URBAN GREEN TRAIN

Urbanization and biodiversity loss

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Erasmus+ URBAN GReen Education for ENTteRprising Agricultural INnovation

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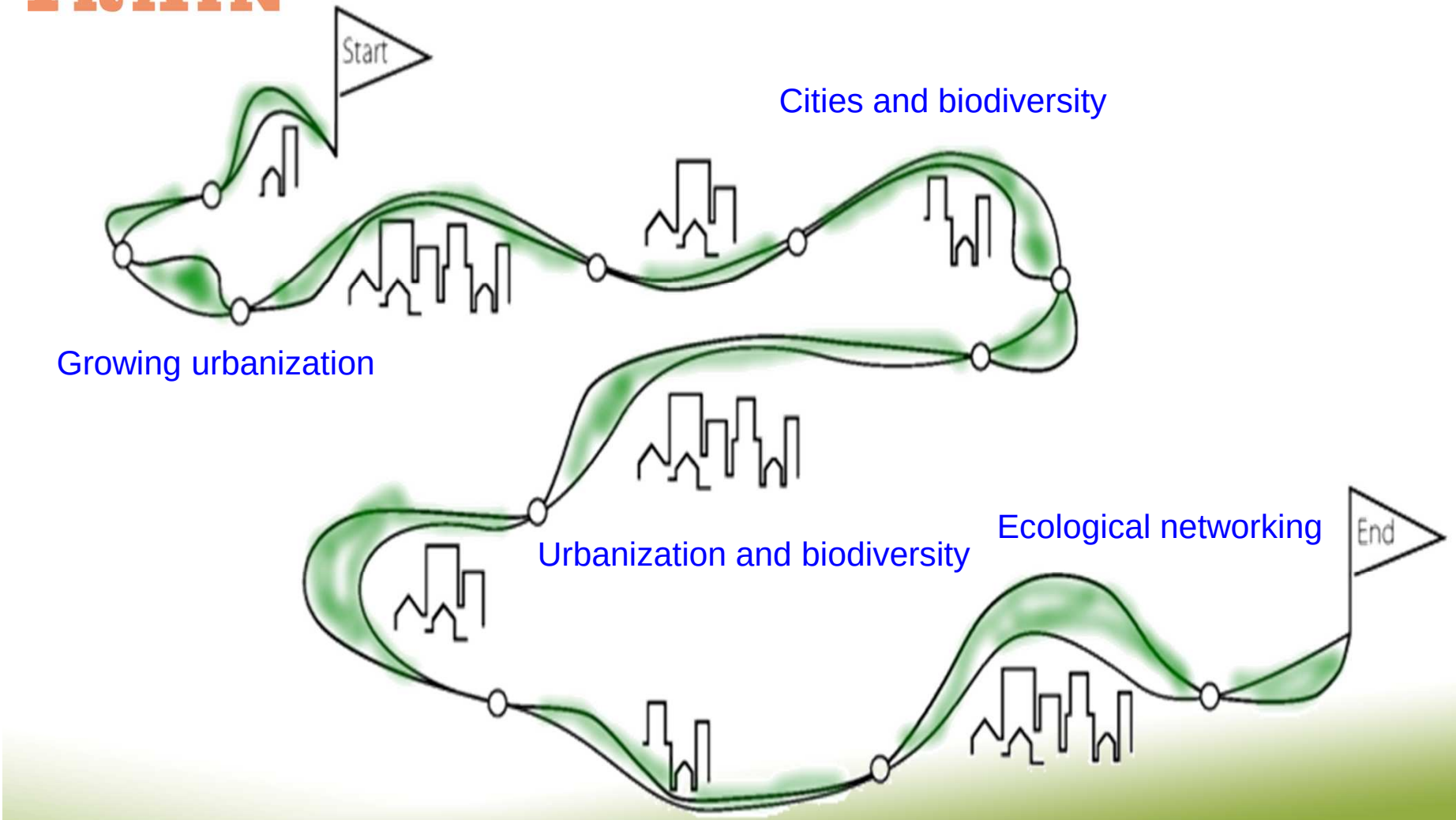

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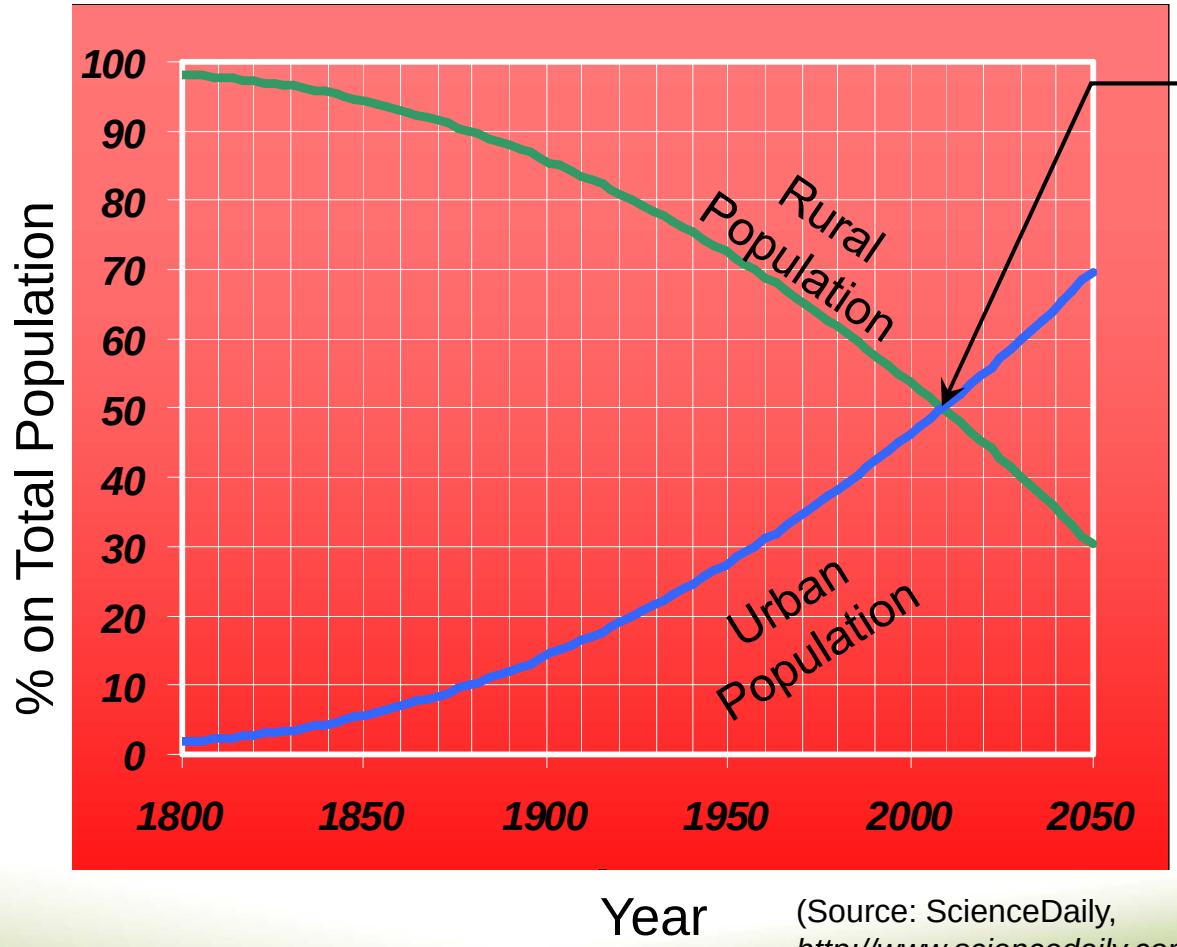
The increasing urbanization



Wednesday, 23rd May 2007

3.303.992.253
People were living in the cities

3.303.866.404
People were living in rural areas

(Source: ScienceDaily, *http://www.sciencedaily.com/releases/2007/05/070525000642.htm*)

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The increasing urbanization

Urban Population (%)

Year	World	Africa	Asia	Europe	Latin America & Caribe	North America	Oceania
2010	50.6	39.9	42.5	72.6	79.4	82.1	70.6
2030	59.7	50.0	54.1	77.8	84.6	86.7	72.6
2050	69.6	61.8	66.2	83.8	88.7	90.2	76.4

In 1950, 83 cities with more than 1 million of inhabitants (metropolis)

In 2006, more than 400 metropolis, and 21 megalopolis (inhabitants > 10 millions

In 2020, 27 megalopolis:

13 in Asia, 6 in Latin America,

5 through Europe and North America, 3 in Africa

(Source: Citymayors, *http://www.citymayors.com/statistics/largest-cities-mayors-intro.html*)


MEGATROPOLIS
~~50 km~~
~~30 km~~
10 km
HOME SWEET HOME
"We're waiting for the city to come to us..."

Biodiversity Hotspots

Conservation International defines a biodiversity hotspot as having at least 1,500 endemic plant species and having lost at least 70 percent of its original habitat area. Of the 34 biodiversity hotspots identified globally, all contain urban areas—many of them significant in size and population. Cities in biodiversity hotspots have a vital role to play in the conservation of these critically threatened ecosystems. ICLEI and several partners recently established the Cities in the Hotspot program (see p. 53), to secure ecosystem services in such areas.

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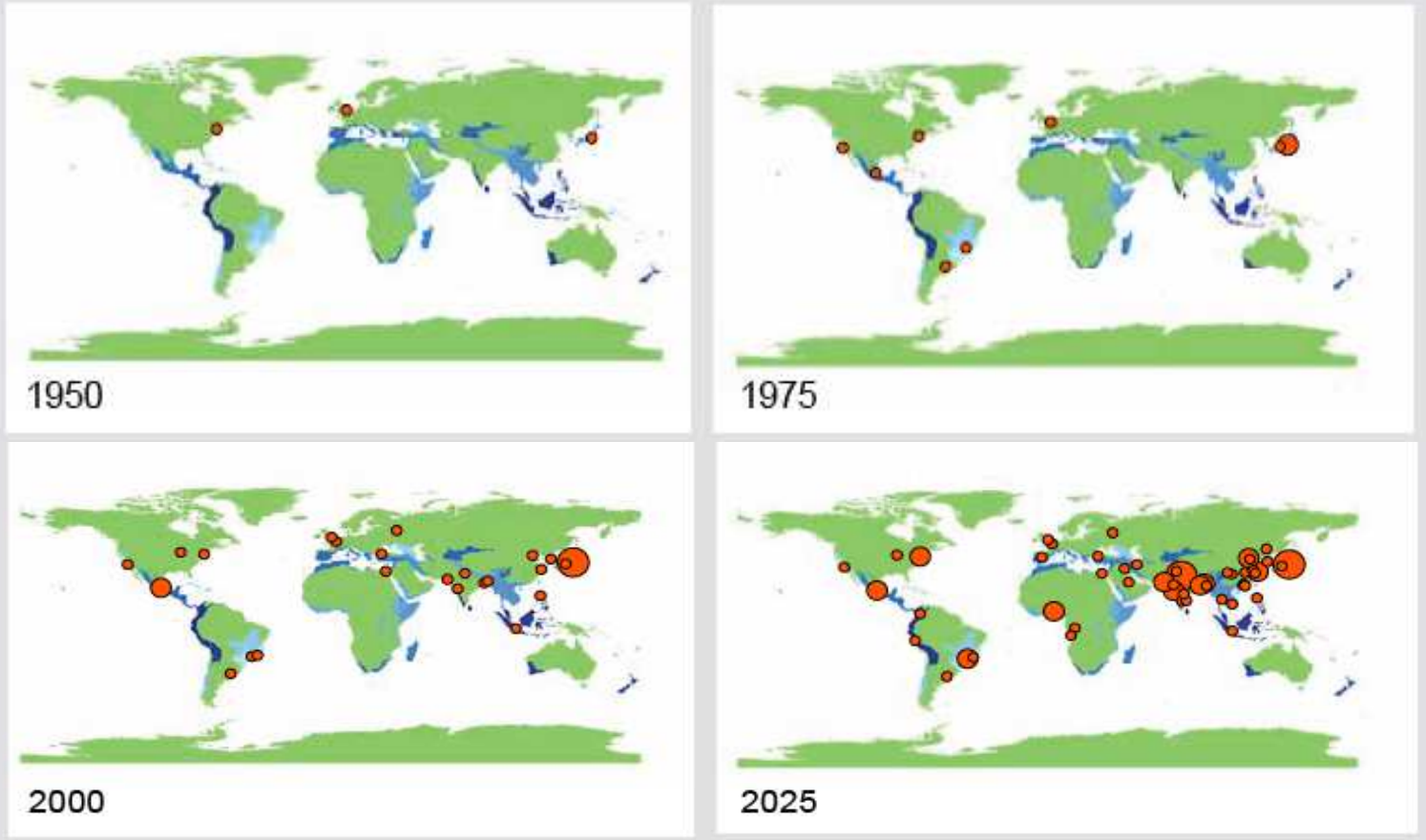
Biodiversity hotspots and cities growth



Secretariat of the Convention on Biological Diversity (2012)

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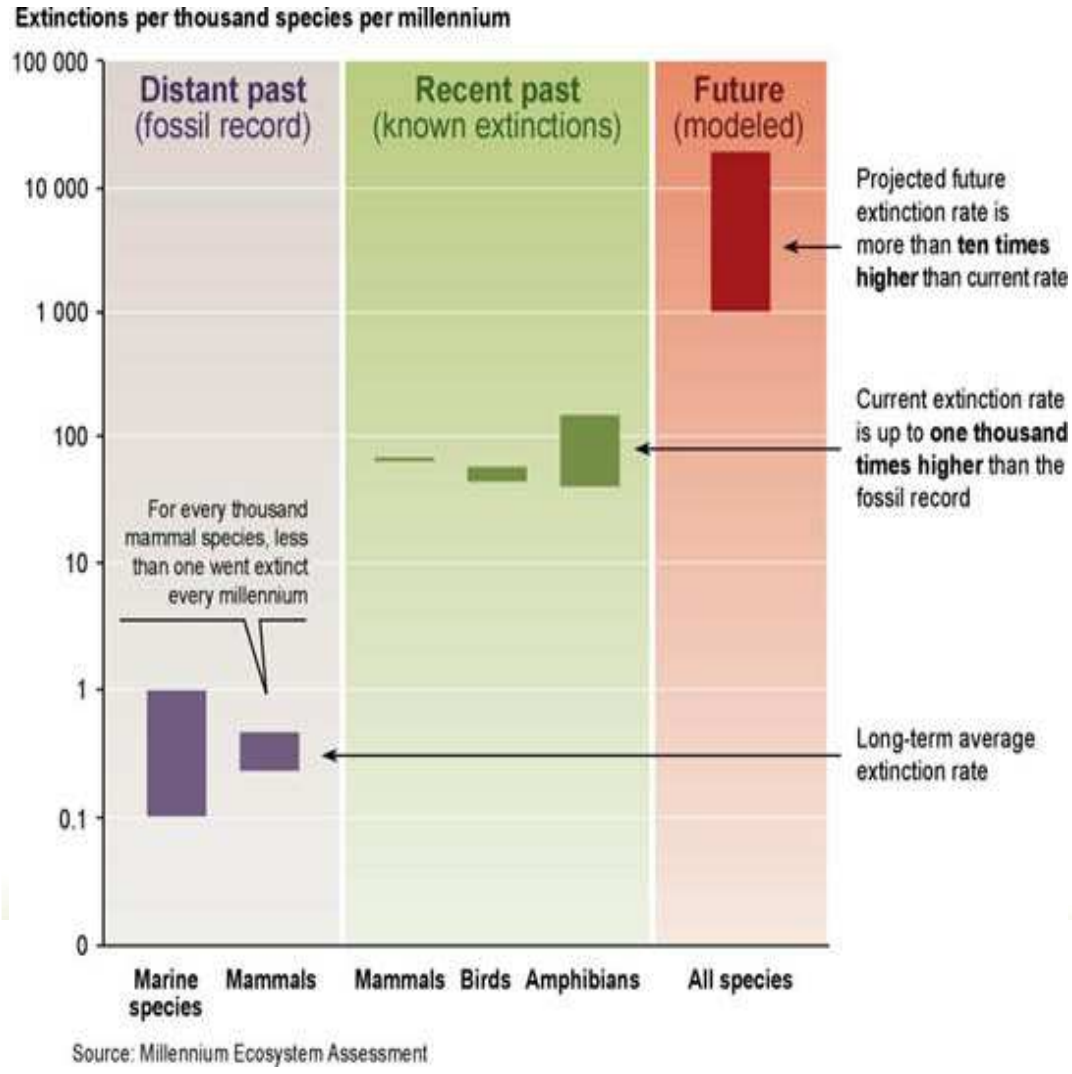
Global biodiversity loss



Chapin et al. (2000)

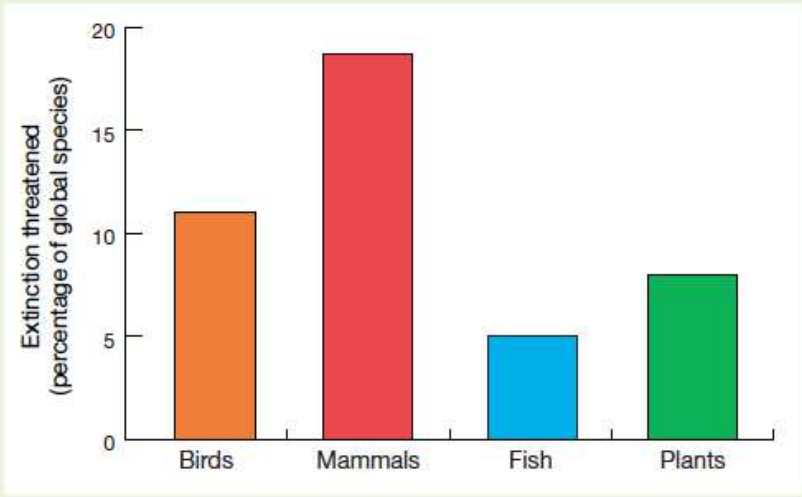


Figure 2 Proportion of the global number of species of birds, mammals, fish and plants that are currently threatened with extinction[4].

Urban sprawl and biodiversity

Loss of agricultural land

Loss of agricultural land

Urban expansion on highly productive agricultural field, in Sweden

(Photo: K. Nilsson)

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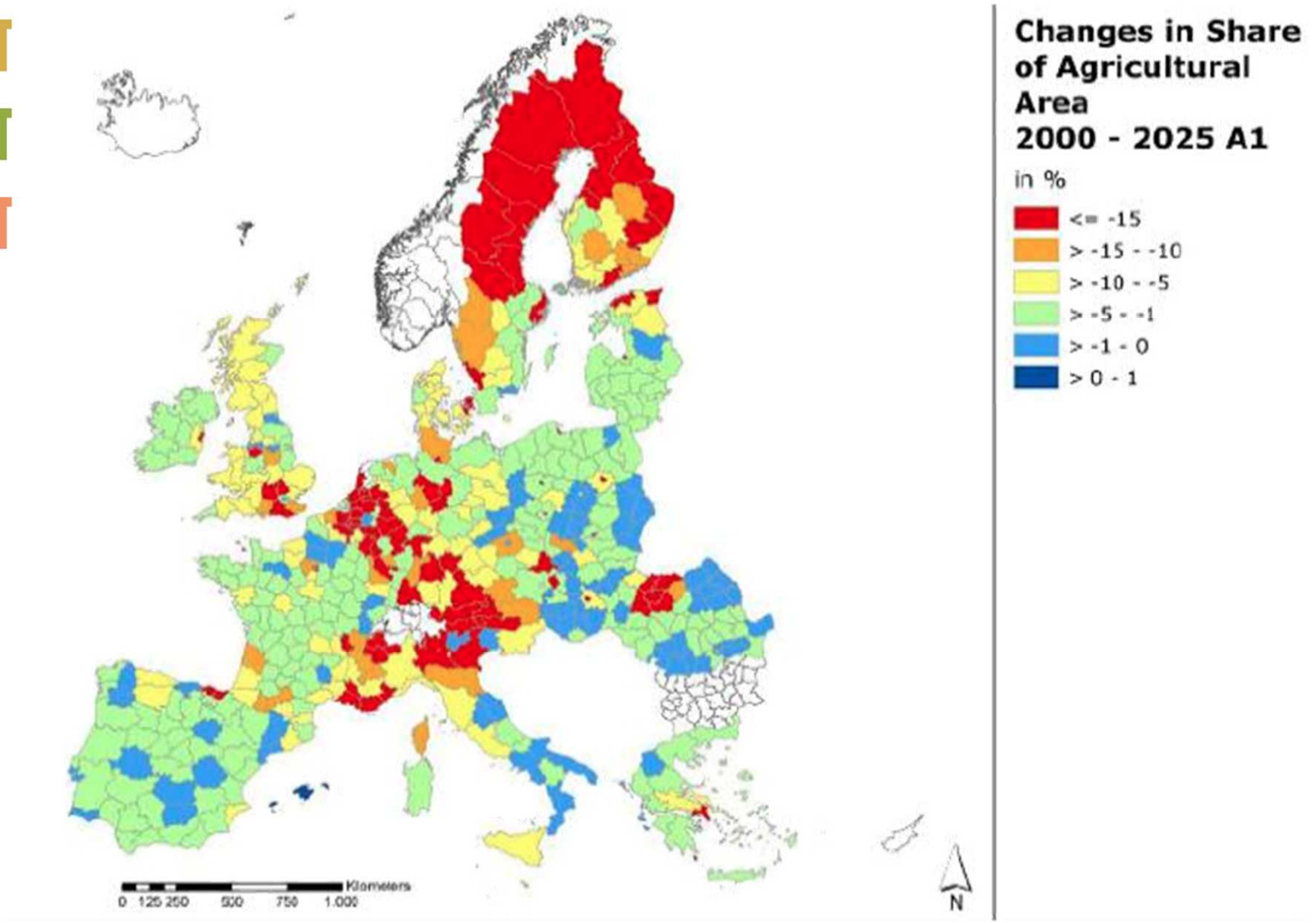

Source: Zasada, Piorr, Berges (ZALF) 2010

Loss of agricultural land in Europe in 2000-2025

Urban sprawl and biodiversity

Loss of agricultural land

Deforestation, habitat destruction, landscape and ecosystem fragmentation.

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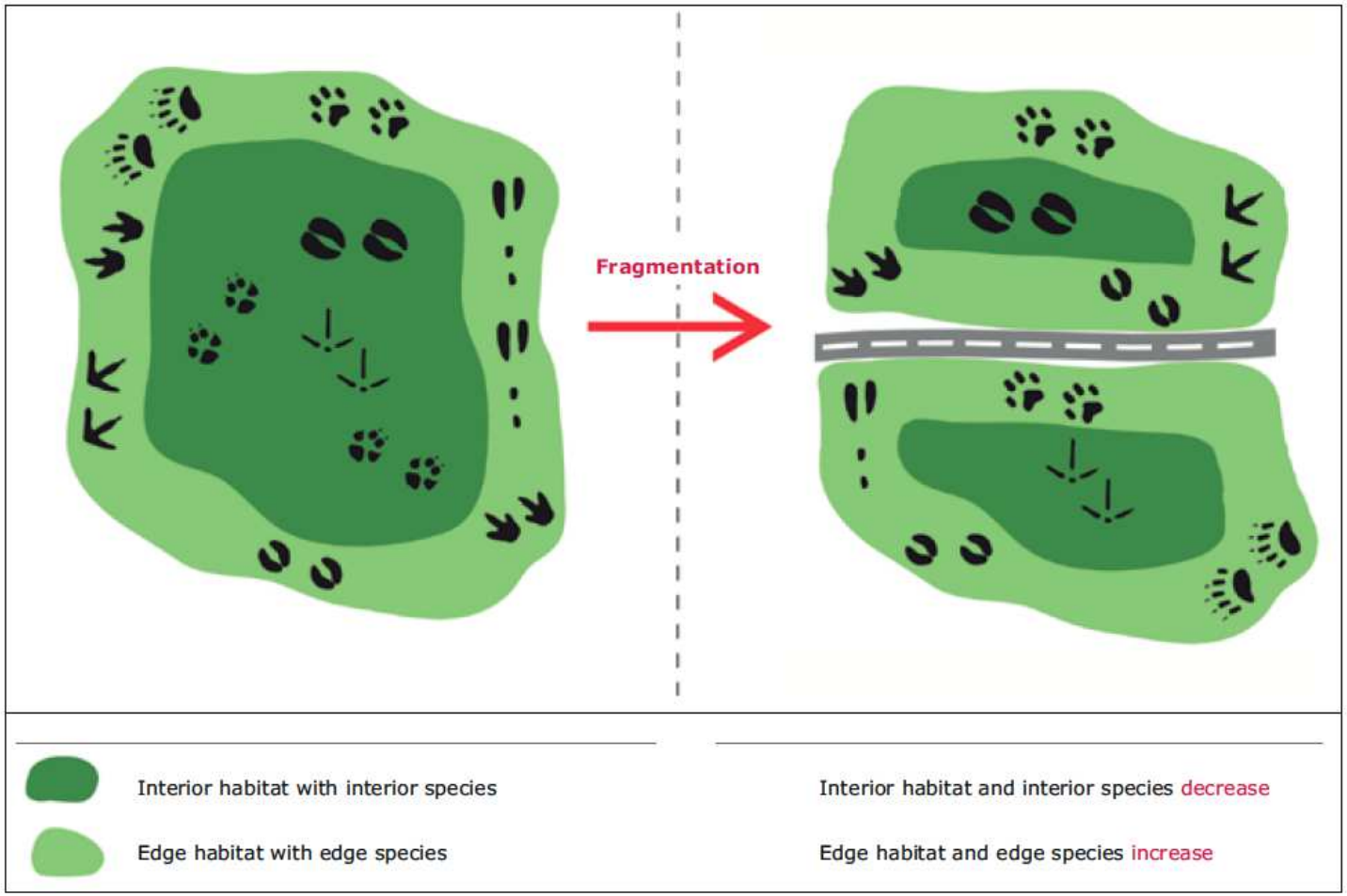
Loss of core habitat caused by road construction cutting through a patch of habitat



Note: Core habitat is strongly reduced while edge habitat increases. Interior species, i.e. species requiring core habitat (shown in dark green) cannot survive in edge habitat (shown in light shading). Edge effects extend several hundred metres from the road. As a consequence, the loss of core habitat is much larger than the surface covered by linear infrastructure. The animal footprints illustrate the presence of different species in core habitat and edge habitat.

(EEA, 2011)

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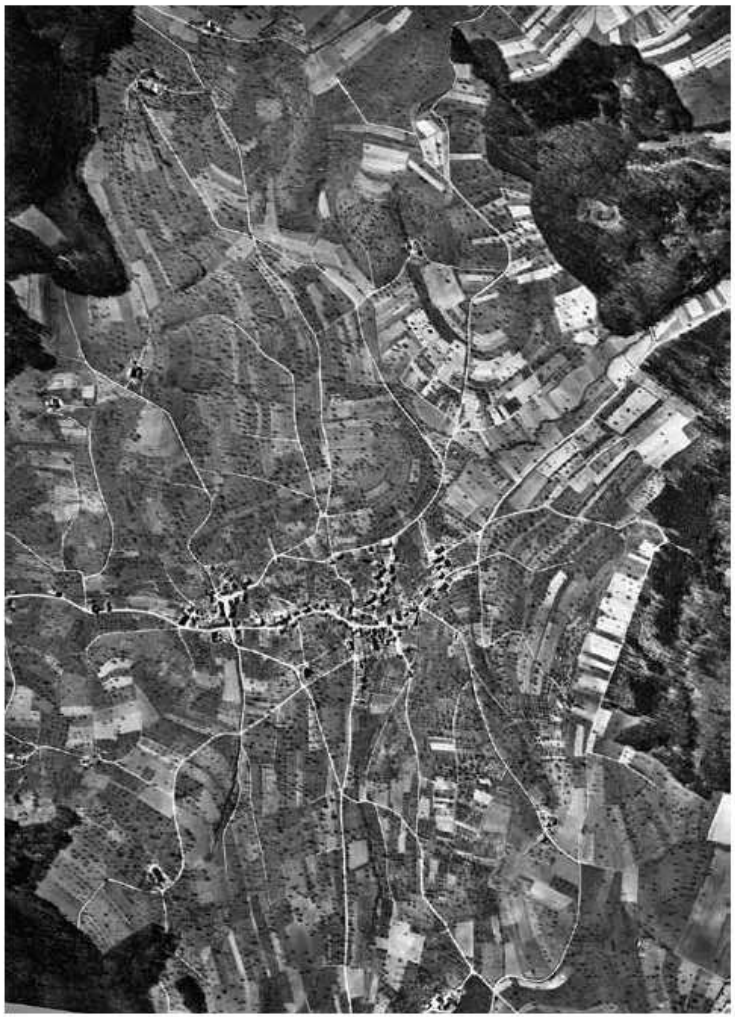
Example of landscape change from Switzerland: aerial photographs of Arisdorf (canton of Basel-country) from 1953 (left) and 1994 (right).



Note: The increase in fragmentation was caused by the motorway and growth of the built-up areas, and was intensified by reallocation of agricultural land and the removal of diverse landscape features such as fruit trees and hedgerows. In contrast, the forest areas have been strictly protected since 1902.

Source: Tanner 1999, © Federal Office of Topography swisstopo, reproduced by permission of swisstopo BA110233. (EEA, 2011)

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Biotic homogeneization

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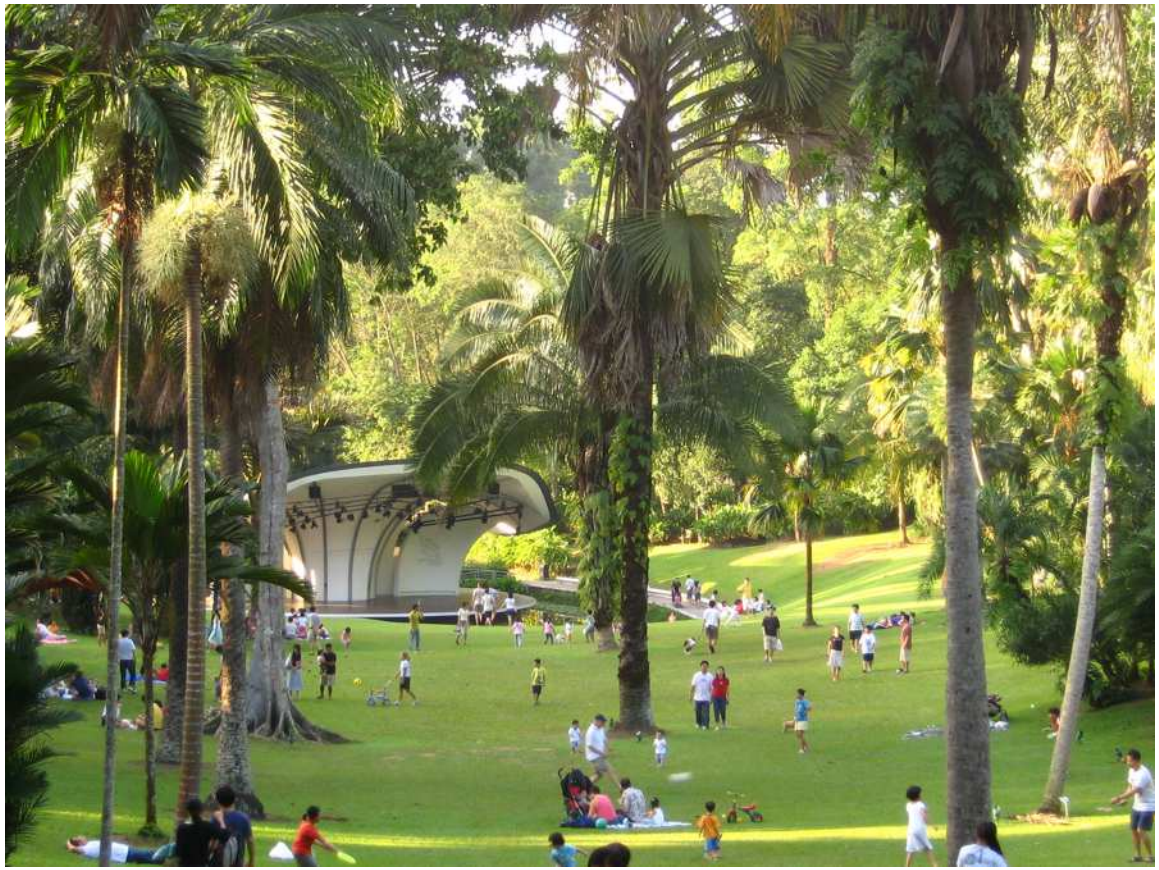
Urban biodiversity



Botanical garden - Singapore

Atlantic forrest – Rio De Janeiro

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Urban biodiversity

Rua Gonçalo de Carvalho in Porto Alegre, Brazil

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Urban sprawl and biodiversity

Loss of agricultural land

Deforestation, habitat destruction, landscape and ecosystem fragmentation.

Reduction of open spaces and greater distance between green areas

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Reduction of open spaces

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Urban sprawl and biodiversity

Loss of agricultural land

Deforestation, habitat destruction, landscape and ecosystem fragmentation.

Reduction of open spaces and greater distance between green areas

Traffic congestion and air pollution

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Increase of private car use, traffic congestion and air and water pollution

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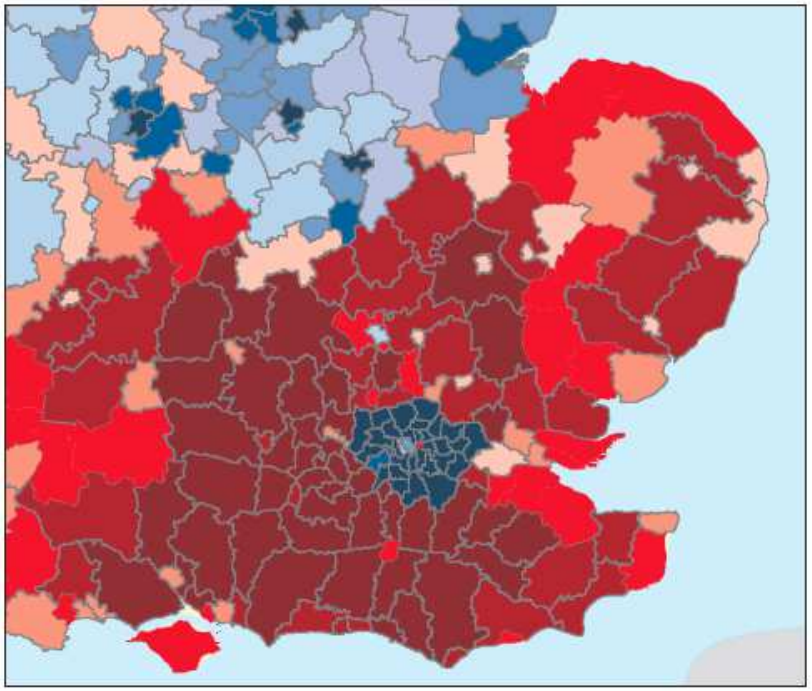
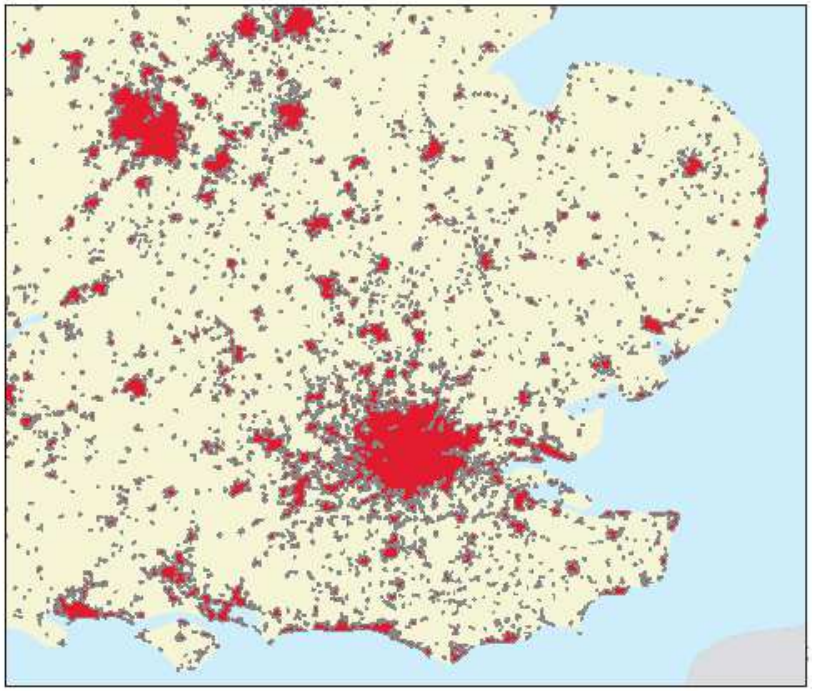
Greenhouse gas footprint per capita for transport in UK local authorities and urban-rural pattern (EEA, 2010)





Transport greenhouse gas footprint per capita, 2006

Tonnes CO_2 equivalent

1.75 5.47

Urban/rural land use pattern, 2000

Urban Morphological Zone (UMZ)

Rural background

Sources: SEI, 2009; EEA, 2000.

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Urban sprawl and biodiversity

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Reduction of open spaces and greater distance between green areas

Traffic congestion and air pollution

Soil sealing and increased flood risk

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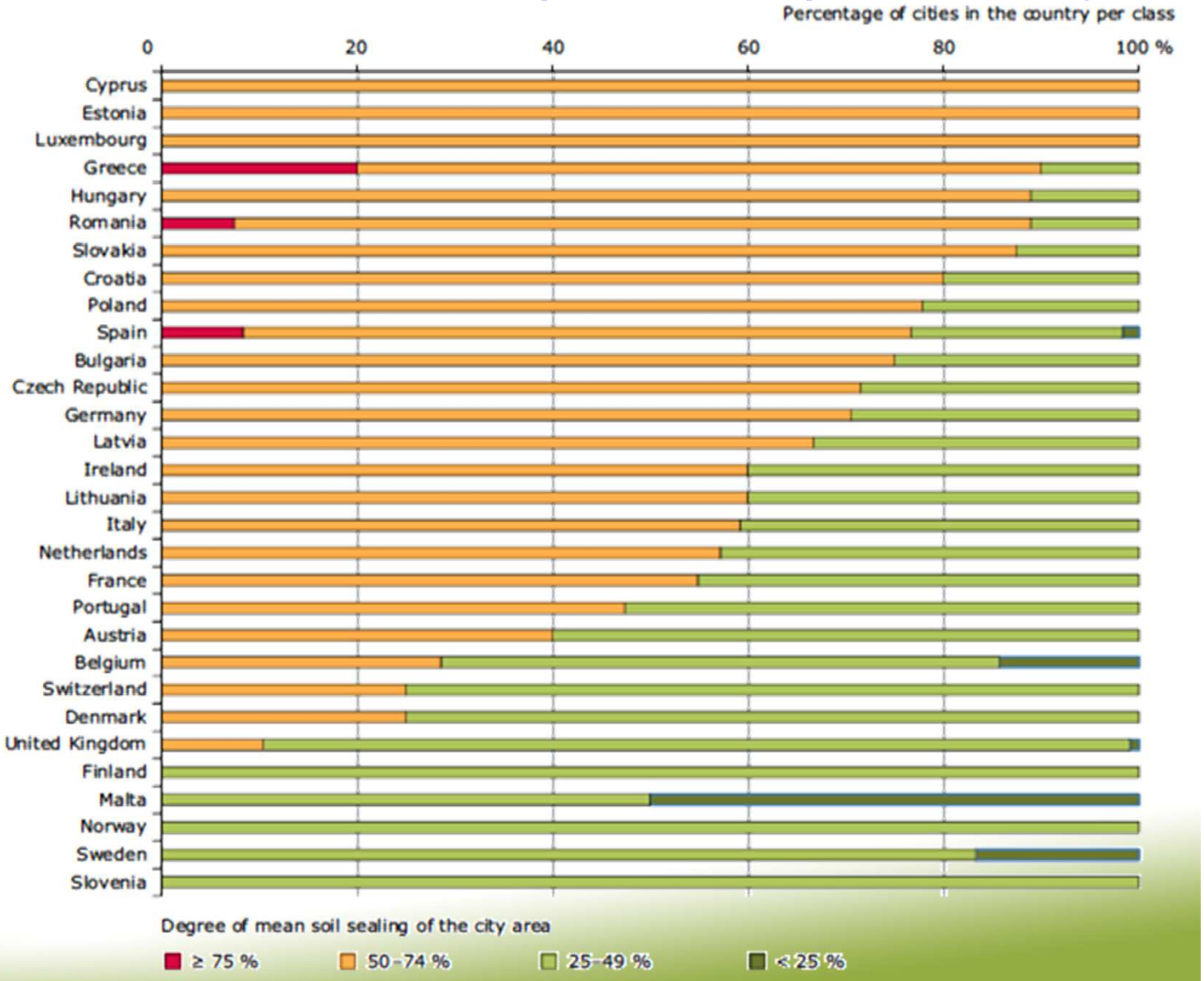
Degree of mean soil sealing per city – share of cities per class per country



(EEA, 2012)

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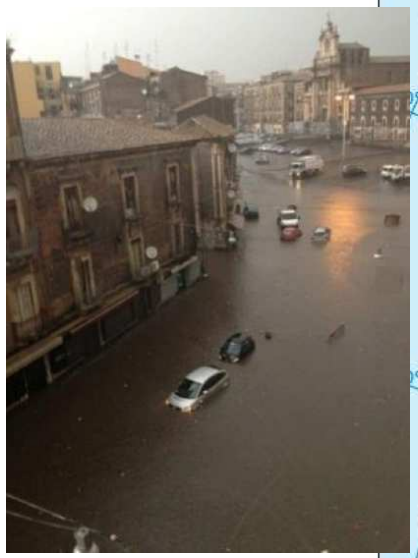
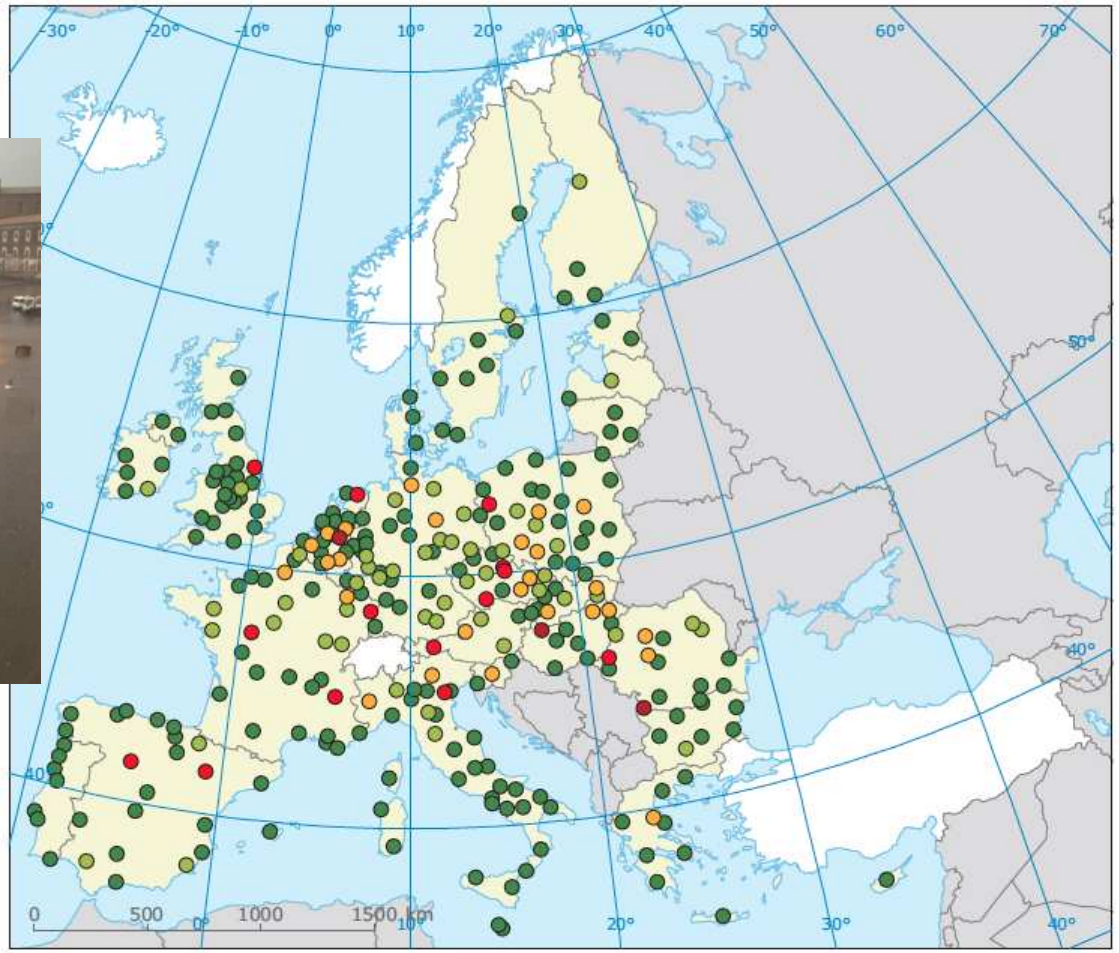
Exposure to flood risk under climate change





Flood risk in European cities

Percentage of population living on urban land exposed to potential floods under climate change scenario A2 (high emission)

- < 3 %
- 3–6 %
- 6–10 %
- 10–20 %
- > 20 %
- No data
- Outside data coverage

(EEA, 2010)

Note: Per city, the population living in the Larger Urban Zone as described in the Urban Atlas/Urban Audit definition (GMES, 2010 and Eurostat, 2010) is considered. The calculation uses the population distribution on urban land-use classes from Corine land cover 2000. Furthermore, neither coastal floods nor flood protection measures are considered in the calculation. Based on the hydrological model LISFLOD.

Sources: Dankers and Feyen, 2008; Dankers and Hiederer, 2008; Dankers, Feyen and Christensen, 2009; Gallego, 2010.

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Urban sprawl and biodiversity

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Urban Heat Island

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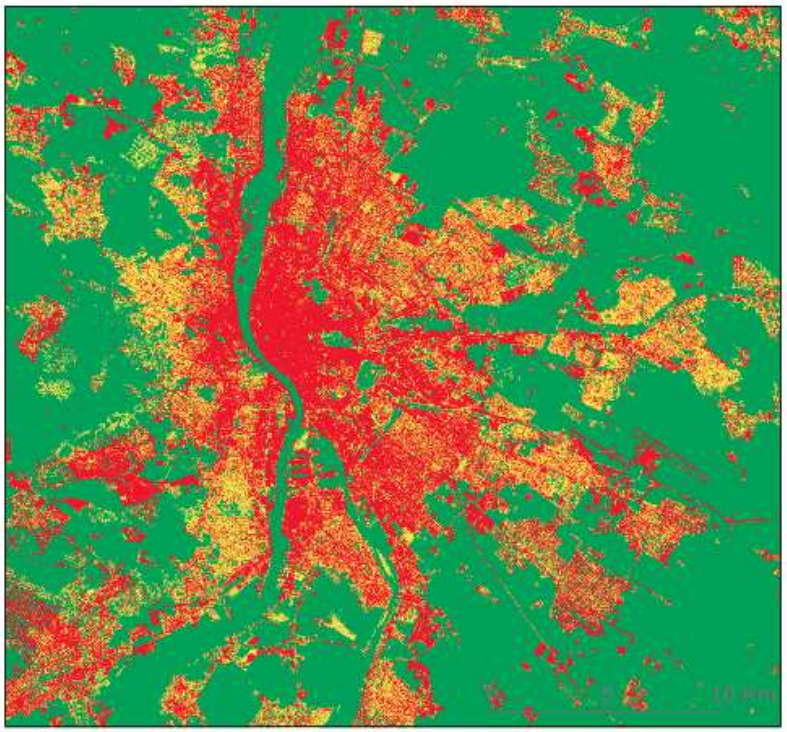
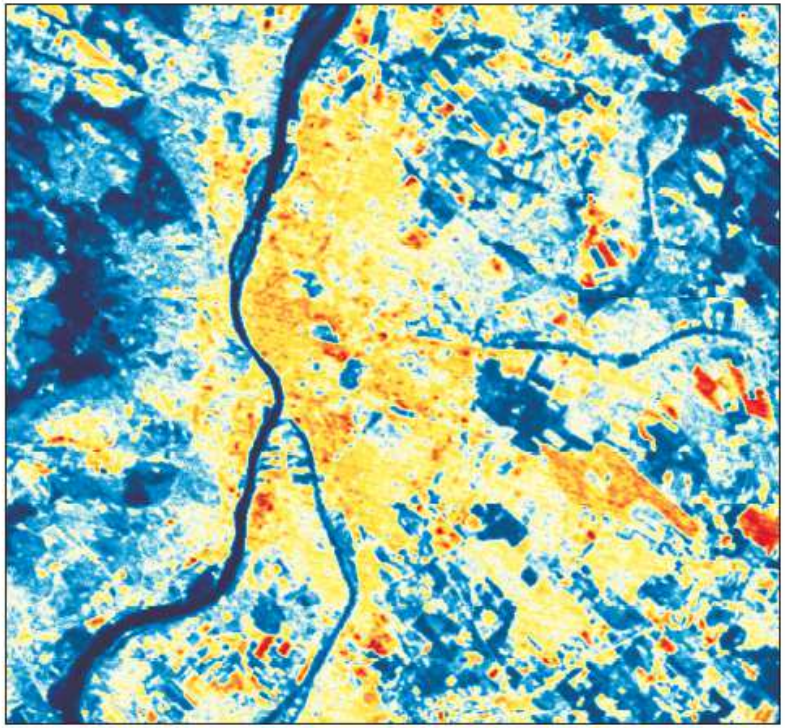
Urban Heat Island: soil sealing and surface temperatures in Budapest Hungary, (EEA, 2010)





Degree of soil sealing (impermeability) of Budapest, 2006

Degree of soil sealing (%)

0 30 50 80 100

Surface temperature of Budapest, 1 August 2005, 9:30 CET

Temperature (°C)

≤ 15 16 19 22 25 28 31 34 35 36 37 40 43 ≥ 45

Source: EEA, 2010c; Ongjerth et al., 2007; Gábor et al., 2008.

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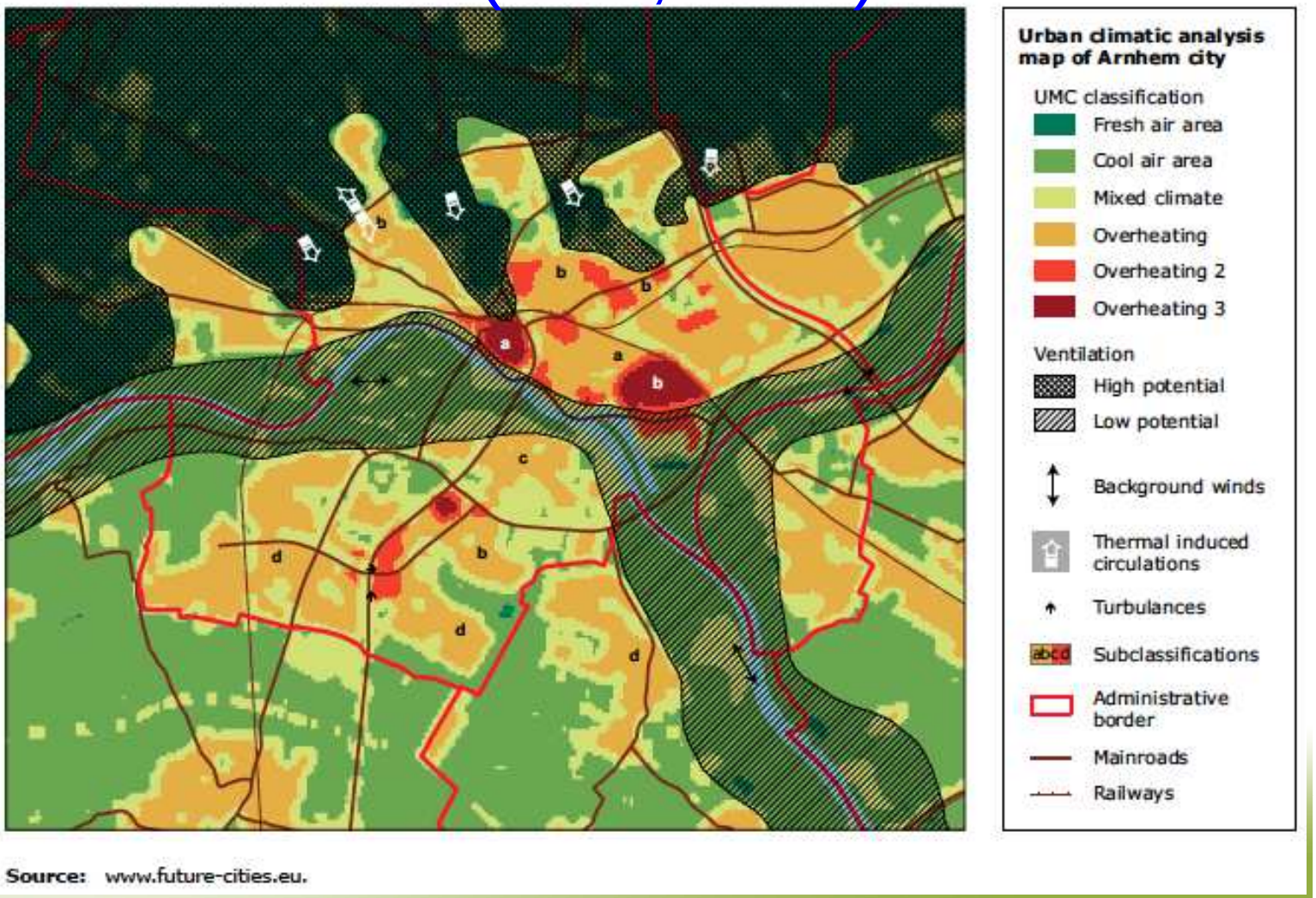
Urban climate analysis map for the city of Arnhem, the Netherlands (EEA, 2012)



Source: www.future-cities.eu.

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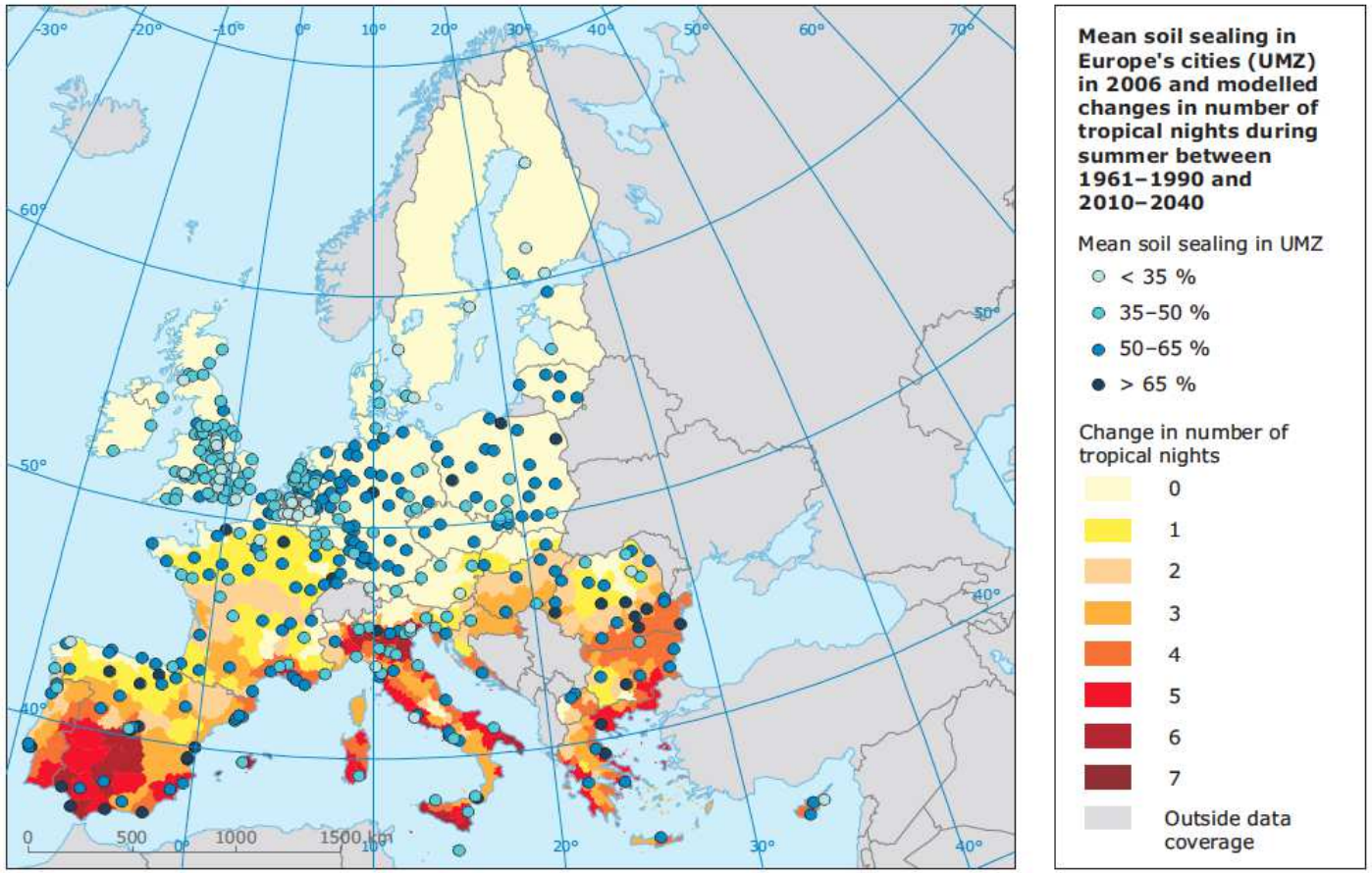
Mean soil sealing in Europe's cities in 2006 and modelled change of number of tropical nights (>20° C) during summer between 1961-1990 and 2010-2040 indicating higher risks of heat waves



Source: Dankers and Hiederer, 2008; EEA, 2010c.

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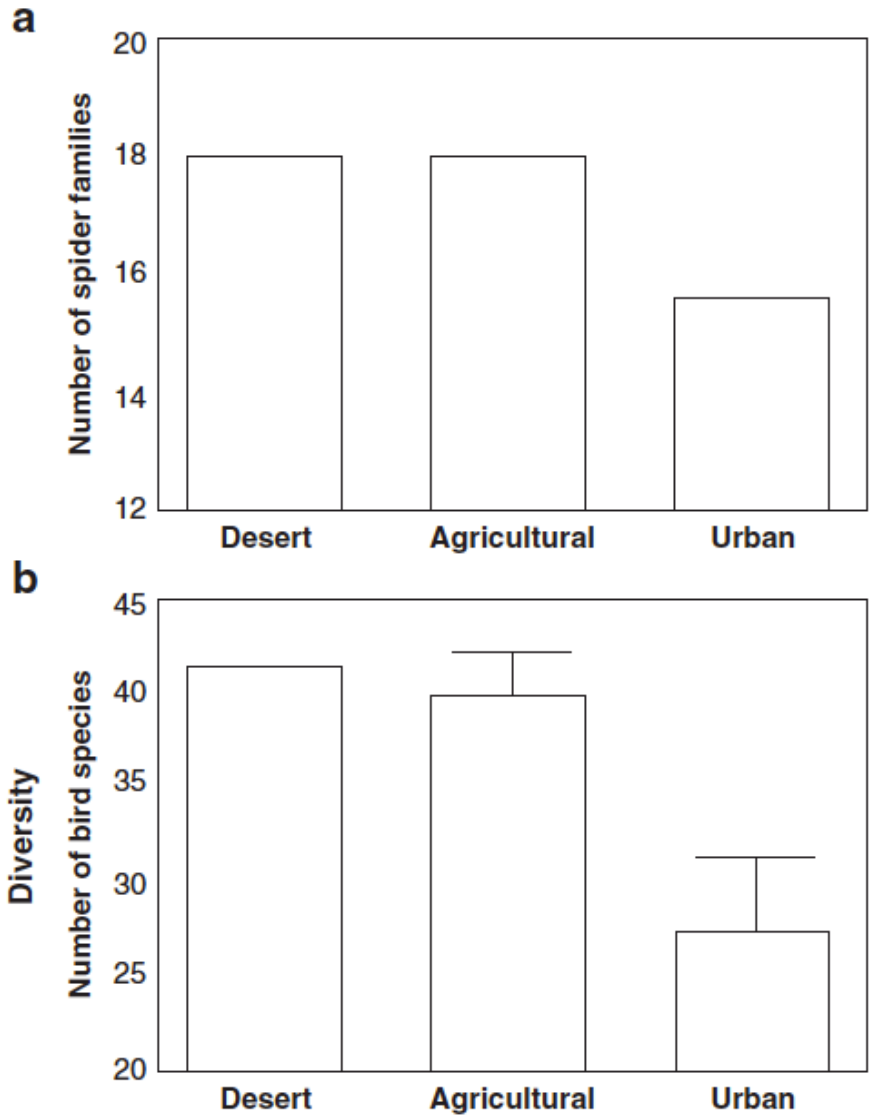
Cities and biodiversity

Biological diversity in wildland, agricultural and urban habitats (Shochat et al., 2010). In Arizona, agricultural land retains spider and bird communities that are as rich as in the sonoron desert, whereas biological richness declines in the urban habitat.



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Urban ecosystems

Urban ecosystem are artificial and offer specific habitat conditions.

Biodiversity in the urban environment is highly specific and varies in relation to human pressure and activities.

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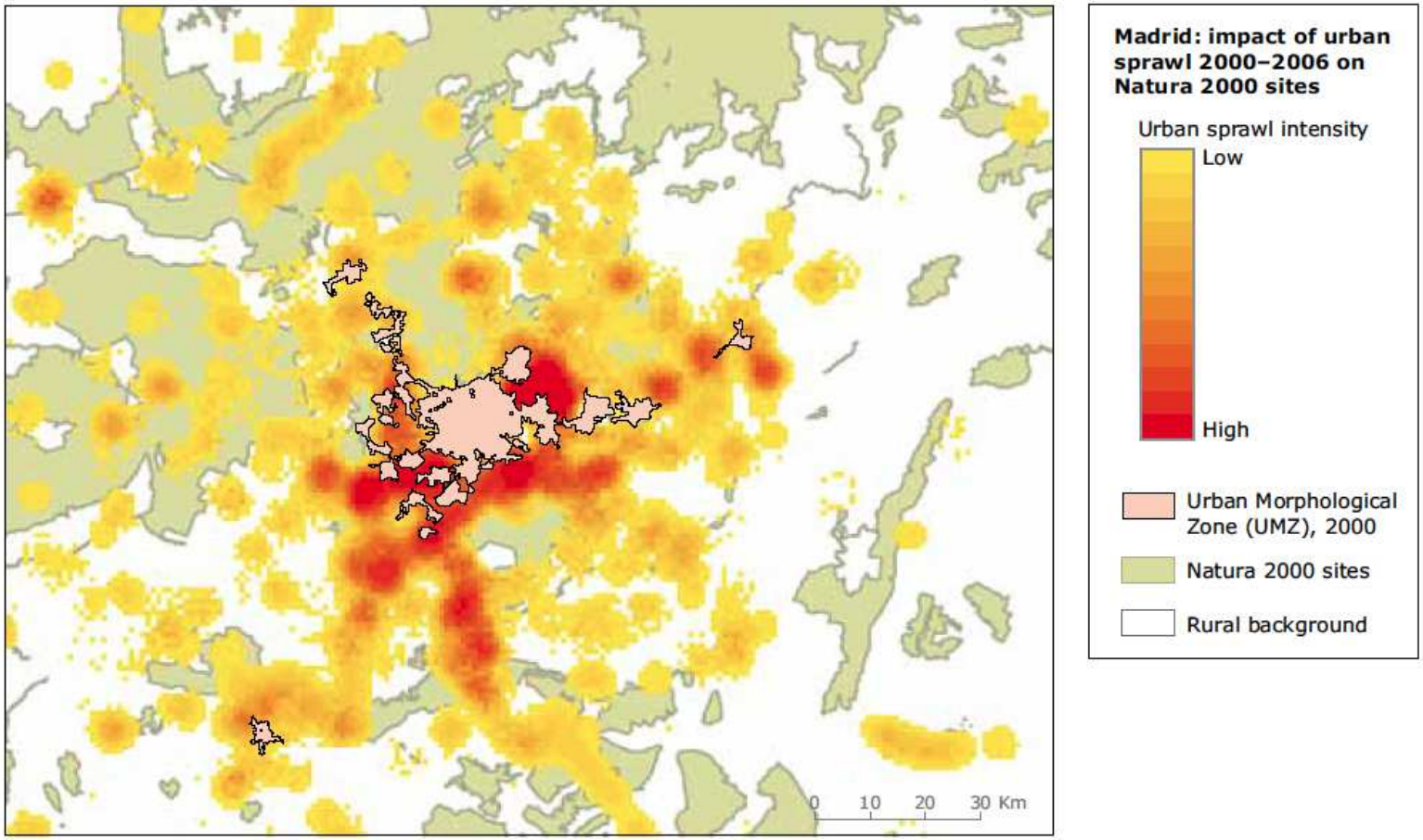
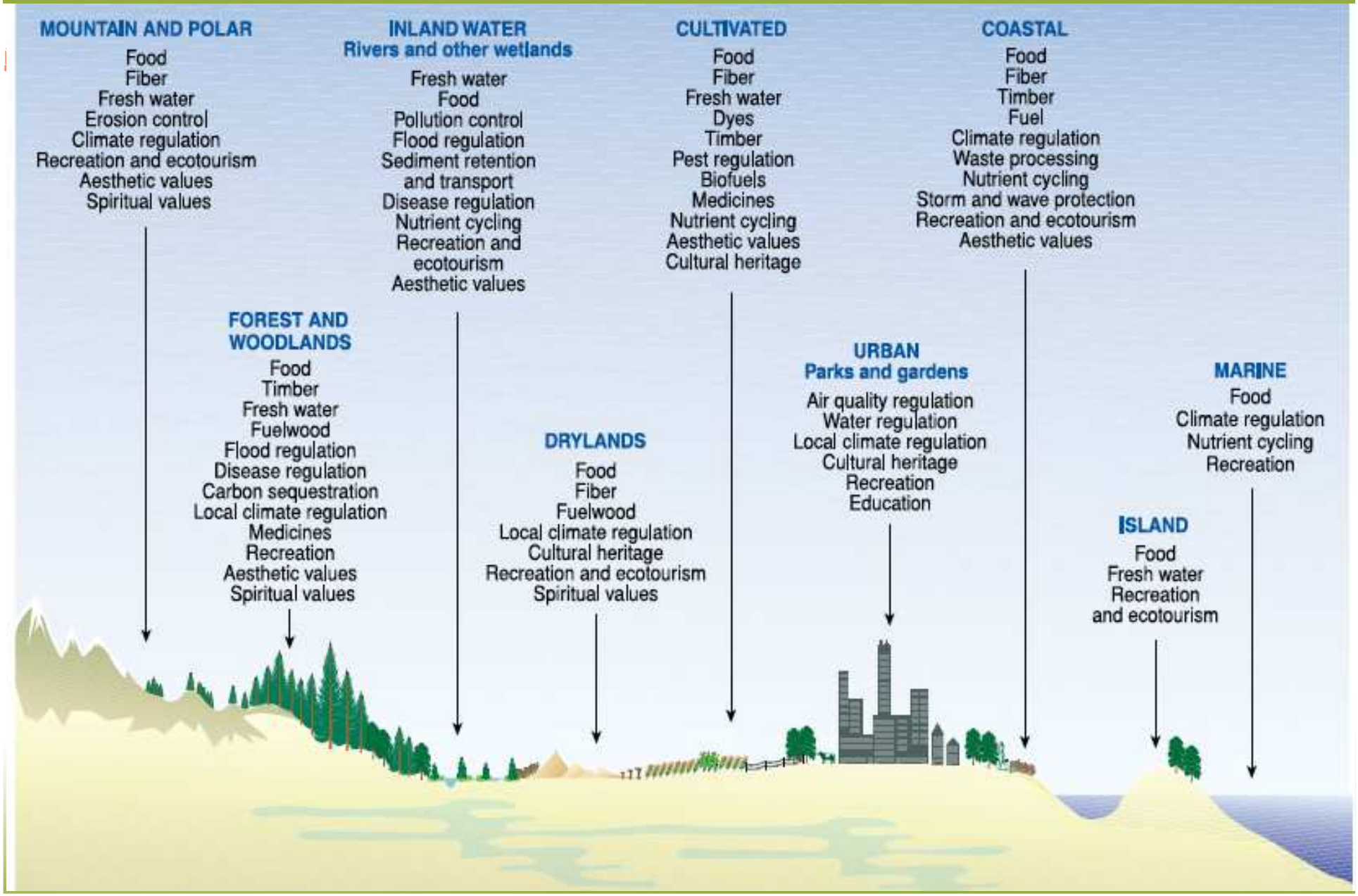
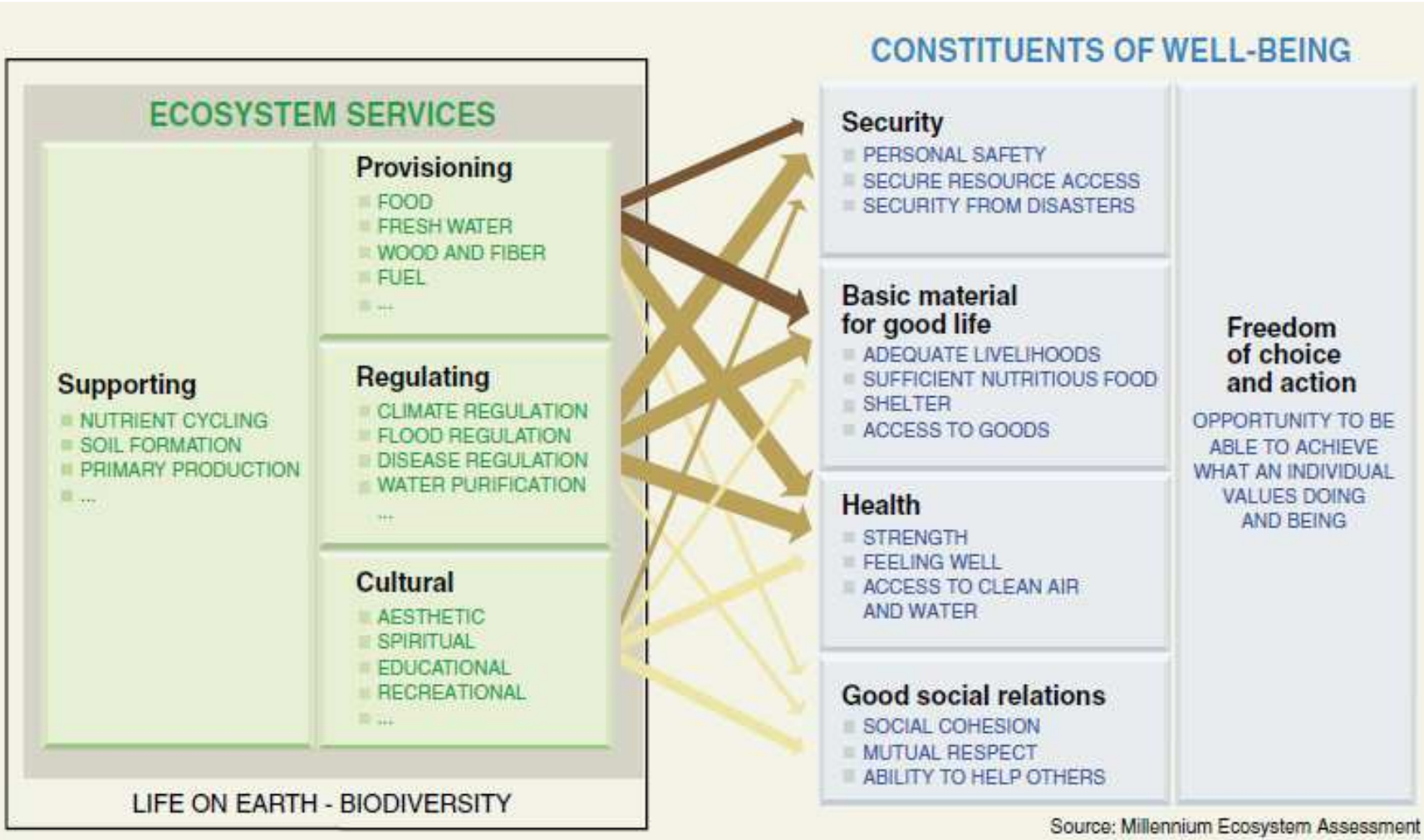
Urban ecosystems: impact of urban sprawl 2000-2006 in Madrid Natura 2000 sites



Note: UMZ denotes 'urban morphological zone', i.e. built-up areas of Madrid situated no more than 200 m apart from each other (see EEA, 2006).

Biodiversity and ecosystem services (Millennium Ecosystem Assessment, 2005)





Source: Millennium Ecosystem Assessment

Ecosystem services and well-being

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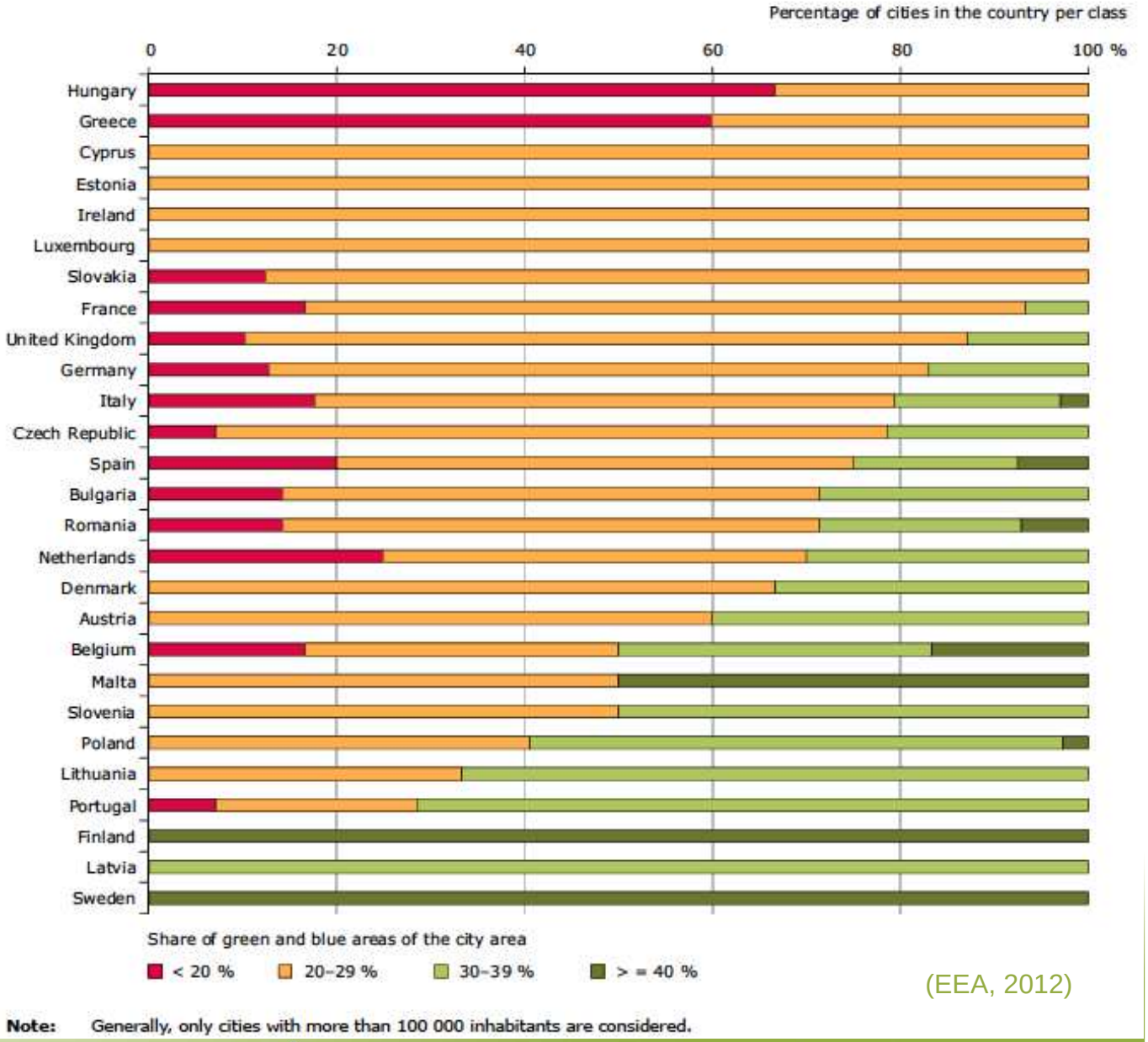
Urban green in EU



(EEA, 2012)

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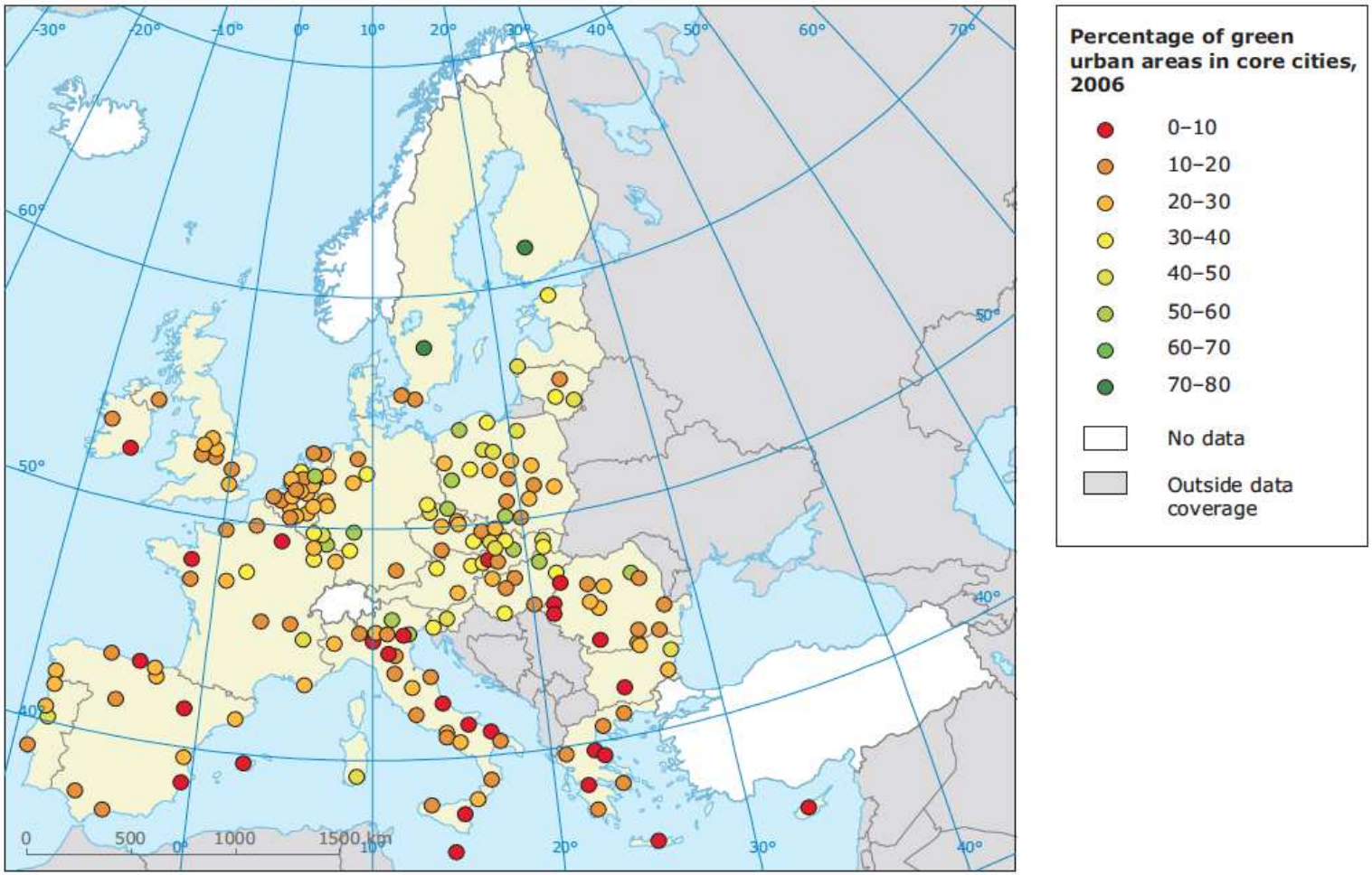
Share of green urban areas in EU cities in 2006



Note: Cities are core cities following the Urban Audit definition (Eurostat, 2010). In most cases the delineation of the core city matches the urban built-up area. But in some cases the delineation also includes substantial areas outside the urban built-up areas (parts of the urban fringe and hinterland); in other cases, it includes only city centres (for more explanation, see also Map 1.1).

Source: Urban Atlas (GMES, 2010), 171 available cities.

(EEA, 2010)

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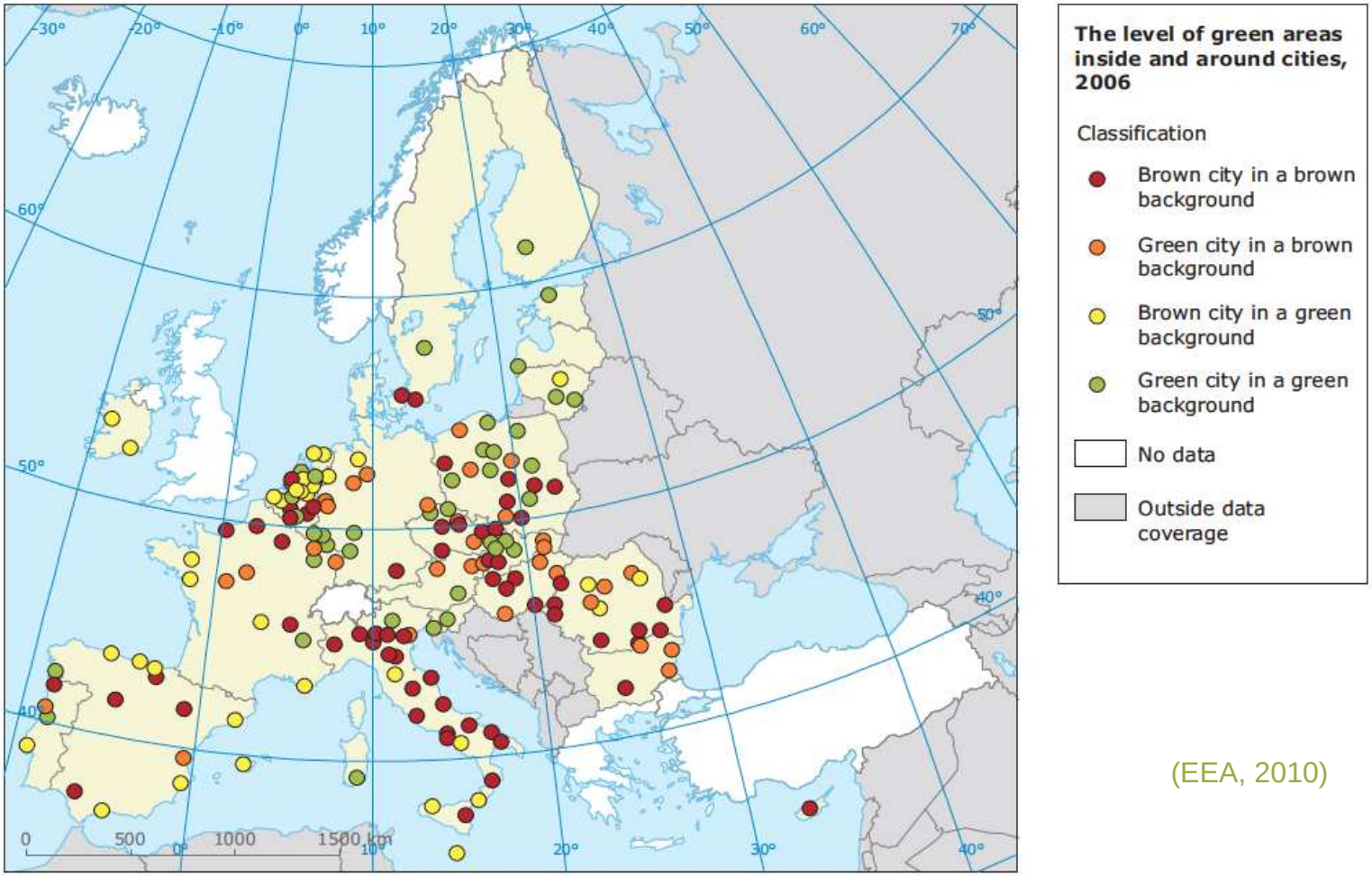
Quality of green areas inside and around cities in 2006



(EEA, 2010)

Note: 'Brown' considers cities with a below average share of green urban areas or green background while 'green' signifies above average. As noted for Map 2.3, different urban delineations might also influence some values of the urban background.

Source: Urban Atlas (GMES, 2010) (171 available cities) and Corine, 2006.

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Urbanization and biodiversity: Bullet Points

- World urban population is greater than rural one and expected to grow in coming years;
- Cities are growing mainly in world biodiversity hotspots
- City growth causes agricultural lands reduction, deforestation and habitat loss, reduction of open spaces, pollution and soil sealing, overall resulting in lower climate resilience and biodiversity loss.