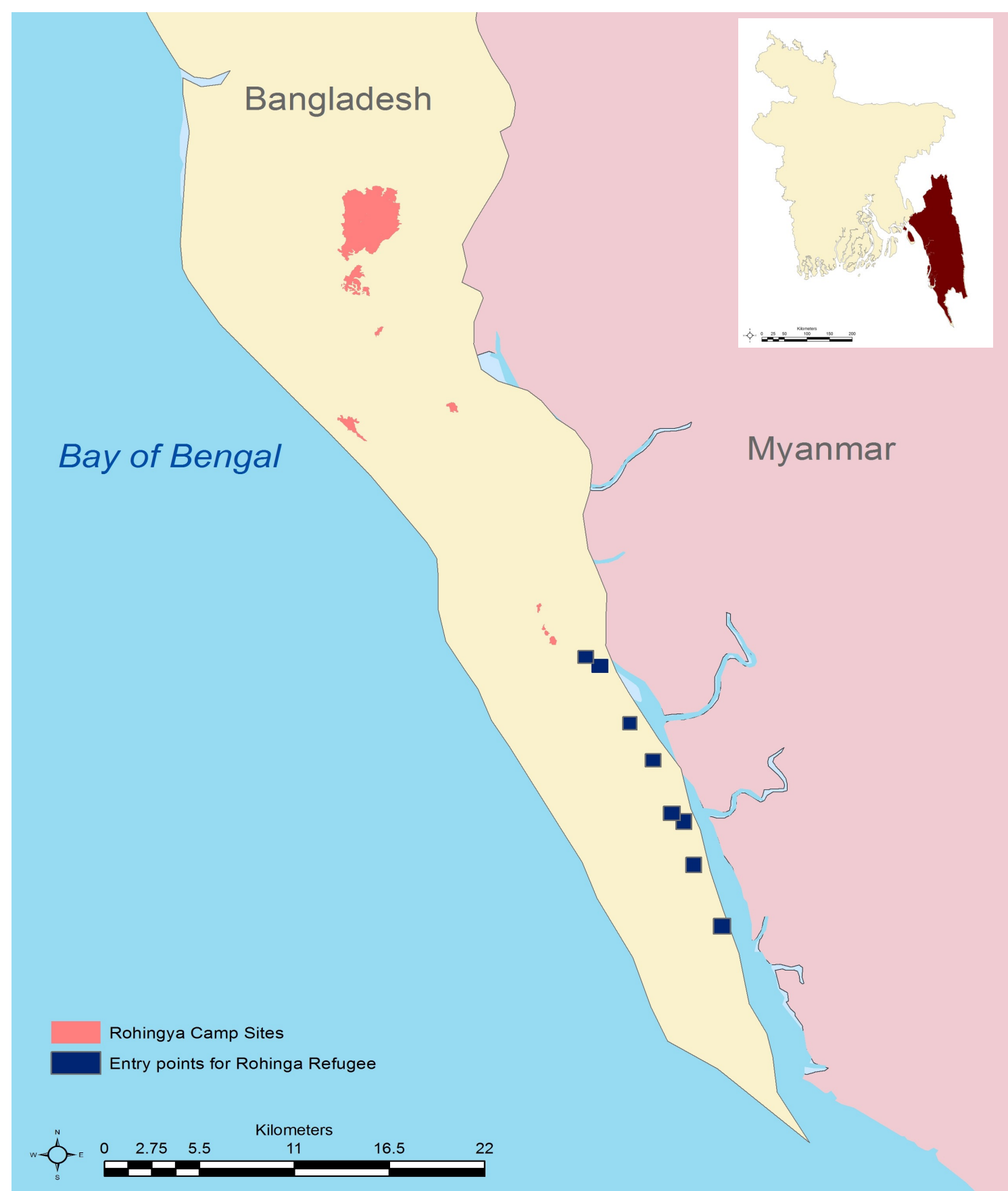


Is Bangladesh Ready?

A Sub-District Resilience Analysis for Rohingya Refugees

Background

As of December 13, 2017, 647,000 Rohingya Muslims have crossed the Myanmar border to enter Bangladesh. This number has increased rapidly since August 2017. Rohingya Muslims are victims of ethnic cleansing in Myanmar. This has created a humanitarian emergency in South-Eastern Bangladesh, where the Rohingya Muslims are arriving. This situation has put extra stress on Bangladeshi resources that has distressed the economic and social health of the country.



Rohingya refugees are arriving in Bangladesh through boats at the coast of Cox's Bazar district. Currently, there are two large refugee settlement camps in Bangladesh—Kutapulung Camp and Nayapara Camp. Both of these camps are located in Cox's Bazar District. However, both of these camps have exhausted their maximum capacity. As a result, the refugees are scattered all over South-East Bangladesh in makeshift camps. This is a major stressor for host communities in an already resource-strapped Bangladesh. This project aims at mapping the resilience of sub-districts of South-East Bangladesh to identify if some humanitarian service may be installed or delivered in a particular district to increase resilience.

Methodology

This project has two aims: 1) To discover if publicly available data and GIS techniques are useful for doing an analysis of this sort. 2) A simulation of resilience of

sub-districts to determine the districts where more humanitarian services may be delivered. It also aims to identify the nature of services that may be added. This project is trying to measure resilience with respect to only man-made factors and infrastructure. This project does not take into account into natural factors such as elevation, floods, earthquake etc.

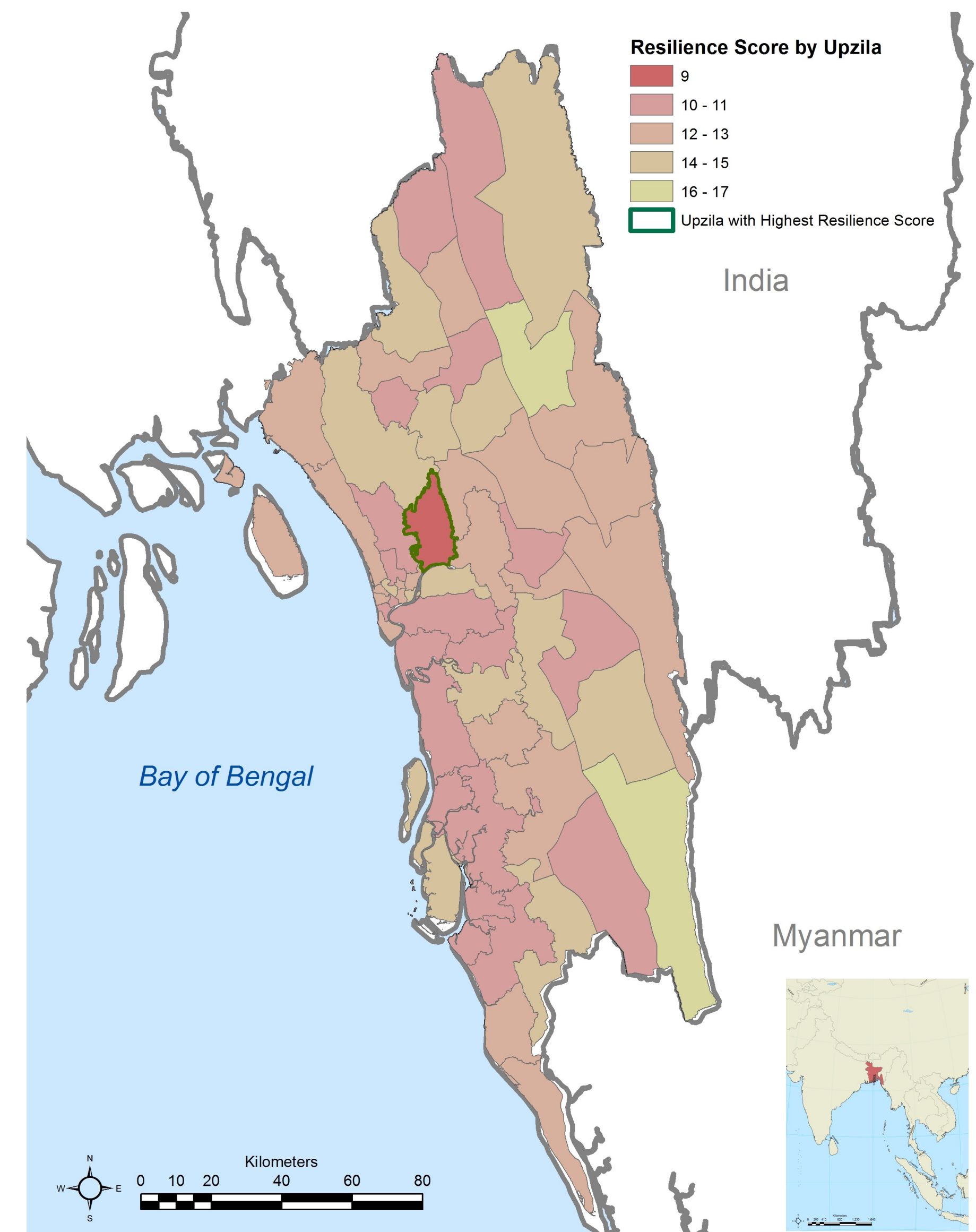
To answer these questions, data is mapped out on the sub-district level(called an upzila). To create resilience scores, 4 factors have been included as follows: density of medical facility (health), density of schools (education), density of terror attacks (safety) and percentage of households with water (water access). The common thread between these factors is that the outcomes can be improved by policy makers by adding or building the required infrastructure such as a clinic, school, police station or a water reservoir tank.

Each sub-district was assigned a score on each of these criteria on a scale of 1(Best) to 5(Worst). The scores were then aggregated to determine the sub-district which is the most resilient and prepared to host refugees.

Assessment

The district scores fell in the range of 9(Best) and 17(Worst). Based on the analysis, the following table presents the score of the sub-districts which were placed in the top slab of resilience scores, where the least facilities may be added to make the sub-district more resilient. This table also provides the scores of these sub-districts on individual criteria. Raozan district has the best resilience score, with a highest score of 1 in the access to water criteria and the lowest score of 3 in both the Education and Safety criteria. To improve ratings, the policy makers may build additional schools and police stations in Raozan.

Sub-District	Health	Education	Safety	Water	Total
Raozan	2	3	3	1	9
Alikadam	2	3	1	4	10
Rowangchhari	1	1	3	5	10
Banshkhali	5	3	1	1	10
Pekua	5	3	1	1	10
Dighinala	2	1	3	4	10
Manakchhari	2	2	2	4	10
Panchhari	2	2	2	4	10



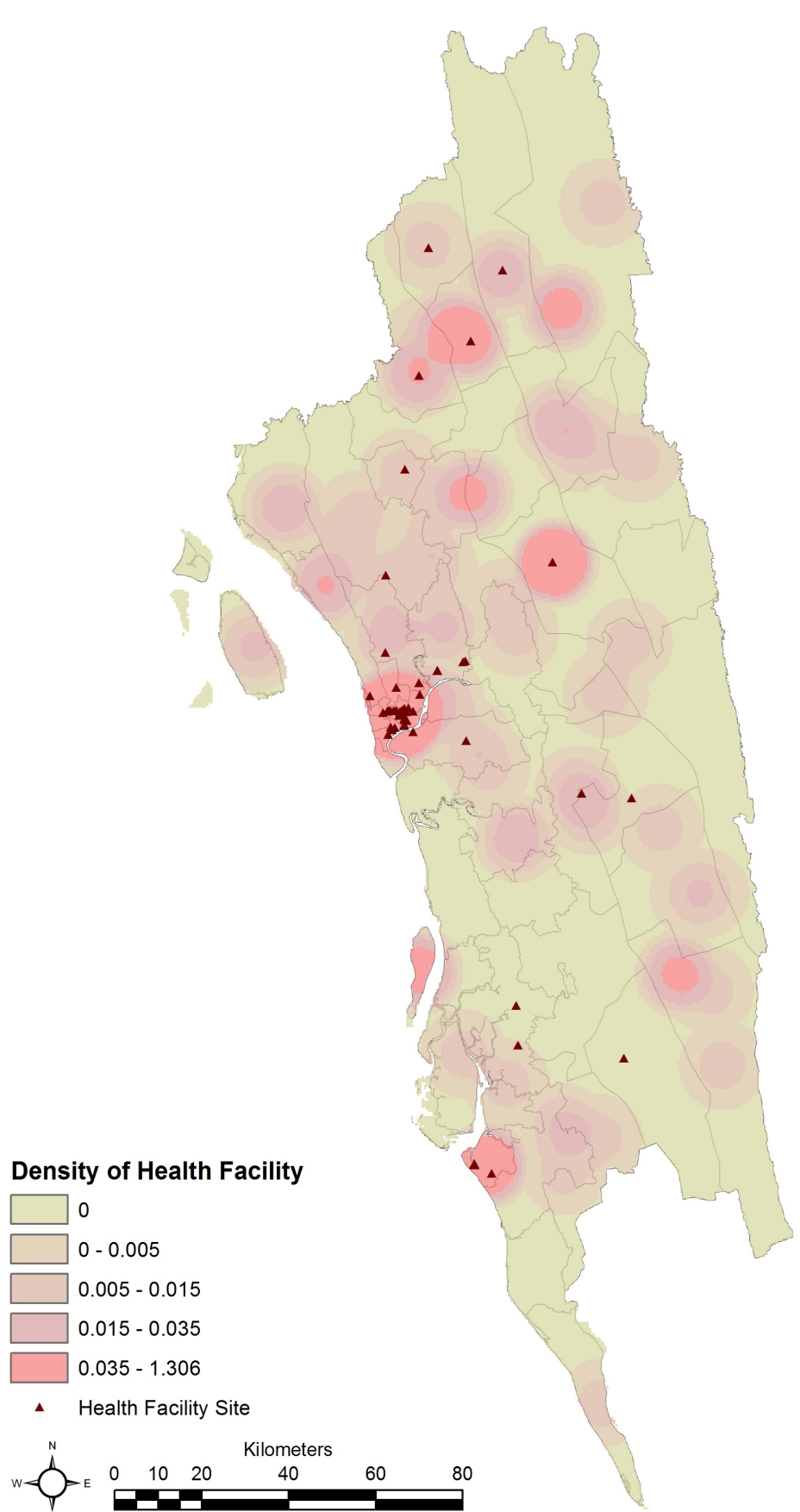
Discussion of the Model

The model suffers from some limitations. Since the nature of this situation is humanitarian and refugees are always on the move, there is a lack of data on the number of refugees in each of the sub-districts. This curbs one from making very definitive decisions and calls for more research and data collection in this area. The analysis would be enhanced if there would be information on the capacity of the schools and hospitals. Some of the data used in this analysis is dated to 2011. Since it is a humanitarian situation, having data which is updated on a regular basis will be useful. This data and GIS techniques may not be useful for giving specific recommendations, but it allows one to compare one district from the other which can be useful for discussion while choosing sub-districts for the delivery of the next round of humanitarian aid.

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Fundamentals of GIS, Fall 2017
Projection: Bangladesh TM, WGS1984

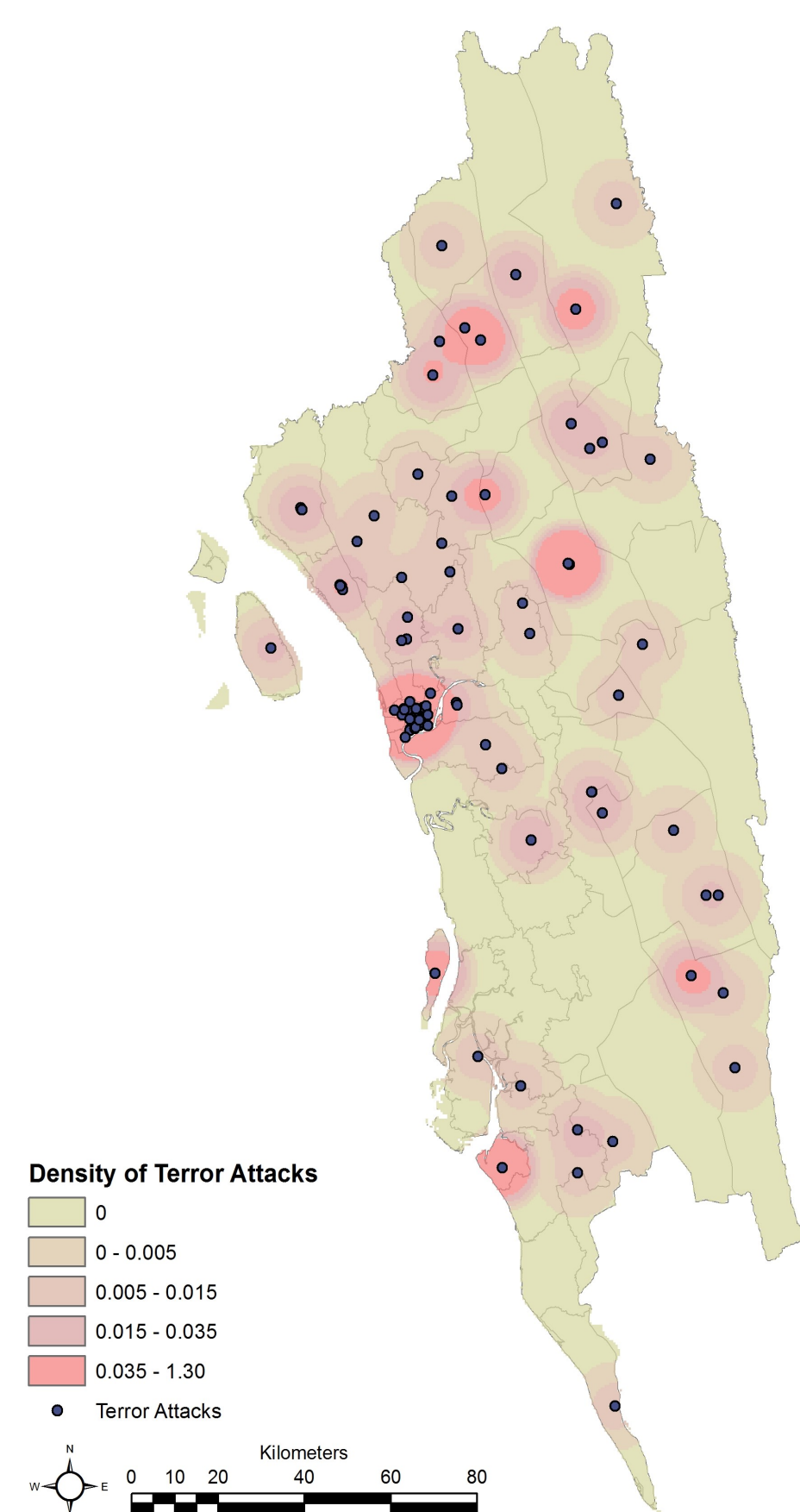
Density of Health Facility

Source: Doctors without Borders(2017)
GIS technique used: Kernel Density and Spatial Join
According to UNHCR, in a humanitarian emergency, there must be 1 Health Center for every 20,000 people. This has been incorporated in the ranking process.



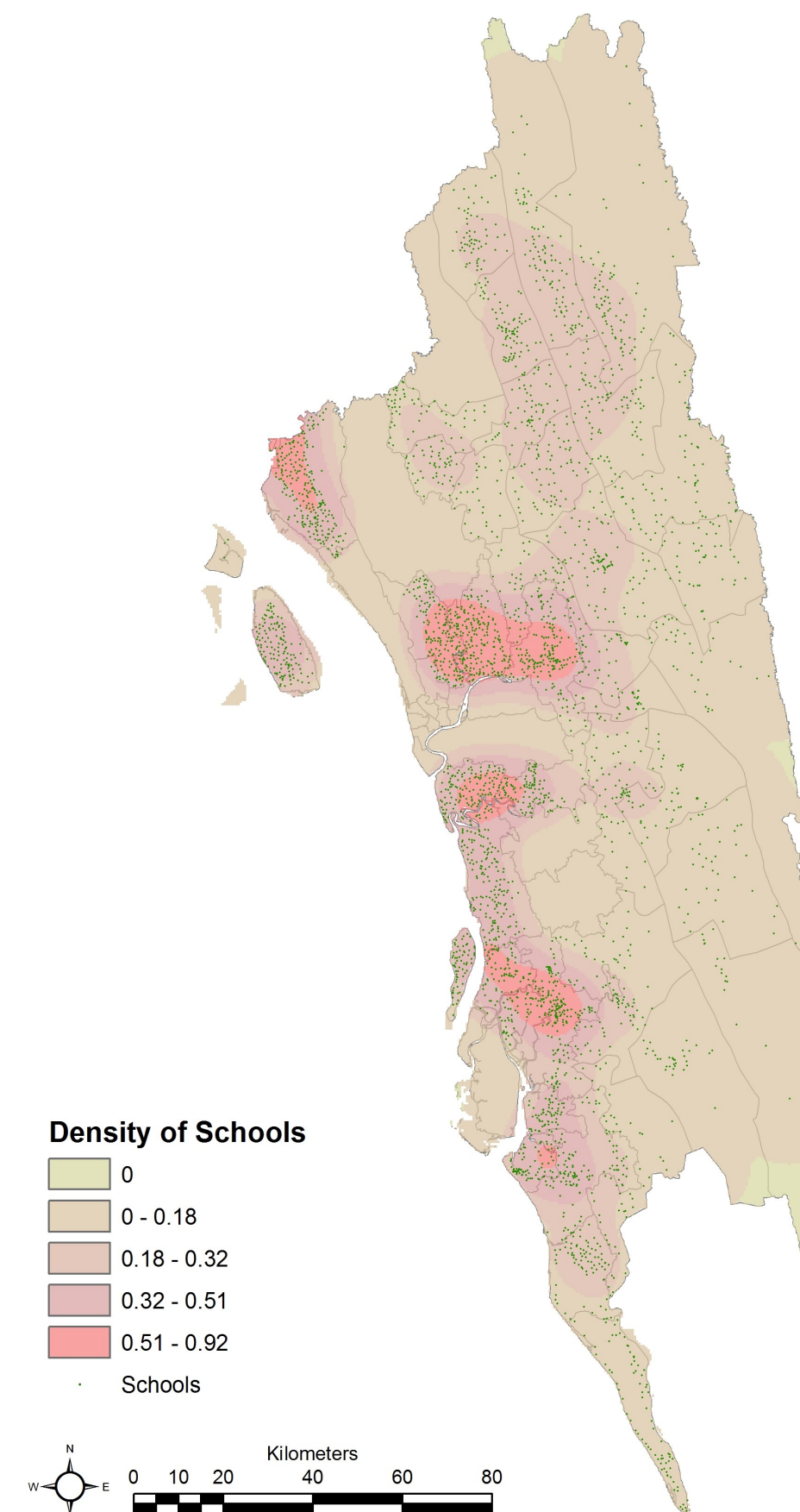
Density of Terror Attacks

Source: University of Maryland, Global Terrorism Database(2005-2015)
GIS Technique used: Spatial Join and Kernel Density . Originally collected to maintain a systematic repository of data on terrorist attacks.



Density of Schools

Source: UN OCHA (2017)
GIS Technique: Spatial Join and Kernel Density
According to UNHCR, in a humanitarian emergency, there must be 1 Health Center for every 5,000 people. This has incorporated in the ranking process.



Access to Water

Source: Bangladesh Bureau of Statistics(2011)
GIS Technique: Reclassify and Table Joins . Dataset originally collected as part of Bangladesh Census in 2011.

