

Natural vegetation and the carbon footprint of regions

Reducing carbon emissions from anthropogenic sources such as industrial production and fossil-fueled transportation is paramount in the pursuit to reduce carbon footprints and tackle the challenge of global climate change. At the same time, natural vegetation and its ability to absorb carbon dioxide (CO₂) are central components in the mitigation of greenhouse gases. This natural process of CO₂ sequestration is the result of photosynthesis; hence, a region's potential to absorb carbon from the atmosphere is linked to its exposure to sunlight, precipitation and green leaf biomass.

Positive regional Net Ecosystem Productivity (NEP) indicates the regional potential to capture carbon from the atmosphere (sequestration), thanks to the presence of forests. Negative regional values indicate that carbon sequestration is outweighed by carbon release from the soil (Figure 5.13).

Central to interpreting these data is the fact that a region's carbon sink capacity is not static and varies over time as climate conditions change as well as the amount of green leaf biomass. And, while carbon sequestration capacity plays an important role in the discussion on global climate change, it is itself influenced by climate conditions in the first place. With temperature and precipitation influencing the amount of CO₂ released from the soil, and the level of photosynthesis driving the amount of CO₂ that can be sequestered from the atmosphere, evaluating an ecosystem's carbon sink potential is a complex task.

Definition

Carbon sinks are natural reservoirs such as forests and other green leaf vegetation and oceans that capture carbon from the atmosphere.

Net Ecosystem Productivity (NEP) measures the net balance of carbon stored by the green leaf vegetation through the production of biomass, subtracting the amount of CO₂ release from the soil. It is expressed in grammes of carbon/m²/year. Positive regional NEP values indicate that carbon is being captured from the atmosphere, suggesting the presence of forests that help reduce the amount of carbon in the air. The share of urban land converted from agriculture (forest or other vegetation) is defined as the difference in the land classified as urban in 2008 and the land classified as agriculture (forest or other vegetation) in 2000, divided by the total land in 2000.

The area covered by vegetation is defined as the land classified as agriculture, forest or other non-forest vegetation.

Countries in the southern hemisphere as well as those situated in lower latitudes of the northern hemisphere are the ones most subject to large regional variations in carbon sequestration (Figure 5.13).

Converting natural land to land for urban uses adds pressure on the potential to sequester carbon from the atmosphere, particularly when converting from green leaf biomass such as forests. Preserving natural landscapes remains a central cornerstone in greenhouse gas mitigation. Across the OECD, urban land conversion from agricultural land accounted for the largest share, followed by forests. In Austria, Finland, Slovenia, Sweden and the United States, the share of forest within the overall land conversion was relatively high or even higher than the share of agricultural land (Figure 5.14).

Across the OECD, the share of regional land covered by vegetation shows comparable maximum values for most countries, but large differences exist in countries' average coverage. Generally higher percentages can be found in countries of the northern latitudes, which on average also show higher values in NEP (Figure 5.15).

Source

NEP NASA-CASA model predictions 2006-2011, <http://geo.arc.nasa.gov/sge/casa/cquestwebsite/>.

Land covered by vegetation: MODIS Land Cover data 2008.

Urban land converted: Corine Land Cover EU23; Japan National Land Service Information Data; NLCD for the United States.

See Annex B for data sources and country-related metadata.

See Annex C for details on data estimation.

Reference years and territorial level

NEP: average 2006-2011; land covered by vegetation: 2008.

TL3 for OECD countries and TL2 for Brazil, China, India, the Russian Federation and South Africa.

Further information

Piacentini, M. and K. Rosina (2012), "Measuring the Environmental Performance of Metropolitan Areas with Geographic Information Sources", *OECD Regional Development Working Papers*, No. 2012/05, OECD Publishing, <http://dx.doi.org/10.1787/5k9b9ltv87jf-en>.

Figure notes

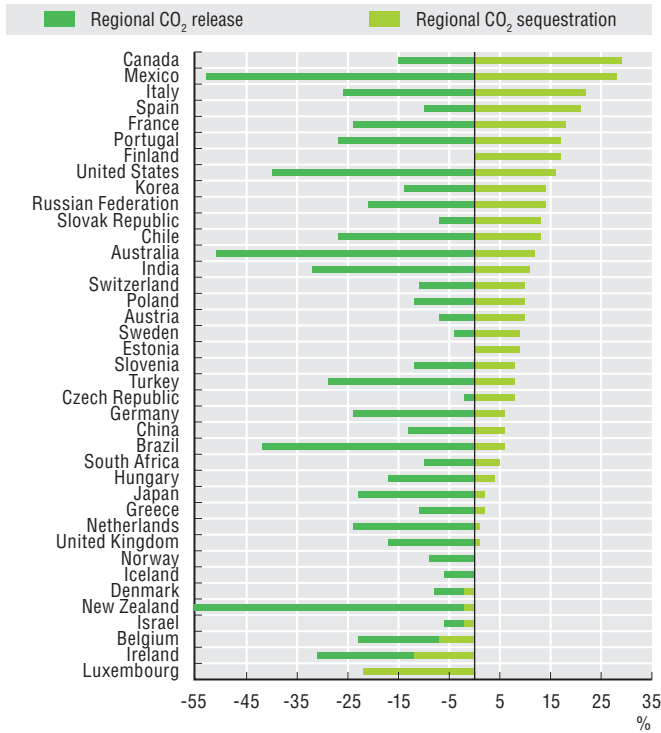
5.14: Data available only for Europe, Japan and the United States.

Information on data for Israel:
<http://dx.doi.org/10.1787/888932315602>.

5. ENVIRONMENTAL SUSTAINABILITY IN REGIONS

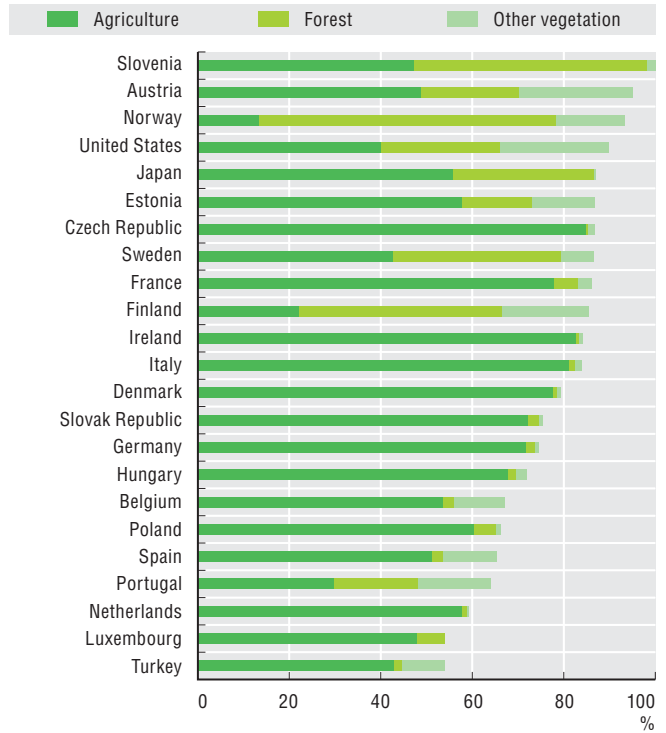
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5.13. Regional (TL3) range in CO₂ sequestration and release, NEP (g/m²) average 2006-11



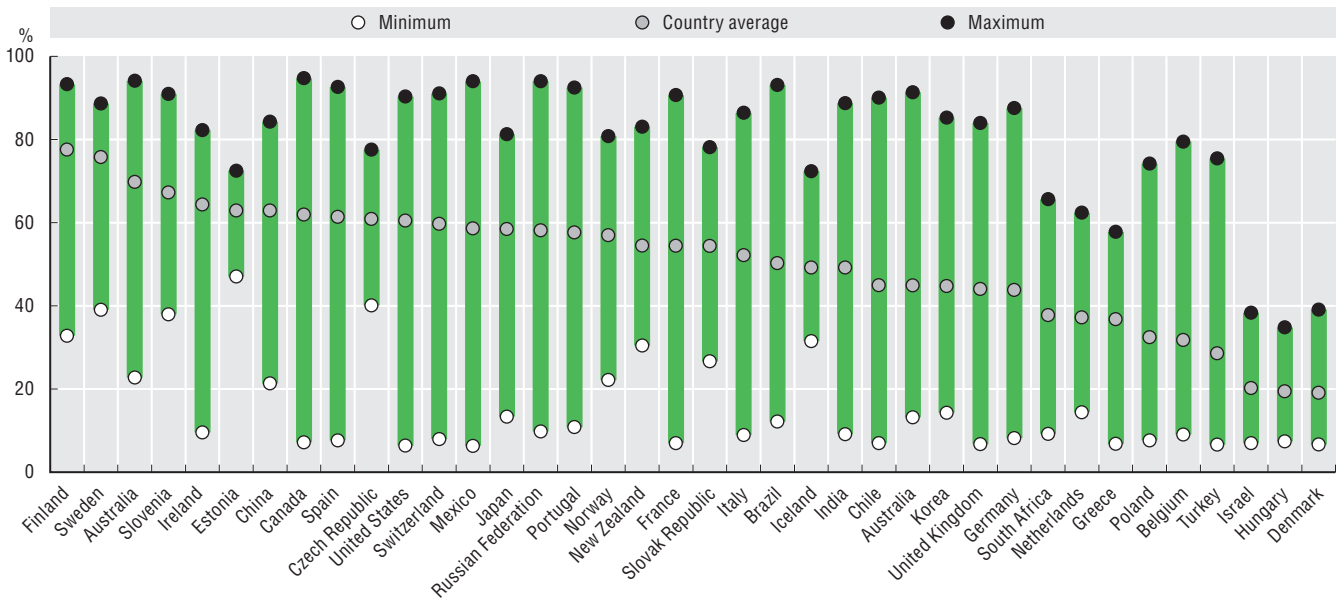
StatLink <http://dx.doi.org/10.1787/888932915014>

5.14. Share of urban land converted from agriculture, forest and other vegetation, 2000-06



StatLink <http://dx.doi.org/10.1787/888932915033>

5.15. Per cent of TL3 regional land covered by vegetation, 2008



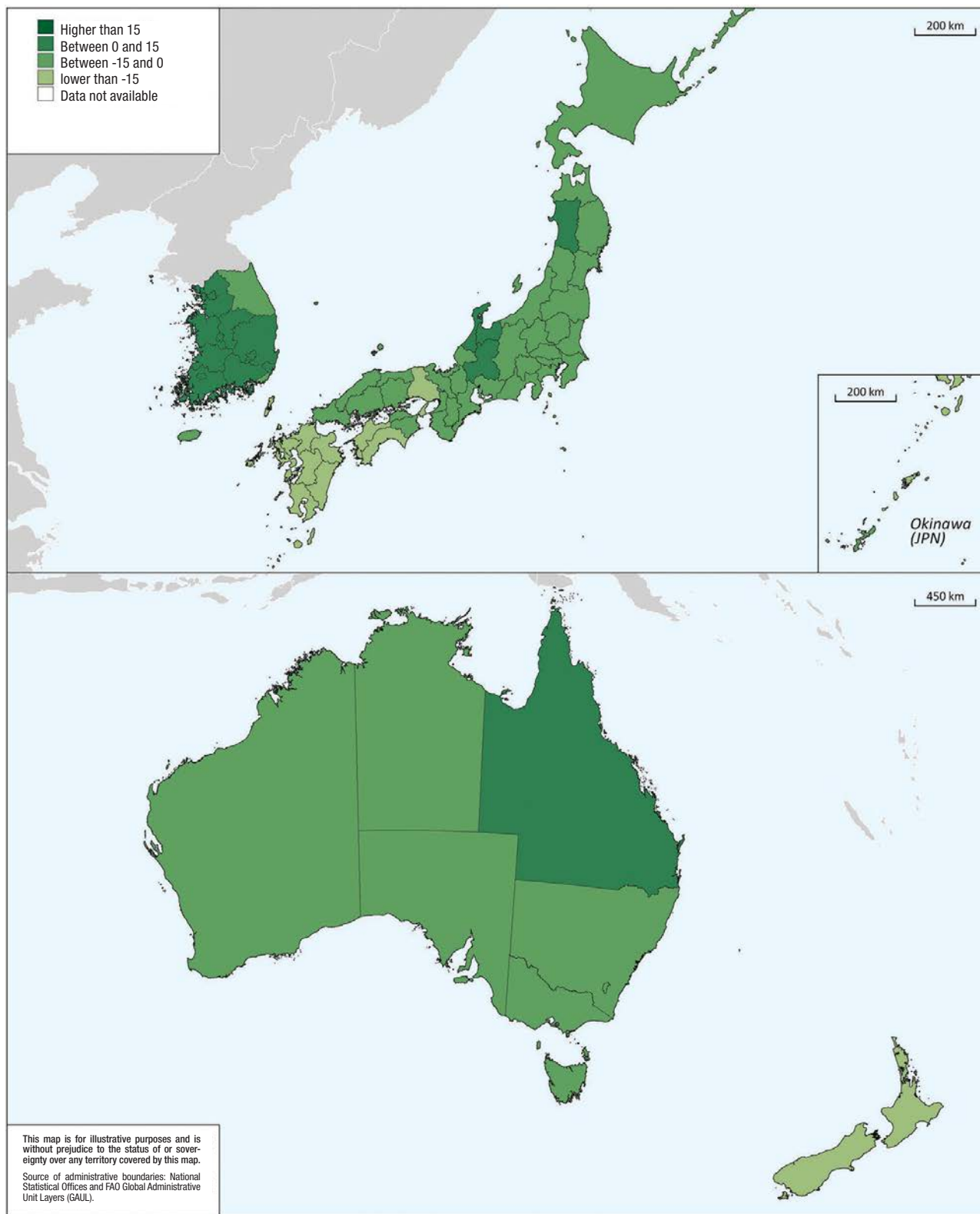
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5.16. Regional CO₂ sequestration (or release): Asia and Oceania, 2006-2011

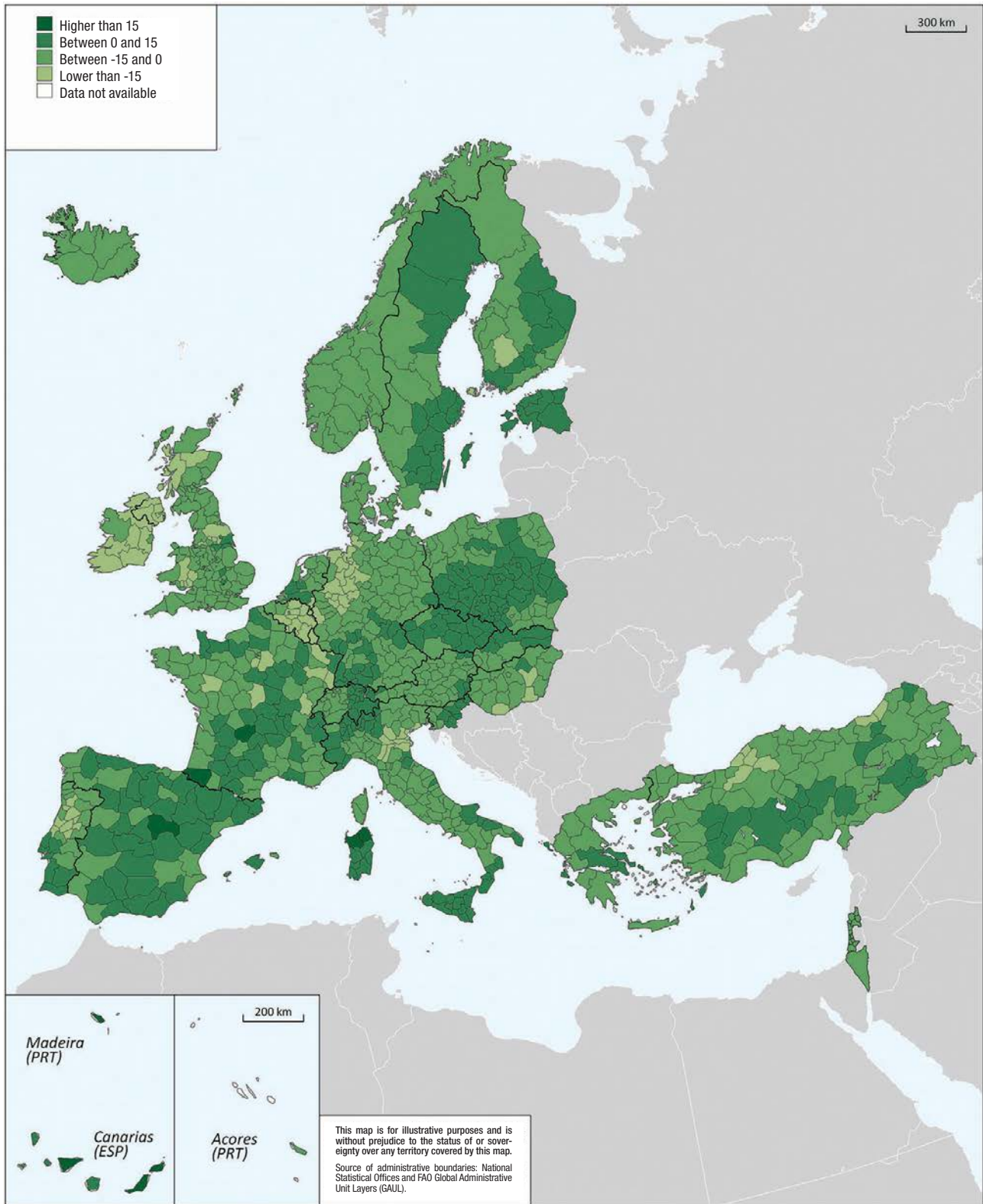
TL3 regions, NEP average (g/m²)



StatLink  <http://dx.doi.org/10.1787/888932915774>

5.17. Regional CO₂ sequestration (or release): Europe, 2006-2011

TL3 regions, average NEP (g/m²)



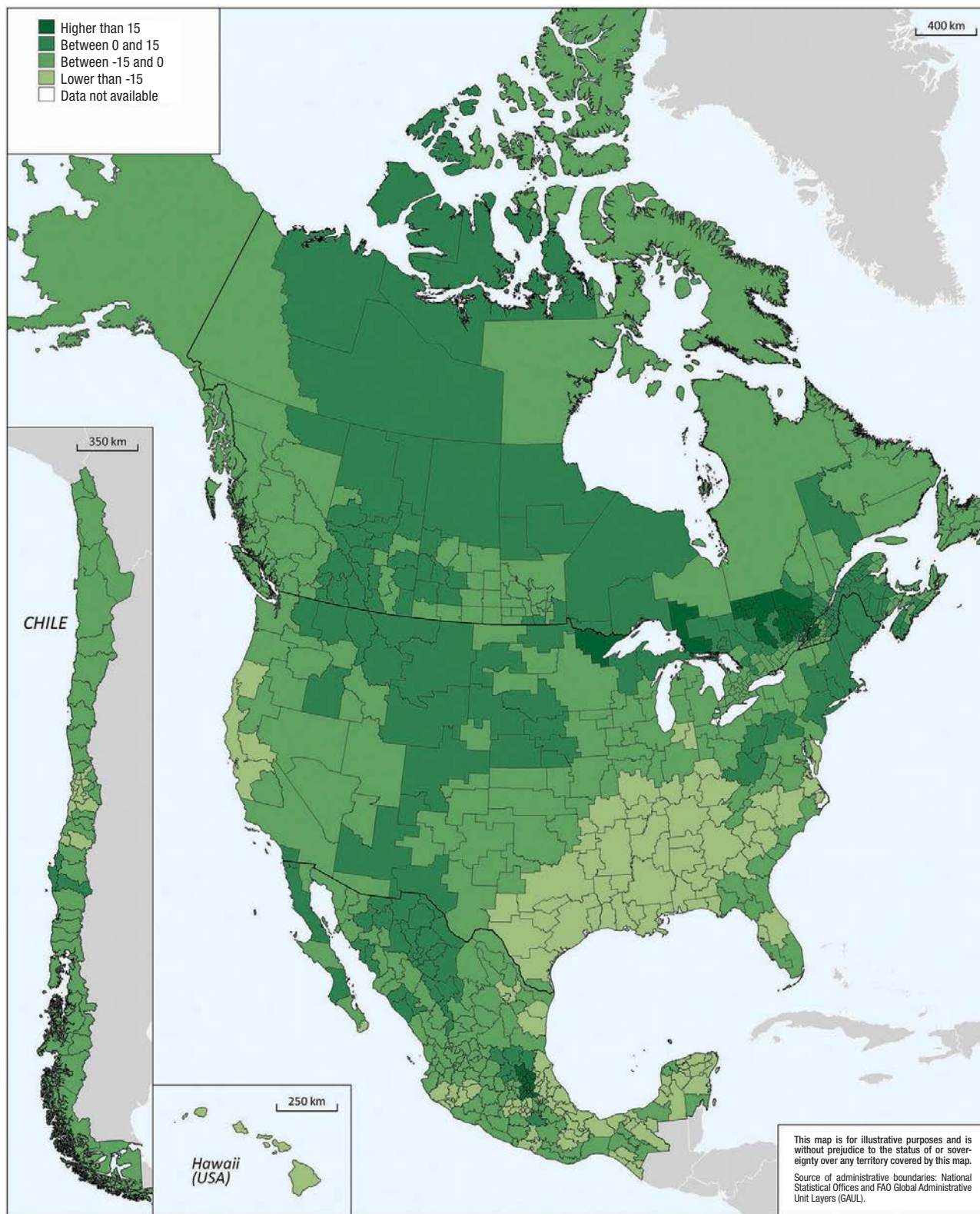
StatLink  <http://dx.doi.org/10.1787/888932915793>

5. ENVIRONMENTAL SUSTAINABILITY IN REGIONS

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5.18. Regional CO₂ sequestration (or release): Americas, 2006-2011

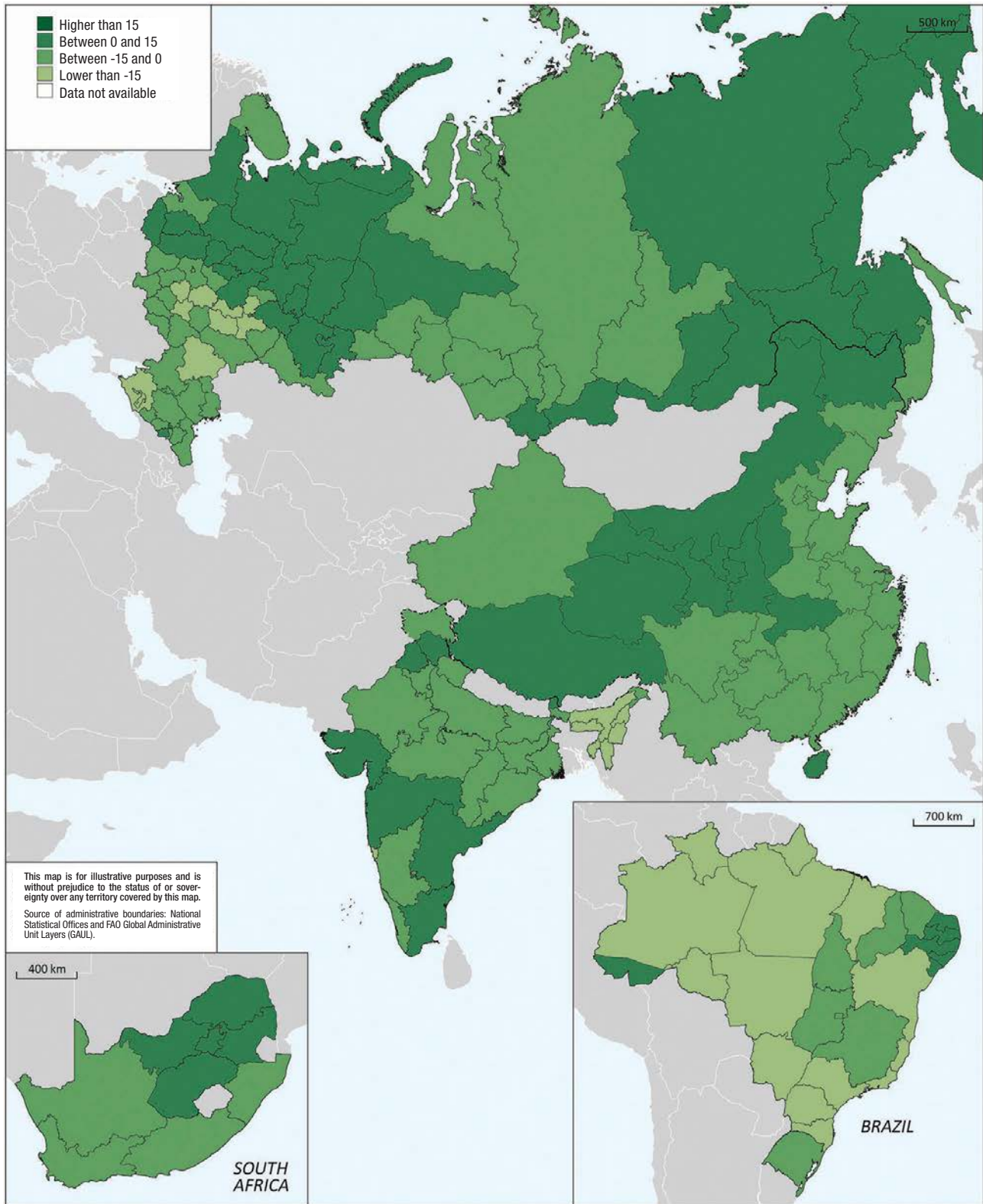
TL3 regions, NEP average (g/m²)




StatLink  <http://dx.doi.org/10.1787/888932915812>

5.19. Regional CO₂ sequestration (or release): Emerging economies, 2006-2011

TL2 regions, average NEP (g/m²)



StatLink  <http://dx.doi.org/10.1787/888932915831>



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