Upper Kohistan Flash Flood, July 2026: NISAR Flood Case Study Report

Summary

AtlasAfterBlue flagged 0.0278 km² (2.78 ha, 278 pixels) of candidate flood change in Upper Kohistan with Low confidence. The two NISAR scenes compared (14 July and 26 July 2026) bracket the 19–22 July 2026 flash flood, so the figure can be read as a candidate flood estimate, though it remains unvalidated.

- **Event:** heavy-rain flash floods in Khyber Pakhtunkhwa, 19–22 July 2026; PDMA recorded a flash flood at Zehar Dara, Kandia Tehsil, Upper Kohistan, on 22 July.
- **Data:** NISAR L2 GCOV (provisional), L-band, HH, Track 84, Frame 19, ascending; same-track pair, so the pair is valid.
- **Result:** ≈ 0.0278 km², Low confidence, unvalidated; permanent water excluded.
- **Timing:** the pair 14 July (pre-event) → 26 July (post-event) brackets the event; the 26 July scene was acquired about four days after the 22 July flash flood.

Event background

Heavy rainfall triggered flash flooding across mountainous districts of Khyber Pakhtunkhwa between 19 and 22 July 2026, with deaths, injuries and damage to homes and infrastructure reported.

- **Local incident:** the KP Provincial Disaster Management Authority (PDMA) Daily Situation Report of 22 July records a flash flood at Zehar Dara, ahead of Maidan Gabral, Kandia Tehsil, Upper Kohistan. It reportedly washed away 7–8 houses, livestock and agricultural land; no casualties were recorded at that location in the initial report.
- **Provincial toll:** Associated Press of Pakistan reported 22 killed and 23 injured in Khyber Pakhtunkhwa since 19 July.
- **Scope:** this study treats Upper Kohistan as the area of interest, not the whole provincial disaster as one continuous flood footprint.
- **Timing caveat:** the local hour of rainfall and flooding is not established, so a satellite pass inside 19–22 July is not automatically a flood observation.

The event details above come from the project's Case Study 3 document and the PDMA and APP reports it cites; the underlying web pages were not re-opened for this report.

Study area and geographic reference

The case study searched ASF Vertex at POINT(72.9081 35.5832) in Kandia Valley, and the AtlasAfterBlue map is centred on the same point (Kandia Gol).

Item	Value
Case-study search point (lon, lat)	72.9081, 35.5832 (Kandia Valley; a search reference, not a surveyed damage site)
AtlasAfterBlue map centre (lon, lat)	72.9081, 35.5832 (zoom 12)
Extent of the 55 candidate patches	72.863–72.957 E, 35.544–35.622 N
Dashboard location label	Kandia Gol (upper valley), Kandia Tehsil, Upper Kohistan, KP

The map centre and the case-study search point are now the same. It is unverified whether Track 84, Frame 19 covers Zehar Dara; the case study confirmed only that the reference point falls inside the displayed frames.

NISAR data and acquisition timeline

The 14 July and 26 July scenes were analysed and bracket the 22 July flash flood; the 2 July scene is not part of the result.

Date (2026)	Observation	Role	Used in AtlasAfterBlue result
2 July, 00:22 UTC	Ascending, Track 84, Frame 19, GCOV	Earlier pre-event scene	No
14 July, 00:22 UTC	Ascending, Track 84, Frame 19, GCOV	Pre-event scene	Yes (before)
19 July, 14:03 UTC	Descending, Track 164, Frame 70, GCOV	Near-event candidate; footprint overlap unconfirmed	No
19–22 July	Reported flash-flood episode (PDMA Zehar Dara report: 22 July)	Event period	n/a
26 July, 00:22 UTC	Ascending, Track 84, Frame 19, GCOV	Post-event, four days after the event period	Yes (after)

All products are NISAR L2 GCOV, provisional status, HH and HV polarizations, full frame coverage. NISAR repeats every 12 days, which matches the 2 → 14 July and 14 → 26 July spacing. The 19 July descending scene has a different geometry and was searched with a different coordinate (71.6871, 35.7018), so it must not be compared pixel by pixel with the ascending series.

Method

AtlasAfterBlueuses a transparent threshold rule on L-band radar backscatter; no machine-learning model makes the detection decision.

1. **Scene selection:** same track and same viewing direction only; cross-orbit pairs are rejected because of radar shadow and layover in steep valleys.
2. **Processing:** GCOV terrain-corrected linear power, validity masks applied, converted to dB once.
3. **Change logic:** a backscatter decrease of at least 3 dB between the two dates, with post-event backscatter below −14 dB. Calm water scatters the signal away from the sensor and appears dark.
4. **Permanent water excluded:** rivers and lakes are removed so only new dark areas remain.
5. **Cleaning:** a minimum mapping unit removed 3,323 isolated speckle pixels.
6. **Output:** 55 candidate patches, with area computed in projected UTM metres (EPSG:32643). Strong backscatter increases (debris, roughness) are flagged as uncertain, not flooded.

The 278 pixels for 0.0278 km² imply 100 m² per pixel, i.e. a 10 m × 10 m grid. Pipeline version: v1.0, 16-stage NISAR GCOV pipeline.

Results

The 14 → 26 July comparison returned about 0.0278 km² of candidate flood change, with Low confidence and no independent validation.

Field	Value
Estimated flooded area	≈ 0.0278 km² (278 pixels; 2.78 ha)
Dates compared	2026-07-14 → 2026-07-26 (before → after)
Confidence level	Low
Scene-pair validity	Yes: same track and direction
Satellite / band / polarization	NISAR, L-band, HH
Track / frame / direction	84 / 19 / Ascending
Candidate patches	55
Before scene	NISAR_L2_PR_GCOV_025_084_A_019_4005_DHDH_A_20260714T002238_20260714T002313_P05023_F_F_J_001

Field	Value
After scene	NISAR_L2_PR_GCOV_026_084_A_019_4005_DHDH_A_20260726T002237_20260726T002312_P05023_N_F_J_001

This is a candidate estimate from a threshold rule, never confirmed floodwater.

Date check: the compared dates bracket the event

The 14 July scene was acquired before the 19 July start of the flood and the 26 July scene about four days after the 22 July flash flood, so the 0.0278 km² figure can be reported as a candidate flood estimate.

The dashboard now labels the event as "22 July 2026 (imaged 2026-07-14 vs 2026-07-26)", consistent with Case Study 3, which lists 14 July as pre-event and 26 July as the only post-event scene.

No satellite acquisition of any kind occurred between 19 July (14:03 UTC) and 24 July (13:54 UTC), so the flood peak was never directly imaged; the 26 July pass shows residual post-recession conditions.

Limitations

- The result is a threshold-based candidate estimate, not confirmed floodwater, and carries Low confidence.
- Steep Upper Kohistan valleys cause radar shadow and layover that can hide or mimic water.
- Flash-flood debris and sediment raise backscatter, so those areas are only flagged as uncertain; a debris-laden flash flood may be under-counted.
- A short-lived flash flood may have receded before the 26 July pass, four days after the event period.
- NISAR GCOV products are provisional; maturity and suitability for quantitative analysis are not guaranteed.
- No independent ground truth (optical imagery, Sentinel-1, OPERA DSWx, ALOS-2 or a field survey) has been used.
- Backscatter change cannot yet be separated from soil moisture, vegetation or terrain effects.
- The mapped area may not include Zehar Dara (see geographic reference).

Next steps

1. Keep 2 → 14 July as the no-event baseline and compare the two areas before drawing any conclusion.
2. Confirm the Track 84 / Frame 19 footprint covers Kandia Valley and Zehar Dara.
3. Check the 19 July descending scene (Track 164, Frame 70) footprint; use it only as supplementary evidence.

4. Find independent evidence: Sentinel-1, OPERA DSWx-S1 or ALOS-2 for 19–26 July, plus optical imagery if cloud-free.
5. Insert the direct PDMA report link (reference PDMA/PEOC/DSR/2026/Jul-E-22-25) on the dashboard's sources page.

References

All items below are cited through the project's Case Study 3 document and were not re-opened for this report.

- PDMA Khyber Pakhtunkhwa, Daily Situation Report, 22 July 2026
- PDMA Khyber Pakhtunkhwa, Daily Situation Report, 20 July 2026
- Associated Press of Pakistan, Flash floods, heavy rains kill 22, injure 23 in Khyber Pakhtunkhwa since July 19
- ASF Vertex, NISAR acquisition search
- NASA/JPL ASF, NISAR GCOV product documentation
- NSAC 2026 internal documents: Case Study 3 (Upper Kohistan), Guide for Flood Case Studies, and the AtlasAfterBlue dashboard output (summary.json, flood_boundary.geojson)