Damage Assessment using Optical Data

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SUPARCO Role in Disaster Monitoring

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

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- Landslide
  - Landcover
  - Buildings
  - Roads
- Forest Fire
  - Forest Types
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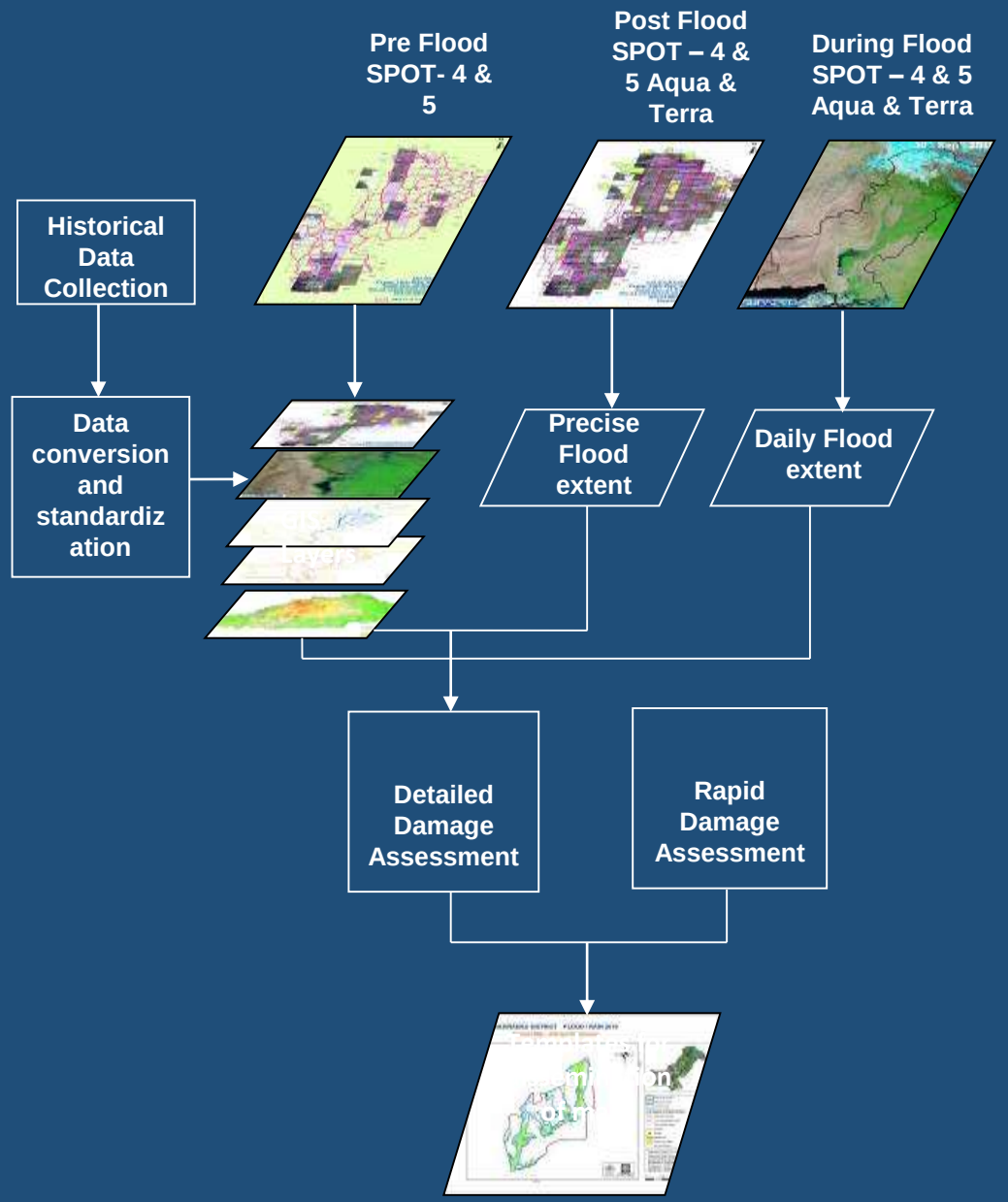
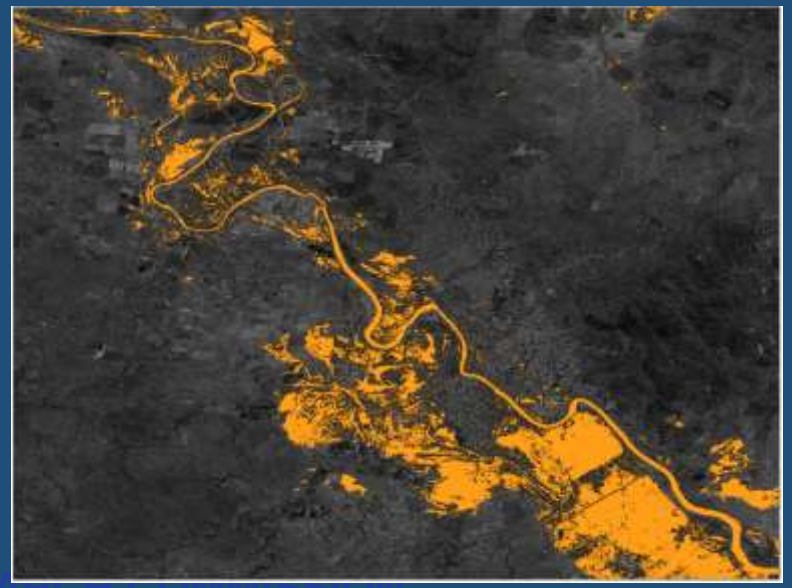
Rapid Damage Assessment Overall Approach



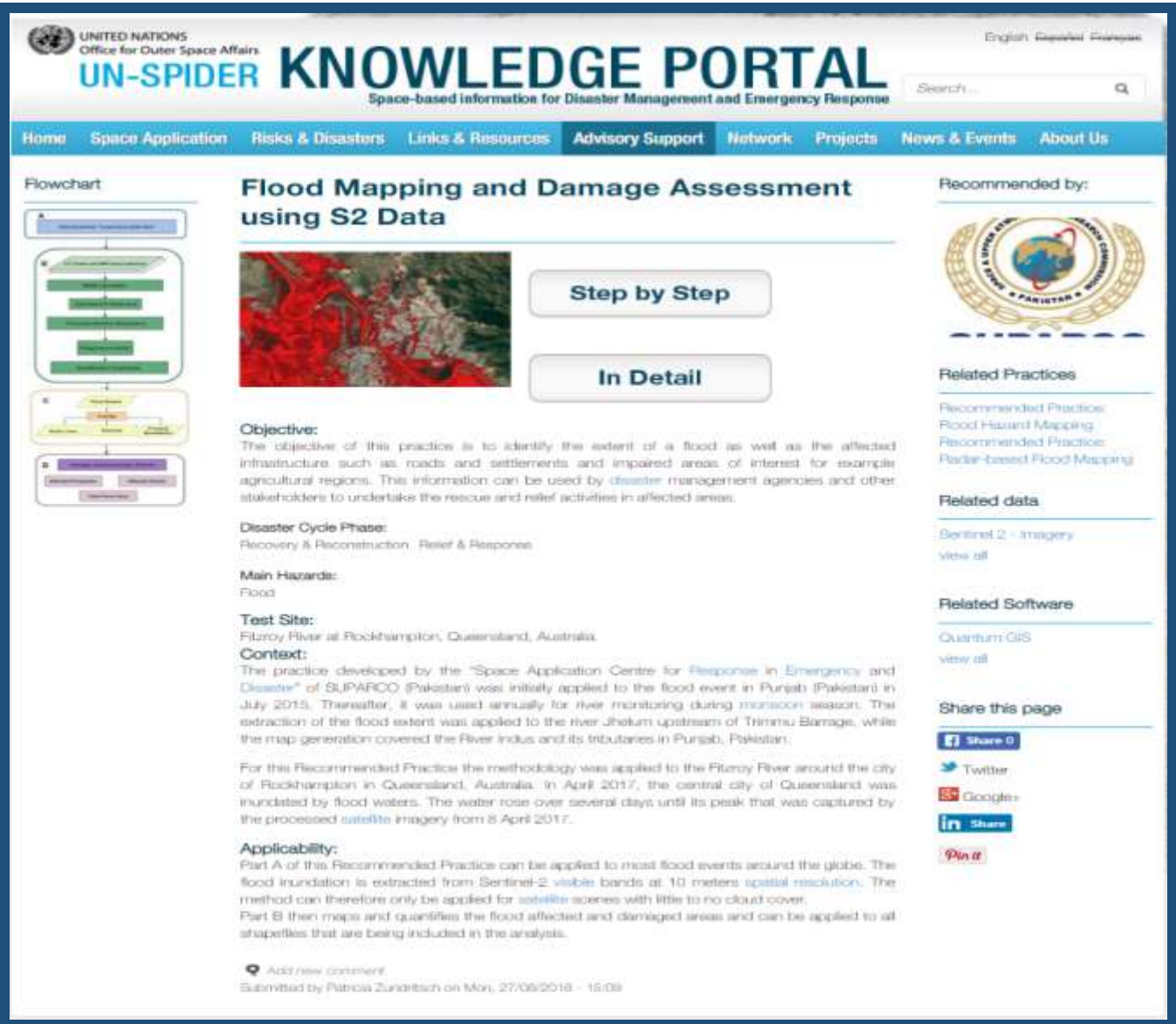
FLOOD

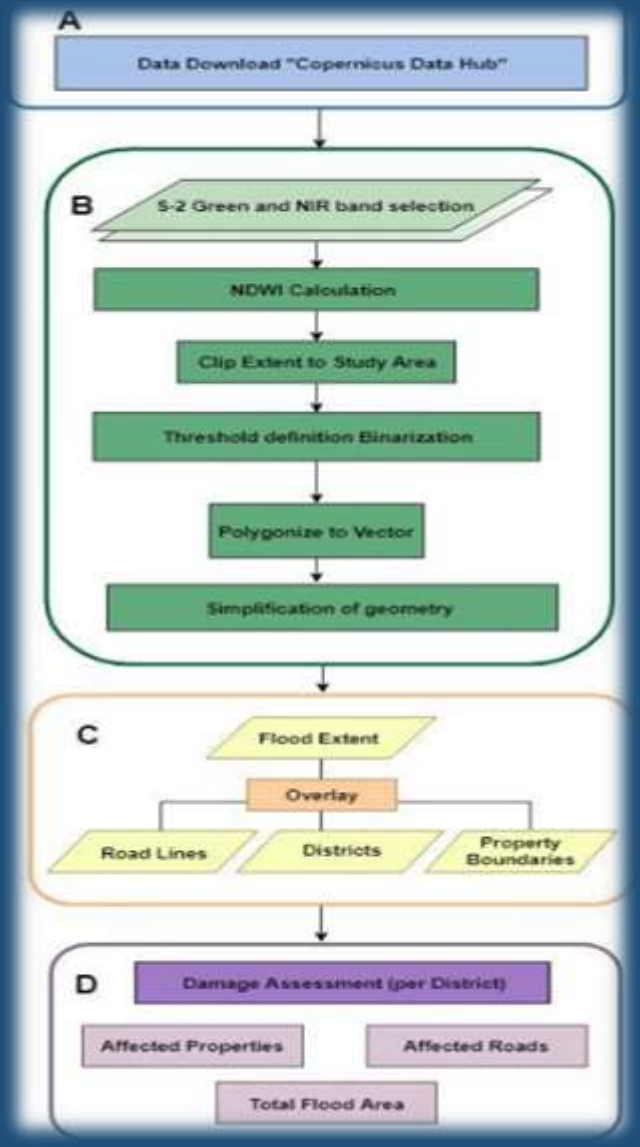
Flood Damage Assessment

- Flood Extent Extraction - Normalized Difference Water Index (NDWI)
- Elements at Risk – Crops , Houses/Built up , Roads and Water Infrastructure
- Change Detection
- Spatial Analysis Attributes/Statistical Calculation
- Rapid Damage Maps

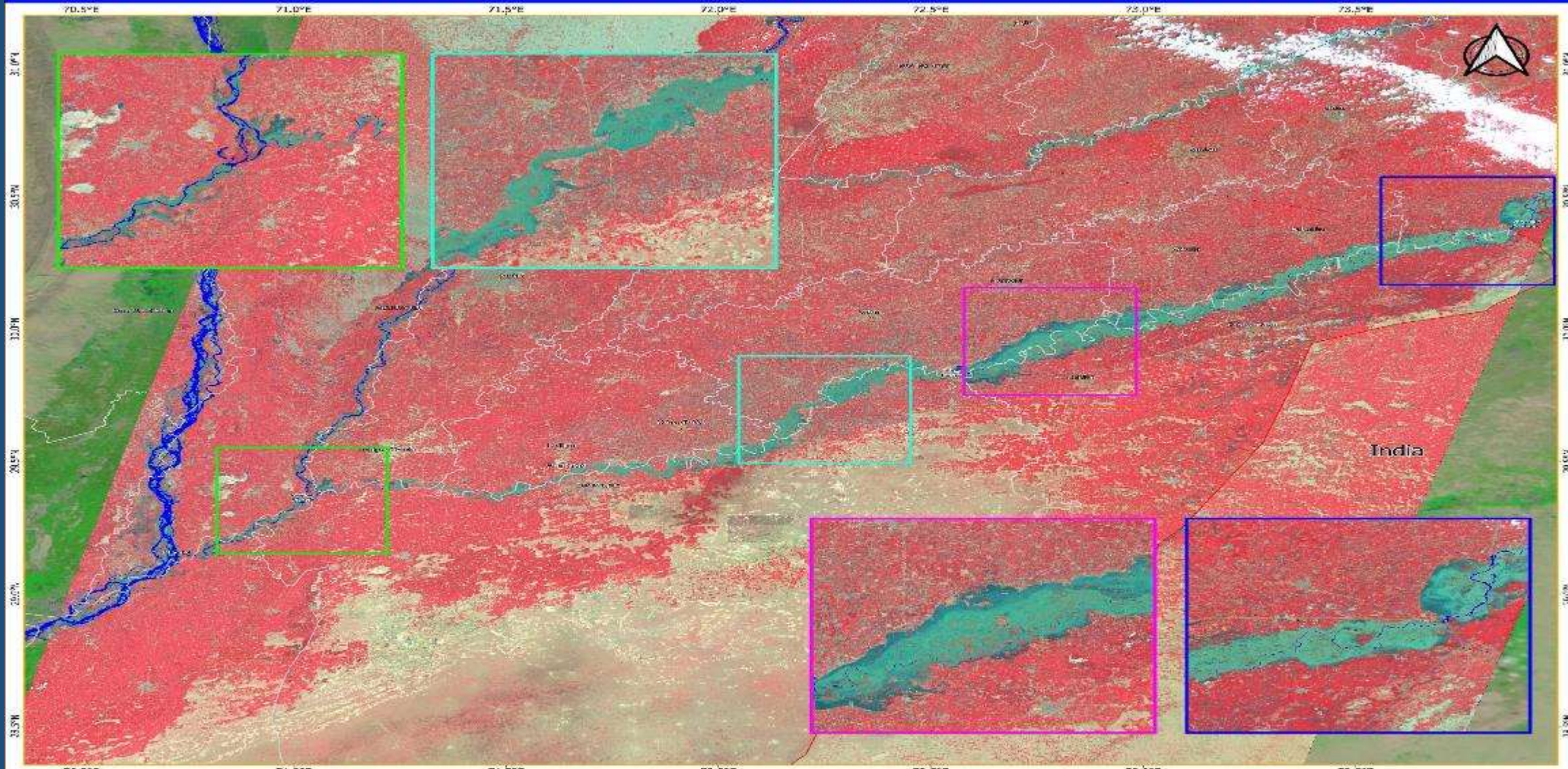


Recommended Practices for UN-SPIDER Flood Mapping and Damage Assessment





Monsoon Situation Analysis - River Sutlej
28 August 2023



This map shows updated situation in River Sutlej. It shows an increase in river flows downstream Sulemanki and Islam Headworks. The analysis also shows normal river flow at Panjnad Barrage. Analysis was carried out using Sentinel-2 (10m) Satellite imagery acquired on 28 August 2023.

This analysis is yet to be validated in field.

This map is generated at Space Application Center for Response in Emergency and Disasters (SACRED) – SUPARCO on 28 August 2023.

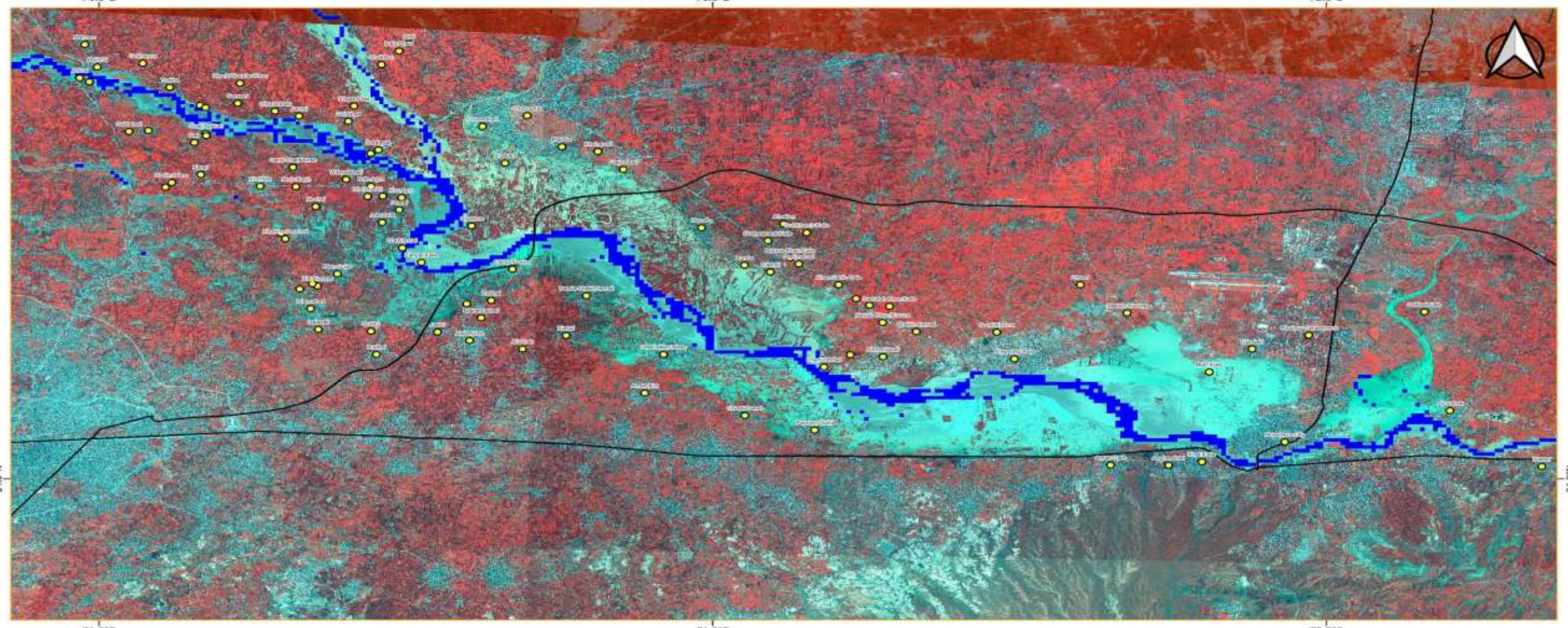
- Cities/Towns
- Premonsoon 2023
- District Boundary
- International Boundary

0 10 20 30 40 50 km

1:300,000

SUPARCO

Monsoon Situation Analysis - Kabul River
28 August 2022



This map shows the current situation of Kabul River.The analysis indicates increase in river fllows in the river course which have affected settlements in Districts Charsadda and Nowshera, Khyber Pakhtunkwa.The analysis is performed using Satellite imagery of SPOT6 (1.5 m) acquired on 28 August 2022.

This analysis is yet to be validated in the field.

This map is generated at Space Applications Centre for Response in Emergency and Disasters (SACRED) on 28 August 2022

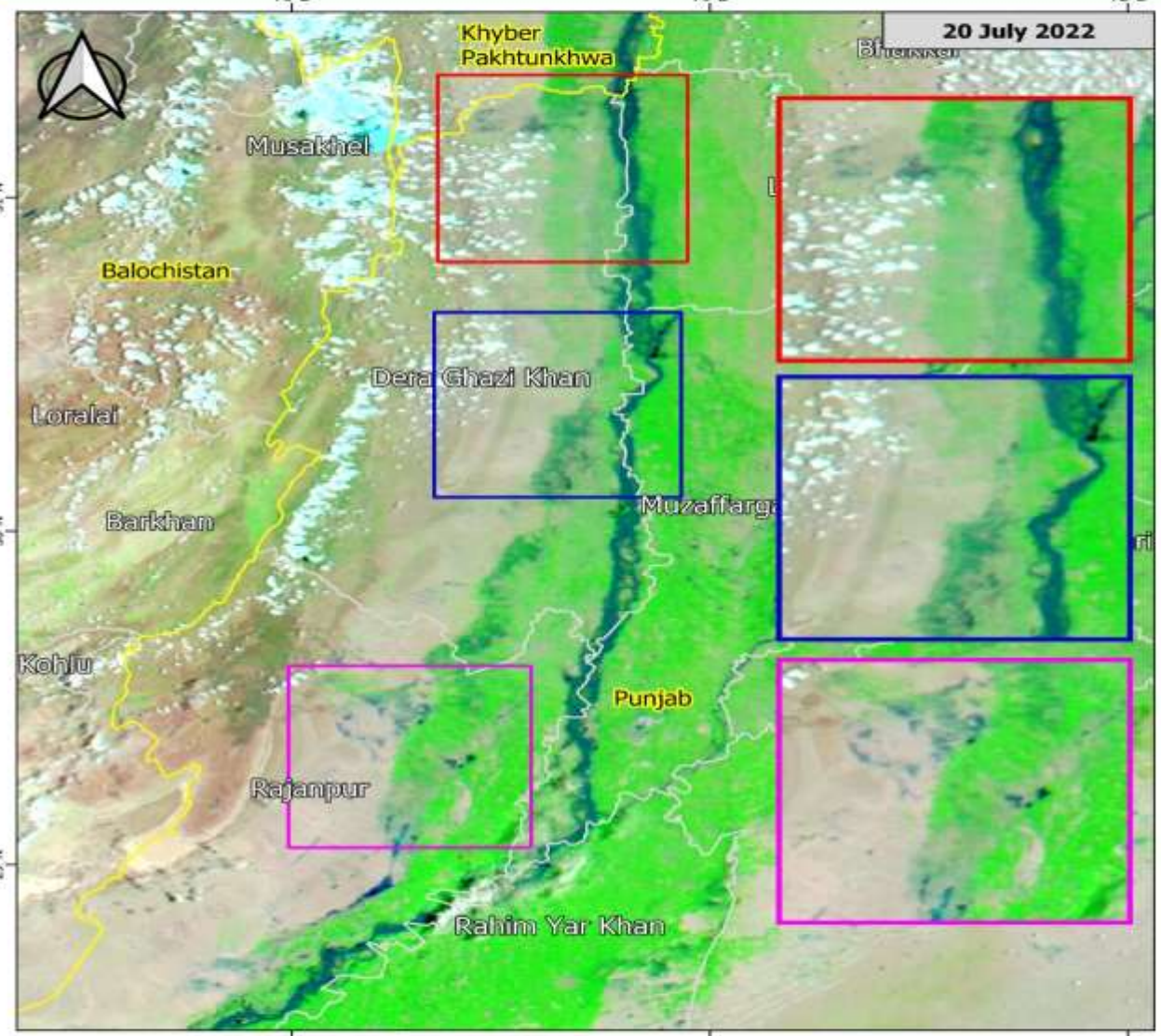
- Towns/ Villages
- Main Roads
- Pre-Monsoon Water Surface 2022
- District Boundary

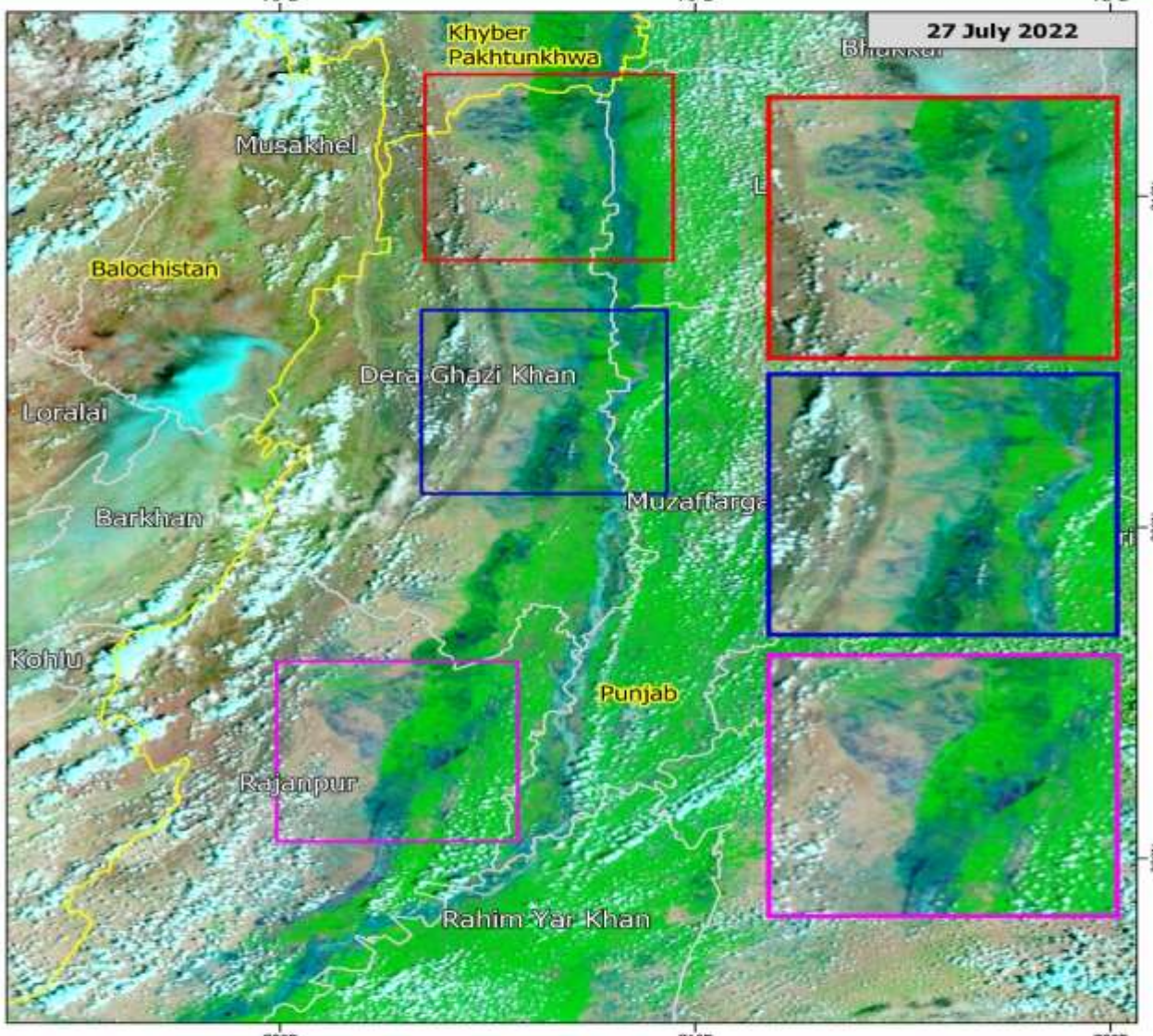
0 2 4 6 km

1:85,000

SUPARCO

Monsoon Flooding - Situation Analysis
27 July 2022





This map shows the updated flooding situation in Districts D.G Khan and Rajanpur, Punjab. The pre-post analysis shows inundation due to heavy rainfall. The pre-post analysis is performed using MODIS (250m) imagery acquired on 20 & 27 July 2022 respectively.

This analysis is yet to be validated in the field.

District Boundary
Provincial Boundary

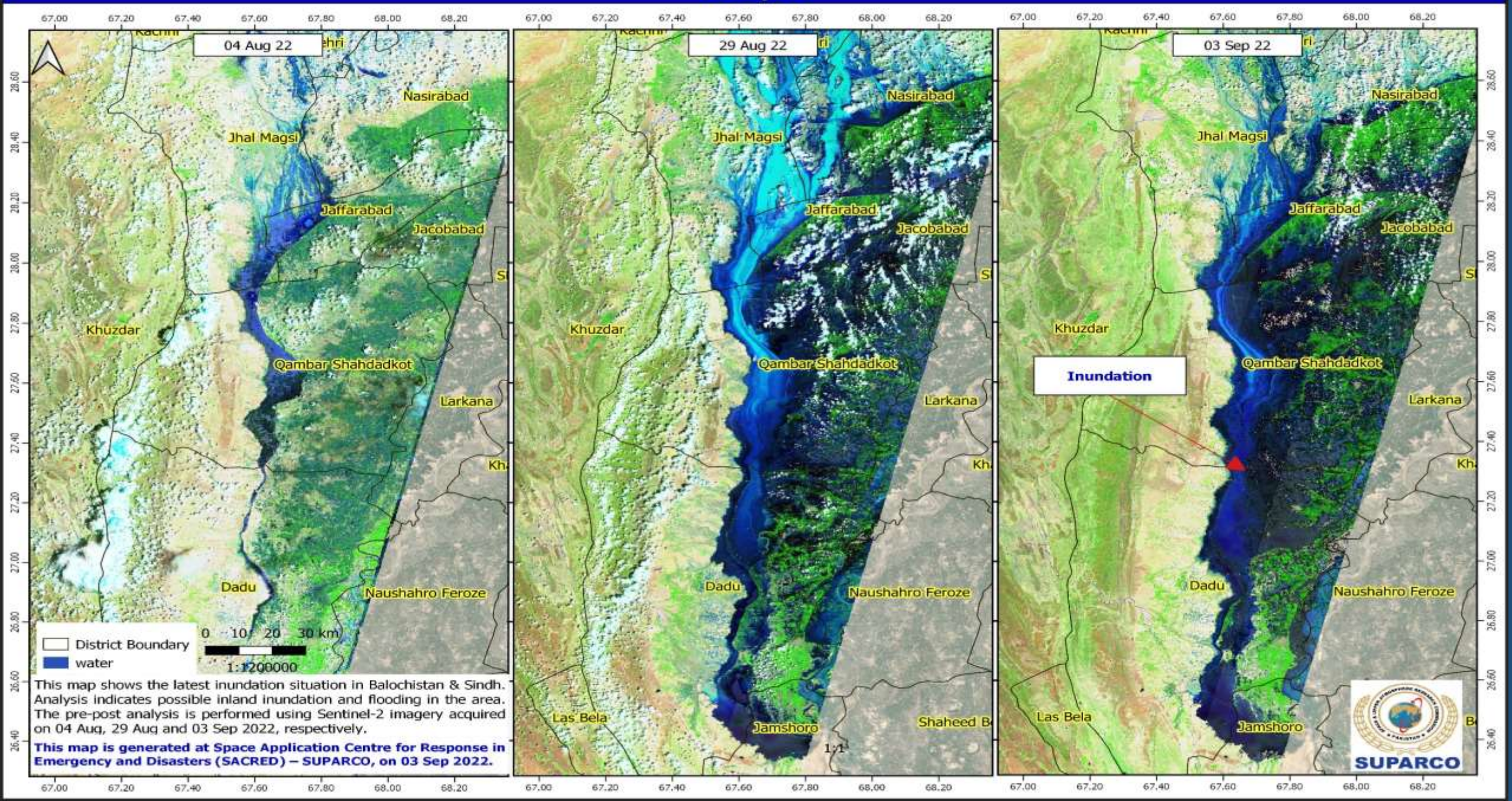
0 30 60 km

1:1,000,000

SUPARCO

This map is generated at Space Applications Centre for Response in Emergency and Disasters (SACRED) on 27-July-2022

Monsoon Flooding Situation Analysis
03 Sep 22

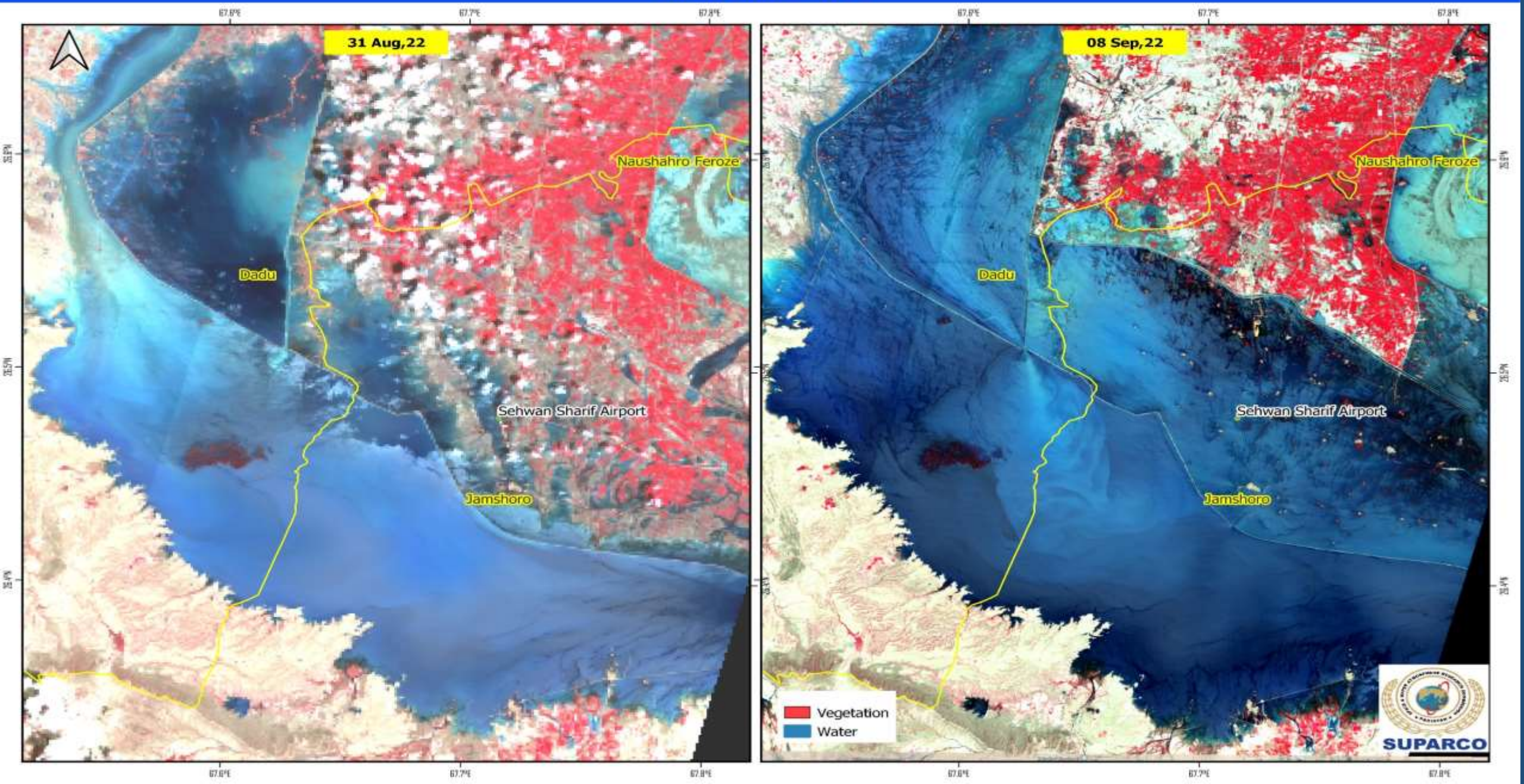


This map shows the latest inundation situation in Balochistan & Sindh. Analysis indicates possible inland inundation and flooding in the area. The pre-post analysis is performed using Sentinel-2 imagery acquired on 04 Aug, 29 Aug and 03 Sep 2022, respectively.

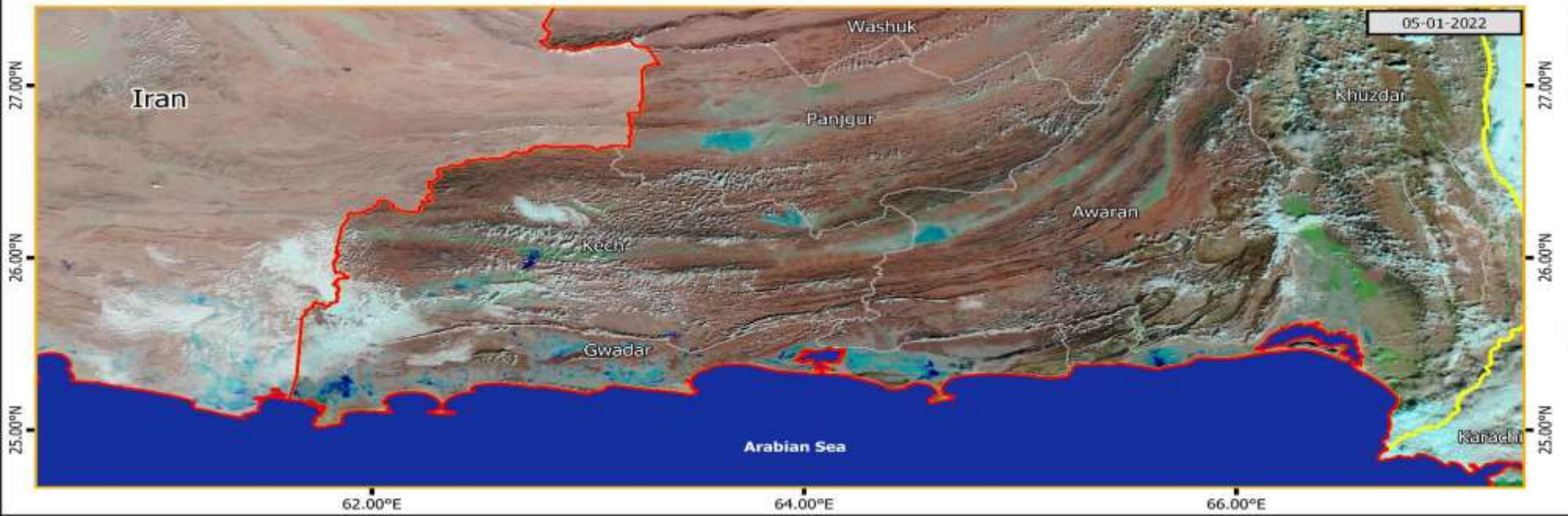
This map is generated at Space Application Centre for Response in Emergency and Disasters (SACRED) – SUPARCO, on 03 Sep 2022.

Monsoon Situation Analysis - 09 September 2022

Rapid Damage Assessment - 08 Sep,22
Manchar Lake



Flash Flooding in Balochistan
13 January 2022



District Boundary
Provincial Boundary
International Boundary

This map shows the updated situation of flash flooding in Balochistan Province, as seen on latest satellite imagery of Modis (250 m) satellite acquired on 13 Jan 2022. Pondage water has been reduced as compared to previous imagery

This analysis is yet to be validated in the field.

0 50 100 km

1:1730000

This map is generated at Space Applications Centre for Response in Emergency and Disasters (SACRED) on 14 January 2022.

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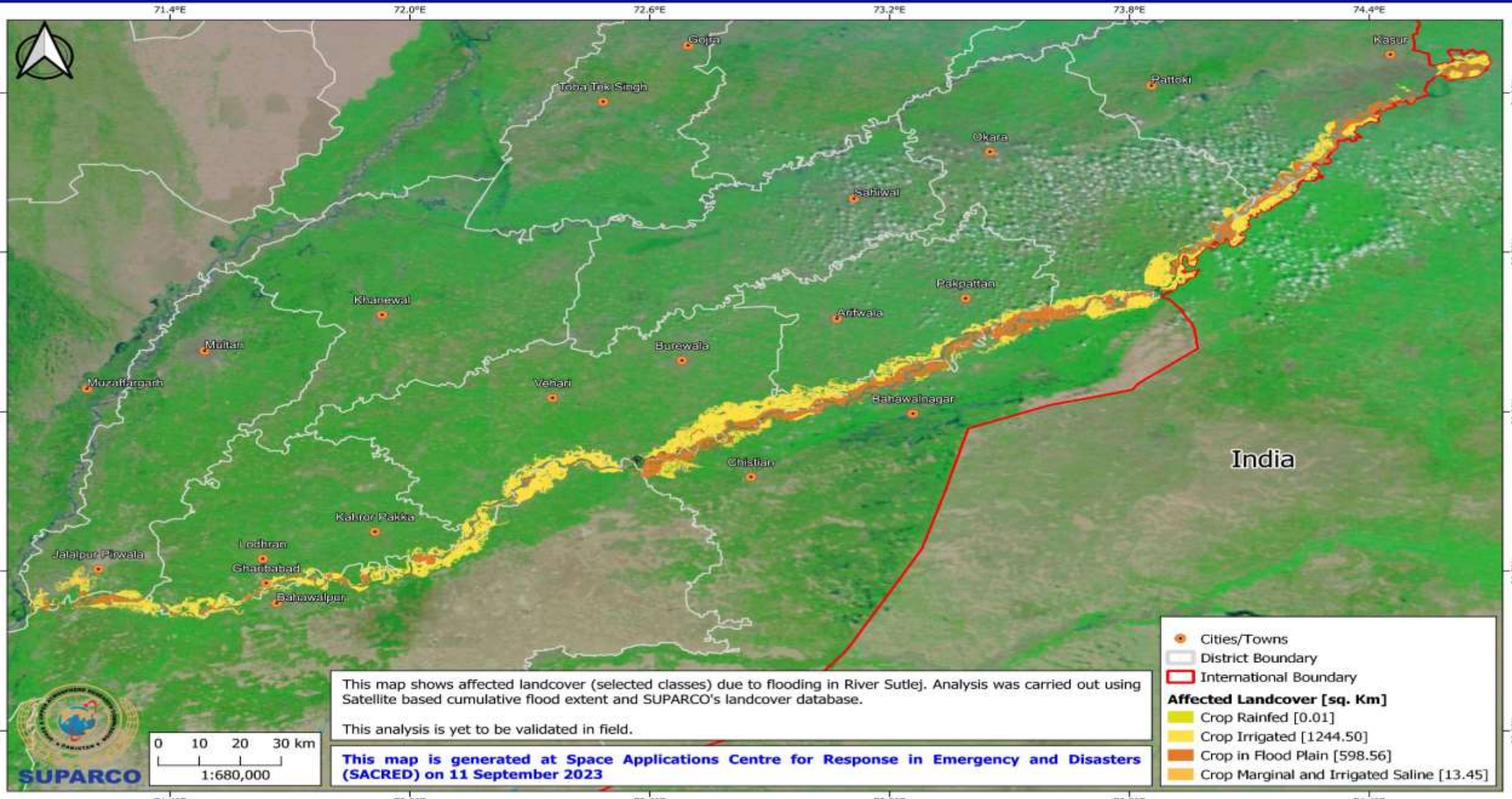
Monsoon Situation Analysis - River Sutlej
Affected Landcover



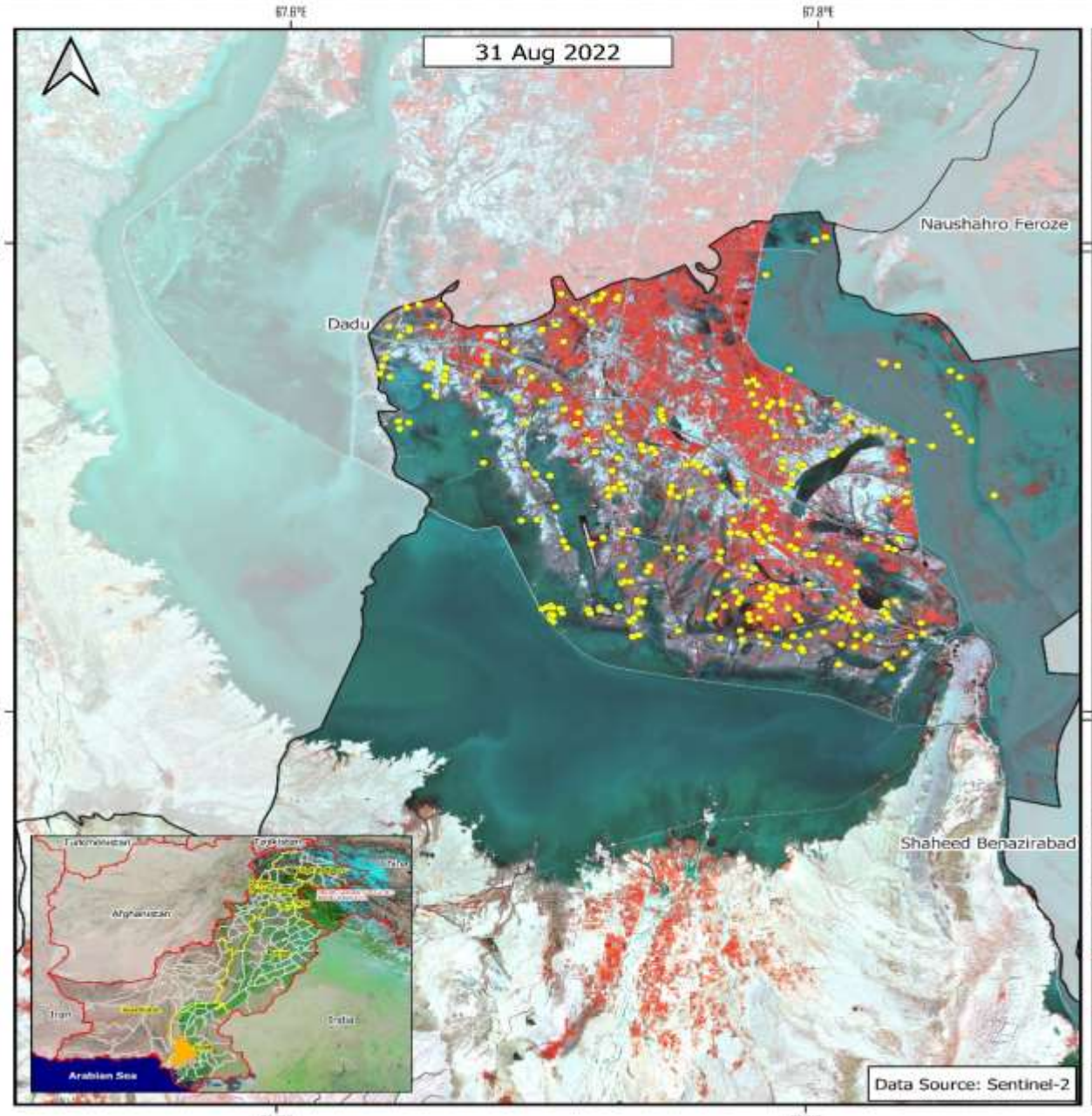
This map shows affected landcover (selected classes) due to flooding in River Sutlej. Analysis was carried out using Satellite based cumulative flood extent and SUPARCO's landcover database.

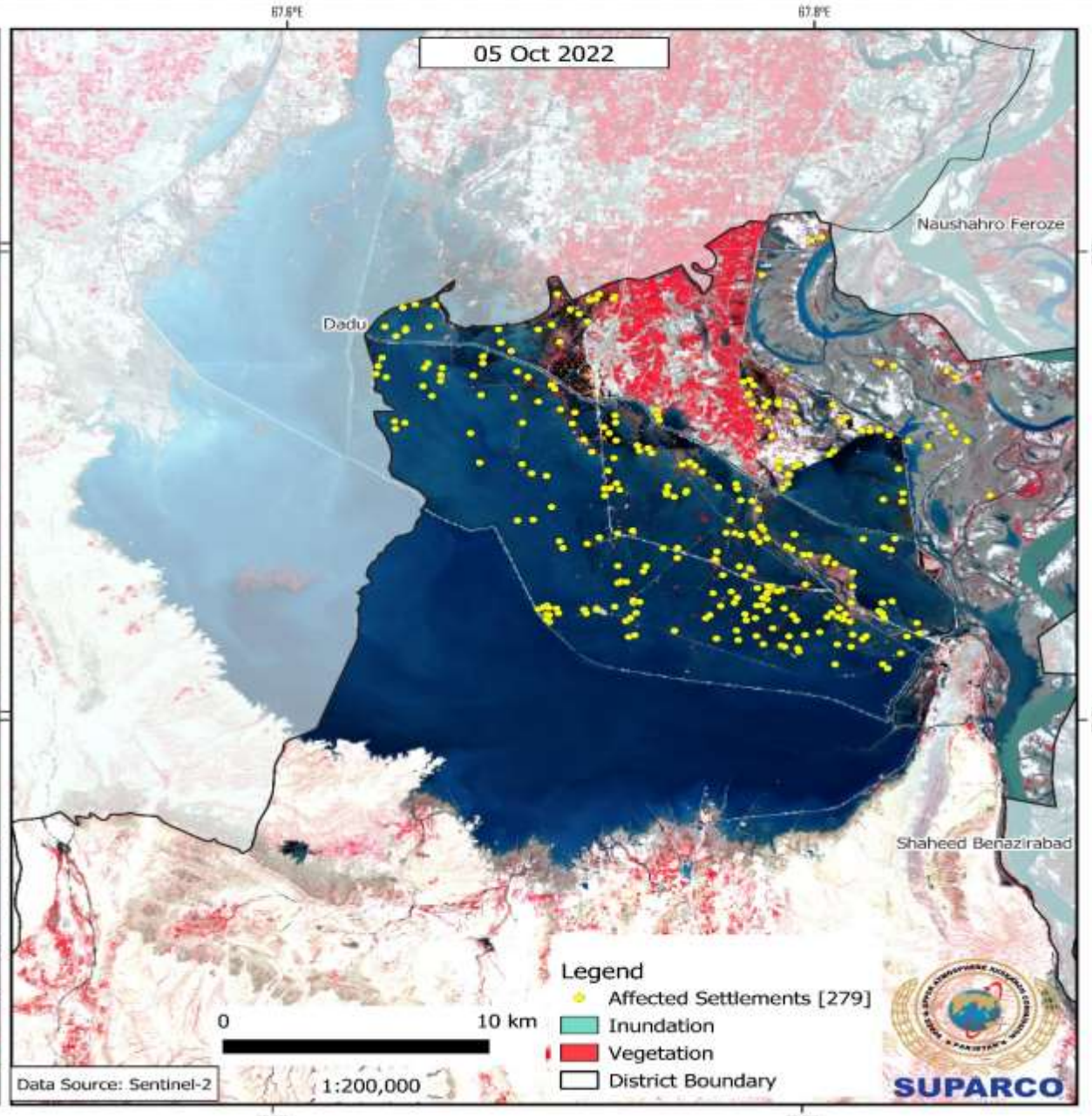
This analysis is yet to be validated in field.

This map is generated at Space Applications Centre for Response in Emergency and Disasters (SACRED) on 11 September 2023

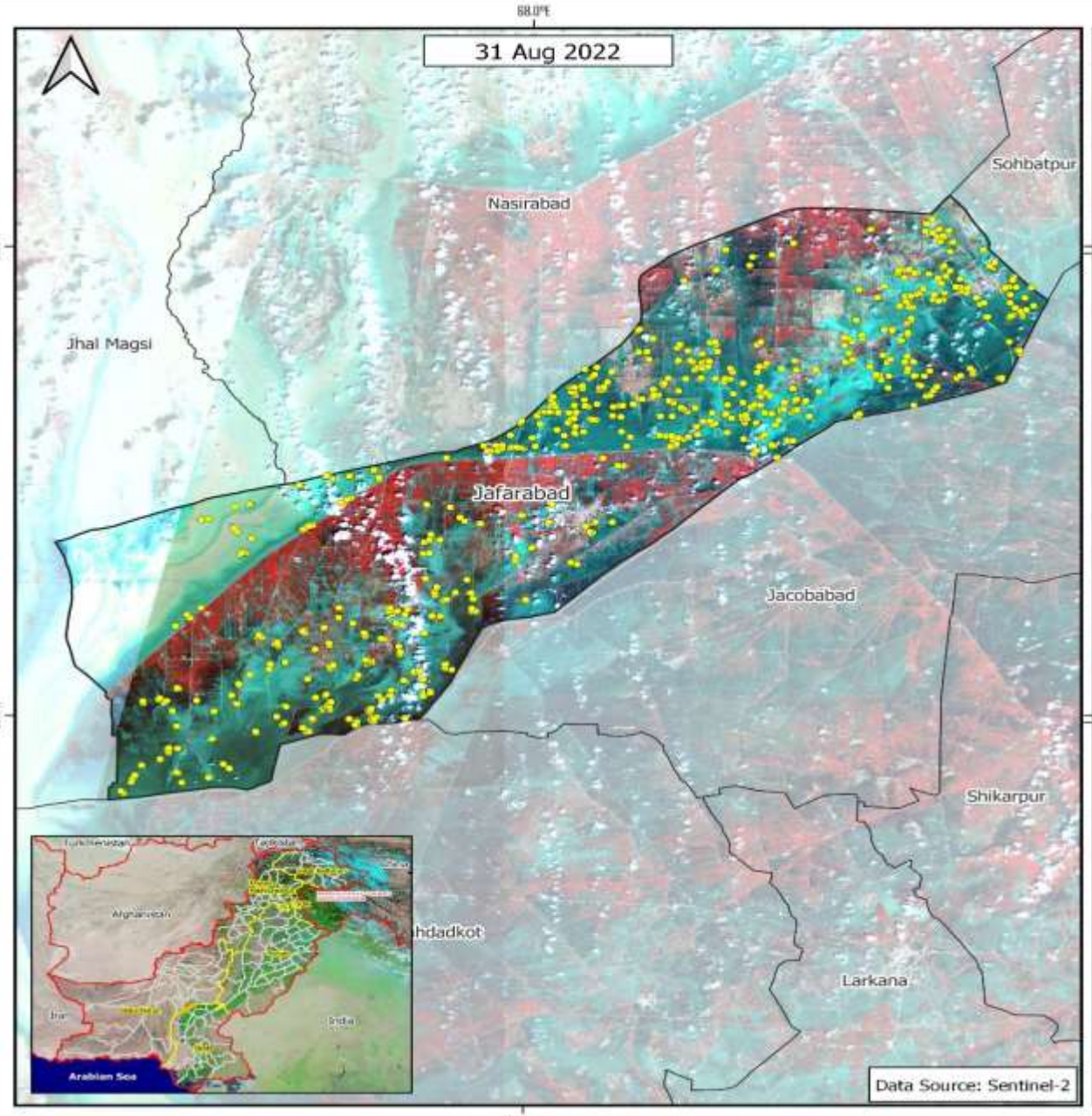
Monitoring of Erosion along River Indus, Layyah, Punjab

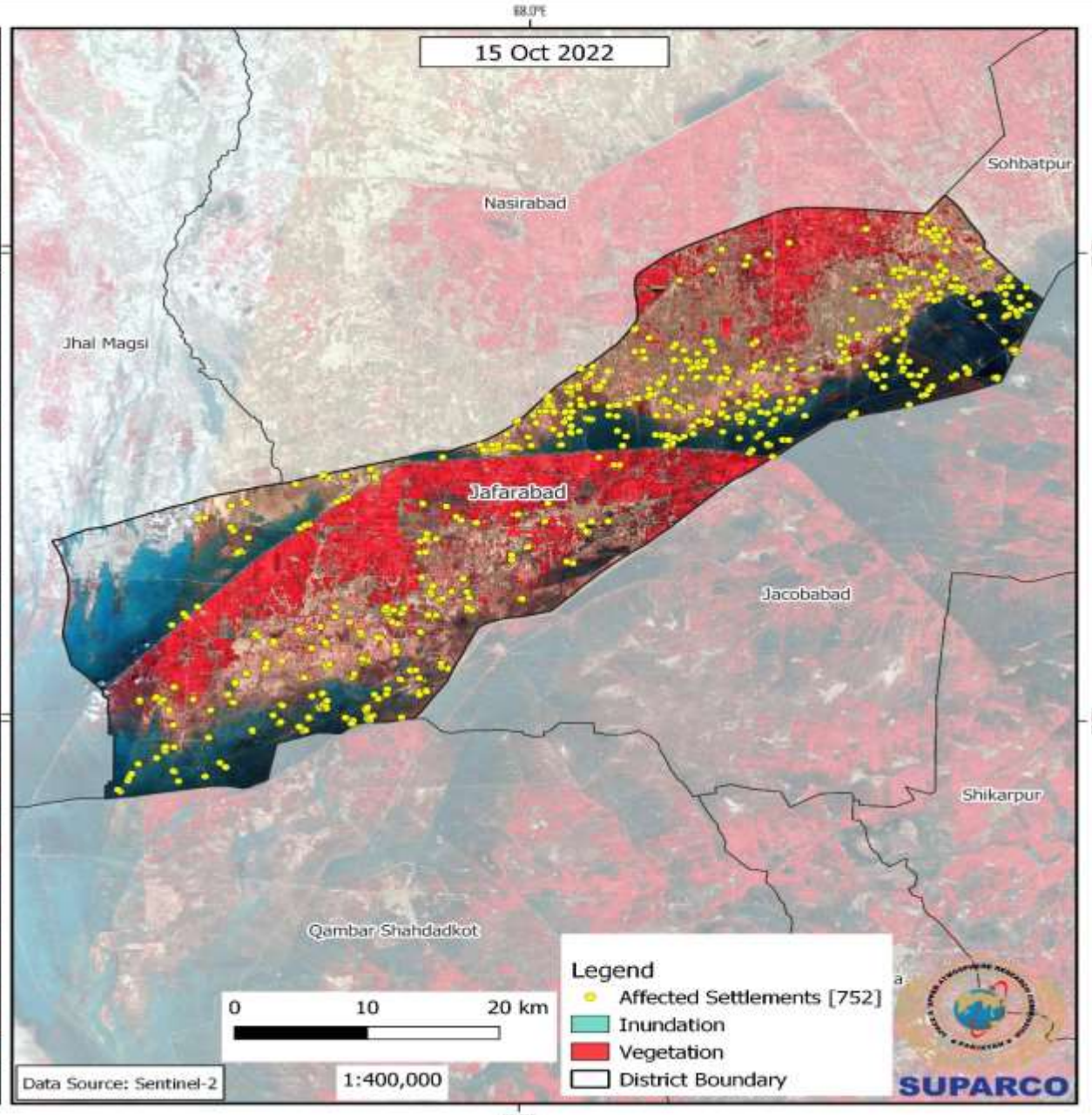
Rapid Damage Assessment - Settlements
District Jamshoro, Sindh





Rapid Damage Assessment - Settlements
District Jafarabad, Balochistan





Damages caused by Floods/Rains 2022 - Buildings

Pre - 01 Jun 2022

Post - 28 Aug 2022

Pre - 01 Jun 2022

Post - 28 Aug 2022

Flooding in River Swat – Bridge Damages

Collapsed Bridge on N-35

Hub River Bridge on N-25 Lasbella

Damages caused by Floods/Rains 2022 – Road/Bridges

Pre - 01 Jun 2022 Post - 28 Aug 2022

Pre - 01 Jun 2022 Post - 28 Aug 2022

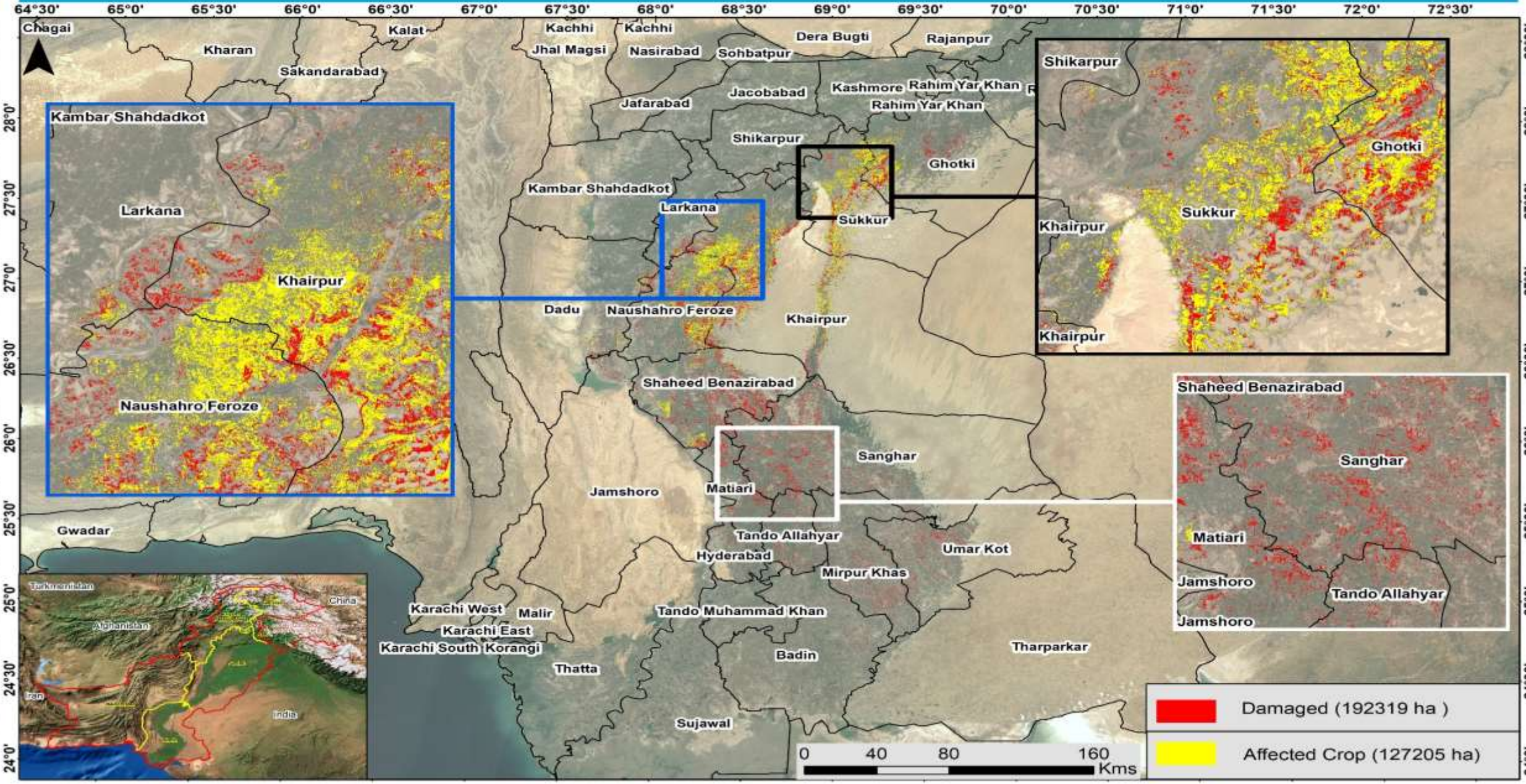
Small Dam Breaches in Balochistan

Sherjan Khada Dam, Loralai, Balochistan

Dam Breach - Qilla Abdullah , Balochistan

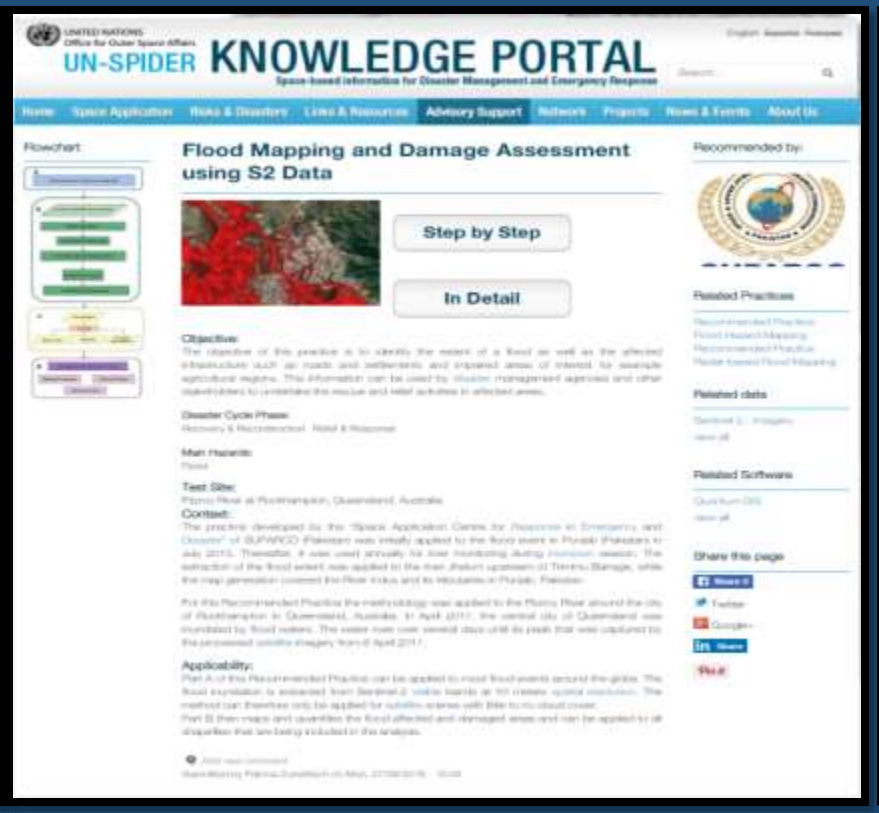
Flooding in Swat River at Munda Headwork

Sindh Province - Cotton Crop
Rapid Damage Assessment - Monsoon Flood 2022



Recommended Practices for UN-SPIDER Knowledge Portal

FLOOD HAZARD ASSESSMENT

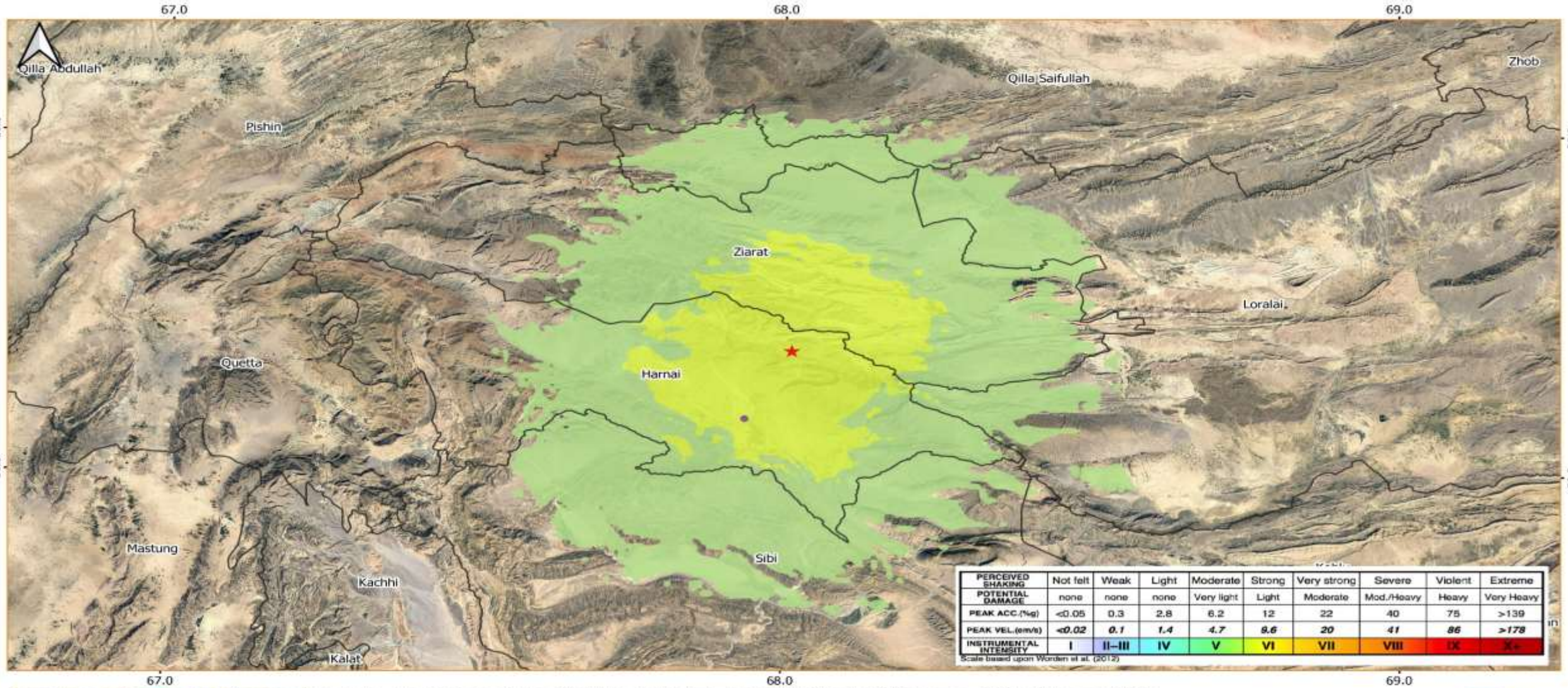


FLOOD MAPPING AND DAMAGE ASSESSMENT

DROUGHT HAZARD ASSESSMENT

EARTHQUAKE

Harnai Earthquake - 07 Oct 2021
Instrumental Intensity Map



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II–III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. (2012)

An earthquake of 5.9 magnitude with 09 km depth struck Harnai District and adjoining areas of Balochistan, on 07 Oct 2021 at 0301hrs local time (USGS). The epicenter was located at approx. 15 km NE of Harnai City. This map shows the epicenter and instrumental intensity of the earthquake. The intensity of earthquake was strong to moderate.

This map is generated at Space Applications Centre for Response in Emergency and Disasters (SACRED)-SUPARCO on 07-10-2021.

Legend
- Epicentre
- Harnai City
- International Boundary
- District Boundary
- Provincial Boundary

0 10 20 30 40 km

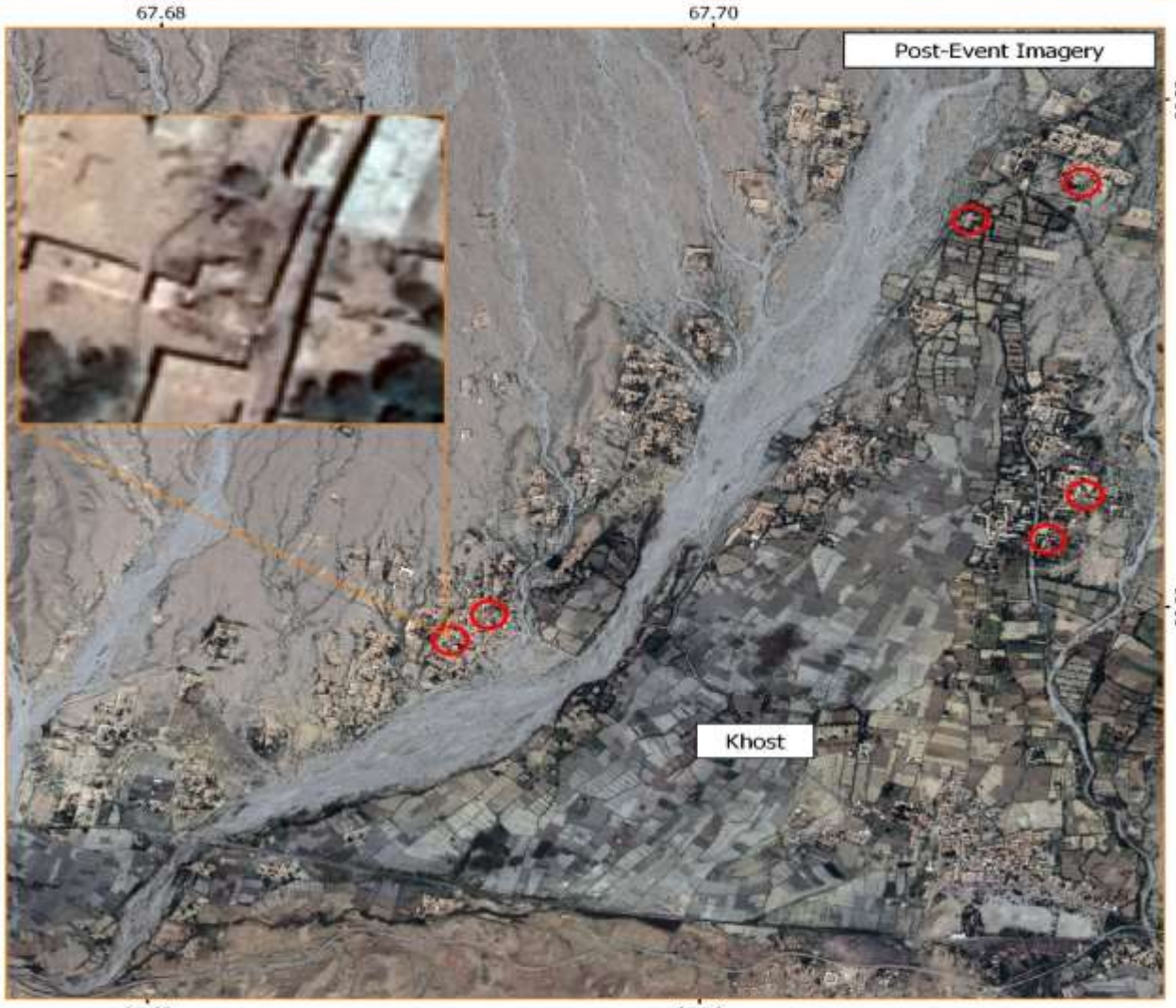
1:600000

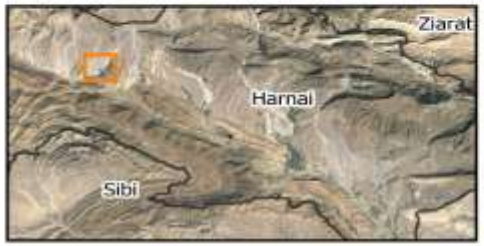
SUPARCO

Map Id: 07-10-2021 EQ 01

Earthquake 2015 Damage Assessment, Buner, KP

Harnai Earthquake - 07 Oct 2021
Rapid Damage Assesment Map





An earthquake of 5.9 magnitude with 15 km depth struck Harnai District and adjoining areas of Balochistan, on 07 Oct 2021 at 0301hrs local time (PMD). The epicenter was located at approx. 15 km NE of Harnai City. Analysis indicates multiple partially/completely damaged structures in the affected area. This analysis was performed using very high resolution Pleiades (50 cm) satellite imagery acquired on 08 Oct 2021. This analysis is yet to be validated in the field

This map is generated at Space Applications Centre for Response in Emergency and Disasters (SACRED)-SUPARCO on 08-10-2021.

Legend

EQ Damages (67)

District Boundary

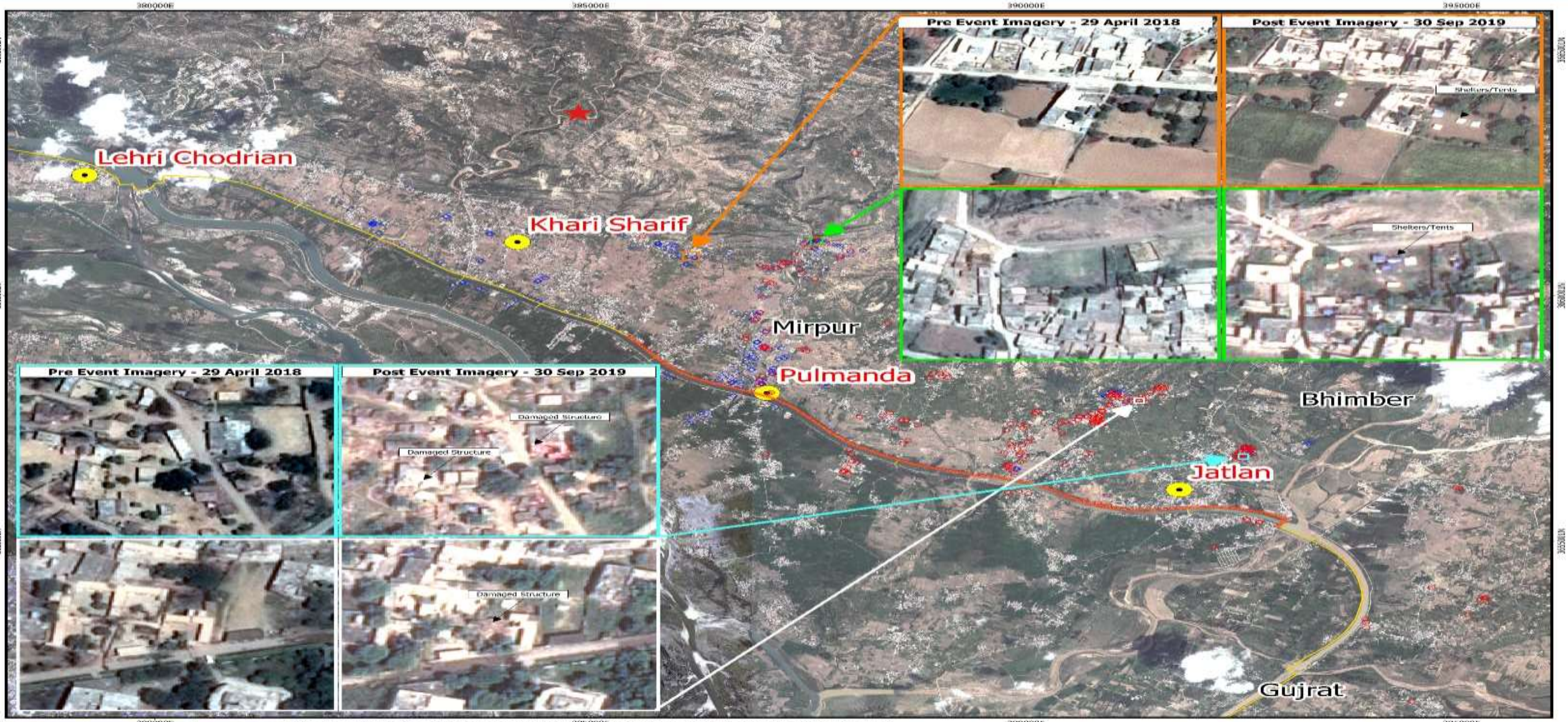
0 250 500 750 m

1:20000

SUPARCO

Map Id: 08-10-2021 EQ 02

Mirpur Earthquake
Detailed Damage Assesment Map - 30 Sep 2019



An earthquake of 5.6 magnitude with 10 km depth struck Mirpur and Northern areas of Pakistan on 24 Sep 2019 at 1602 hrs. The epicenter was located at Khari Sharif, District Mirpur. Analysis indicates, there are 334 partially/completely damaged structures in District Mirpur and Bhimber. Analysis also shows distribution of 451 tents in the affected area. This analysis was performed using pre and post imagery of Pleiades (50 cm) satellites acquired on 29 April 2018 and 30 Sep 2019, respectively. Post disaster image was provided by International Charter Space & Major Disasters. The analysis is yet to be validated in the field.

This map is generated at Space Applications Centre for Response in Emergency & Disasters (SACRED)-SUPARCO on 04 Oct 2019.

- Epicenter
- Tents (451)
- Damaged Structures (334)
- Damaged Road
- Road
- City/Town

Instrumental Intensity
- 5 - Moderate
- 6 - Strong
- 7 - Very Strong

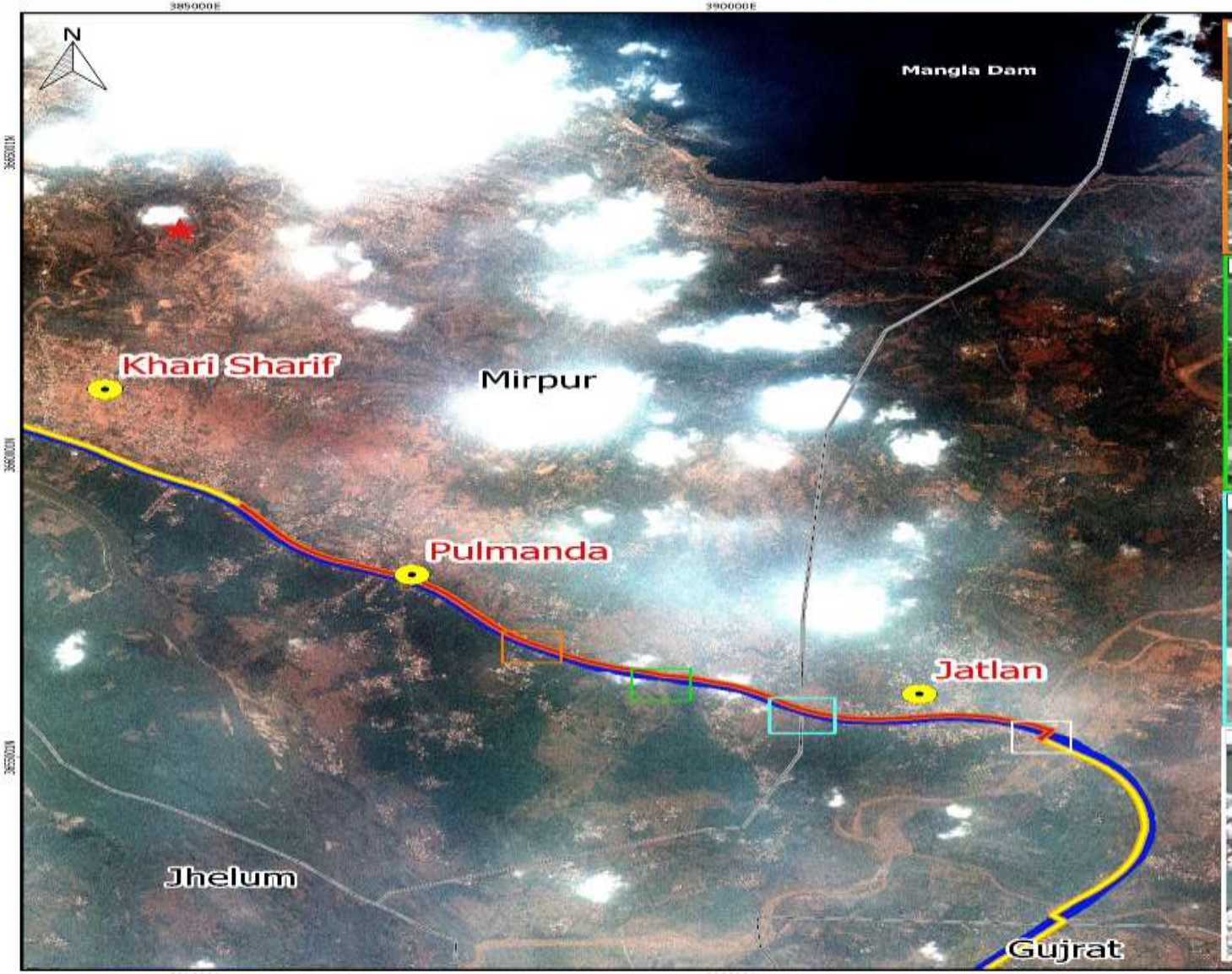
Datum: WGS 84; Projection: UTM 43N

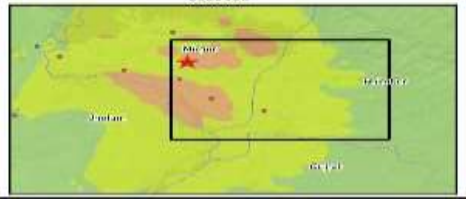
0 2 4 km

1:20000

SUPARCO

Mirpur Earthquake 2019
Rapid Damage Assesment Map - 26 Sep 2019





An earthquake of 5.6 magnitude with 10 km depth struck Mirpur and Northern areas of Pakistan on 24 Sep 2019 at 1602 hrs. The epicenter was located at Khari Sharif, District Mirpur. This map shows the possible damaged road sections along the Mirpur-Jatlan road, next to the upper Jhelum canal. As per the analysis/reports approx. 14 km section of the road has been damaged. Heavy cloud cover/haze was also observed across the scene. This analysis was performed using pre and post imagery of PRSS-1 (90 cm) and Pleiades (50 cm) satellites acquired on 04 Sep and 26 Sep 2019, respectively. The analysis is yet to be validated in the field.

This map is generated at Space Applications Centre for Response in Emergency & Disasters (SACRED)-SUPARCO on 26 Sep 2019.

Epicenter
City/Town
Road
Damaged Road
Canal
District Boundary

Instrumental Intensity
5 - Moderate
6 - Strong
7 - Very Strong

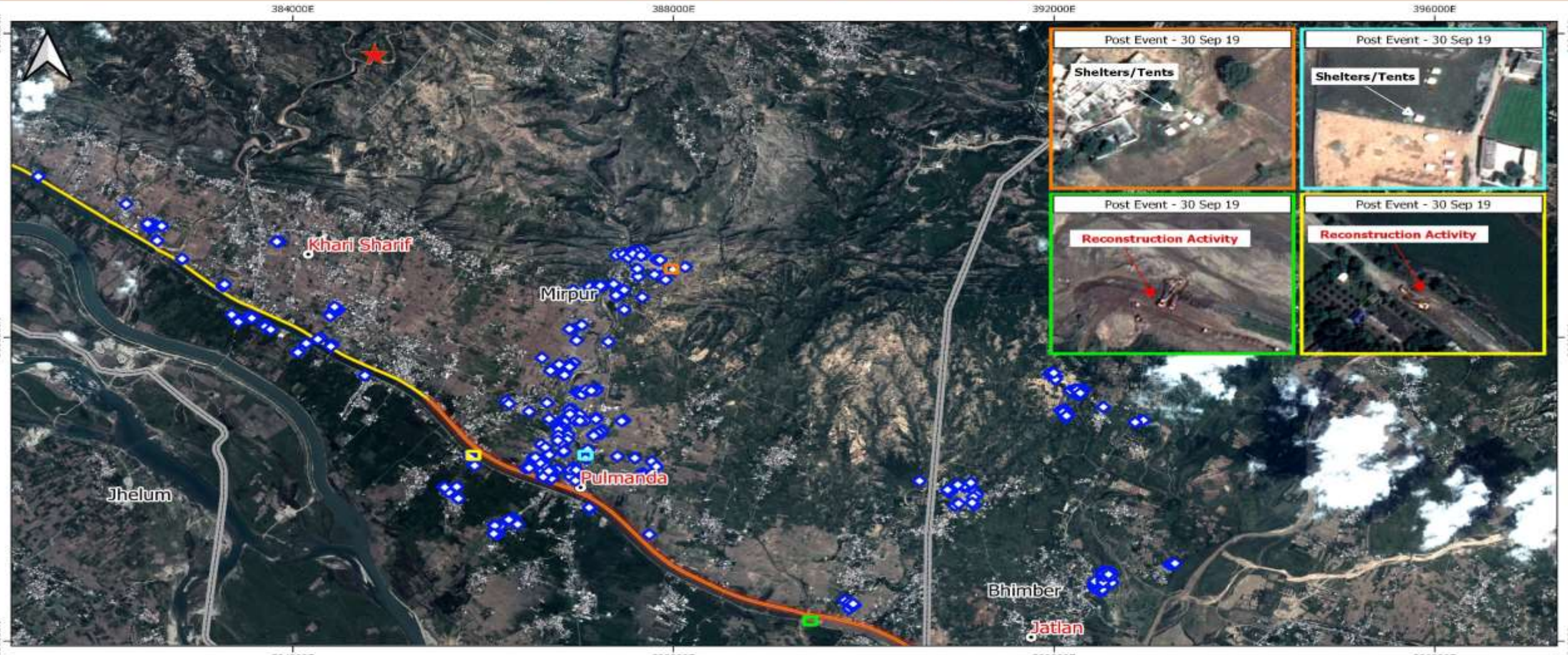
Datum: WGS 84; Projection: UTM 43N

0 2 4 km

1:22000

SUPARCO

Mirpur Earthquake 2019
Early Recovery Activities - 30 Sep 2019



An earthquake of 5.6 magnitude with 10 km depth struck Mirpur and Northern areas of Pakistan on 24 Sep 2019 at 1602 hrs. The epicenter was located at Khari Sharif, District Mirpur. This map shows the locations of shelters/tents spread across the area. The reconstruction on the Mirpur-Jatlan road has also been started.

This analysis was performed using post event imagery of Pleiades (50 cm) satellite acquired on 30 Sep 2019. Post disaster image was provided by International Charter Space & Major Disasters in collaboration with UNOSAT/UNITAR. The analysis is yet to be validated in the field.

This map is generated at Space Applications Centre for Response in Emergency & Disasters (SACRED)-SUPARCO on 30 Sep 2019.

Datum: WGS 84
Projection: UTM zone 43N

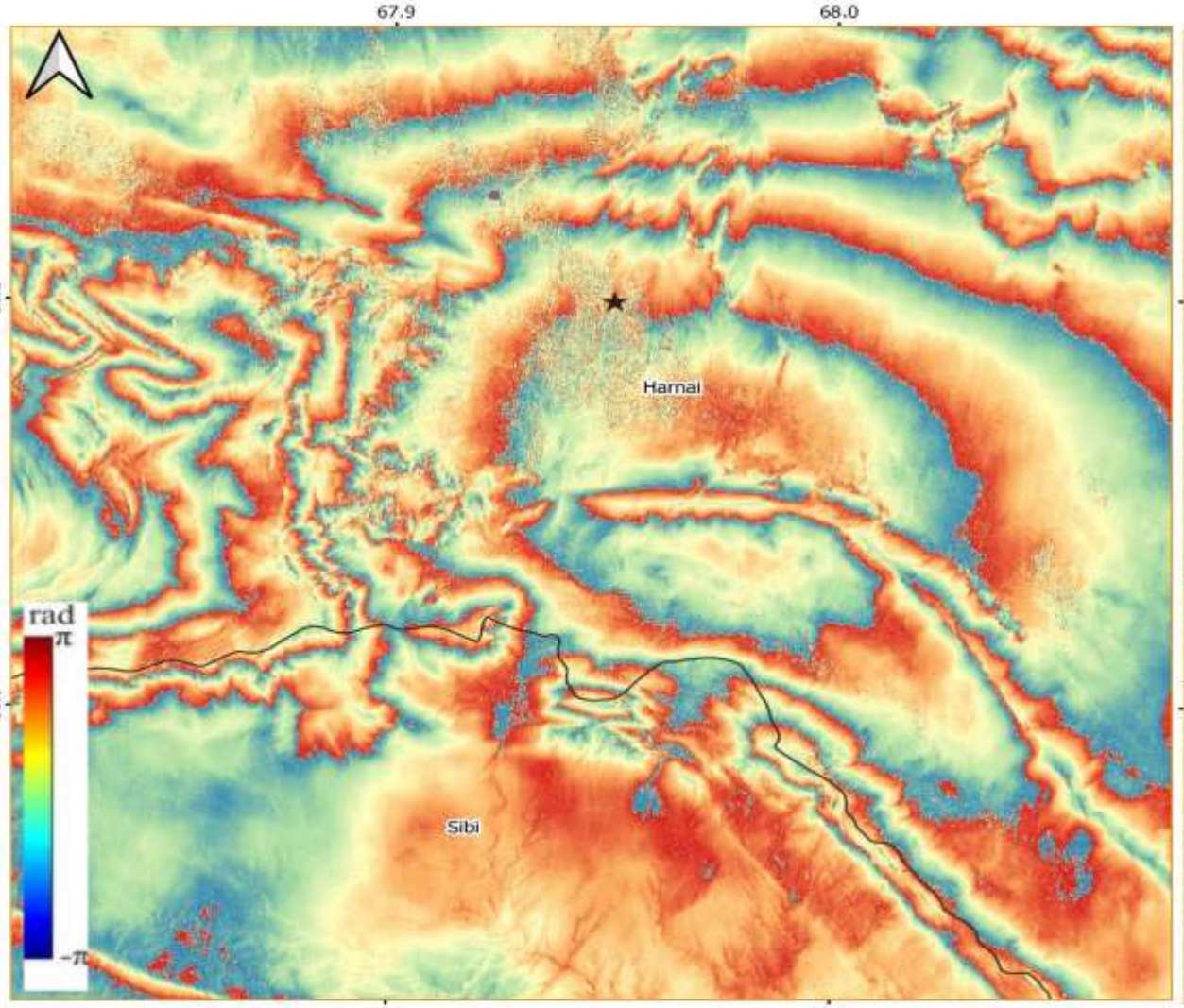
0 0.5 1 km

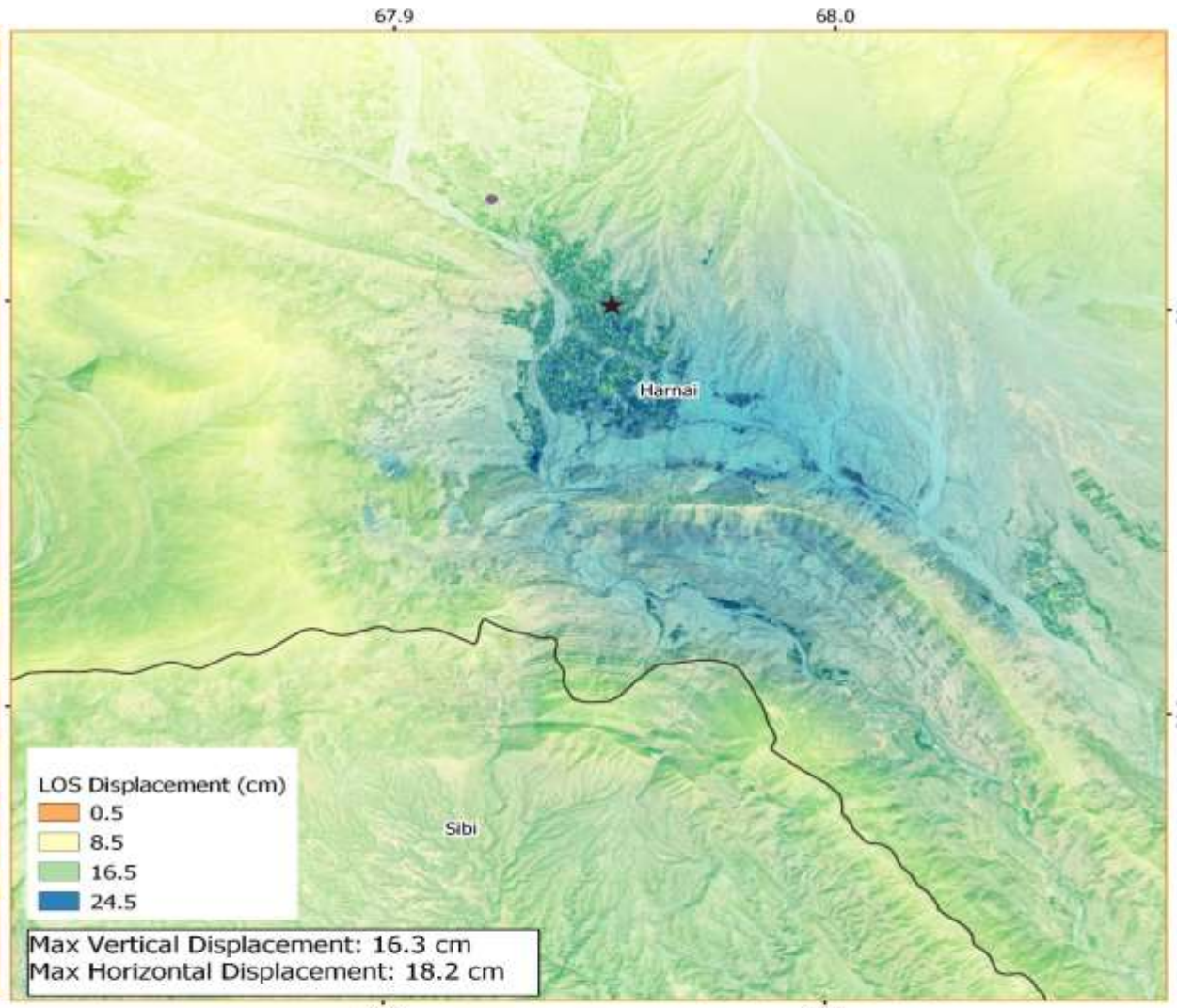
1:40000

- Epicenter
- Tents
- City/Town
- Damaged Road
- Road Network
- District Boundary

SUPARCO

Harnai Earthquake - 07 Oct 2021
Ground Displacement Map





An earthquake of 5.9 magnitude with 09 km depth struck Harnai District and adjoining areas of Balochistan, on 07 Oct 2021 at 0301hrs local time An earthquake of 5.9 magnitude with 15 km depth struck Harnai District and adjoining areas of Balochistan, on 07 Oct 2021 at 0301hrs local time (PMD). This map shows the ground deformation using Interferometric SAR technique. Analysis indicates 24.5 cm Line of Sight displacement (uplift) near the epicenter. This analysis is performed using pre-post Sentinel-1 C band SAR satellite acquired on 28 Sep 2021 and 10 Oct 2021, respectively. This analysis is yet to be validated in the field.

This map is generated at Space Applications Centre for Response in Emergency and Disasters (SACRED)-SUPARCO on 12-10-2021.

0 2.5 5 7.5 km

1:100000

Legend

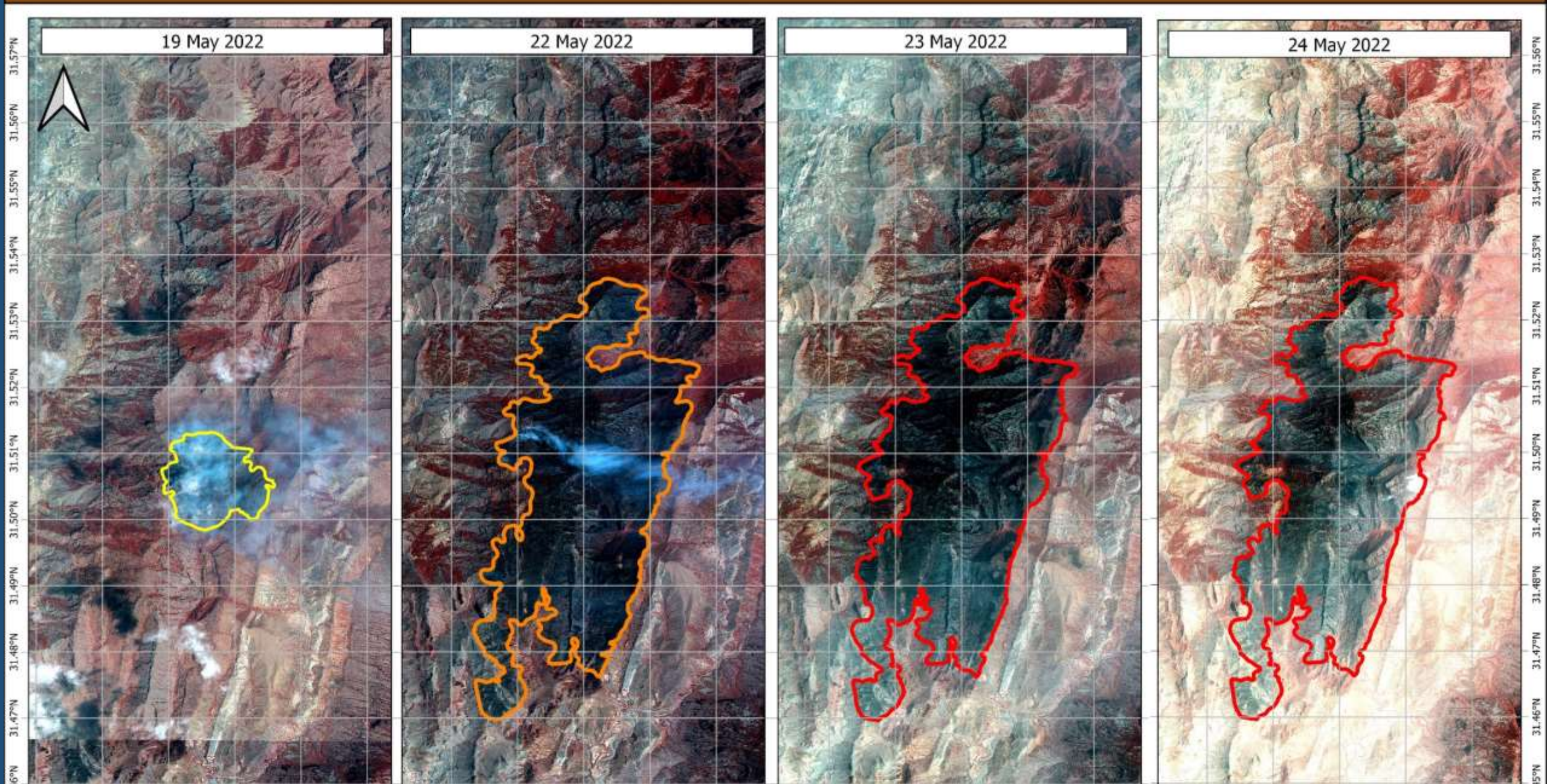
- Epicentre (PMD)
- Harnai City
- International Boundary
- District Boundary
- Provincial Boundary

SUPARCO

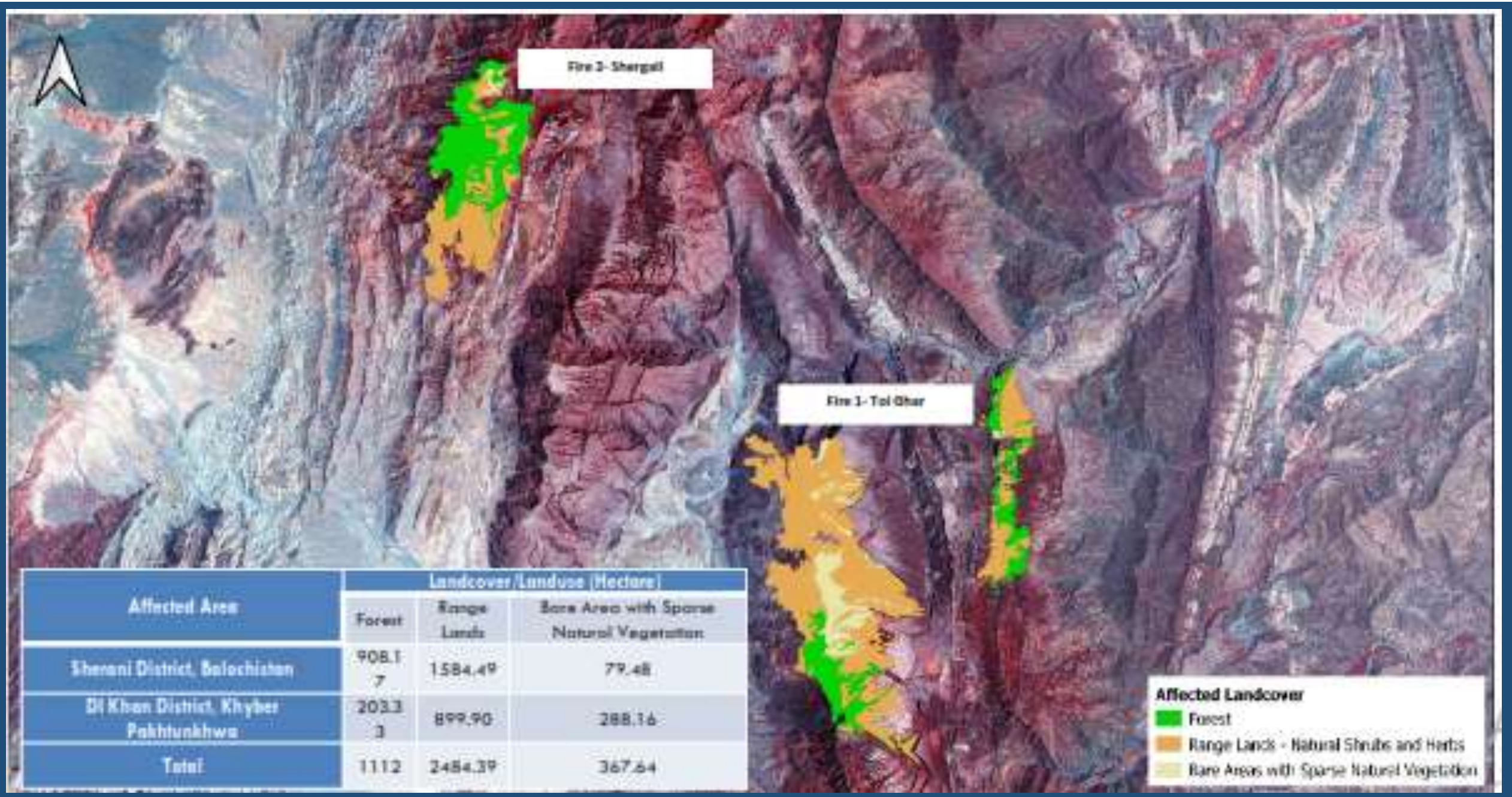
Map Id: 12-10-2021 EQ 01

FOREST FIRE

TEMPORAL ANALYSIS OF FOREST FIRE - Sherghali



Balochistan Fire 2022 – Affected LandCover



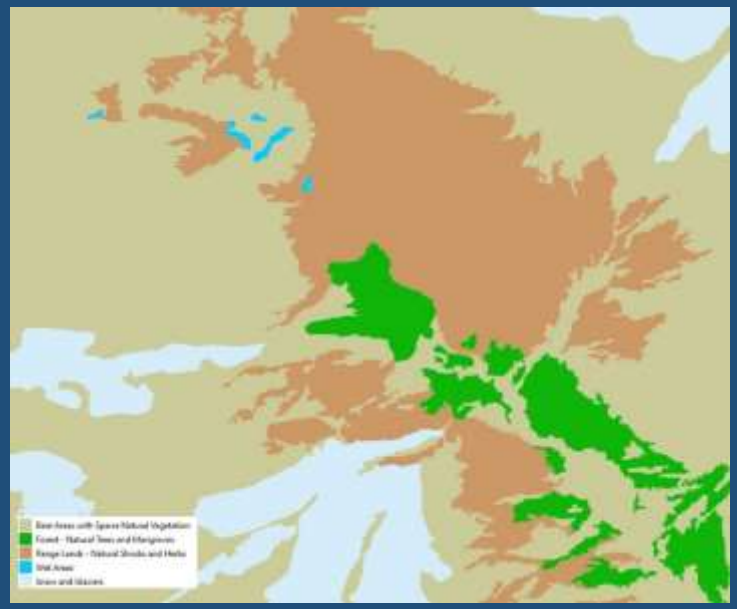
Affected Area	Landcover/Landuse (Hectare)		
	Forest	Range Lands	Bare Area with Sparse Natural Vegetation
Sherani District, Balochistan	908.17	1584.49	79.48
DI Khan District, Khyber Pakhtunkhwa	203.33	899.90	288.16
Total	1112	2484.39	367.64

Landslide

Landslide, Karora, Shangla, Khyber Pakhtunkhwa

Naltar 24-06-2021

Naltar 09-07-2021



Naltar Landcover

Landslide
Havelian, District Abbottabad

This map shows the landslide that occurred near Satora, Tehsil Havelian, District Abbottabad on 21-Nov-2015. This analysis indicates that the landslide mass covers approx. 7.92 ha area and about 203 m road has been completely damaged. The analysis is performed on 0.5m Pleiades Satellite Data acquired on 27-Nov-2015. This map is generated at SUPARCO on 02-12-2015. This analysis is yet to be validated in the field.

0 100 200 300 400 m

Legend

- landslide
- River Blockade
- Destroyed Road
- Road
- District Boundary

Map Scale: 1:3800

SUPARCO

Map Id: 02-12-2015_LS_01