NORTHEAST LIBYA FLOOD SUSCEPTIBILITY AND EXPOSURE

Flood susceptibility and exposure of population and roads
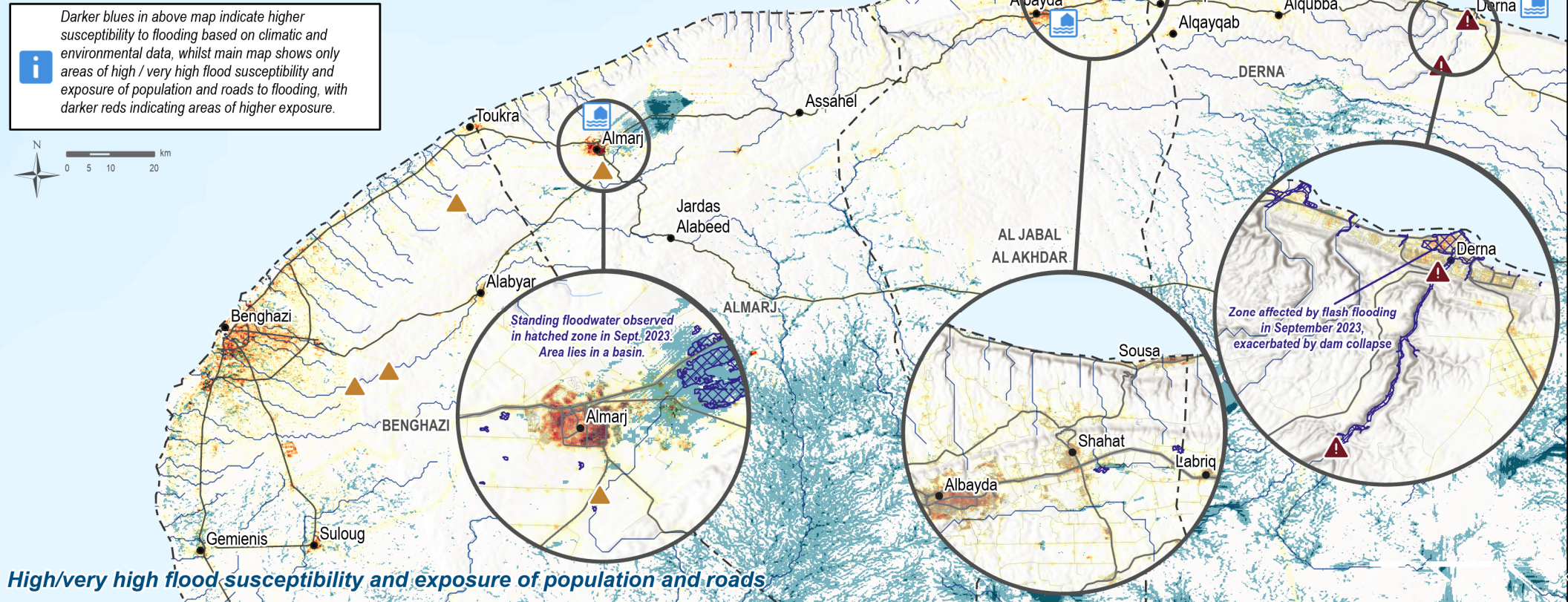
Flood susceptibility

On September 10th, Storm Daniel struck northeastern Libya, causing extensive damage in the coastal region. In Derna, rainfall exceeded 100mm in just 3 days, where the average monthly rainfall in the whole of September is under 1.5mm. The storm also led to the collapse of a dam upstream from Derna, leading to widespread destruction of residential areas. The storm was unprecedented for the region and its intensity is likely to have been exacerbated by climate change. The increased likelihood of similar events as global temperatures continue to rise highlights the importance of improving understanding of flood susceptibility and exposure to reduce disaster impacts.
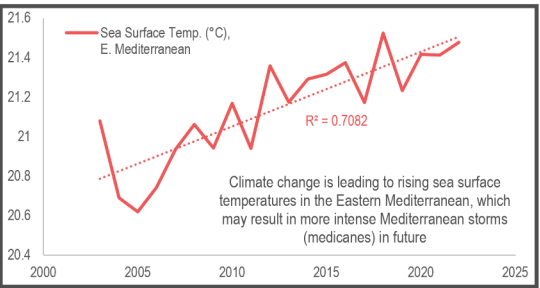
Darker blues in above map indicate higher susceptibility to flooding based on climatic and environmental data, whilst main map shows only areas of high / very high flood susceptibility and exposure of population and roads to flooding, with darker reds indicating areas of higher exposure.

N
0 5 10 20 km

Standing floodwater observed in hatched zone in Sept. 2023. Area lies in a basin.

Zone affected by flash flooding in September 2023, exacerbated by dam collapse

High/very high flood susceptibility and exposure of population and roads

Sea Surface Temp. (°C), E. Mediterranean

R² = 0.7082

Climate change is leading to rising sea surface temperatures in the Eastern Mediterranean, which may result in more intense Mediterranean storms (medicanes) in future

Legend:

- ● Baladiya
- ⬚ Mantika
- —— Primary stream
- —— Trunk roads
- —— Primary roads
- —— Other roads

Flood susceptibility
Susceptibility to flooding
- Moderate
- High
- Very high

- ⬚ Observed flood extent (Sept. 2023)

Flood hazard exposure
Exposure of population and roads
- Moderate
- High
- Very high

Dams
- ⚠ Affected by 2023 floods
- ▲ Other

- 🔷 Areas severely affected by floods (2023)

Flood Hazard Exposure calculated based on overlay analysis as: Flood Susceptibility x (Flood Exposure /100), where:
Flood Susceptibility = Topographic Wetness Index (30%) + Precipitation (15%) + Distance from primary channels (15%) + Distance from other channels (10%) + Land Cover (10%) + Soil Drainage (10%) + Elevation (5%) + Slope Angle (5%); and
Flood Exposure = Population Density (85%) + Distance to major roads (10%) + Distance to other roads (5%).

Data sources: SRTM 90m DEM (Slope and Topographic Wetness Index derived in GIS); WWF HydroSheds streams; Africa Soil Grids Soil Drainage; ESA land cover; CHIRPS rainfall; Meta population density; OSM roads (2023); MODIS AQUA SST (2003-2022); observed flood extent (Copernicus).
Coordinate System:GCS WGS 1984 File: Libya_Flood_Risk Contact: reach.mapping@impact-initiatives.org

Note: Data, designations and boundaries contained on this map are not warranted to be error-free and do not imply acceptance by REACH partners, associates or donors mentioned on this map.

LIBYA

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