support Office in Pakistan (PAK-RSO)".

The Windows taskbar at the bottom shows the system clock as 10:21 AM on 8/3/2022, along with various application icons and system tray icons.

# 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

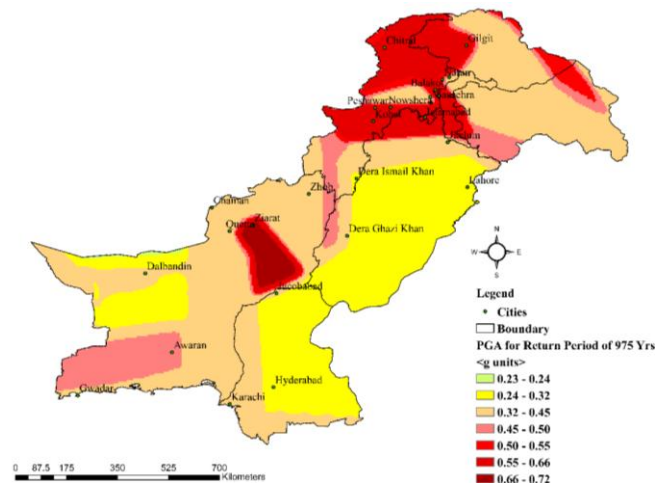
## Scope of Work

- 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

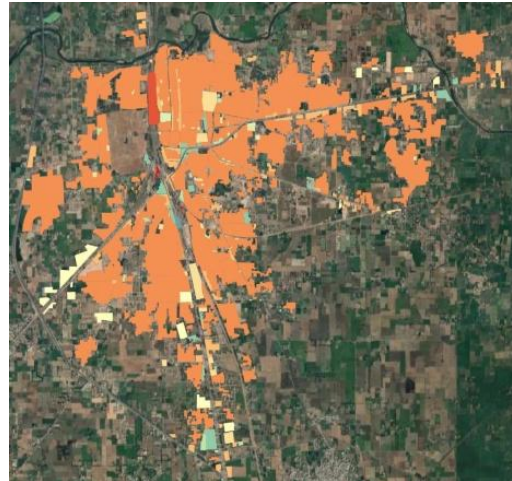
## Project Significance

- 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

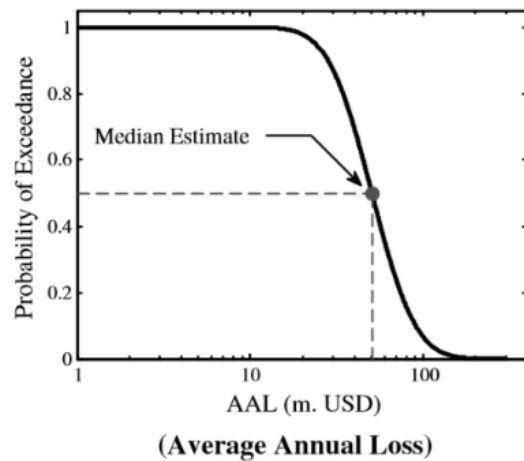
# NatCat Model Overall Approach



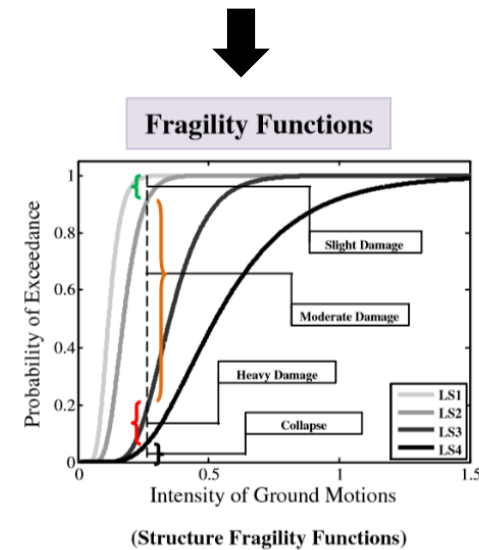
Hazard



Exposure



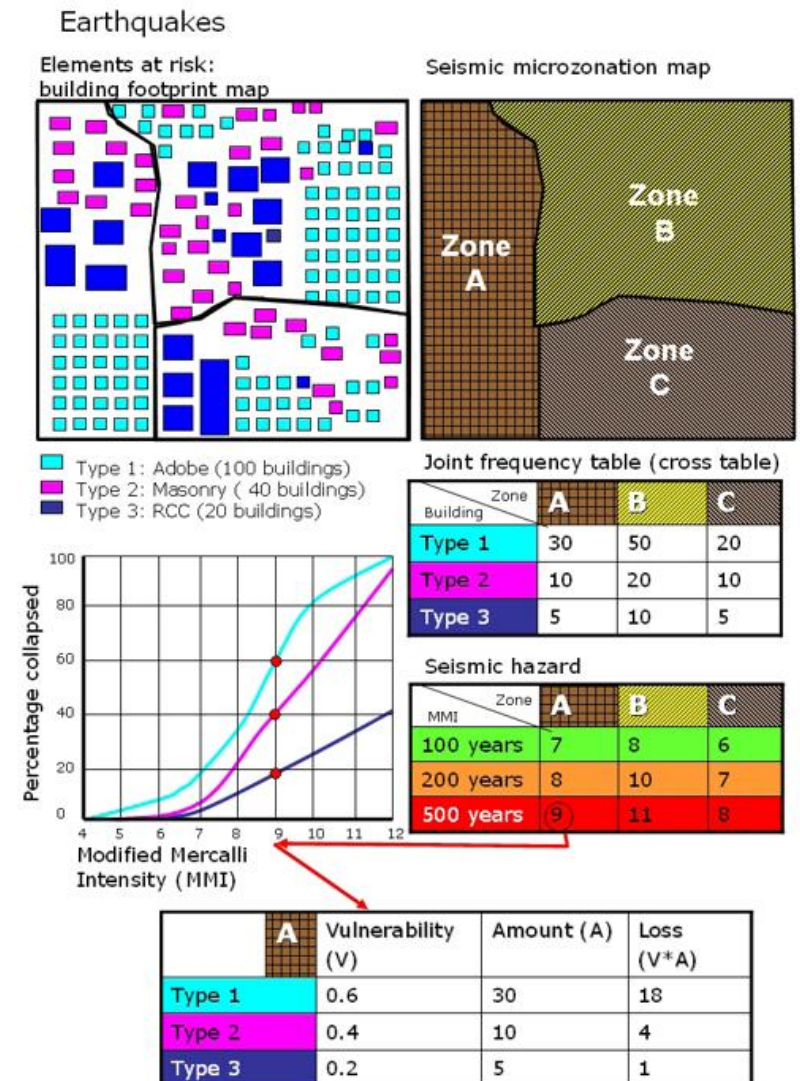
Loss/Risk



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

**RISK CALCULATOR**

AOI

**Hazard Module**

Flood Charts

5 10 25 **50** 100 200  
*Return period in years*

- < 3 ft. (Low)
- 3 - 6 ft. (Medium)
- 6 - 9 ft. (High)
- > 9 ft. (Very High)

Seismic Charts

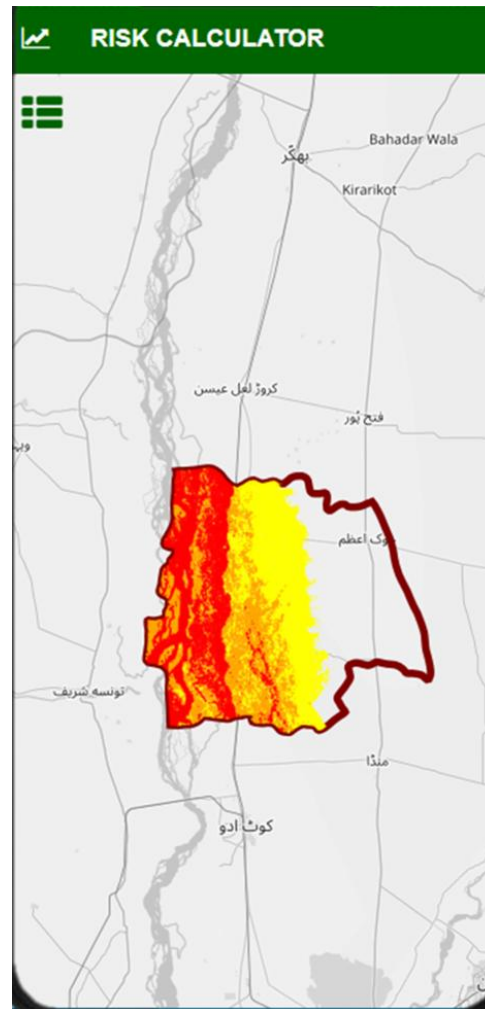
5 100 250 500 2500  
*Return period in years*

- PGA < 3 (Low)
- PGA 3 - 6 (Medium)
- PGA 6 - 9 (High)
- PGA > 9 (Very High)

**Element at Risk Module**

**Exposure Module**

**Loss Estimation Module**



Hazard Module

**RISK CALCULATOR**

AOI | LEIAH TEHSIL -> LEIAH TEHSIL

**Hazard Module**

**Element at Risk Module**

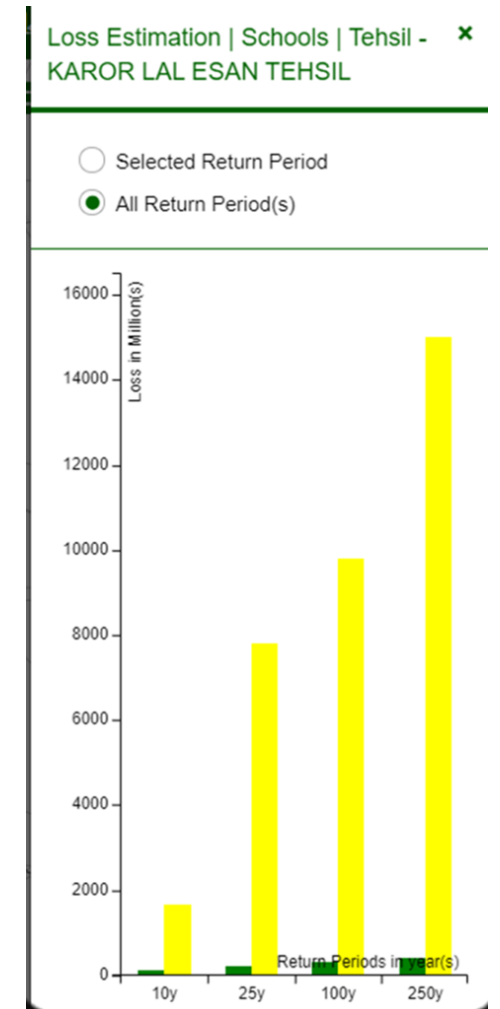
Schools Charts

- High
- Primary
- Middle
- MPS
- sMosque
- H.Sec.

Health Facility Charts

- BHU
- THQ
- Clinic
- DHQ
- Hospital
- Maternity Home
- RHC
- Store
- Zacha Bacha Center

Exposure Module



Loss Module

# Conclusion

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“Disaster Management is the shared responsibility”