One Belt One Road In Xinjiang

A Transport Infrastructure Suitability Analysis, 2005-2015

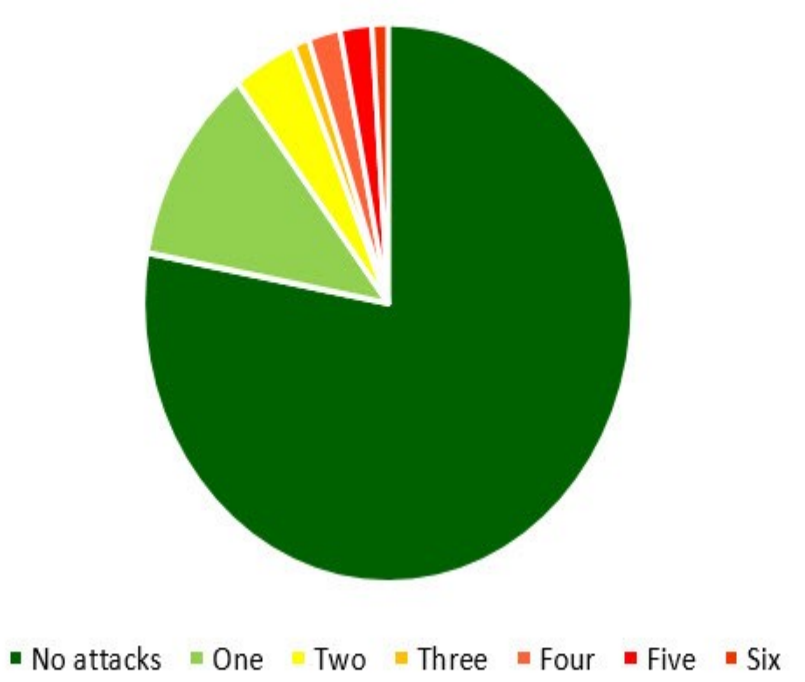
Background

Xinjiang, a Uyghur Autonomous Region in Northwestern China, is China's largest province-level administrative division, and borders Mongolia, Russia, Kazakhstan, Tajikistan, Afghanistan, Pakistan, and India. The fabled Silk Road ran through Xinjiang, while abundant oil and mineral reserves have been found there, making it China's largest natural gas-producing region. The geographic position and characteristics of Xinjiang mean that is an area of focus for the One Belt One Road infrastructure development plan, one of President Xi Jinping's top initiatives. In particular, Khorgas, on the border with Kazakhstan, has been selected as the location for a dry port, while Kashgar, in Xinjiang's southwestern corner, has recently been designated as a special economic zone. But the development of infrastructure in Xinjiang will not be straightforward. Despite its strategic position, Xinjiang's development is challenged by its human and physical geography, ranging from terror attacks to steep mountains. This analysis will examine suitable transport routing for Xinjiang, taking into account these challenges.

Methodology (Continued)

To determine routing that would avoidance known terrorist hotspots, I used Euclidean distances of 5 kilometres, 10 kilometers, 20 kilometers, and 50 kilometers. Likewise, for avoidance of earthquakes epicenters, I selected all earthquakes likely to cause damage on a widespread scale (i.e. with a magnitude equal to or greater than 6), and then applied Euclidean distance of 25km, 50km, 50km, and 100km. I applied a similar framework to the slope dataset, derived from Shuttle Radar Topography Mission data at a 90 meter resolution, using classifications of 2 percent (an innocuous level of slope), 4 percent (normally the maximum slope for railway construction), 6 percent (usually the highest slope for road construction), and 8 percent as an extreme upper end for construction). Lastly, I also ranked land cover data, with barren land being the least appropriate for further construction and urban land the best. To aggregate my results, I reclassified the outputs for each variable on a 1-5 scale, and then summed these datasets. The results summed in my map, shown below.

Count of attacks per county, 2005-2015



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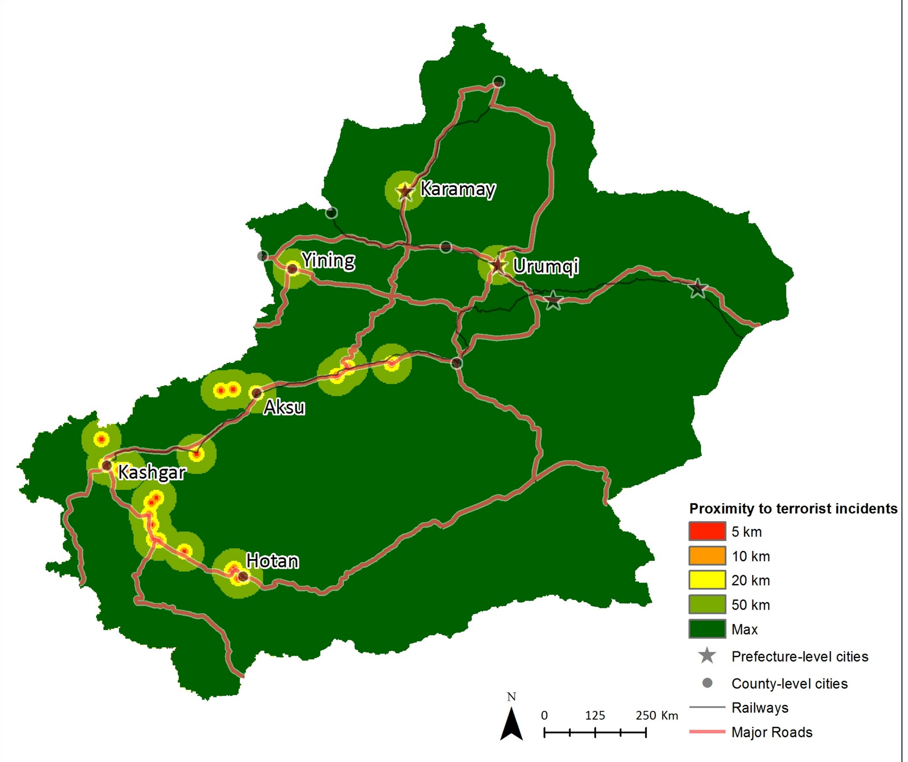
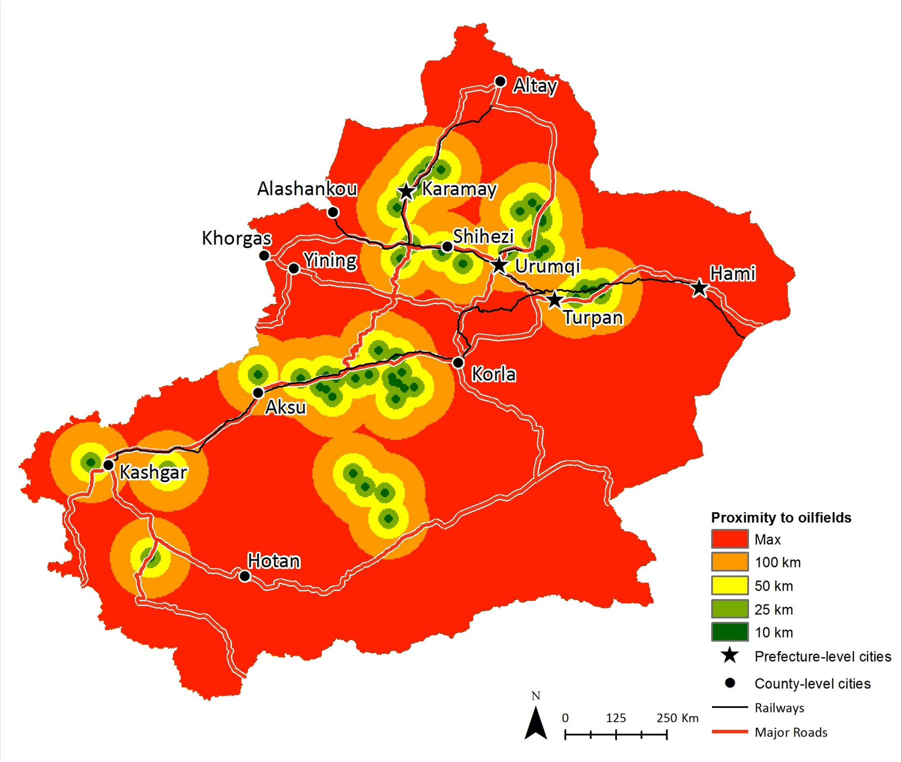
WGS_1984_UTM_Zone_44N

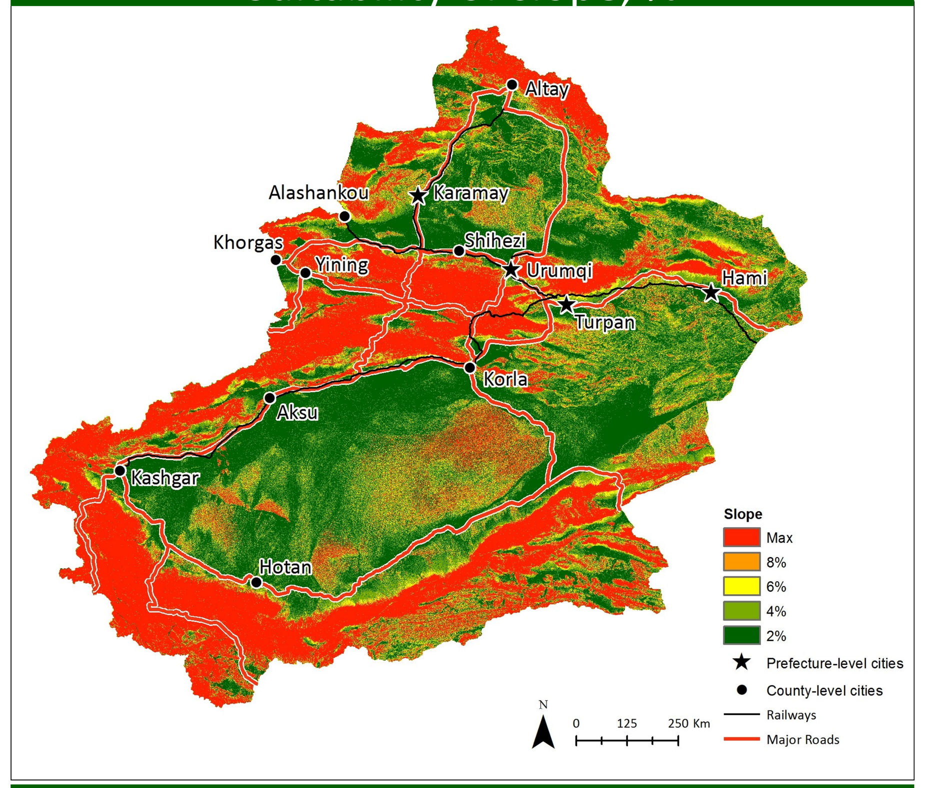
Proximity to terrorist incidents, km



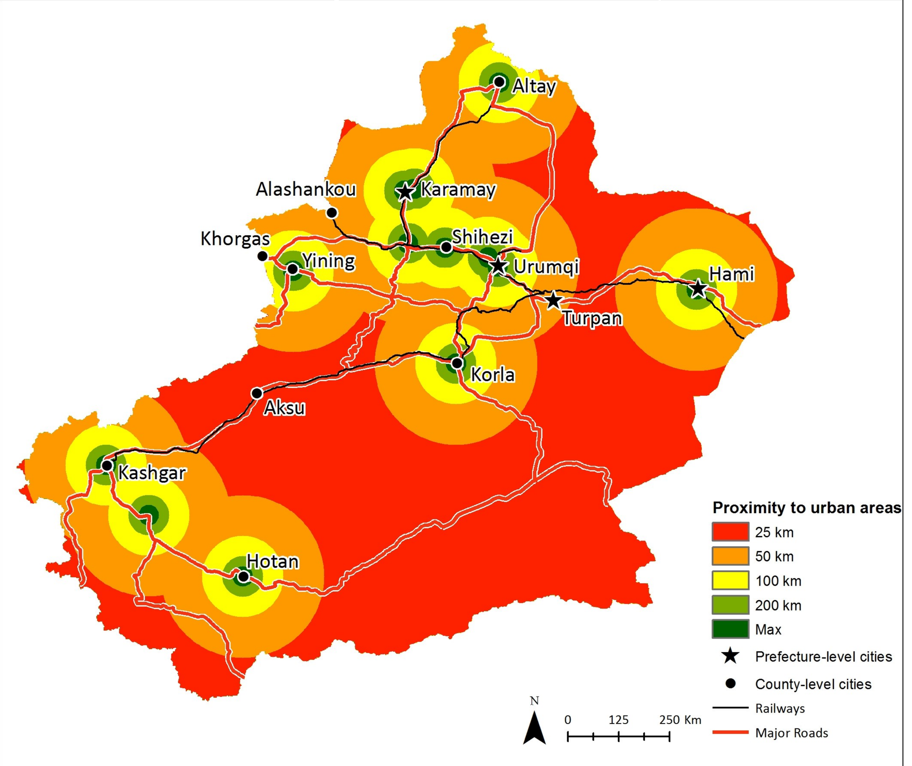
Proximity to oilfields, km



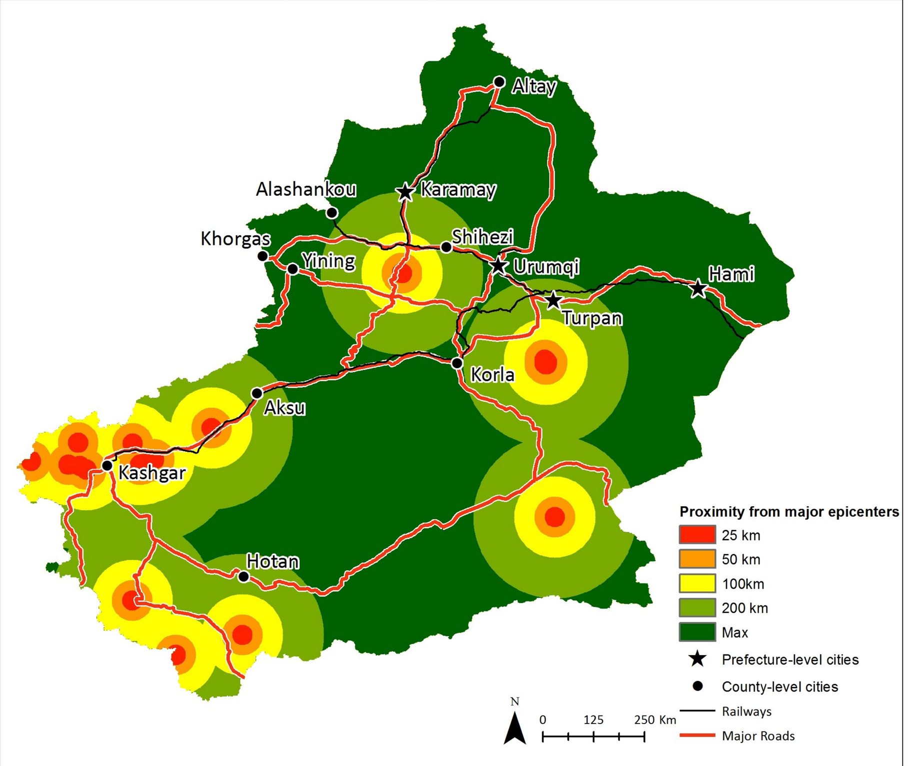
Suitability of slope, %



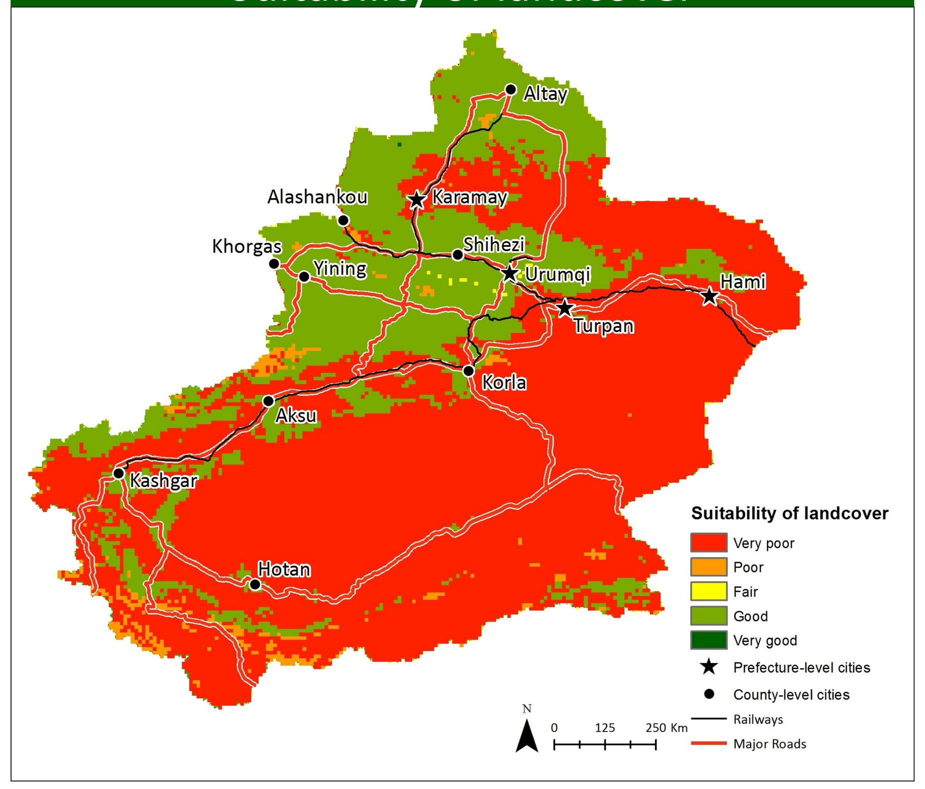
Proximity to urban areas, km



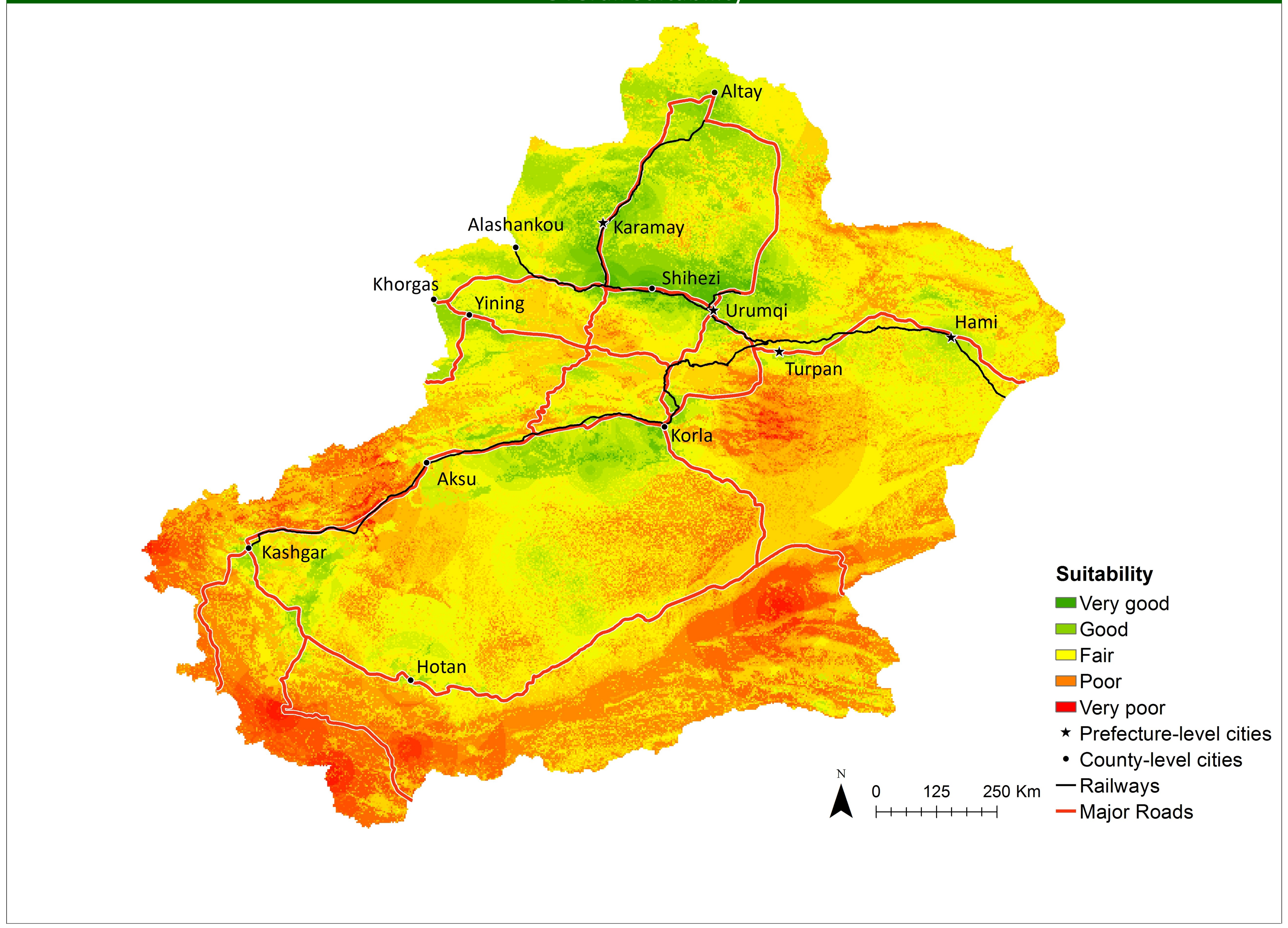
Proximity to major epicenters, km



Suitability of landcover



Overall suitability



Methodology

My analysis identifies areas suitable for the development of infrastructure in Xinjiang. To do so, I targeted the following variables as determinants of suitable routing for road and rail networks in Xinjiang: proximity to oilfields (due to the presence of untapped reserves in Xinjiang), proximity to urban areas (to prosper, urban areas must be connected to efficient road and rail networks), proximity to terrorist incidents (violence being a threat to infrastructure construction), proximity to earthquake epicenters, proximity to areas of high slope (owing to the difficulty of constructing infrastructure in such an environment, and areas with unsuitable land cover.

These factors combine to reveal areas suitable for development of infrastructure. For each of these variables, I identified appropriate classifications. For oilfields, I used Euclidean distances of 10km, 25km, 50km, and 100km to determine accessibility. For access to urban areas (settlements with more than 70,000 people), I used Euclidean distances of 25km, 50km, 100km and 200km.

Results

The most apparent result of my analysis is that the existing network of railways or major roads is in an appropriate location for the most part. This suggests that the development of One Belt One Road projects in Xinjiang should focus on the upgrading of existing transport infrastructure (i.e. from roads to highways and railways to high-speed railways), rather than the creation of new networks from scratch. In particular, the location of the land port at Khorgas sits at the end of an accessible east-west axis across Xinjiang. However, the results do suggest two amendments to the existing network: the development of improved connections to Kashgar and Hotan, long a priority of national and local-level planners, should be shifted slightly to the south to avoid areas of high slope and seismic activity. Likewise, oilfields in south-central Xinjiang are currently deprived of efficient infrastructure access. New connections from Korla to Hotan and Kashgar may provide a solution that both provides access to the oilfields and avoids the difficult topography involved in upgrading existing road and rail links to Kashgar and Hotan.

Challenges

My analysis faced several challenges. First and foremost, the available data on terrorist incidents was limited in both frequency of reporting and detail. A more thorough analysis would use more comprehensive data, and take into account a more complex notion of human geography, for instance accounting for concentrations of different ethnicities within Xinjiang. A major analytical limitation is that my index placed a value on the proximity to cities, but also rewarded distance from terrorist hotspots. Because terrorist incidents largely occurred in populated areas, these indices may have cancelled out one another; further analysis would find a way to separate them out.

Data sources

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