

The Rapid Urbanization of Chongqing China



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Abstract

Chongqing, China has experienced a rapid development growth that can be rivaled by few other cities. The expansive amounts of open land that has been developed into urban fabric has cemented Chongqing, China as one of the fastest growing cities in the world. This analysis aims to put a value on the exact nature of the land use over this 13 year time period. Chongqing, which centers around the intersection of the Jialing and Yangtze Rivers is considered the largest municipality in regards to population, which in 2007 was approximately 31.4 million. Ever since the city became under direct control of the Chinese government in March of 1997, maintaining the balance of agriculture in this rapidly urbanizing society became imperative to the sustainability of the city. From similar studies, Chinese officials have been able to keep the city from sprawling out of control.

Methods

- Obtained data from the LANDSAT satellite archives on the online resource GLOVIS, making sure images did not have cloud interference.
- figures 1.1-1.3 are from August 1994, July 2004, and September 2007 respectively.
- After downloading and extracting the files and by referencing Google Earth, the region of Interest that contained Chongqing was created, making sure to use the exact ROI for each year of study.
- Created Points of Interest (POI) to use in the supervised classification method of maximum likelihood
- These points were manually classified as Water, Vegetation, Urban Fabric or Bare Soil land types. To most accurately classify these land records, Google Earth was again referenced along with toggling the bands in the active display based on which category was being assessed. For example, using near infrared (bands 4,2,1) vegetation was best highlighted.
- After having the images classified (Figures 2.1, 2.2, 2.3), the change detection statics were created. The analysis of the resulting confusion matrix led to the following conclusions

Original "Natural Color" images of Chongqing

1994

2004

2007



Figure 1.1

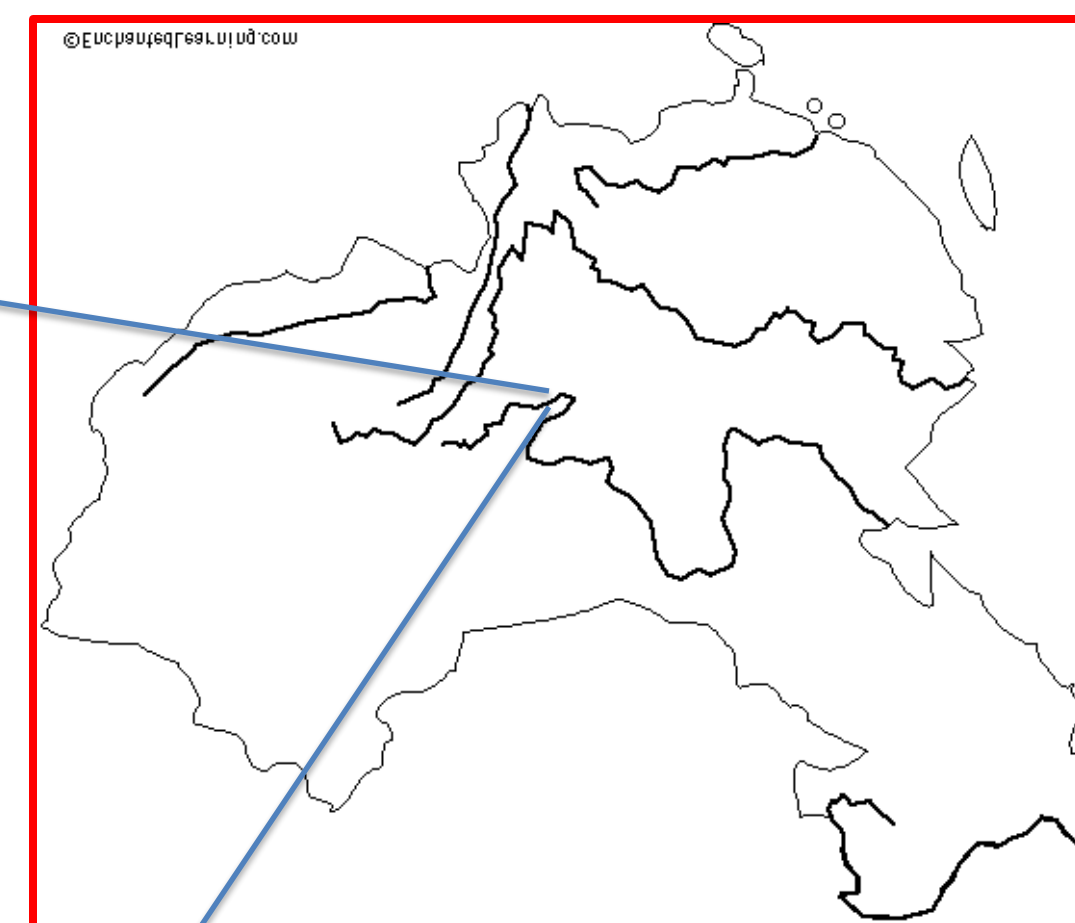


Figure 1.2



Figure 1.3

Figure 3. Chongqing, China: 29°33'46"N 106°33'5" E



Results:



- From 1994 to 2007 1.52 million km² of vegetation and 18,500 km² of bare soil has been developed into an Urban Environment. This is a 30.5% and 64% change respectively
- The land classification reveals that most of the sprawl occurred to the North East of the city's center.
- Over the 10 year period of 1994 to 2004 194,000 km² of vegetation and bare soil had been urbanized, making Chongqing average 19,371 km² of urban growth a year.
- From 2004-2007 this yearly average of urbanization shrank to about 16,885 km², indicating that rate of urbanization is slowing down.
- These results are validated in Sun and Wang's essay.

Land Use Classification

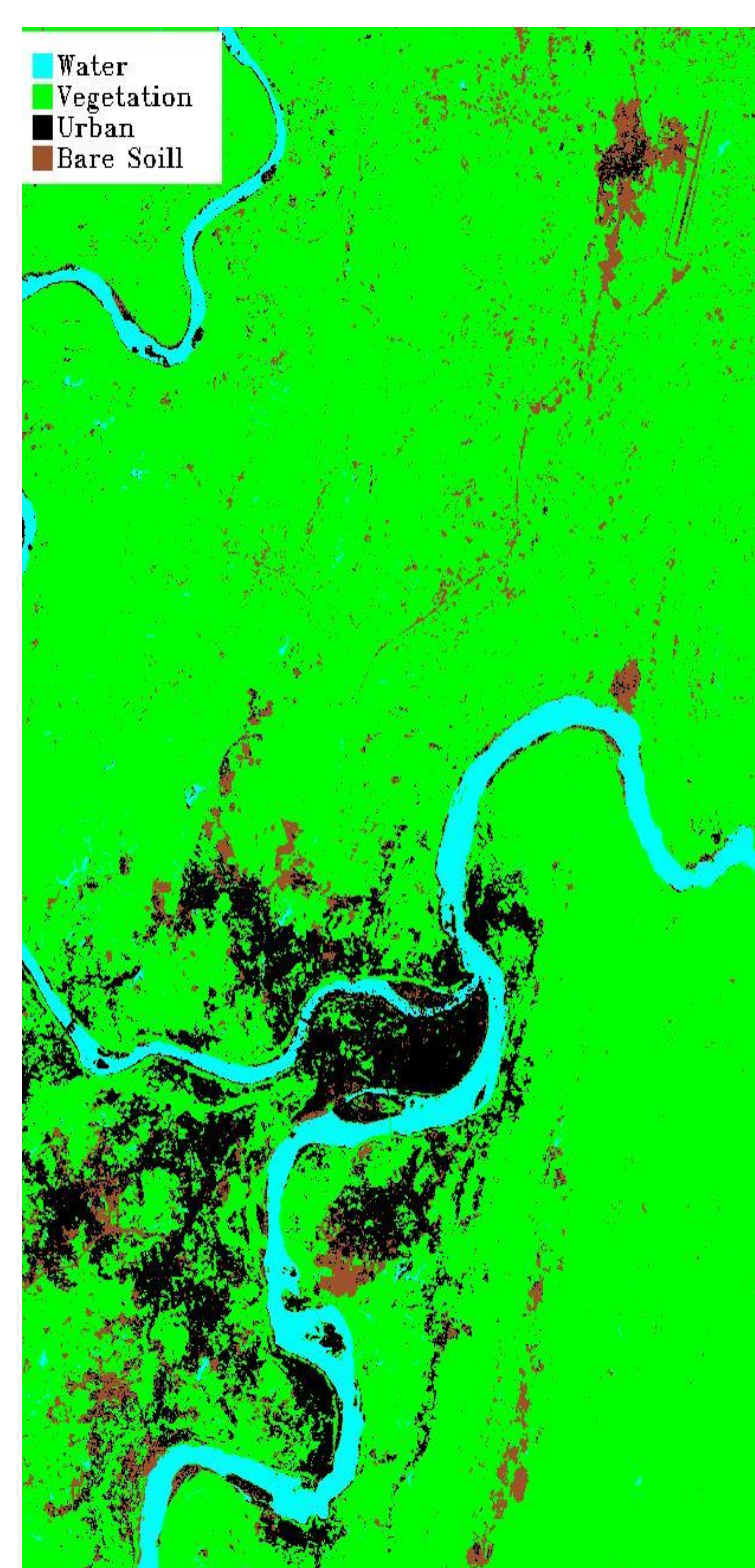


Figure 2.1

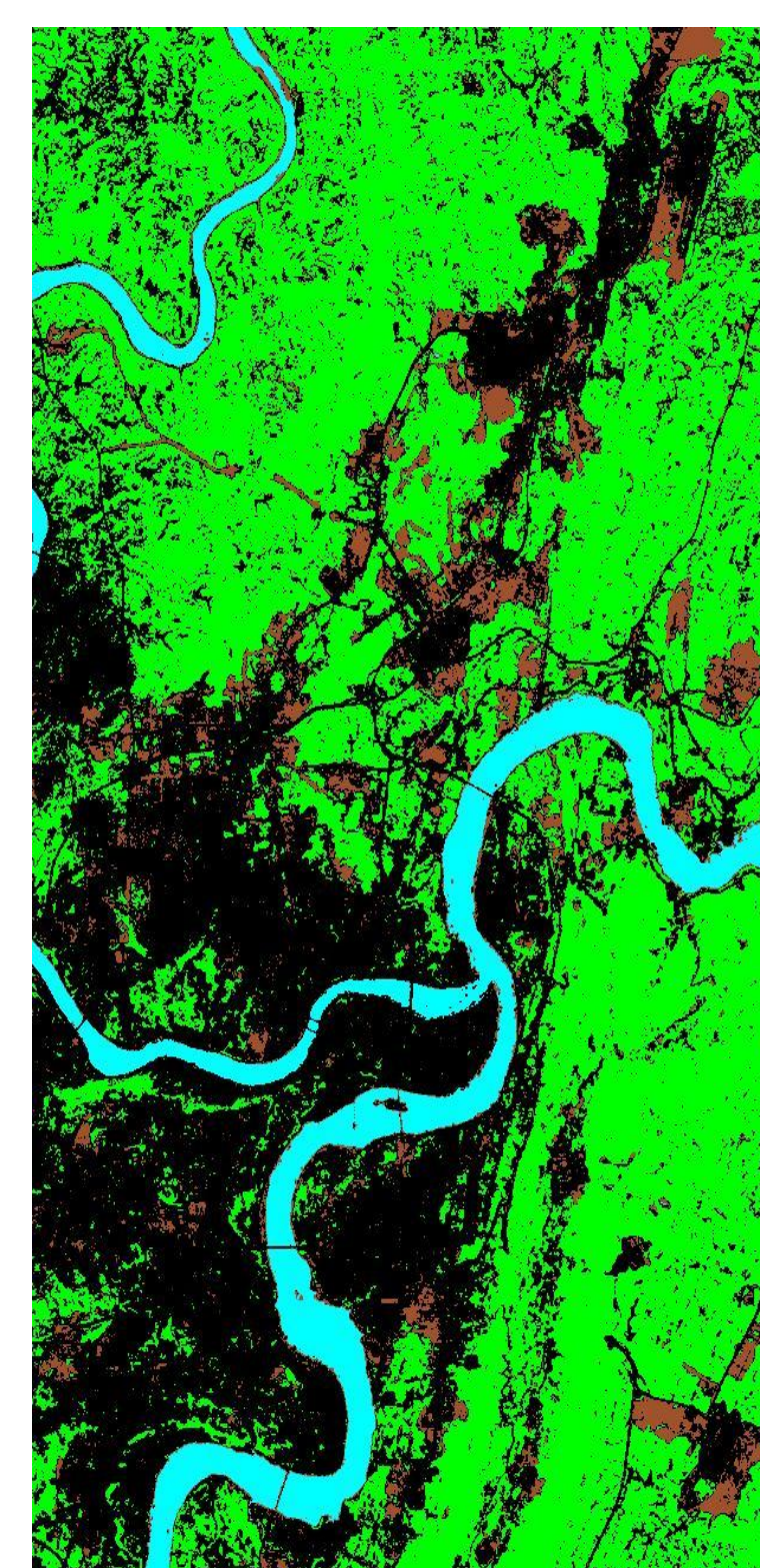


Figure 2.2

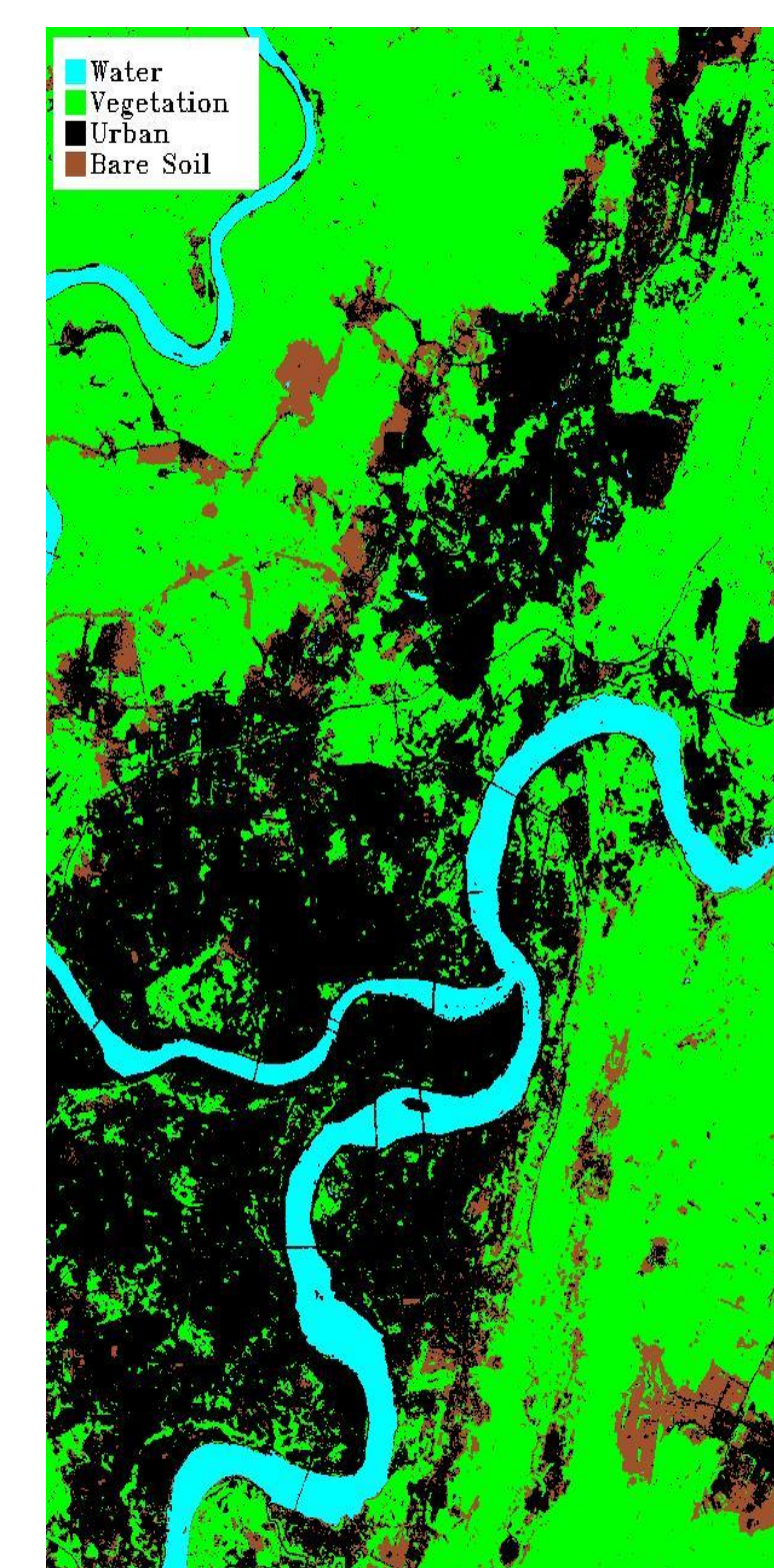


Figure 2.3

Sources

- Han, Sun, and Yong Wang. "City Profile Chongqing." *Science Direct. Elsevier Science*, 24 Apr. 2001. Web. 27 Apr. 2011.
- <http://glovis.usgs.gov/>
- Google Earth