Gaza Strip - Preliminary Debris Quantification

Published: 12 December 2023
Damage Assessment Analysis: 26 November 2023

UN environment programme

This initial quantification of conflict generated debris in Gaza is derived from UNOSAT Comprehensive Damage Assessment from Nov. 26th 2023, in conjunction with building footprint data provided by Microsoft BING. Damaged building footprints were enriched through zonal statistics with an above surface height model, derived from the difference between a Digital Terrain Model (SRTM) and a Digital Surface Model (ALOS World 3D) as provided by the European Commission in the GHS-Built H product.

For modelling purposes, minimum building height and average story height were considered to be 3m. Each built sq. meter is considered to have generated 1 tonne of debris.

For visualization and modelling purposes, results were aggregated into an H3 hexagonal grid where each cell is 250m wide.

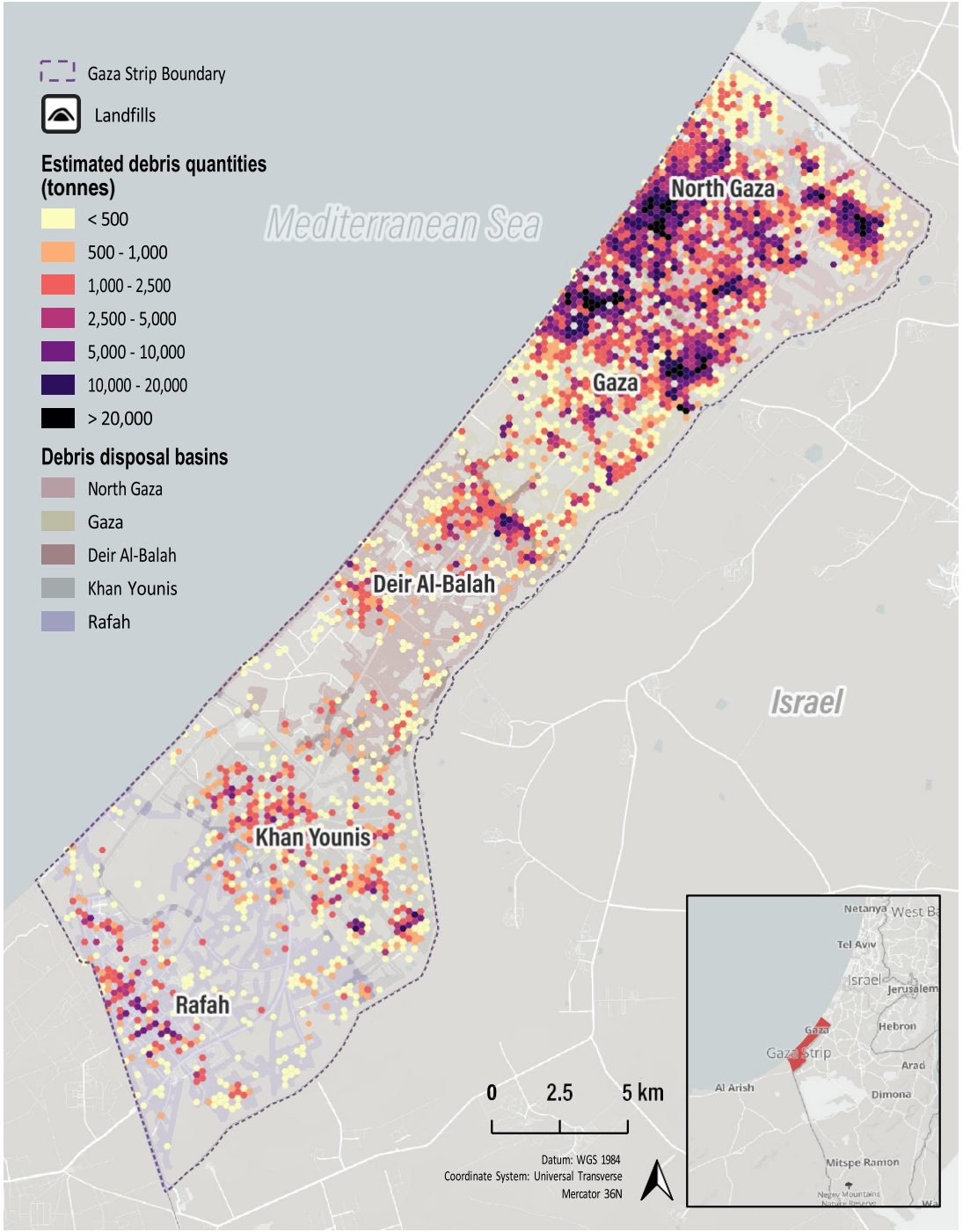
Total debris quantity (tonnes) **7,220,000**

According to UNOSAT damage assessment, a total of 37,379 structures were destroyed or damaged in the Gaza Strip as of 26 November 2023. This corresponds to approximately 18 per cent of the total structures in the Gaza strip.

For the debris optioneering the following scenarios were developed and applied:

A. Disposal of all debris at a debris disposal site located centrally in each of the following zones: North Gaza, Gaza, Deir Al-Balah, Khan Younis and Rafah; and,

B. 50% disposal of the debris to locations as above scenario A, and 50% recycling of the debris at the following sites: 1 centralised debris recycling in North Gaza, 1 centralised debris recycling in Gaza, 1 centralised debris recycling in Khan Younis that serves Deir Al-Balah, Khan Younis and Rafah.



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

SCENARIO 1 - ALL TO DISPOSAL
Debris Management Outputs

Time to clear (months)	33
Time to recycle (months)	0
Total time to clear and recyle (months)	33
Total cost to clear (US$)	94,300,000
Revenue from recycling (US$)	0
Cost less revenue (US$)	**94,300,000**
Total distance covered (km)	3,760,000
CO2e from trucking (tCO2)	6,180
Cost of haulage (US$)	94,300,000
Material recovered for reconstruction (tonnes)	0
Material recovered for reconstruction (%)	0
Cost of processing of debris (US$)	0
Value of recovered material in market (US$)	0
Total cost of natural raw materials substituted (US$)	0
Material disposed (tonnes)	7,220,000
Material disposed (%)	100
Total space required for disposal (ha)	90
Value of land taken by debris disposal (US$/5 years)	450,000

SCENARIO 2 - 50% RECYCLING
Debris Management Outputs

Time to clear (months)	35
Time to recycle (months)	150
Total time to clear and recyle (months)	150
Total cost to clear (US$)	115,700,000
Revenue from recycling (US$)	37,900,000
Cost less revenue (US$)	**77,900,000**
Total distance covered (km)	3,940,000
CO2e from trucking (tCO2)	6,450
Cost of haulage (US$)	86,000,000
Material recovered for reconstruction (tonnes)	2,500,000
Material recovered for reconstruction (%)	50
Cost of processing of debris (US$)	25,200,000
Value of recovered material in market (US$)	37,900,000
Total cost of natural raw materials substituted (US$)	85,900,000
Material disposed (tonnes)	4,690,000
Material disposed (%)	50
Total space required for disposal (ha)	45
Value of land taken by debris disposal (US$/5 years)	225,000