

Sand & Gravel Mining in Bangladesh

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BACKGROUND

Sand and gravel are cornerstones of a growing economy, and key in moves towards many of the UN Sustainable Development Goals. In Bangladesh:

- Sand is used for land reclamation / floodplain infill to enable new industrial and residential buildings, and combat flooding and climate change (Bangladesh is only an average of 9 meters above sea level, with significant regions at/below sea-level)
- Sand and gravel are essential for the production of concrete
- Gravel is used in the construction of roads and other large infrastructure projects, such as bridges and embankments (Bangladesh has over 700 navigable rivers)

AIM

From field observations in January 2023, the sheer quantity of raw material being extracted and transported in Bangladesh is stunning. My project aims to examine the total quantity of sand and gravel consumption in Bangladesh



Aerial drone image of sand mining in Bangladesh

METHODS

This study used a combination of field observations, academic/grey literature, and remote sensing to estimate the use of sand and gravel in Bangladesh

Gravel:

- Acquire the value of gravel imported in 2020 (USD) from OEC data. Since many major stone quarries/extraction sites have been shut down in Bangladesh, the vast majority of crushed stone is imported
- To obtain tonnage, divide value by the average price of crushed stone per ton in 2020 (market data from Index Box)



Sand being offloaded at sunset, NE Bangladesh

Sand:

- Multiply per capita consumption of concrete by the total population to estimate the gross amount of concrete in kg; assume 30% of concrete is sand to obtain sand volume
- Use remote sensing data to calculate area of land reclamation in East Dhaka, a region of major sand use, over 19 years
- Multiply area by 3.05m (average thickness of land infill measured in field)
- Use sand density to obtain mass in kg

RESULTS

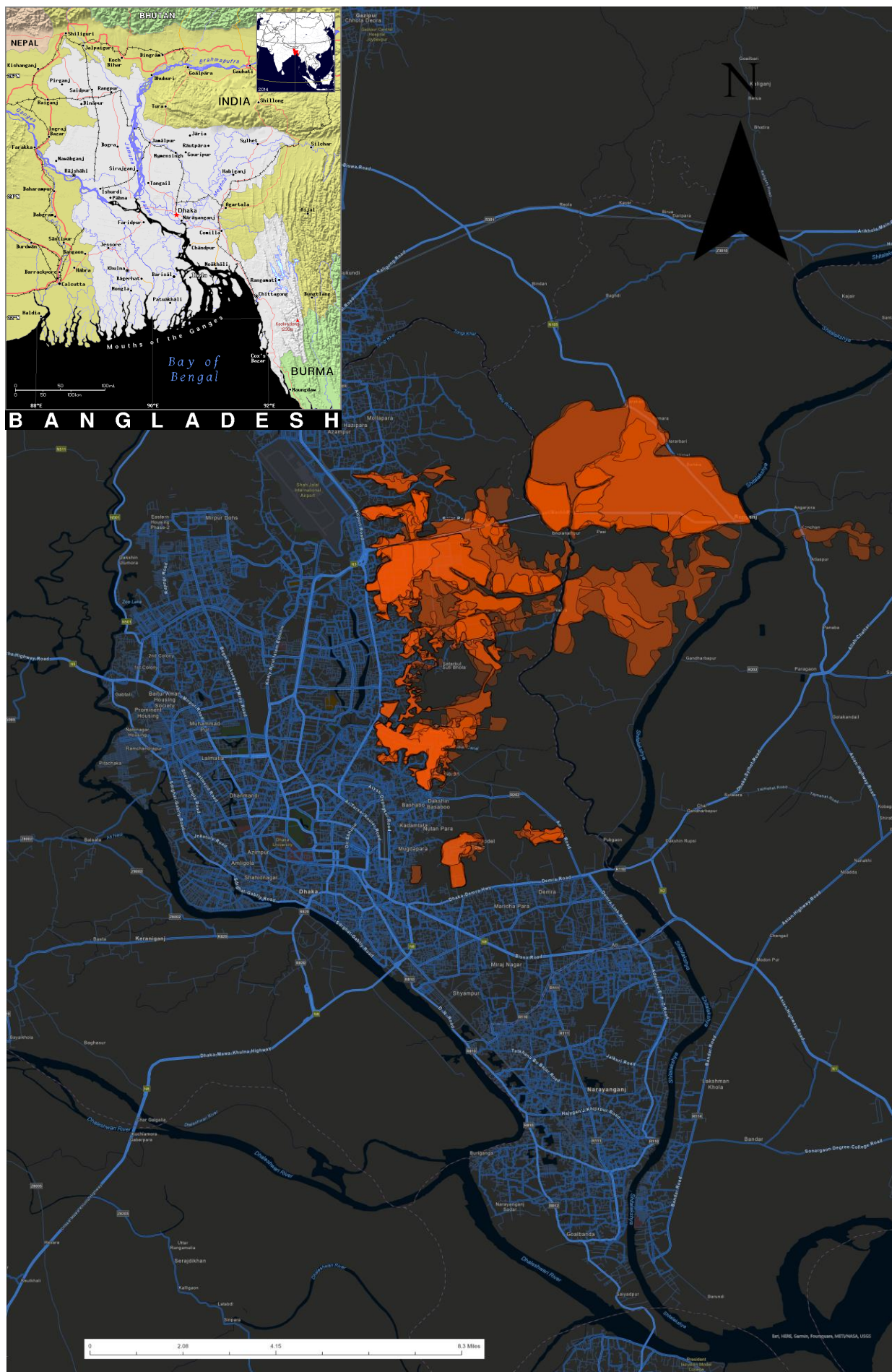
Sand Tonnage in 2020:

8,028,979 tonnes (from land reclamation) + 10,200,000 tonnes (from concrete) = 18,228,979 metric tonnes

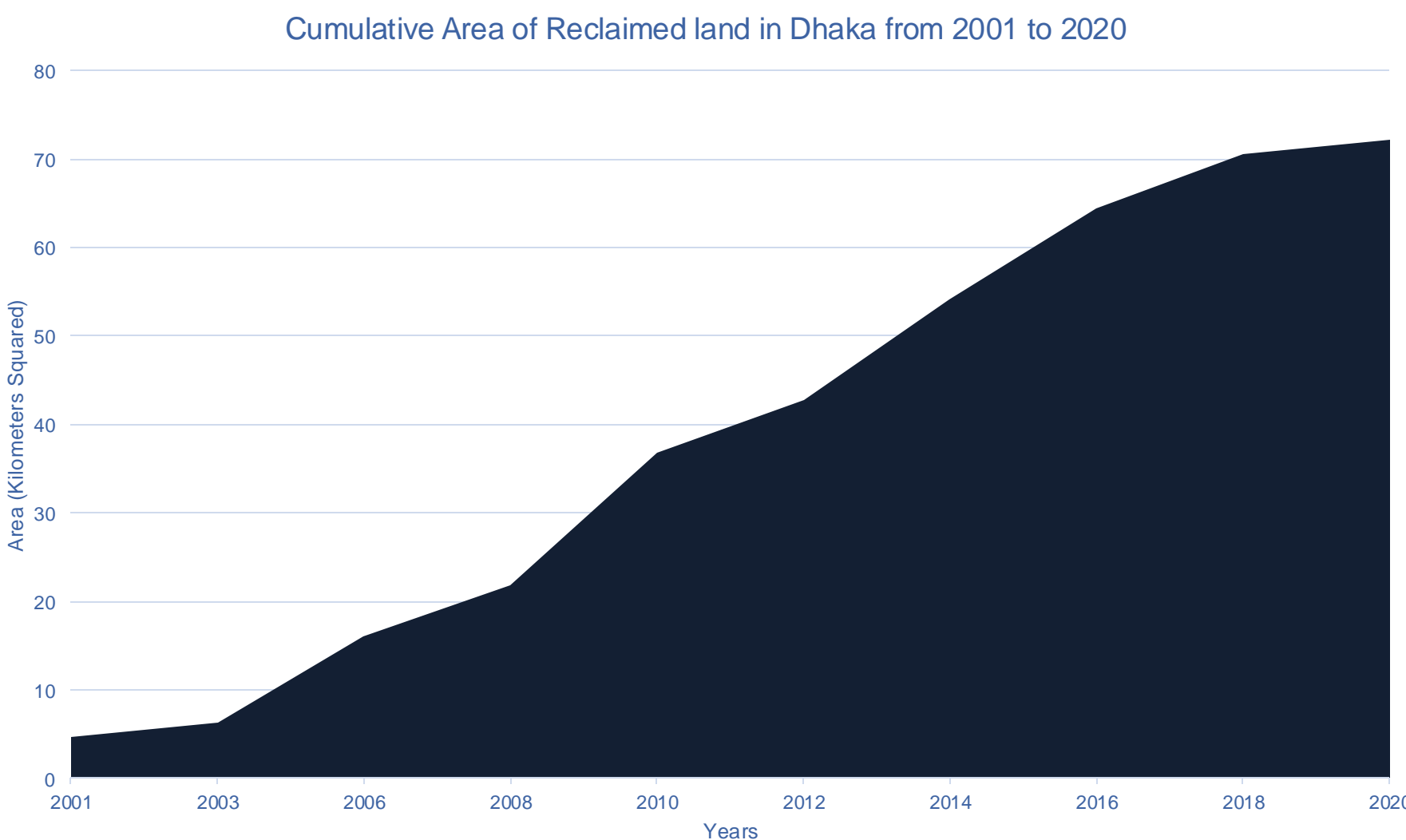
(Note this figure is a minimum value for Bangladesh)

Gravel Tonnage in 2020:

15,209,125 metric tonnes
(13,600,000 metric tonnes are used to produce concrete)



Areas (orange) in Dhaka filled in by sand from 2001-2020



Amer Islam (left) and PhD student Saadi Chyon (right) standing in a standpit in landfill sediments in Dhaka

CONCLUSIONS

- In 2020, 8,028,979 metric tonnes of sand were used in land reclamation
- In 2020, 10,200,000 metric tonnes of sand were used in concrete production
- The total use of gravel in 2020 was 15,209,125 metric tons with 13,600,000 tonnes utilized to make concrete
- Over the past 19 years c. 349,636,950 metric tonnes of sand has been used as landfill in east Dhaka

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