

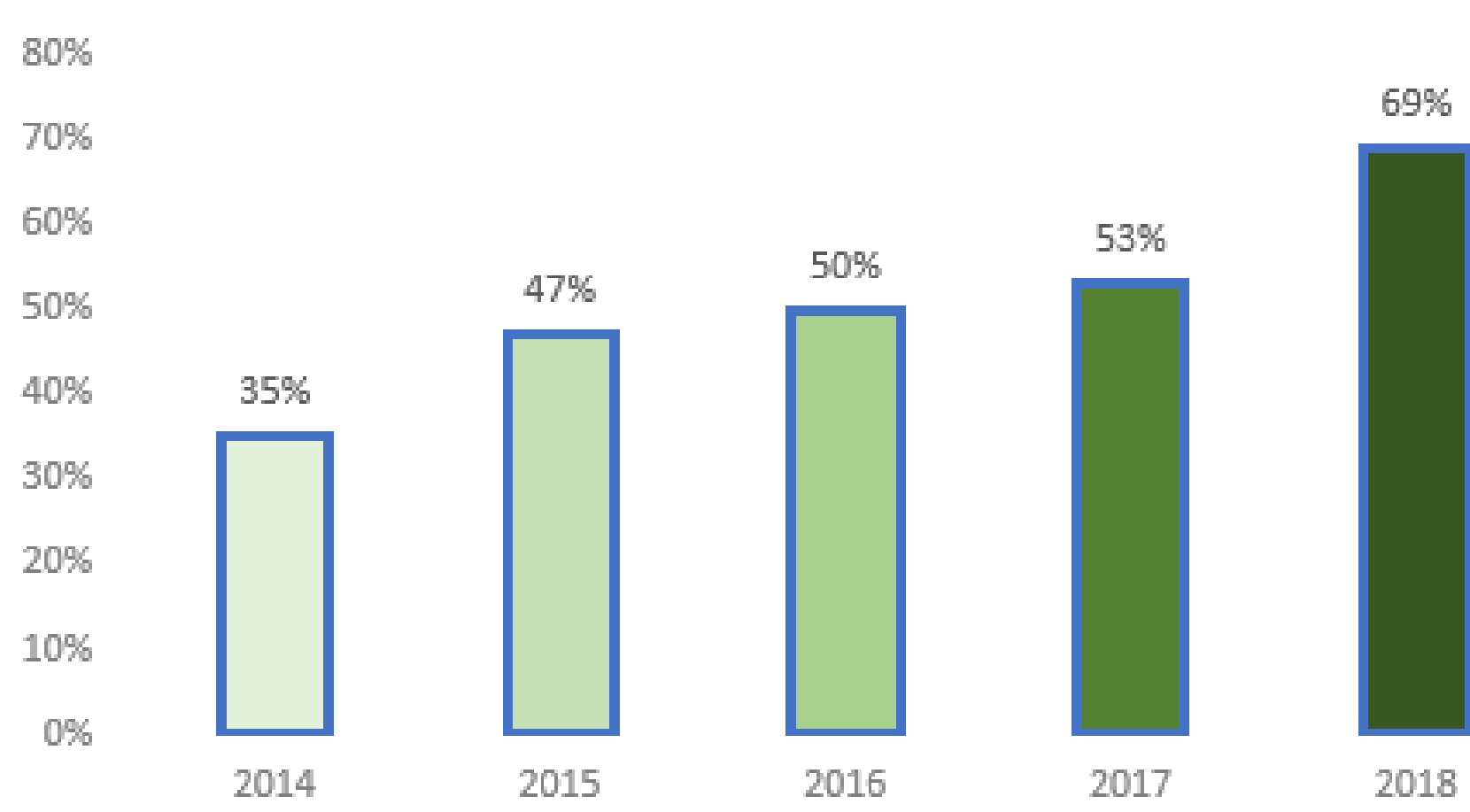
DIGITAL PAKISTAN

The need for new 4G cell towers to increase internet coverage



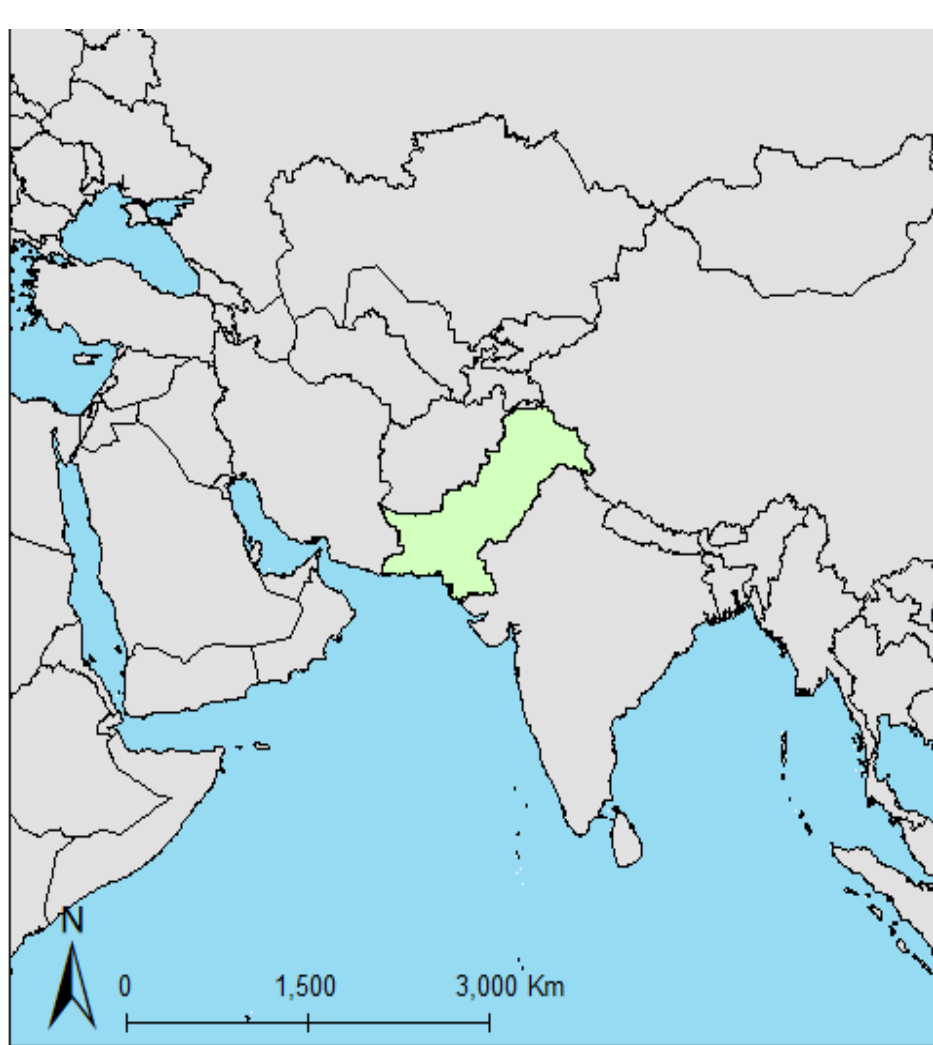
Background

4G Coverage



Lack of internet connectivity is a major barrier to economic development in Pakistan. In 2014, only 35% of the population was covered by 4G network. However, owing to recent rapid growth in smartphone penetration and income levels presents an economic opportunity to the telecommunication firms to identify the areas not covered by 4G network and invest in installing new 4G cell towers.

Study Objective



The objective of the study is to aid telecommunication firms and policy makers in identifying optimal locations and districts to install new 4G cell towers. The study conducts suitability analysis by combining existing cell towers coverage from the year 2018, population density, road network and slope.

Limitations of Study

Due to lack of availability of data at the district level, important determinants of 4G coverage such as gross domestic product, income levels, e-commerce users and mobile-money transactions could not be included in the study.

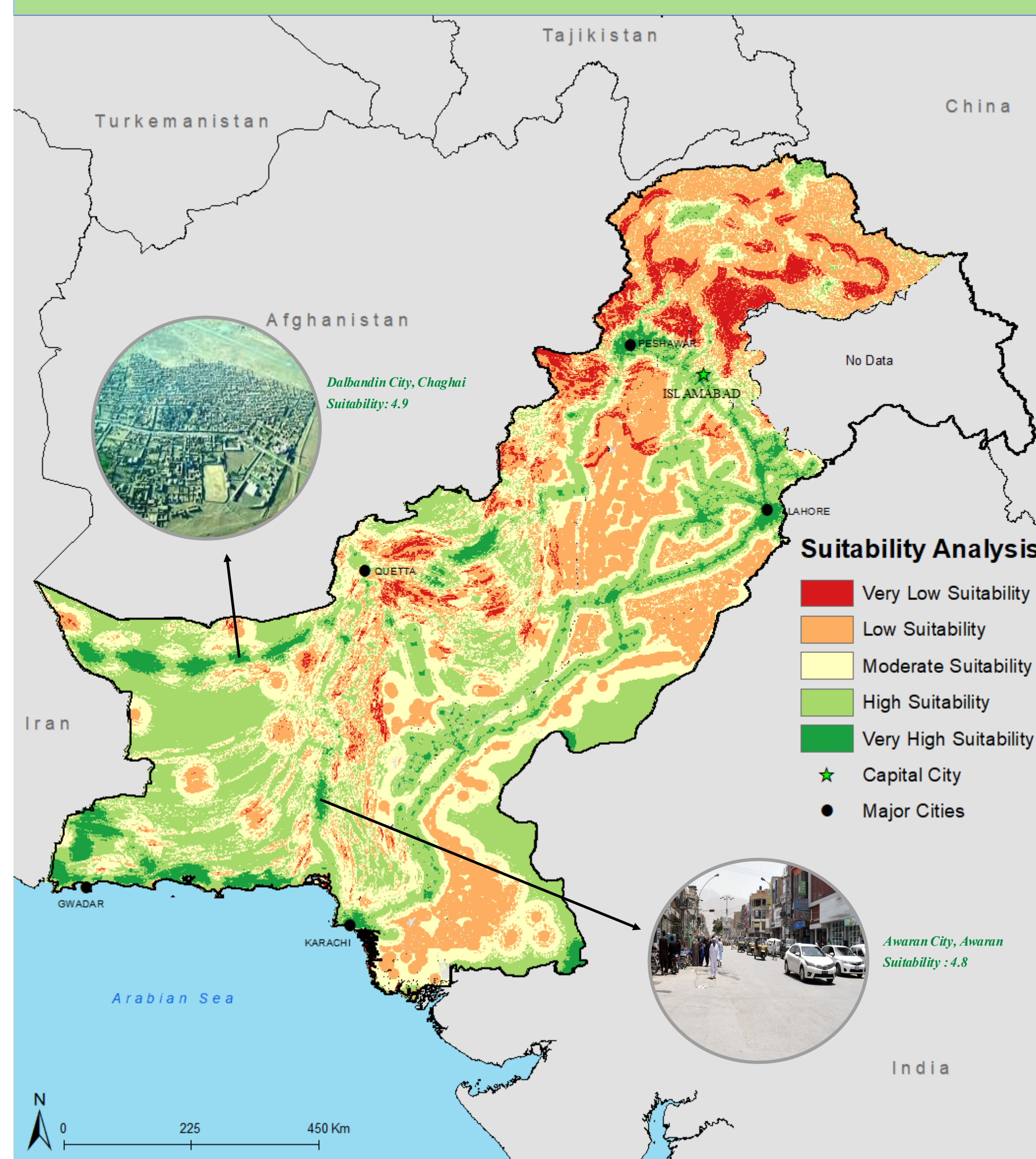
Moreover, due to lack of availability of latest road network, the effect of highways built under CPEC (China-Pakistan Economic Corridor) could not be taken into account.

Spatial Questions

The study aims to address the following spatial questions:-

- 1) What are the most suitable areas to install new 4G cell towers in Pakistan?
- 2) What are the top ten districts in Pakistan with the highest suitability for the installation of new 4G cell towers?
- 3) What is the proportion of off-net population in such districts?

Suitability Analysis



Methodology

Euclidean distance was used to convert existing cell towers and road network data to raster. After reclassification (1-5), raster calculator was utilized to conduct suitability analysis.

The ideal site for the new 4G cell tower should meet the following criteria:-

- 1) Must be located at least **10 kms** away from the existing cell towers.
- 2) Must be located at least **10 kms** near the high population density areas.
- 3) Must be located at least **10 kms** near major roads.
- 4) Must be located away from the **high slope**.
- 5) Must target the areas currently **unserved** by the telecommunication firms.

Weightages

Suitability factors were given weightages based on existing literature and research. Existing coverage, population density, slope and road network were given a weightage of 50%, 25%, 12.5% and 12.5% respectively. Along with Euclidean distance, factors were reclassified into 5 classes and converged into

Results

| Sr | District | Off-Net Population | Suitability Score |
|----|------------|--------------------|-------------------|
| 1 | Kech | 45% | 3.86 |
| 2 | Chaghai | 50% | 3.68 |
| 3 | Washuk | 70% | 3.62 |
| 4 | Panjgur | 27% | 3.49 |
| 5 | Khairpur | 12% | 3.44 |
| 6 | Lasbela | 29% | 3.42 |
| 7 | Tharparkar | 20% | 3.38 |
| 8 | Awaran | 33% | 3.37 |
| 9 | Bahawalpur | 10% | 3.35 |
| 10 | Khuzdar | 35% | 3.04 |

The suitability analysis shows the top ten districts, ranked by the highest suitability to build new 4G cell towers in Pakistan. Most of the districts are located in the largest province, Baluchistan, where existing coverage, population density and road network is low and the terrain is mountainous. The results also shows the off-net population in such districts.

Information

Cartographer: Mohammad Uzair Akram

Course: DHP P207 GIS for International Applications

Date: December 17, 2019

Projection: Lambert Conformal Conic

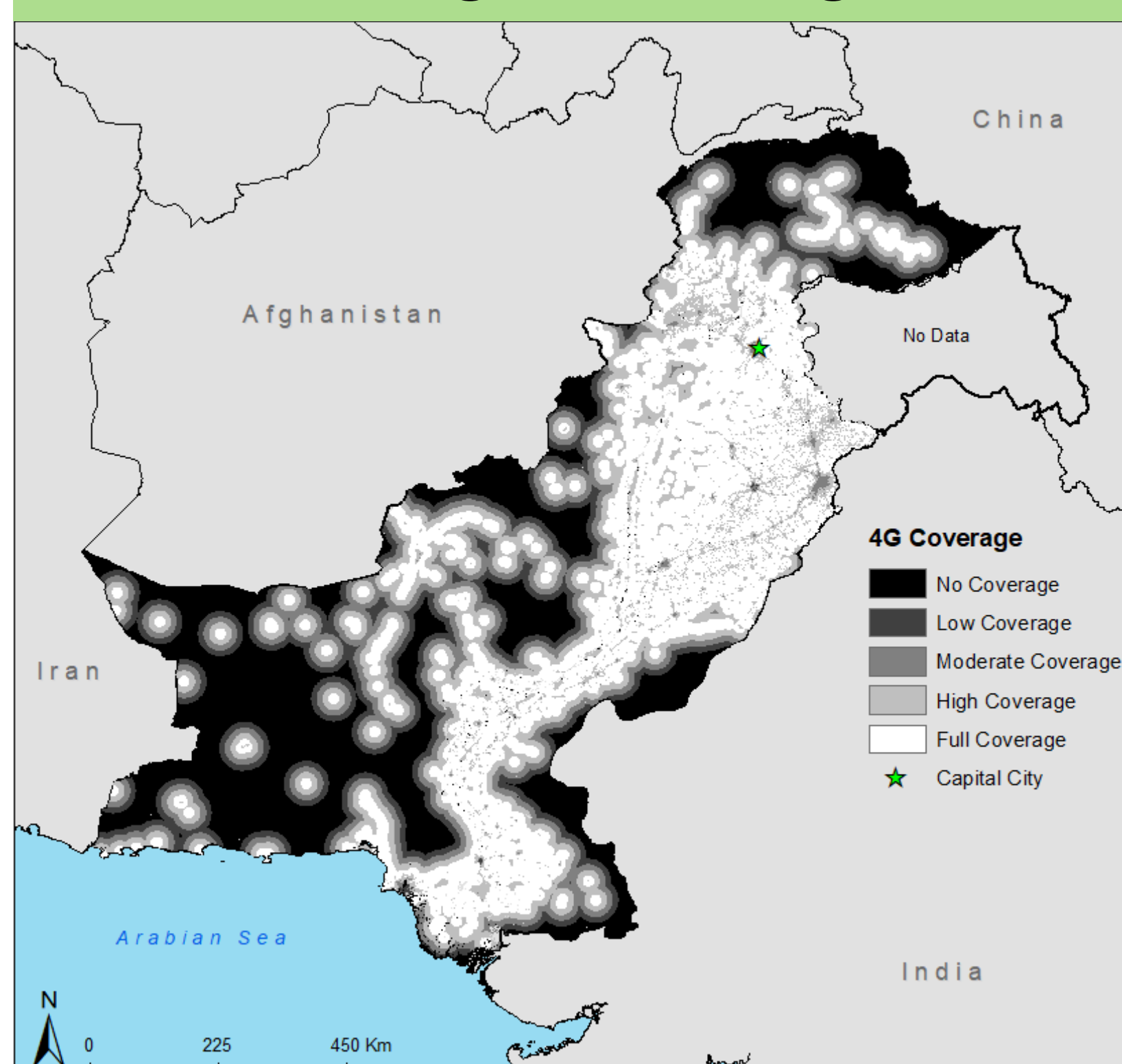
Map Data Sources: ESRI, World Bank, Pakistan Bureau of Statistics

Image Sources: Government of Baluchistan

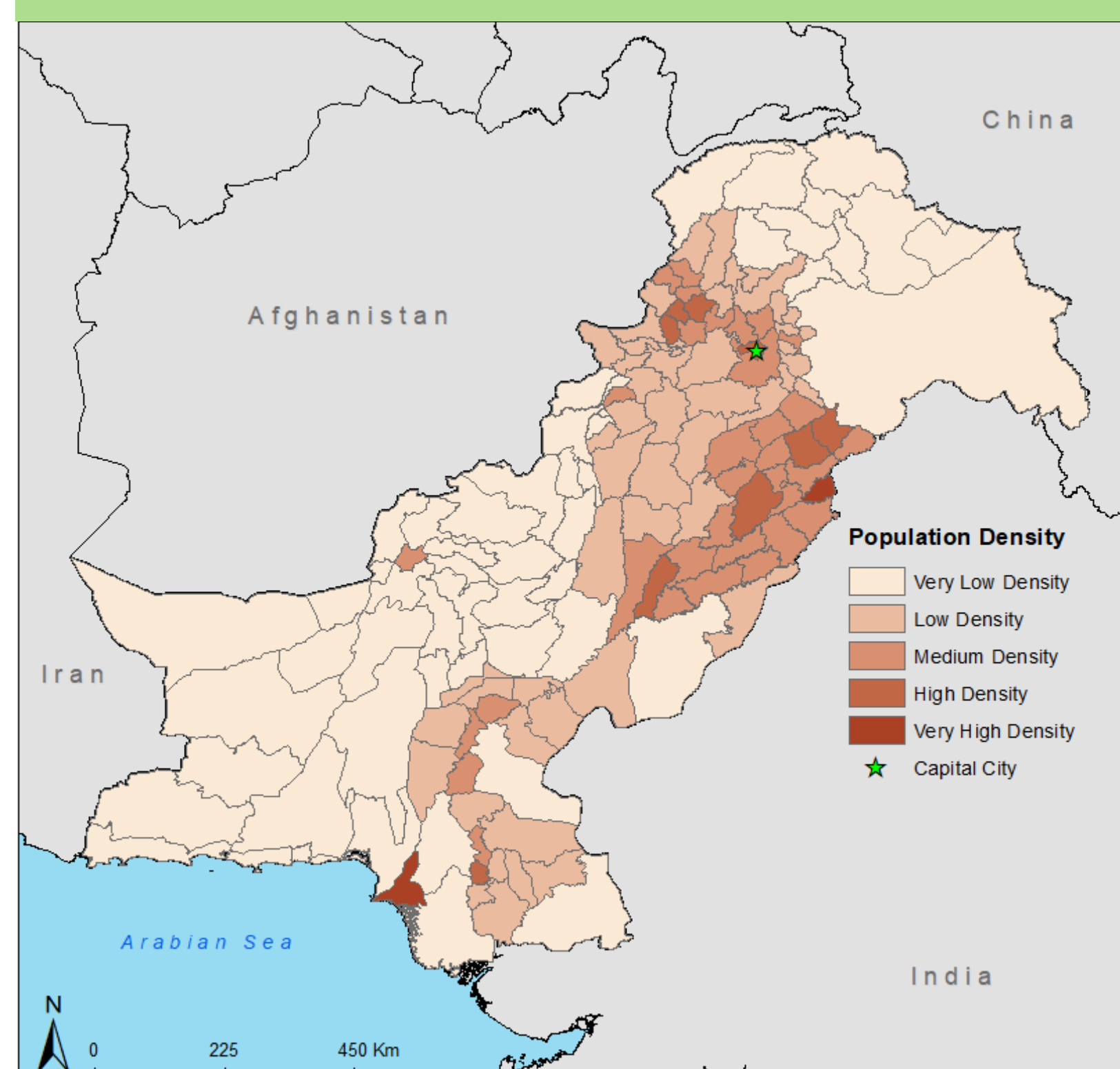


Suitability Factors

Existing 4G Coverage



Population Density



Slope

