

Sea level rise in Bangladesh

An analysis of population and land at risk of a 2 meter rise

1. Introduction

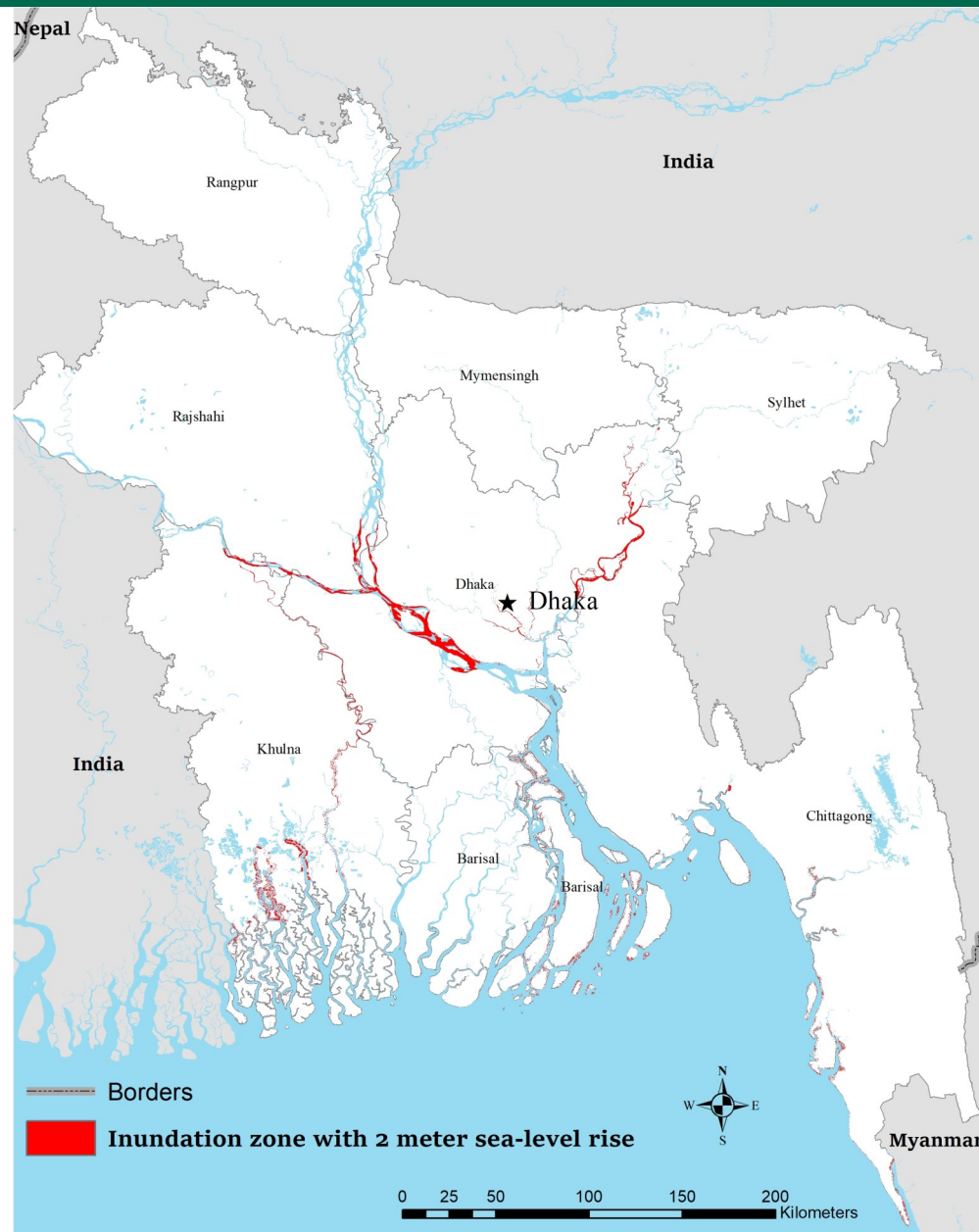
Climate change has become one of, if not the, most important challenge facing humanity. Impacts of rising temperatures can already be felt today but will inevitably affect many more factors such as increases in extreme weather events, species extinction, lower agricultural yields, spread of diseases and sea level rises. While the rise of sea levels is one of the most certain outcomes of increased global temperatures, the amount of sea-level rise is less certain. Under current business as usual scenarios, scientists' estimates range between increases of between 0.5—2 meters by the end of the century. This project analyzes the impact of a 2 meter sea live rise on the population of Bangladesh. The research question asks how many people would be affected by such a scenario and what type of land would be flooded,. We find that at least 800,000 people currently live in the areas which would be affected, most of which are currently wetlands and agricultural land.



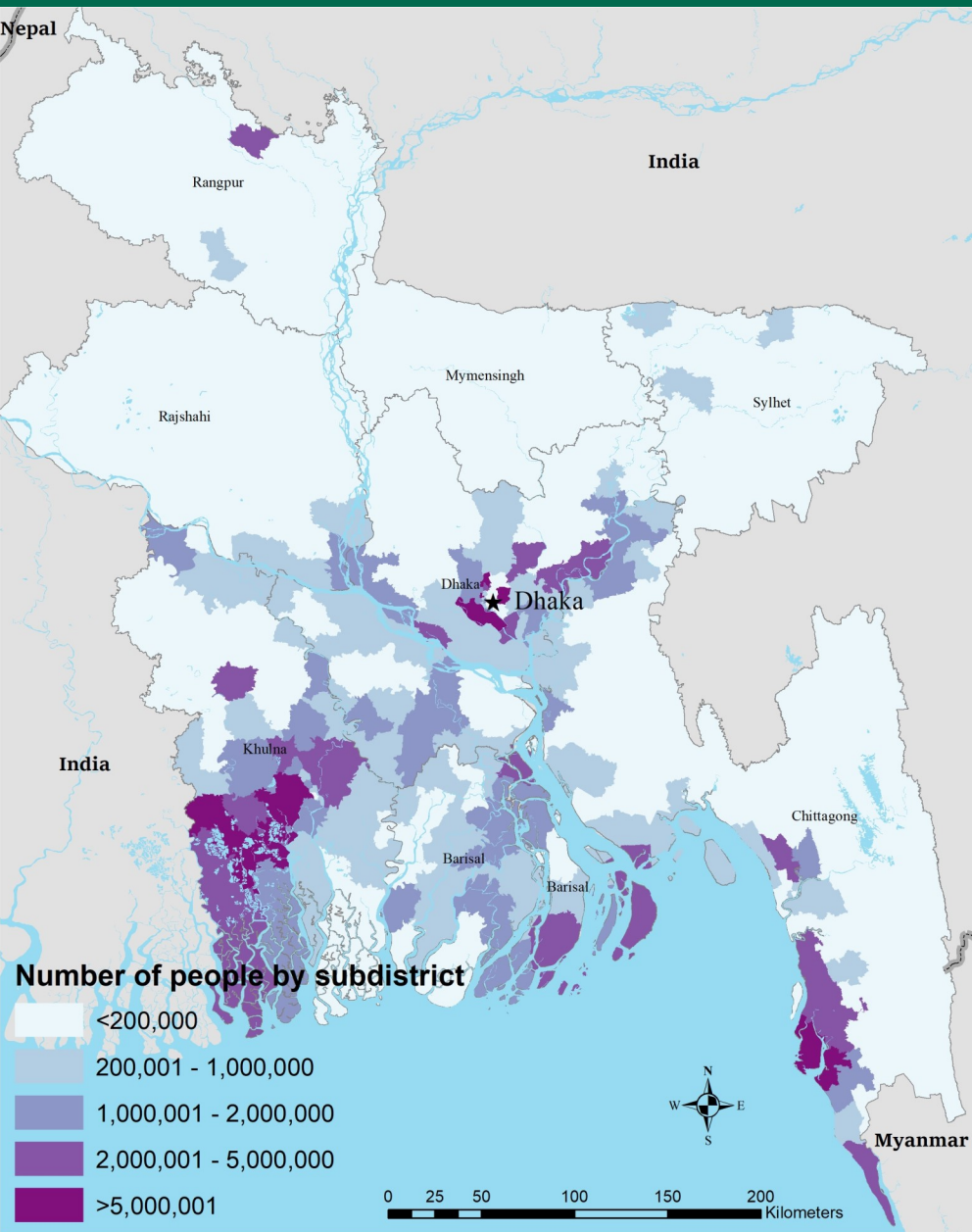
2. Methodology

In order to answer this question, the first step required the creation of an inundation zone. Using data produced by the National Aeronautics and Space Administration (NASA), all areas which had an elevation of lower than two meters were identified and those extracted which were within a created buffer. The buffer marked the area which was within one kilometer of water bodies connected to the ocean. Using estimated population data for 2020 by the Center for International Earth Science Information Network (CIESIN) it was then analyzed how many people are currently estimated to live within this area, which is expected to be flooded in scenarios predicting a 2 meter sea level rise. Additionally, it was calculated what type of land cover currently exists within the inundation area, in order to estimate how many square kilometers of each given class of land would be inundated.

Inundation Zone with 2m rise



Estimated population in 2020



3. Population at Risk

An estimated 161.4 million people currently live in Bangladesh, the world's most populous delta. The Meghna river is one of its longest river, leading up from the Indian Ocean to Dhaka. The delta's different rivers is what makes sea level rise so dangerous for

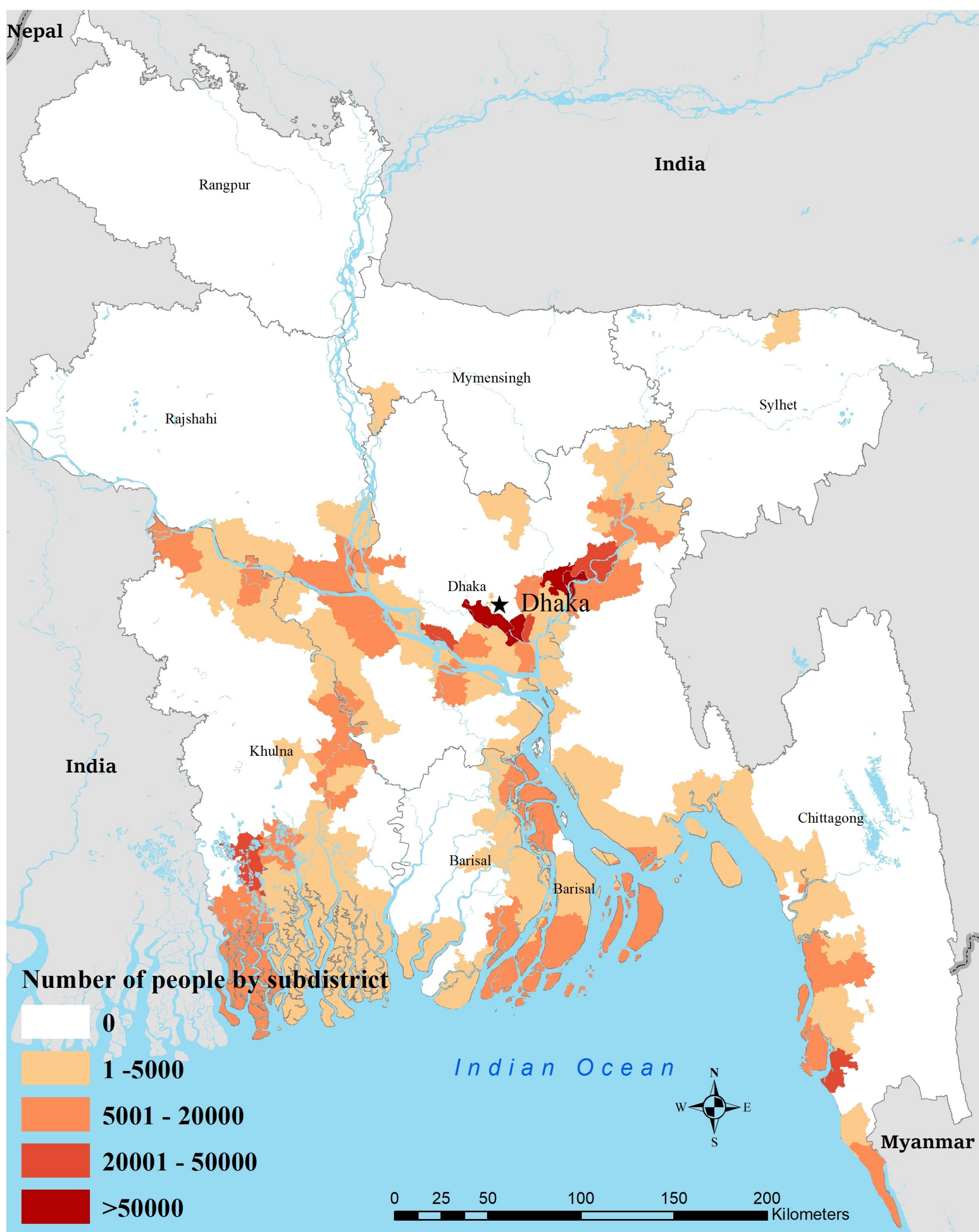


Table 1.

Divison	Population estimated to be affected
Dhaka	402,974
Chittagong	163,512
Khulna	129,334
Barisal	77,642
Rajshahi	31,499
Mymensingh	610
Rangpur	0
Sylhet	0
Total	805,571

the already flooding prone Bangladesh. Not surprisingly, the most populous division of Bangladesh which also neighbors the Meghna river, Dhaka, is estimated to be the most affected by a two meter sea level rise. Dhaka makes up around half of the total amount of people estimated to be displaced, with the furthest southern division of Chittagong having another more than 160,000 people at risk from sea level rise.

Potential population affected by 2 meter sea level rise



4. Land Cover

In order to simplify the analysis the land cover dataset was reduced from seventeen classes into six, which made up 91% of the land. The most common type of land cover in Bangladesh is agriculture, however most affected by the possible sea level rise in this analysis is

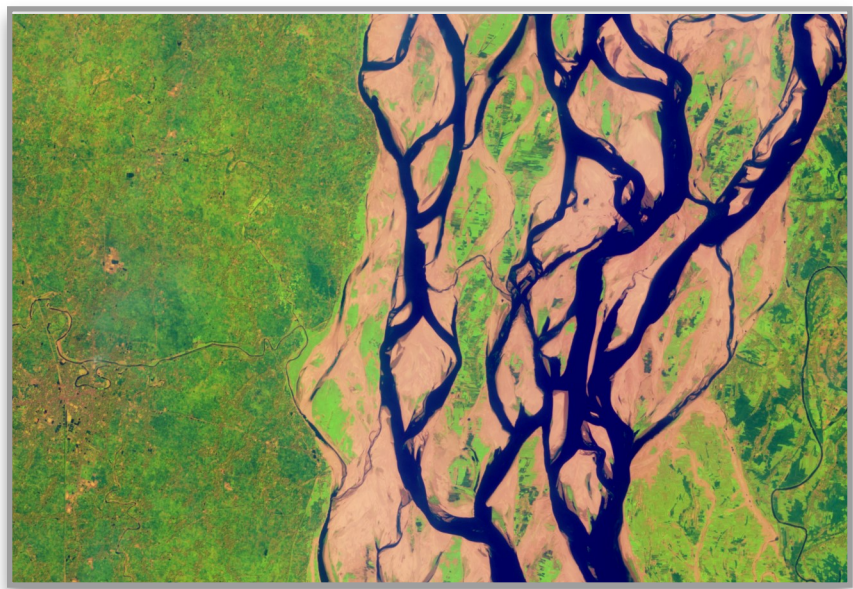


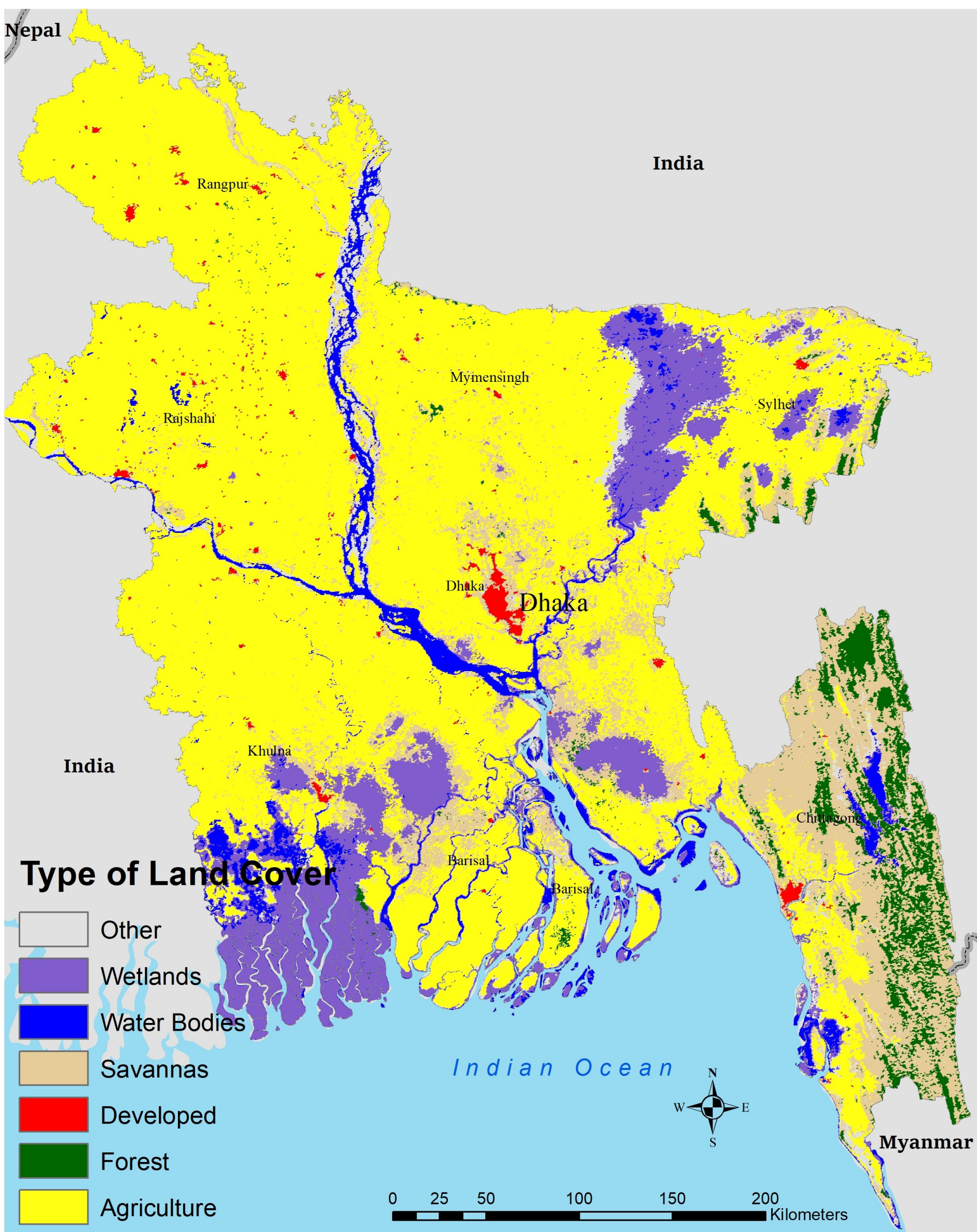
Table 2.

Land Cover	Square Kilometers	Percentage of Inundation
Water Bodies	613.34	57.3
Wetlands	238.57	22.3
Agriculture	82.64	7.7
Other	65.02	6.1
Savanna	63.68	6.0
Urban	8.78	0.8
Forest	0.01	0.0
Total	1072.04	~100

lands, which mostly stems from the delta region in the South-Western part of Bangladesh. However, Table 2 also indicates the limitations of this analysis. As the land cover dataset is at a larger scale than our inundation area, many parts of the inundation zone are identified as being water bodies. Lastly, urban areas which contain most of the people affected

by sea level rise, only make up about 0.8 per cent of the inundation area.

Land Cover of Bangladesh



5. Conclusion

The analysis has presented that around 800,000 people currently live in areas which are at risk of being flooded due to climate change. The urban area, in which most of these people live, represents only a small percentage of the area to be inundated.

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Data Sources: NASA; CIESIN and Columbia University; Bangladesh Bureau of Statistics
Photos: Frank Sedlar, NRDC; Sentinel Hub;
Projection: WGS 1984 UTM Zone 45N.
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