

Examined by light: *Measuring inequality using nighttime satellite images*

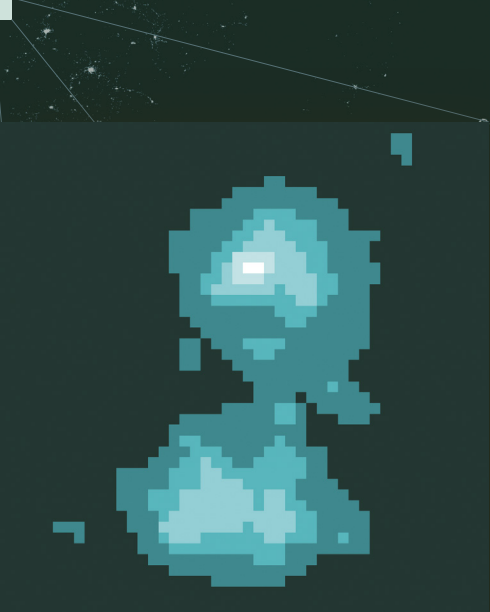
(G. Theunissen, N. B. Weidmann)

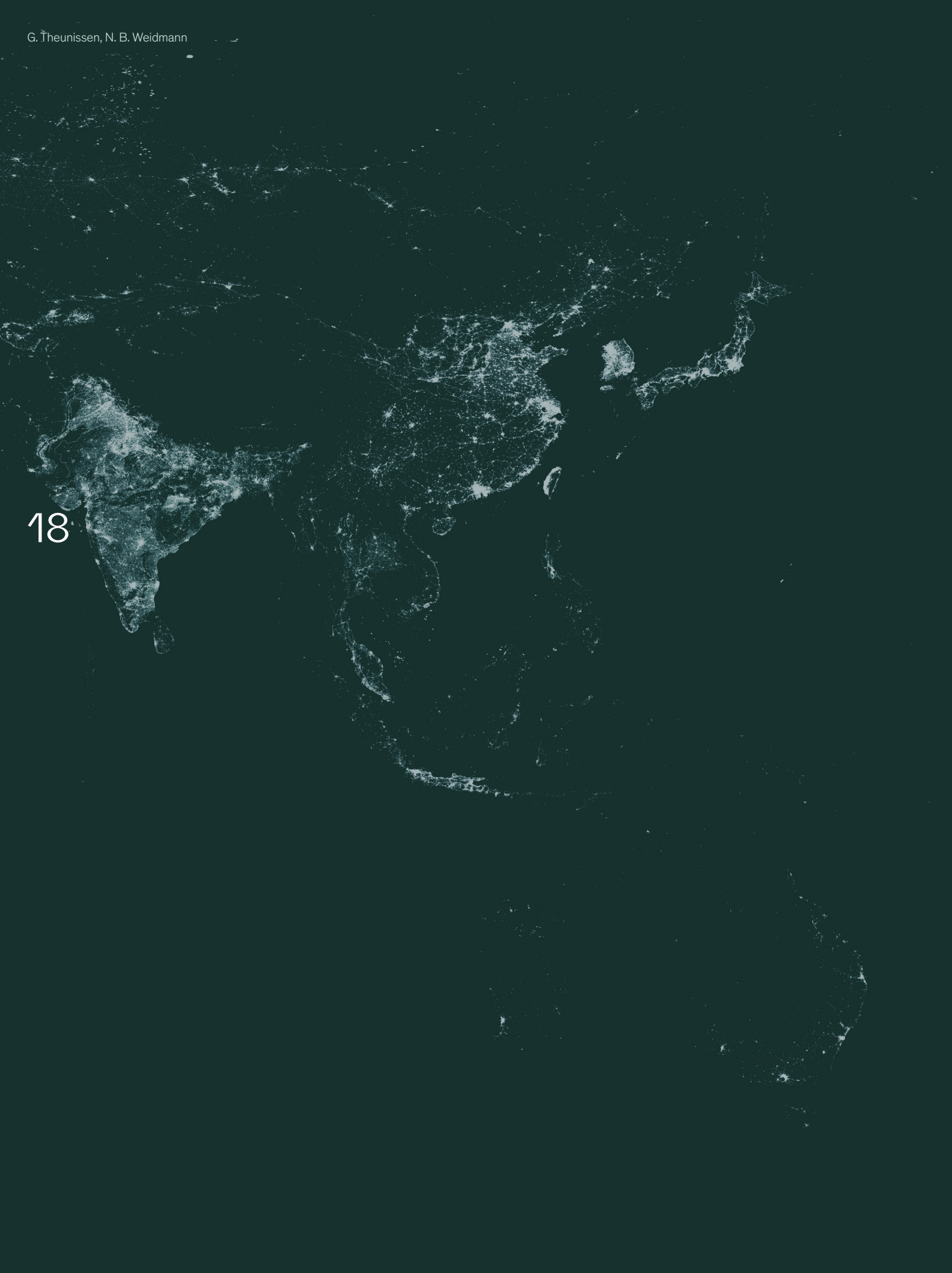
Nightlight emissions in 2012

Images such as this one are created from a combination of monthly observations. This helps reduce sources of error, including the influence of non-constant light sources such as bush fires.

The neighboring mining towns of Kansanshi (to the north, upper bright spot in the image) and Solwezi (to the south, the lower bright spot) in Zambia at night. The individual pixels of the nightlight image are clearly visible. Each pixel shows the emission value at that location: brighter colors correspond to higher light emissions.

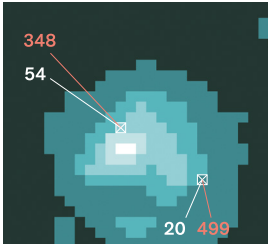
Kansanshi





Inequality researchers are interested in national indicators such as the famous Gini coefficient, which measures a country’s overall income inequality. But they often need to measure local economic inequality as well—within a region, a city, or even a village. This data is often difficult to obtain locally, especially in countries of the Global South. That is why Gerlinde Theunissen and Nils B. Weidmann work on a method to measure inequality from outer space.

Each pixel corresponds to a certain area (here: in the town of Kansanshi). The nightlight value of this area is shown in white. We match this value with the estimated population (in orange) living in the same area. We know from our previous



research: More light emissions per capita are associated with greater wealth. This enables us to calculate a local measure of inequality from the pixels of a location.

How do we know that measuring nightlight emissions is really a valid way to measure inequality? To test our method, we need an independent source to confirm that what we measure is realistic. For this purpose, we use a wealth index from the Demographic and Health Surveys (DHS), an internationally funded program that collects data on population, development, and health. The DHS wealth index measures a household’s socioeconomic status on a scale of 1 to 5. Using the household scores of a neighborhood (=one pixel), we can estimate local inequality and match it with the results of our nightlight measurements. As a result, we can determine how accurately our method measures inequality. →

