

# SPACE APPLICATION CENTRE FOR RESPONSE IN EMERGENCY AND DISASTERS (SACRED) PAK-RSO



- 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.

EMAIL: [SACRED@SUPARCO.GOV.PK](mailto:SACRED@SUPARCO.GOV.PK)

WEB: [DISASTERWATCH.SGS-SUPARCO.GOV.PK](http://DISASTERWATCH.SGS-SUPARCO.GOV.PK)

# INTERNATIONAL COOPERATION IN DISASTER MANAGEMENT

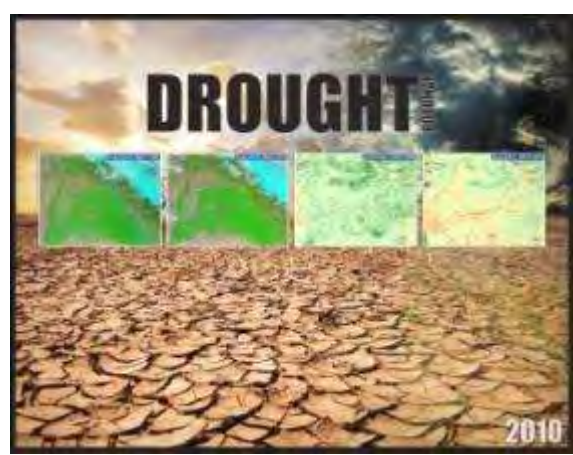
## PARTNERS



## International Charter Space and Major Disasters

- ✓ The International Charter aims at providing a unified system of space data acquisition and delivery to those affected by natural or man-made disasters through Authorized Users
- ✓ On Behalf of NDMA, SUPARCO has been registered with Charter as Authorized User (AU)
- ✓ SUPARCO is host to UN-SPIDER Regional Support office in Pakistan
- ✓ SUPARCO is also Member of JPT-3 project of Sentinel Asia and is registered as Data Analysis Node (DAN)

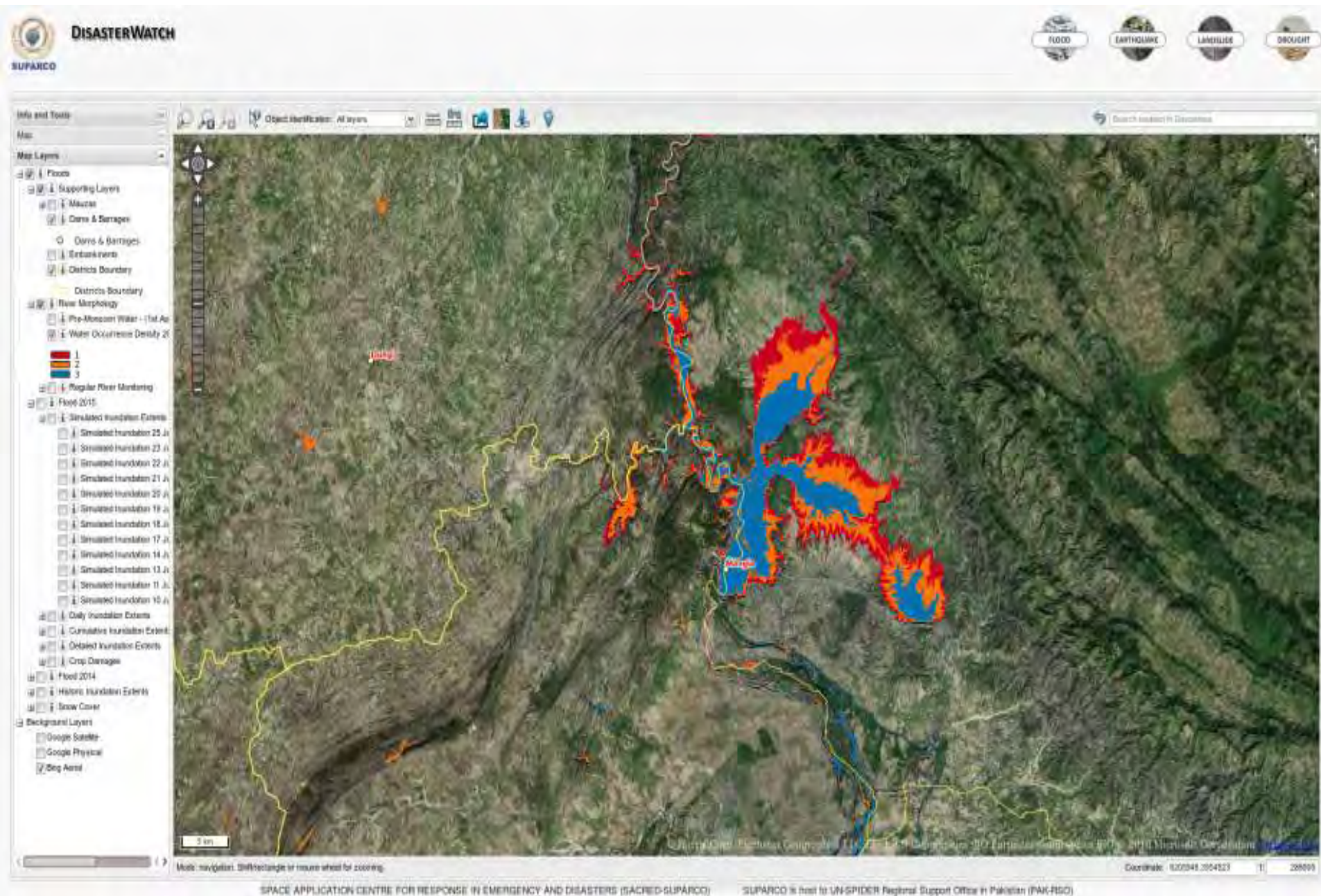
## DISASTER MONITORING



During Natural Disasters, SUPARCO provided technical support to various national Organizations NDMA, PDMAs and International Agencies ICIMOD, UN-FAO etc

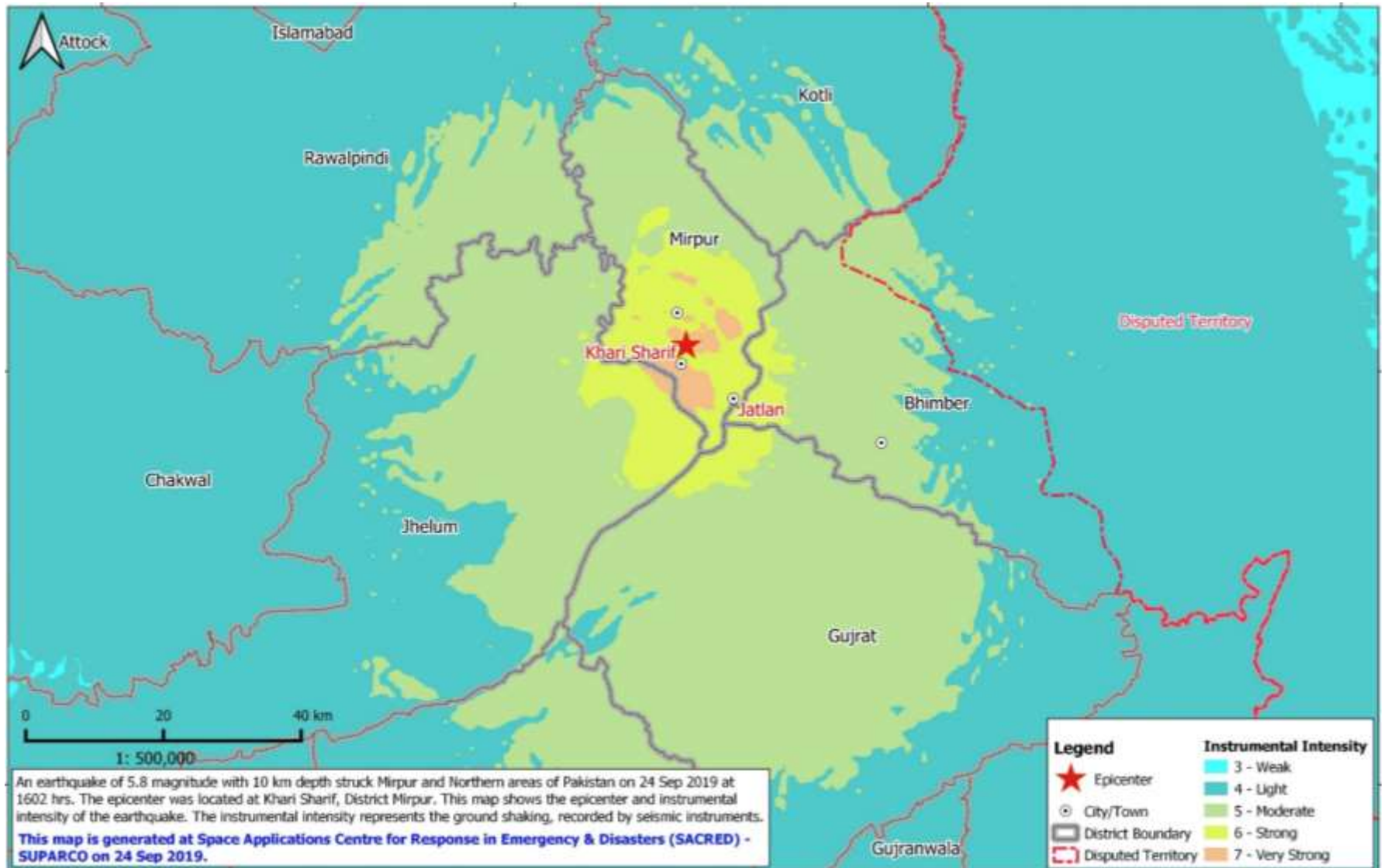


# DISASTERWATCH PLATFORM



# MIRPUR EARTHQUAKE , 24 SEP 19

## INTENSITY MAP





# MIRPUR EARTHQUAKE , 24 SEP 19

## *RAPID DAMAGE ASSESSMENT – PRSS/PLEIADES*



# MIRPUR EARTHQUAKE , 24 SEP 19

## *RAPID DAMAGE ASSESSMENT – TERRASAR-X*





# MIRPUR EARTHQUAKE , 24 SEP 19

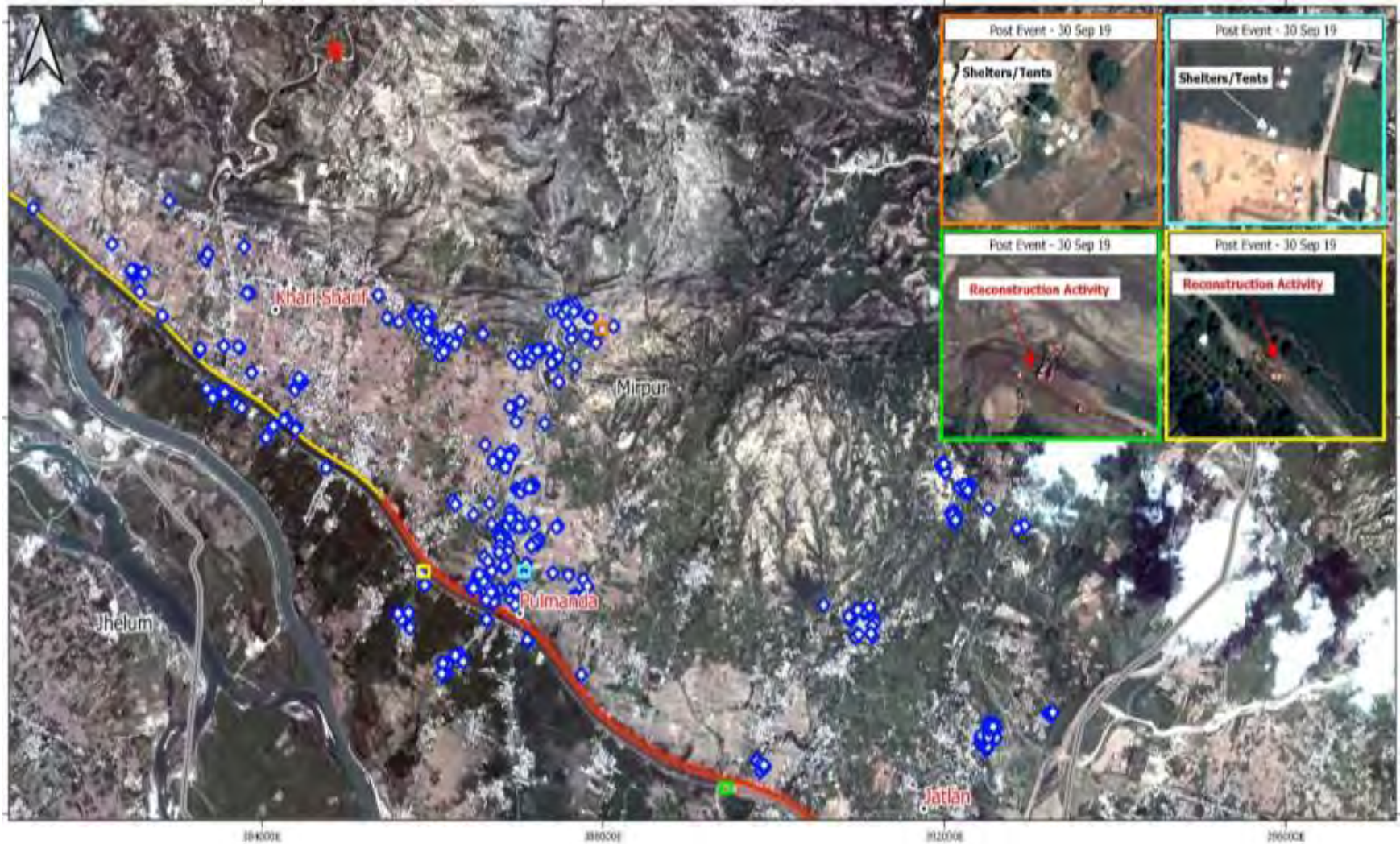
## *DETAILED DAMAGE ASSESSMENT – PLEIADES*





# MIRPUR EARTHQUAKE , 24 SEP 19

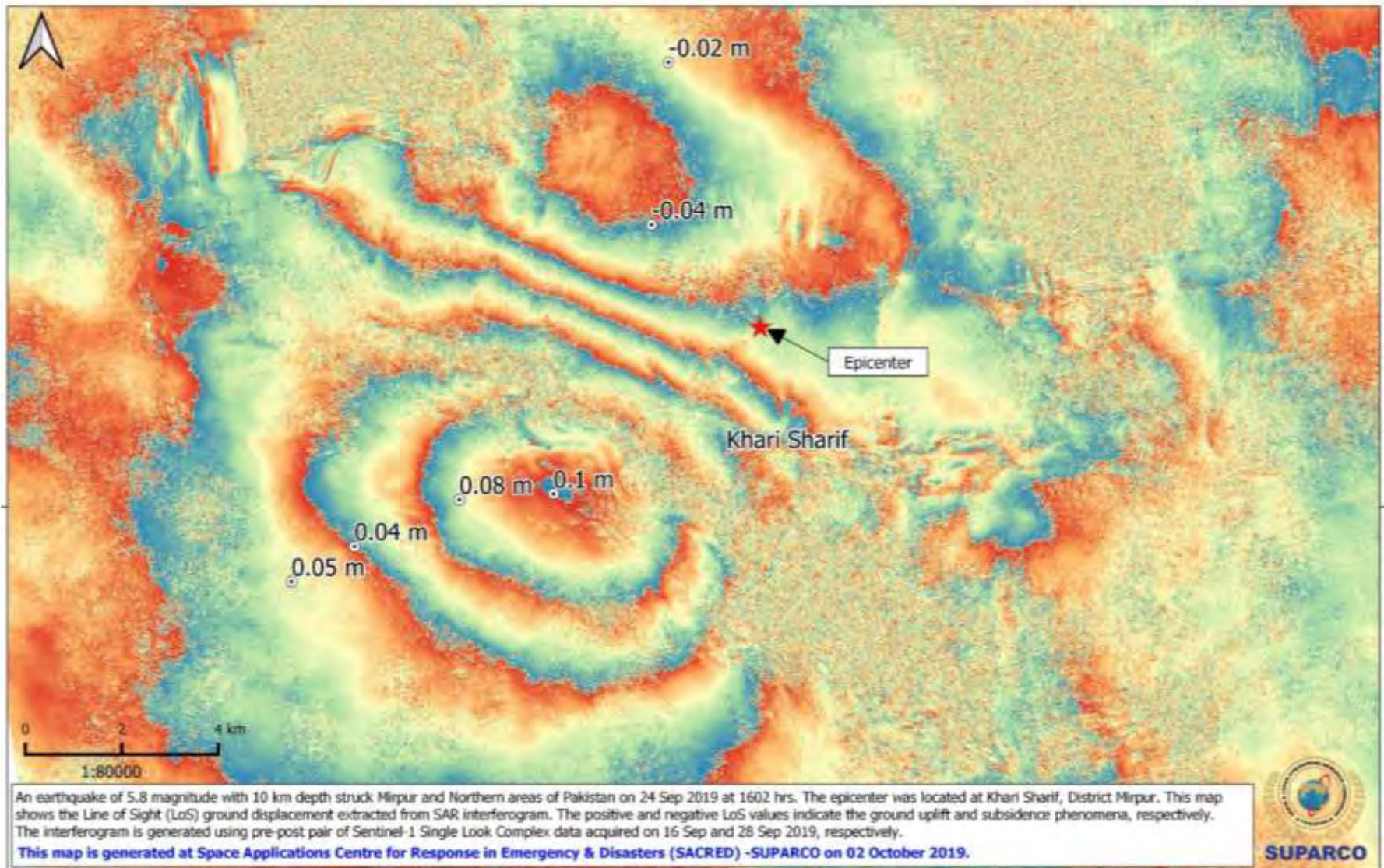
## *RECONSTRUCTION/REHABILITATION MONITORING – PLEIADES*





# MIRPUR EARTHQUAKE , 24 SEP 19


## *Co-SEISMIC DISPLACEMENT MAP – SENTINEL 1*





# MIRPUR EARTHQUAKE , 24 SEP 19

## INTERNATIONAL CHARTER ACTIVATION



INTERNATIONAL CHARTER SPACE & MAJOR DISASTERS  
CHARTRE INTERNATIONALE ESPACE ET CATASTROPHES MAJEURES

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English ▼


# Charter activations

26 SEPTEMBER 2019

## Earthquake in Pakistan

[Browse activations on map ▶](#)

Map Satellite



Google Imagery ©2019 TerraMetrics Terms of Use

<b>Type of Event:</b>	Earthquake
<b>Location of Event:</b>	Pakistan
<b>Date of Charter Activation:</b>	2019-09-26
<b>Time of Charter Activation:</b>	11:15
<b>Time zone of Charter Activation:</b>	UTC+02:00
<b>Charter Requestor:</b>	UNITAR/UNOSAT on behalf of UNOCHA
<b>Activation ID:</b>	622
<b>Project Management:</b>	UNOSAT

## PRE-MONSOON ACTIVITIES 2020

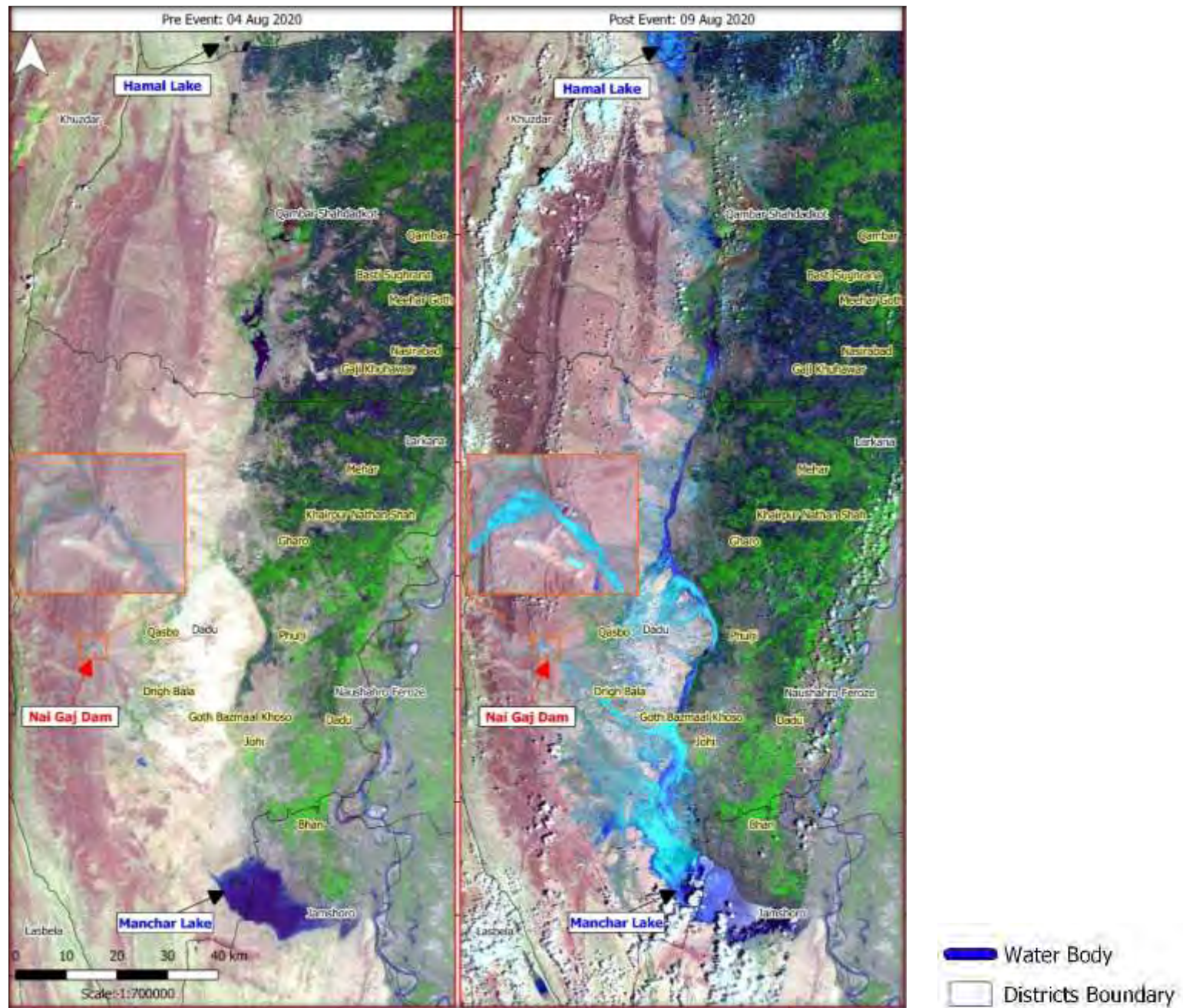
- Extraction of the pre-monsoon layer of all major rivers and water bodies – June 30, 2020
- Preparation/Updation of the spatial datasets i.e. Landcover, Crop, Road, Settlements etc for rapid mapping and damage assessment – 30 April 2020
- Preparation of the pre-monsoon satellite imagery (Rivers and Hot spots) – 30 April 2020
- Satellite programming for rivers and dams monitoring - June 30, 2020
- HR Deployment Plan – 30 April 2020



## TECHNICAL SUPPORT DURING MONSOON

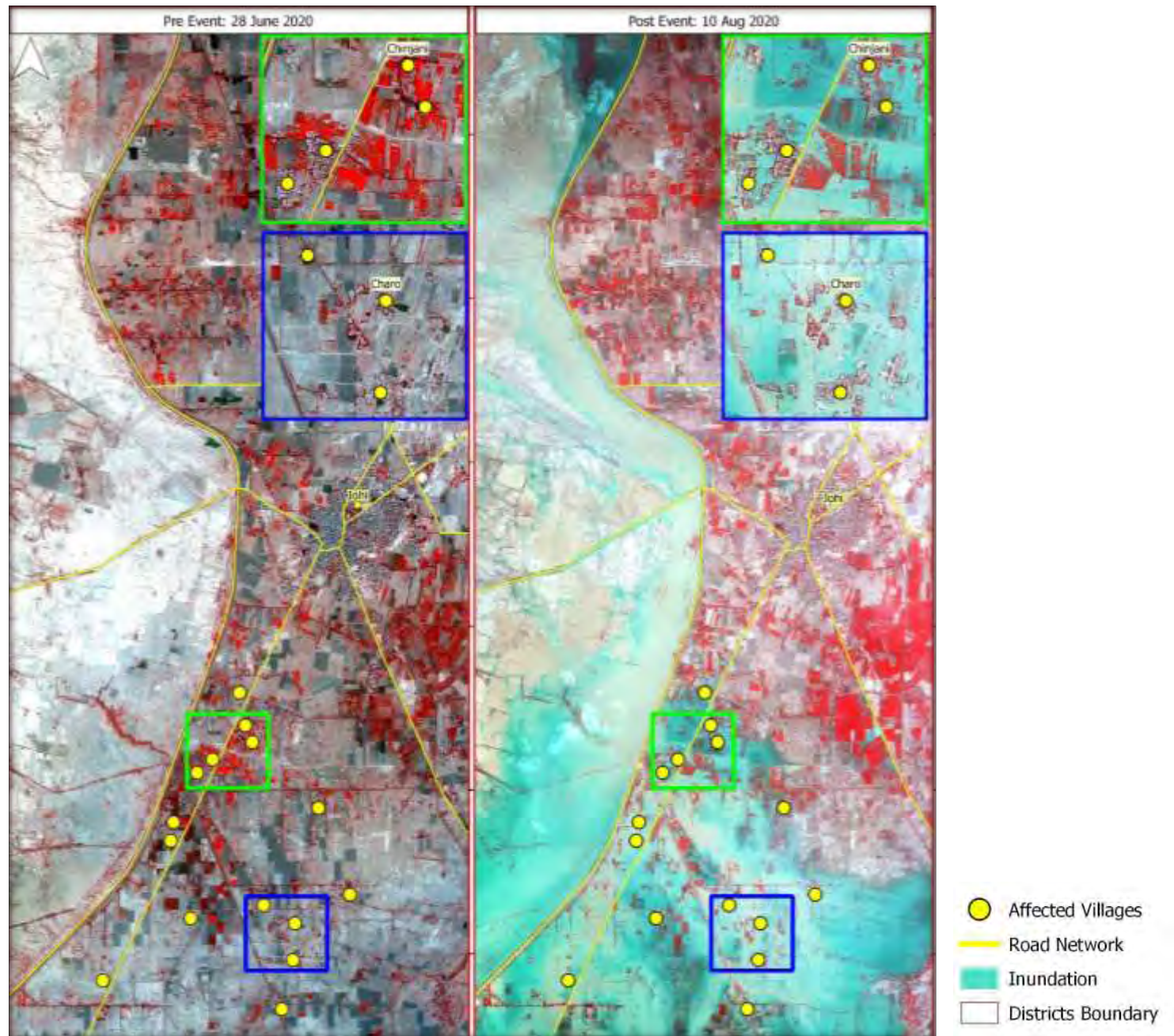
- Near Real time monitoring of Rivers and Dams
- Near Real time monitoring of Hot spots
- Rapid Inundation Mapping
- Rapid Damage Assessment (Crop and Infrastructure)
- Detail Damage Assessment (Crop and Infrastructure)
- Monitoring of Rehabilitation and Reconstruction Work in flood affected areas
- Near real time information provided in the form of exposure, damage maps and stats via DisasterWatch ([disasterwatch.sgs-suparco.gov.pk](http://disasterwatch.sgs-suparco.gov.pk))

# NAI GAJ DAM BREACH, DADU – 09 AUG 20



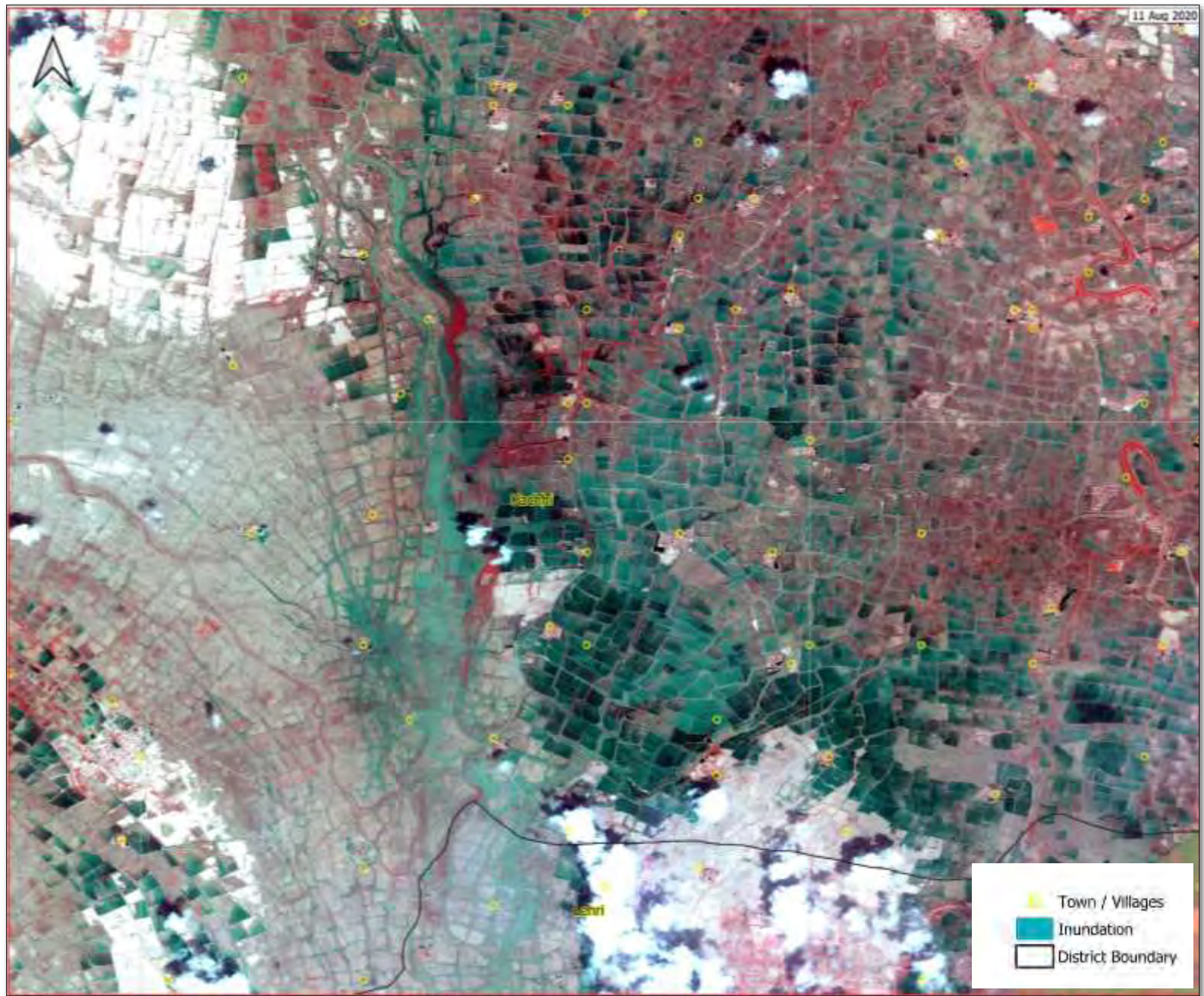


# NAI GAJ DAM BREACH, DADU – 10 AUG 20



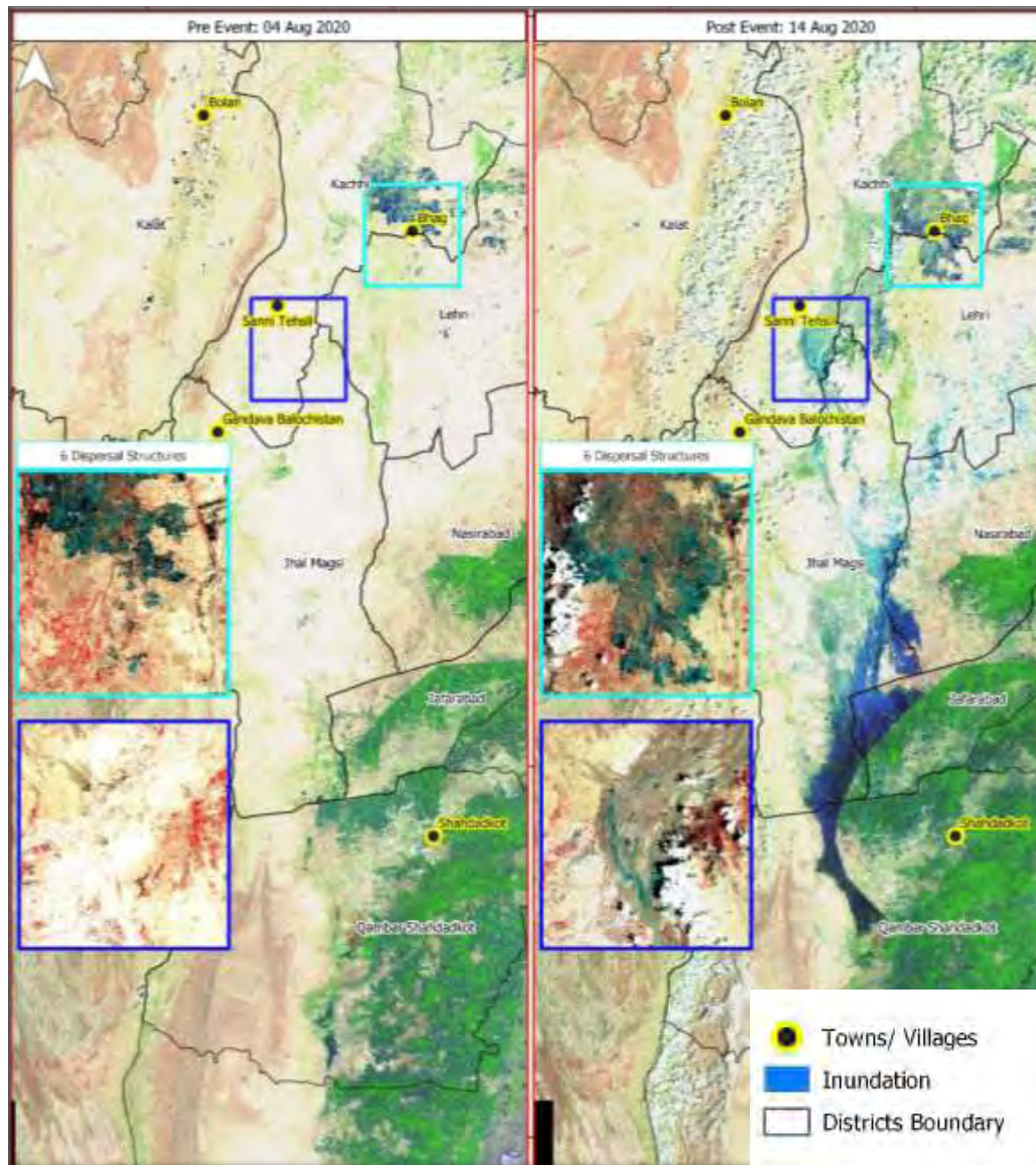


# BALUCHISTAN FLASH FLOODS, KACHHI – 11 AUG 20

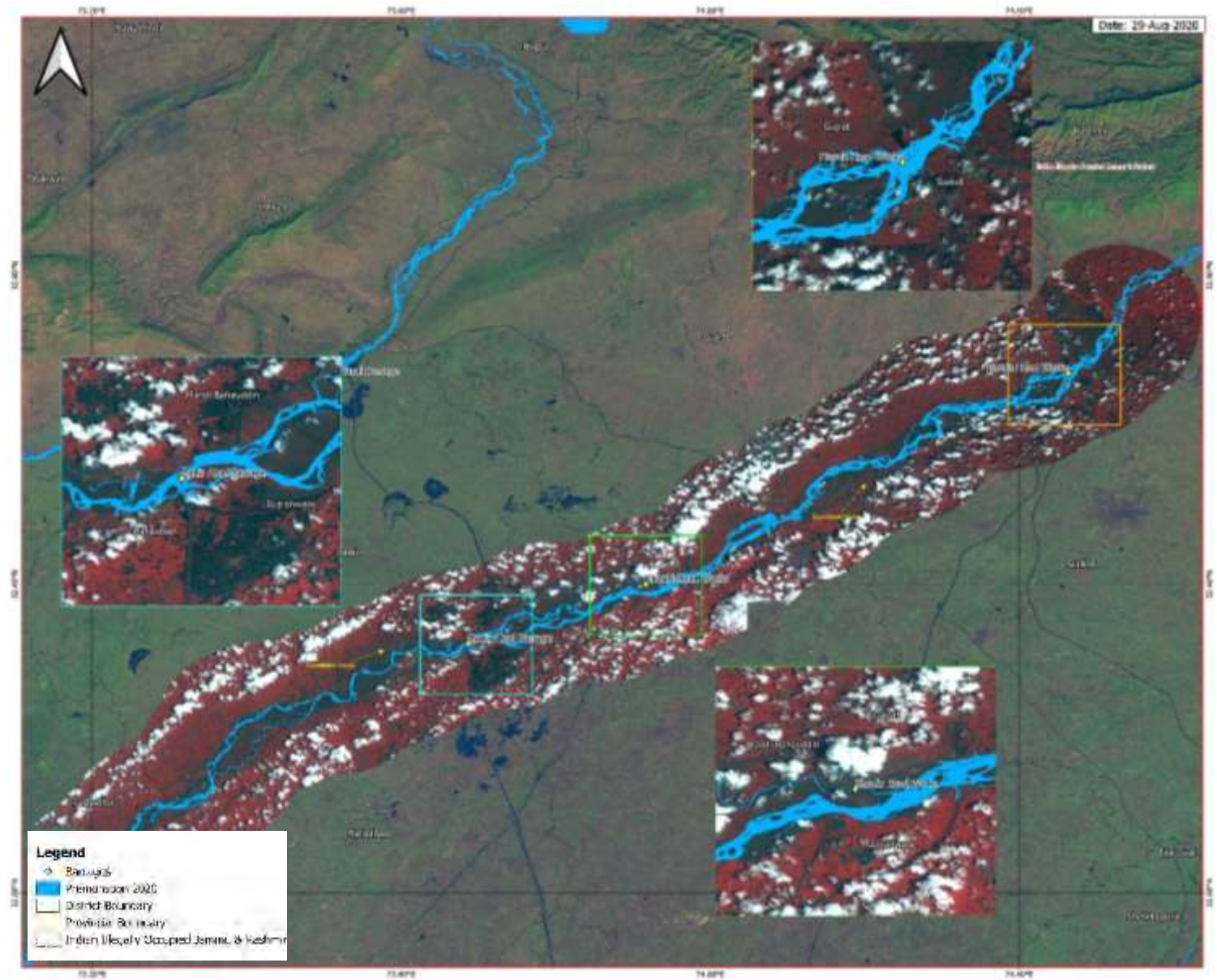




# KACHHI FLASH FLOODING – 14 AUG 20

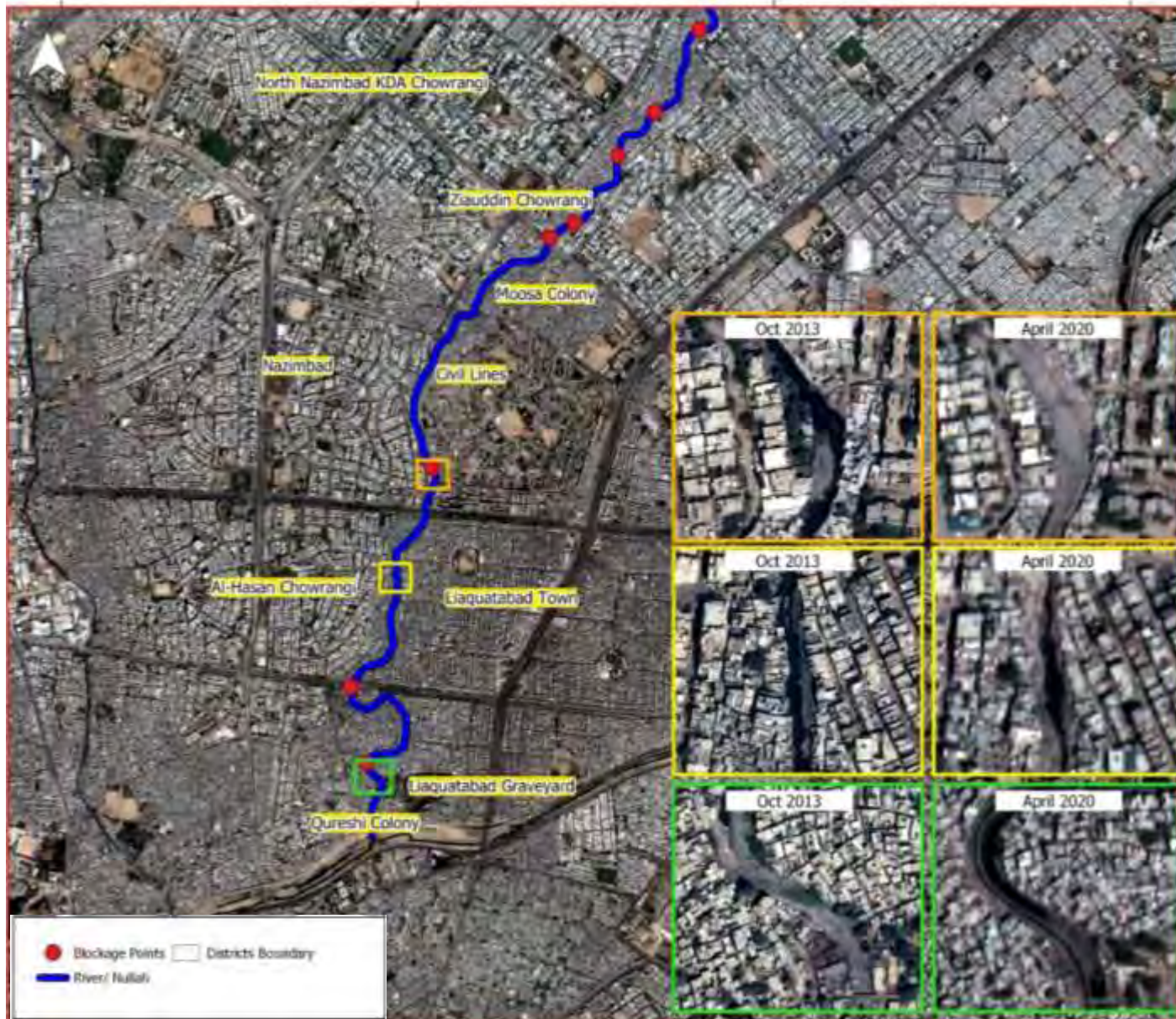


# RIVER CHENAB FLOOD – 29 AUG 20



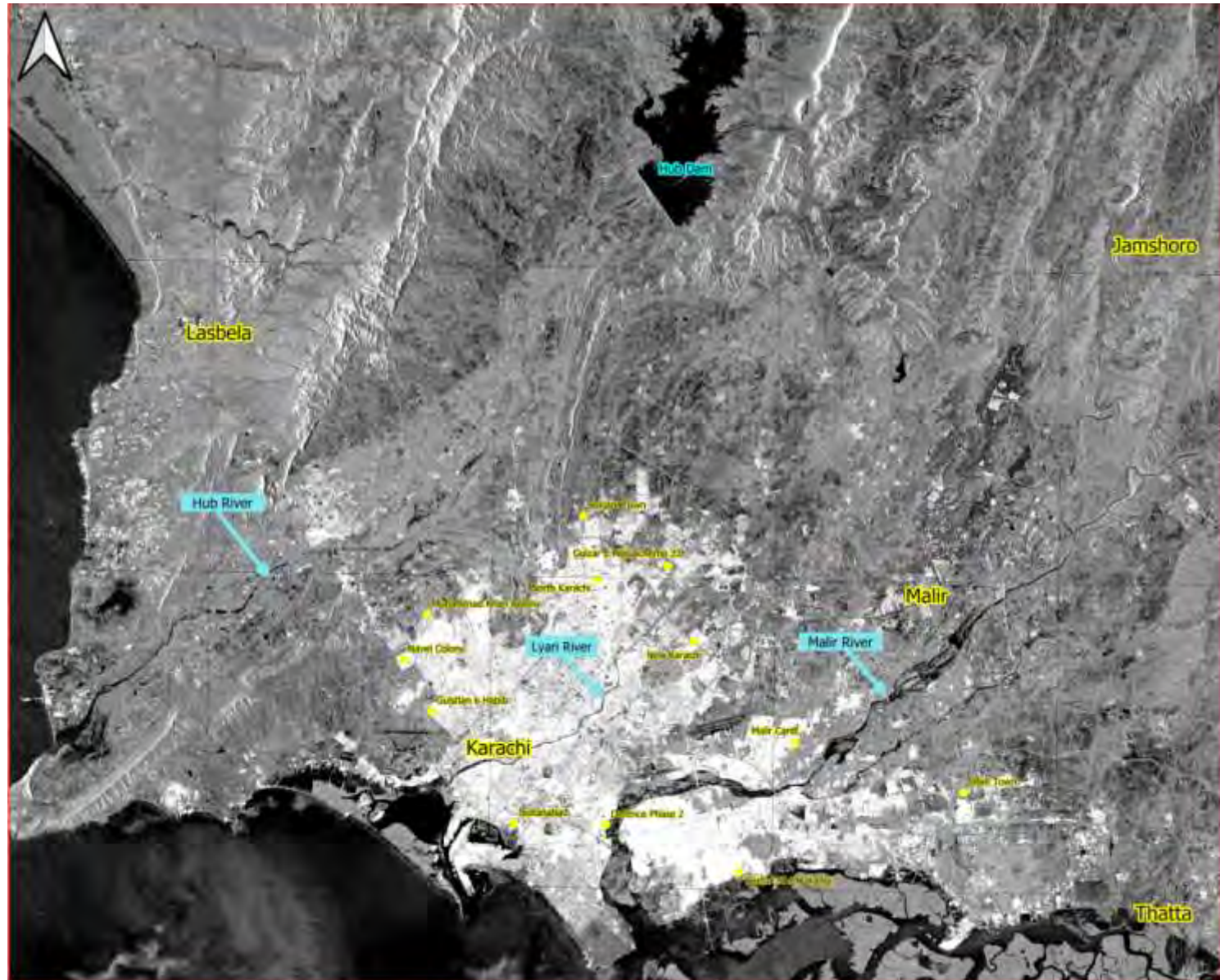


# KARACHI URBAN FLOODING – GUJJAR NULLAH





# KARACHI URBAN FLOODING – GUJJAR NULLAH

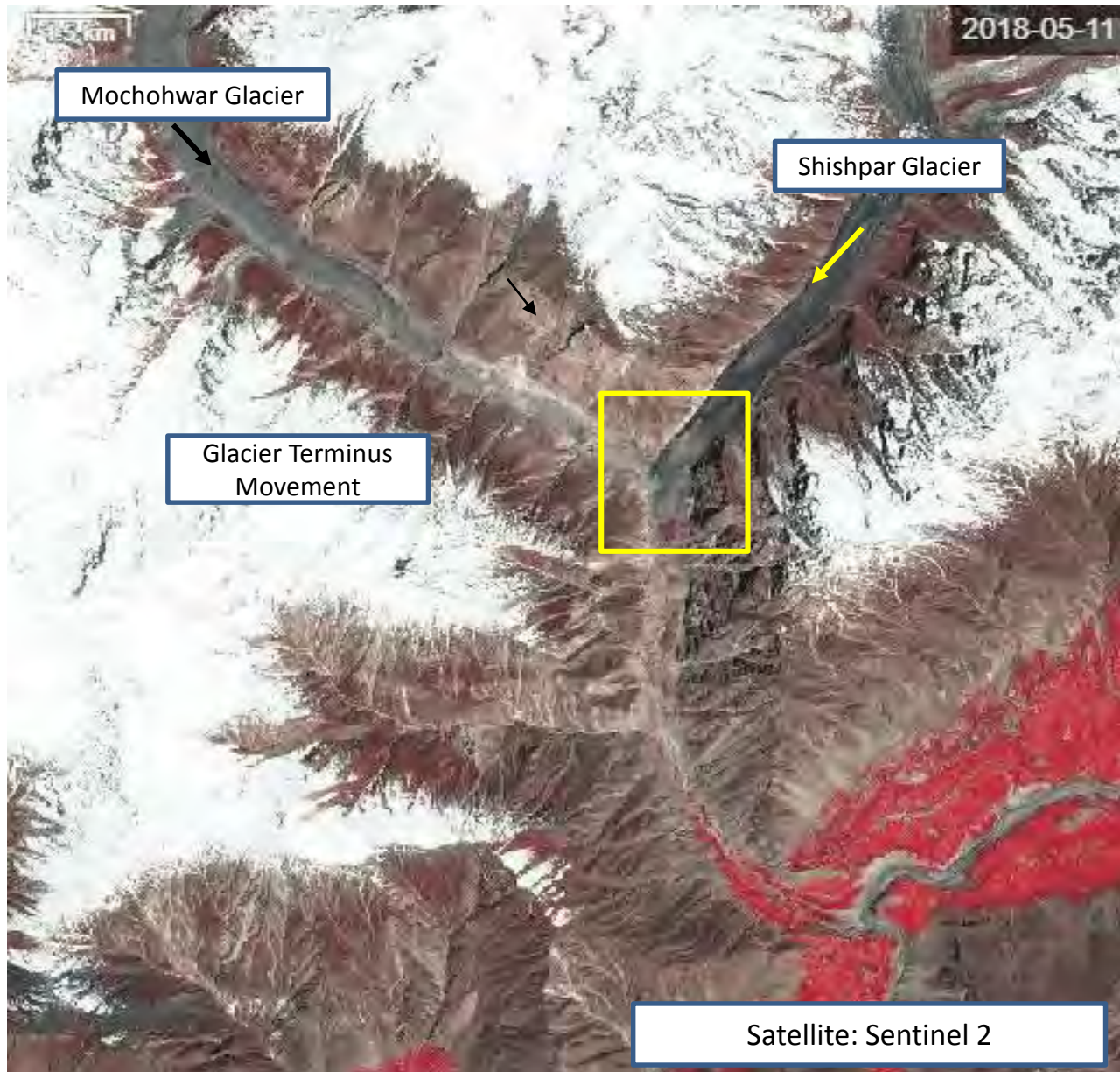




# GLOF EVENT - GOLAIN

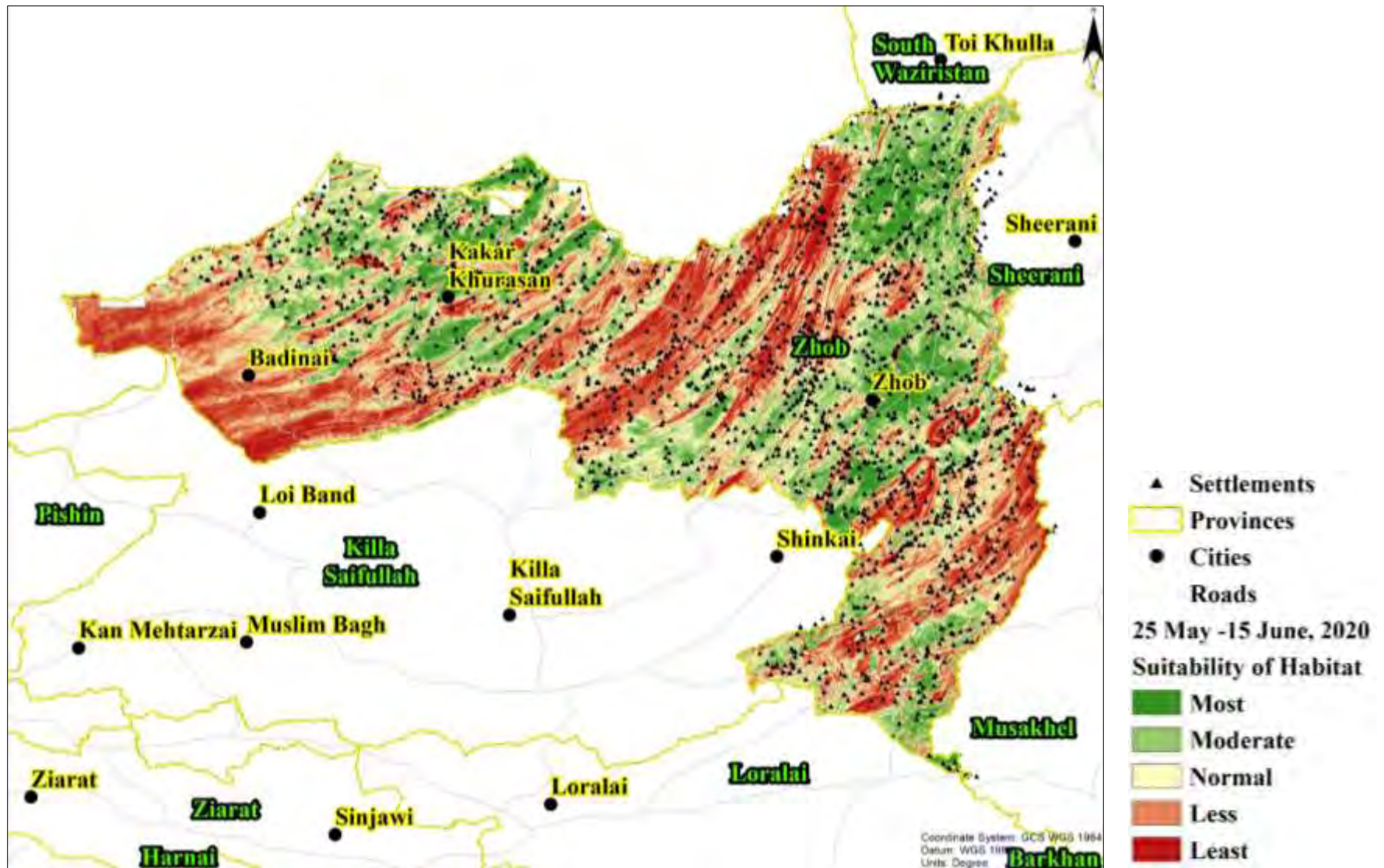


# MONITORING OF SHISHPAR GLACIER





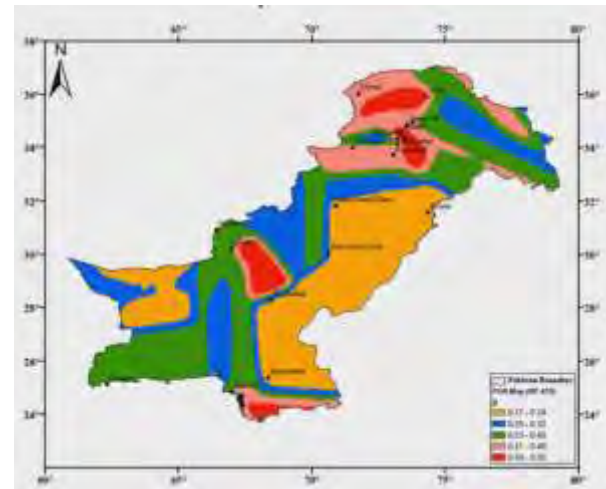
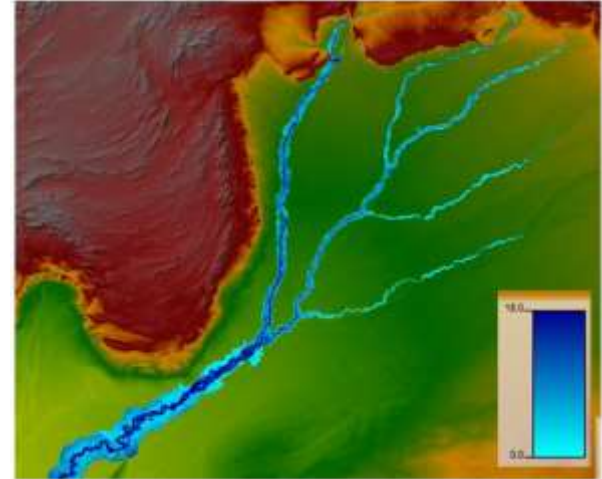
# DESERT LOCUST MONITORING



# NATIONAL CATASTROPHIC MODEL FOR NDRMF

## NATCAT MODEL PROJECT

- NatCat Model will provide quantitative information on the expected levels of loss for natural hazards events of varying types, intensities, and return periods.
- The scope of work includes
  - 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





# CONTRIBUTION IN UN-SPIDER ACTIVITIES

## Webinar on space-based inputs for locust early warning and preparedness

 **Event Organisers:**  
United Nations Office for Outer Space Affairs through its UN-SPIDER programme, and the International Water Management Institute

**Date:**

12/06/2020

**Registration Deadline:**

Wednesday, June 10, 2020

**Event website:**

[Webinar recording](#)

**Description:**

On 12 June, United Nations Office for Outer Space Affairs (UNOOSA), through its UN-SPIDER programme, and International Water Management Institute (IWMI) will be hosting a webinar on "Space-based inputs for locust early warning and preparedness" as a commitment to promote the use of space technologies in combating a crisis that is resulting on top of the COVID-19 crisis.

The webinar will take place at 10:30-12:30am Vienna, Austria time (UTC+2). Registrations are open until 11.59pm Vienna, Austria time (UTC+2) on 10 June.

During the 90-minute session, experts from UNOOSA, IWMI, India, Pakistan as well as from other international organisations, governments and private agencies will discuss how space applications can strengthen the monitoring and early warning efforts to prevent the locust outbreak in future.

The recording of the webinar is [available online](#).

### Background on current locust impact globally

Swarms of [locusts](#) are threatening large areas of pastures and crops, overwhelming countries in the Horn of Africa, the Middle East, and South Asia. The UN Food and Agriculture Organization (FAO) says these swarms represent the worst infestation in 25 years in Ethiopia and Somalia, in 20 years in India, and the worst in 70 years in Kenya. The locust has affected 33 countries to date, from Pakistan in Tanzania. This is a single global outbreak, and if it reaches plague levels, it could cover 30 per cent of the earth's landmass.

Families across Pakistan and Indian states are suffering the worst plague of locusts in recent history, which has caused billions of dollars in damage and led to fears of long-term food shortages. The locust crisis overlaps with the COVID-19 pandemic, creating a crisis within a crisis. Local agri food supply chains are already experiencing disruptions, including reduced access to inputs and services, slower movement, transport and market access, and credit liquidity (due to COVID-19). These crises have the potential to generate a condition of famine, disease and poverty.

Space technology, including [satellite data](#), offers a handy tool for locust impact monitoring and early warning. The data are used for assessing the current situation, forecasting developments and planning an effective response at all levels. Satellite-derived vegetation data and satellite climate variables derived from, for example, MERRA-2 data, or NASA's Global Modeling and Assimilation Office (GMAO) are used to alert authorities in preventing the spread of desert locust swarms and helps protect the crops of amahabikar farmers. The MODIS-derived dynamic greenness map (250 m), as well as the satellite-based rainfall map, can be used by authorities when moving at the field which is implemented using Google Earth Engine. These are some of the examples of adopting innovative technology for use in the locust affected region.

To find out more about space applications to fight the global crisis, please visit:

- [UN-SPIDER Data applications of the Moon](#)
- [UN-SPIDER satellite page](#)
- [International Water Management Institute](#)
- [United Nations Office for Outer Space Affairs](#)
- [United Nations Office for Outer Space Affairs](#)

## Flood modelling in the Indus river using different digital elevation models



Flood impact assessments are essential to design effective interventions to reduce the adverse the impacts of future climate change and enhance the vulnerability to high floods. Flood impact assessments rely on flood modelling which can be conducted using both existing software.

A study conducted by UN-SPIDER, the Space Applications Centre for Hydrology, in Birmingham and Gujarat (IACOH) of Physical Space and Upper Atmosphere Research Institute (ISAPRI) conducted a comparative analysis of the modelling of floods using two digital elevation models (DEM) developed by SRTM and WorldDEM.

The United Nations Office for Outer Space Affairs (UNOOSA) and the International Water Management Institute (IWMI) have been the primary funding bodies for this study.

ISAPRI developed digital surface models (DSMs) which represent the surface of the Earth, including buildings, infrastructure and vegetation.

The comparison was conducted using the HEC-RAS Flow Analysis System software developed by the Hydrologic Engineering Center (HEC) of the United States Army Corps of Engineers. Flood modelling was conducted by the segment of the Indus between the Chashma and the Tarsia barrage. The study presents the results of this comparison.

### The Indus River

The Indus river is the main river of Pakistan. It originates in the Tibetan plateau and flows through the country reaching the Arabian Sea near the city of Karachi. It is one of the longest rivers in Asia with a length of nearly 2,800 kilometers. For this study, the segment of the Indus river between the Chashma and the Tarsia barrage was used for flood modelling.

### Data and Methods

This study compares the results of hydrological modelling of flood between the Chashma and the Tarsia barrage using two different digital surface models (DSMs).

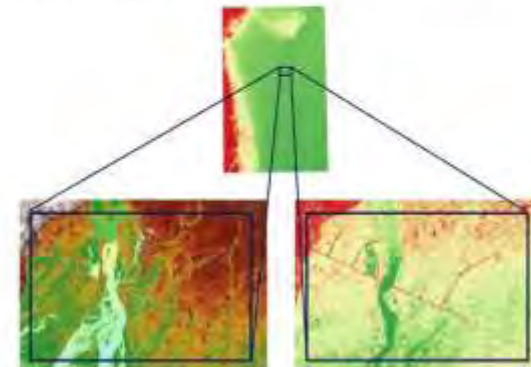
- The digital elevation model (DEM) developed by the Space Applications Centre (IACOH)
- The digital elevation model developed by SRTM of NASA

Table 1 presents the characteristics of the two digital elevation models.

Parameter (SRTM)	WORLDDEM™	SRTM DSM
XY coordinate system	WGS 1984 UTM	WGS 1984 UTM
Vertical coordinate system	IGDA2011 geoid height	IGDA2011 geoid height
Resolution	30 m per pixel (approx. 1 km)	1 m per pixel (approx. 30 m)
Vertical accuracy	20 metres (1 m horizontal)	10 metres (0.5 m horizontal)
Data acquisition date	2011 - 2015	2000

### Results

While both DSMs can be used to carry out the flood modelling analysis, it is important to keep in mind that they were developed on the basis of space missions conducted at different times. The SRTM data and WorldDEM data are of about 10 years apart. Due to the different acquisition times, there are differences in the river morphology as well as in the topography of the area (see also Figure 1).



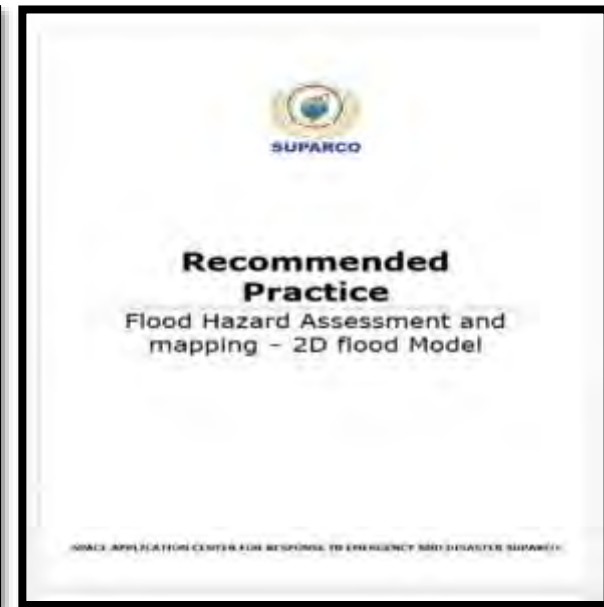
# RECOMMENDED PRACTICES FOR UN-SPIDER KNOWLEDGE PORTAL



FLOOD HAZARD ASSESSMENT



FLOOD MAPPING AND DAMAGE ASSESSMENT

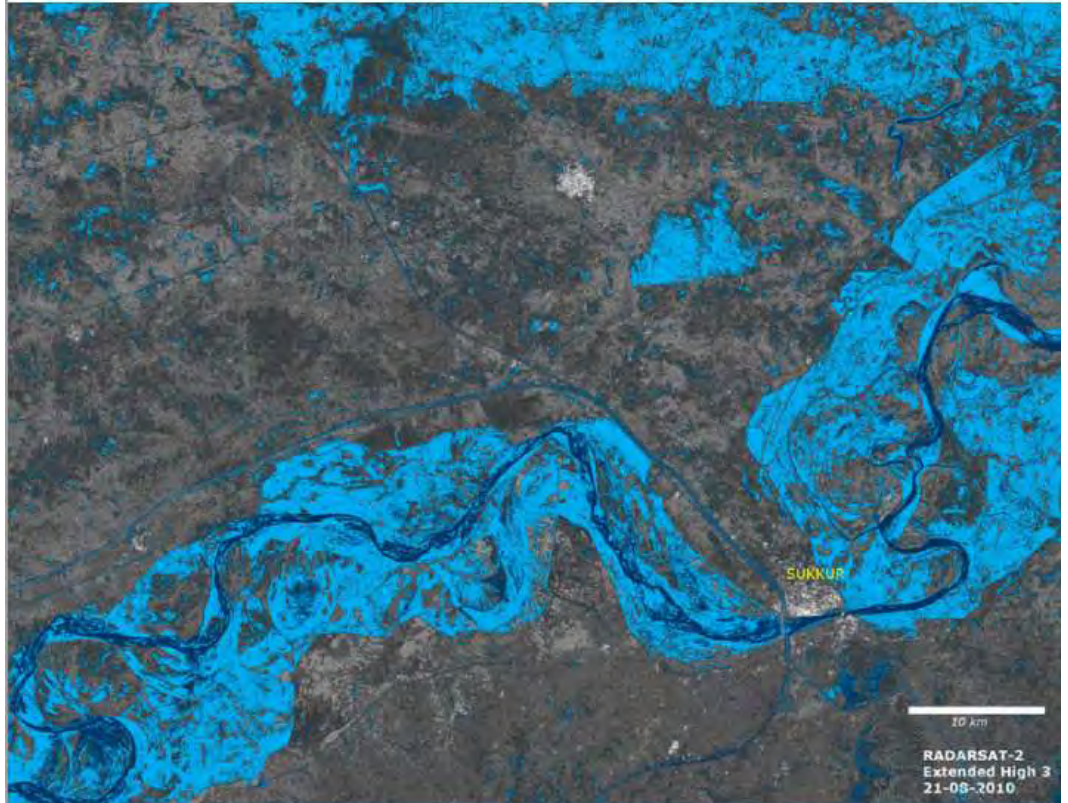


DROUGHT HAZARD ASSESSMENT





<http://www.un-spider.org/network/regional-support-offices/pakistan-regional-support-office>



Effective use of Space-based  
information to monitor disasters  
and its impacts

## Lessons Learnt from Floods in Pakistan

prepared by SUPARCO, Pakistan

## WAY FORWARD

- Capacity building on Flood Hazard Mapping via MOOC
- Recommended practice of Landslide susceptibility mapping.
- Participation in TAMs
- SUPARCO can provide Resource persons for Flood Modeling trainings
- Capacity Building in the field of SAR data processing and analysis for Disaster monitoring, mapping and damage assessment particularly for earthquake and landslide
- Participation in regional Collaborative projects