



Breaking News

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Figure 1: Saudi Arabia in world map

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Torrential Rains Lead to Partial Collapse of Bridge in KSA

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On the fateful day of Saturday, 3rd August, 2024, a bridge partially collapsed in Saudi Arabia.

This followed ten (10) hours of heavy rainfall leading to a flash flood from the mountains of southwestern Saudi Arabia in Jazan province, with Ahad al-Masarihah bearing the brunt.

The Rainfall Event

The rainfall was extremely intense causing widespread disruption to life, damage to property and loss of life. Rainfall still continues in the region, and authorities urge citizens to exercise caution and stay updated on road conditions.

In Wadi Musalla (Wadi al-Khams) three vehicles were swept away due to huge torrents. The intense downpour also resulted in widespread damage, including vehicle losses, road collapses, and at least one confirmed fatality.

Authorities also responded to several incidents caused by the floods and rains, including the collapse of roofs of commercial buildings, flooding of homes, and vehicles being stranded or trapped.

State television news channel Al-Ekhbariya aired images of two vehicles caught up in the floodwaters, one of them crushed by a collapsed bridge support.

The National Centre for Meteorology warned Saturday that more heavy rainfall was still to come in Jizan province, with thunderstorms forecast in the mountains.

Rainfall has reduced visibility in many parts of Saudi Arabia, especially in the city of Al Baha and its suburbs, affecting various other governorates and regions, including Baljarshi, Bani Hassan, Al Qura, Al Makhwah, Qalwa, Al Hajra, and Ghamad Al Zanad.

In a tragic incident in Wadi Masla, a vehicle carrying a couple was washed away while traveling on the road between Al Arada and Ahad Al Masarihah. The wife died, and the husband sustained injuries. Okaz sources reported that one of the vehicles contained a family, and their fate remains uncertain. Civil Defense teams are on-site, conducting searches and assessing the damage.

Additionally, lighter rainfalls have reduced visibility in many parts of the kingdom, especially in Al Baha city and its suburbs, affecting various other governorates and regions, including Baljarshi, Bani Hassan, Al Qura, Al Makhwah, Qalwa, Al Hajra, and Ghamad Al Zanad.

Climatology

Jizan province has starkly different climates. The narrow coastal plain along the Red Sea experiences some of the highest temperatures in Saudi Arabia, but the mountains inland, which rise to 3,000 metres (10,000 feet), are much cooler, with significant rainfall even in summer.

The Bridge

The Redis Bridge, is located on the road connecting the provinces of Abu Arish and Sabya in the Jazan region Saudi Arabia. The dual carriageway Jazan Valley Bridge, connects the governorates of Abu Arish (30 km towards the East) and Sabya towards the town of Radis.

Each carriage is apparently a two-lane system. Each span is supported on four piers. The type of foundation system remains unknown to this scribe.

Fallout

This incident led to the fall of two vehicles, resulting in one fatality and several injuries, with the injured being transported by ambulance teams for necessary medical care.

The state media said that several people were also injured in the bridge collapse at an important crossroads inland from the Red Sea port city of Jizan.

While two vehicles fell into the collapsed section, other vehicles managed to stop just before reaching the affected area.

The National Centre for Transport Safety confirmed that specialized teams are heading to the incident site to initiate necessary investigation procedures to uncover the circumstances and causes, and to submit recommendations in coordination with relevant authorities.

The number of affected people is being determined.

The Special Forces for Road Security announced that traffic has been diverted to alternative routes in both directions due to the damage to the Radis Bridge. They urged the public to follow field team instructions and traffic regulations.

The Jazan Civil Defense Directorate emphasized the importance of adhering to all safety measures and avoiding approaching valleys, highlighting the dangers of lightning and electrical shorts during rainfall.

Rain continues to fall on the Jazan region and its governorates for the second consecutive day, with floods flowing westward through the central governorates and their villages towards the sea.

The residents and drivers are advised to use alternative routes until repairs are completed.

Regional Plan

The regional plan of the site has been produced below:

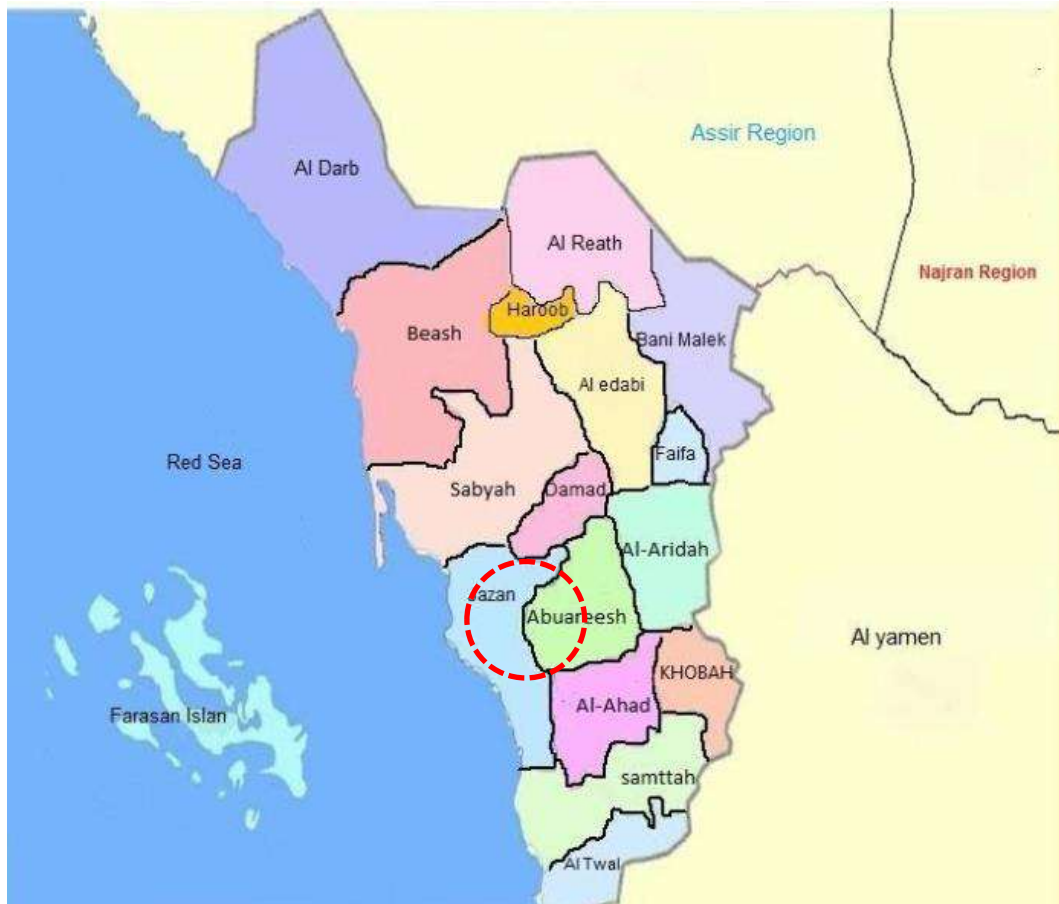


FIGURE 2: REGIONAL PLAN

Images

Following are some of the available images, partially annotated for clarity:



FIGURE 3: AN AERIAL CLOSE-UP OF THE COLLAPSED DECKS SHOWING DAMAGED VEHICLES AND THE DECKS



FIGURE 4: A PERSPECTIVE VIEW OF THE COLLAPSED BRIDGE



FIGURE 5: TURN IN THE STREAM CENTERLINE, COLLAPSED DECKS AND VEHICLE IMPACT



FIGURE 6: AN AERIAL VIEW OF THE COLLAPSE BRIDGE



FIGURE 7: AN ELEVATION VIEW OF THE COLLAPSED DECKS



FIGURE 8: VEHICULAR IMPACT



FIGURE 9: FINAL AND ORIGINAL POSITIONS OF COLLAPSED DECK SYSTEM



FIGURE 10: BADLY DAMAGED DECK OF THE COLLAPSED SPAN

Failure Mechanics



FIGURE 11: FAILURE MECHANICS

The failure of the bridge followed ten hours of heavy rain. The centreline of the stream had a sharp turn at the point it crossed the bridge axis.

High-velocity water, at the turn, led to heavy turbulence in the water causing inundation of the soil, finally resulting in the scouring of the upstream foundation system, located within the stream and serving as the support of one carriageway. The foundation lost support to the ground and collapsed. Two spans of this carriageway, resting on the damaged foundation, lost their support at this common edge and fell off. The soil is believed to be non-cohesive sandy material.

One span retained its shear connection at the far end while the other pier could not do so, possibly, as a result of the vibrations caused by the impact.

This preliminary analysis is based on the available journalistic accounts and pictorial evidence.



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