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Learning Network for
Sustainable Neighborhoods in Vietnam

LNSNV

Some guidelines for applying ecosystem-services in urban planning

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Ecosystem Services:

The set of services for free that 'nature' is offering to our society :

After HASSAN, 2005 ; MEIRE en VAN DYCK, 2014, etc. ...

Producing and providing services:

*Food and fibres,
Fuel,
(Building)materials,
Fresh water,*

Regulating services:

*Carbon sequestration,
Climate regulation,
Erosion- and flood-control,
Water regulation and
-purification,
Disease control ,
Pollination, ...*

Cultural services:

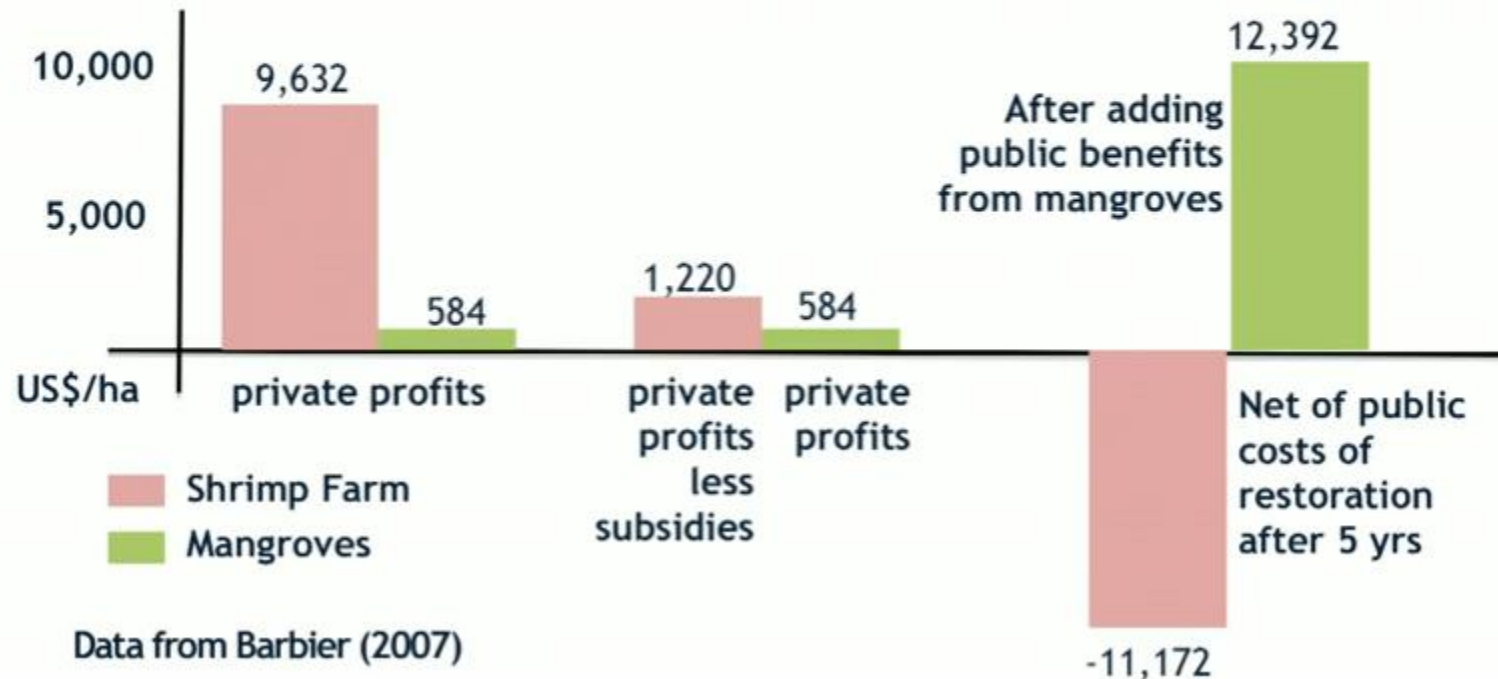
*Inspiration,
Aesthetic, Spiritual,
Educational,
Recreation,
Health ,...*

Supporting services (necessary for services above)

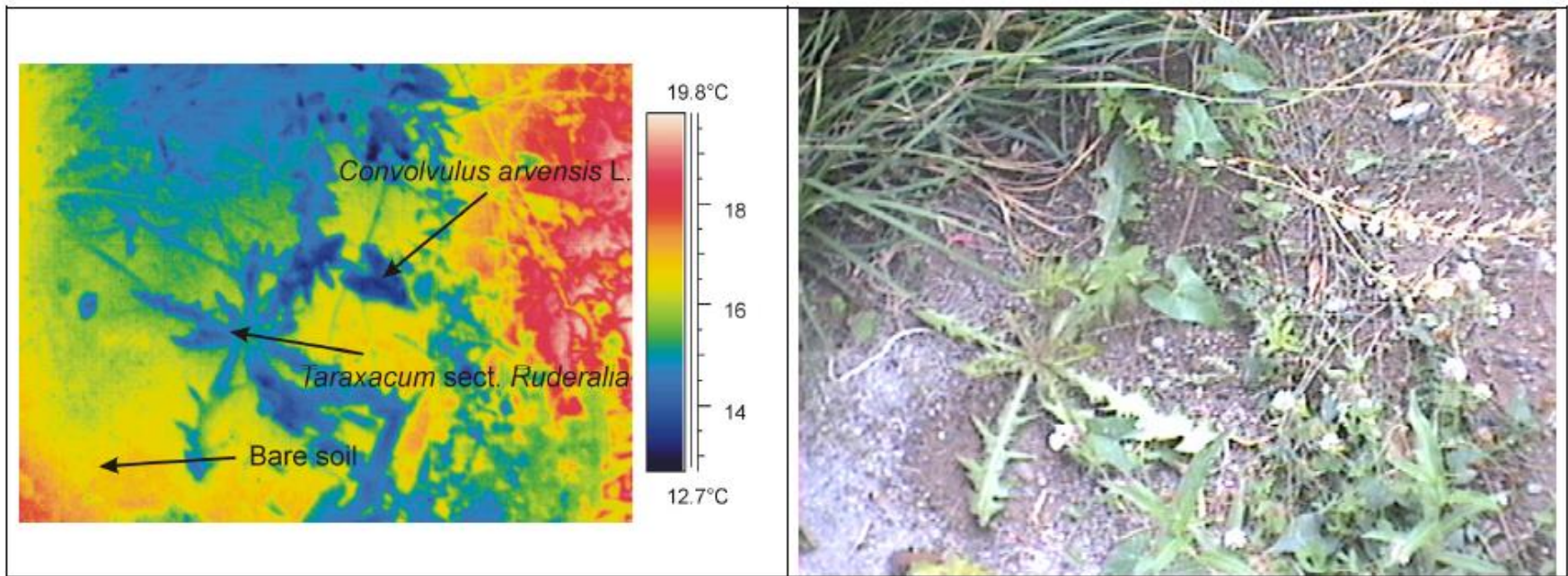
*Photosynthesis (C-cycling), Nutrient cycling (N, P, K, ...)
Water cycling, Biodiversity, Soil formation,*

Example: Replacing mangroves by shrimp farms: Poor private profits linked with huge losses of public benefits (Thailand)

Private Profits, Public Losses Shrimp farms in Thailand



One ecosystem service in detail: The cooling effect of vegetation.



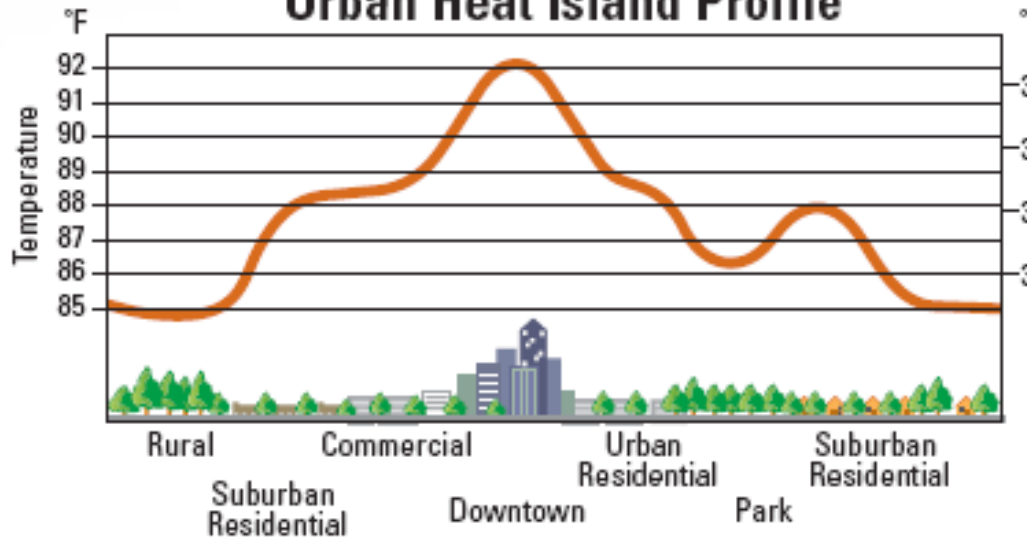
Infrared spectrum

Visible spectrum

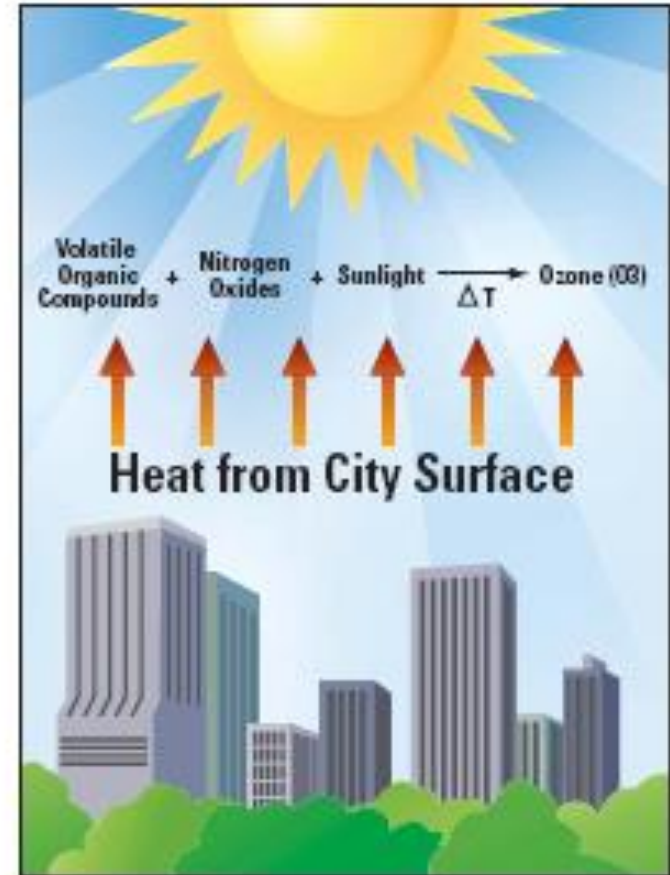
Fig. 7 Photographs of thin vegetation in the infrared spectrum and in the visible spectrum. The bare surface of the ground is visibly warmer than the surface of the leaves cooled by transpiration. (Třeboň, Czech Republic, 12 July 2002, 10:00 hrs).

The urban heat island effect caused by poor blue-green areas within cities.

Urban Heat Island Profile



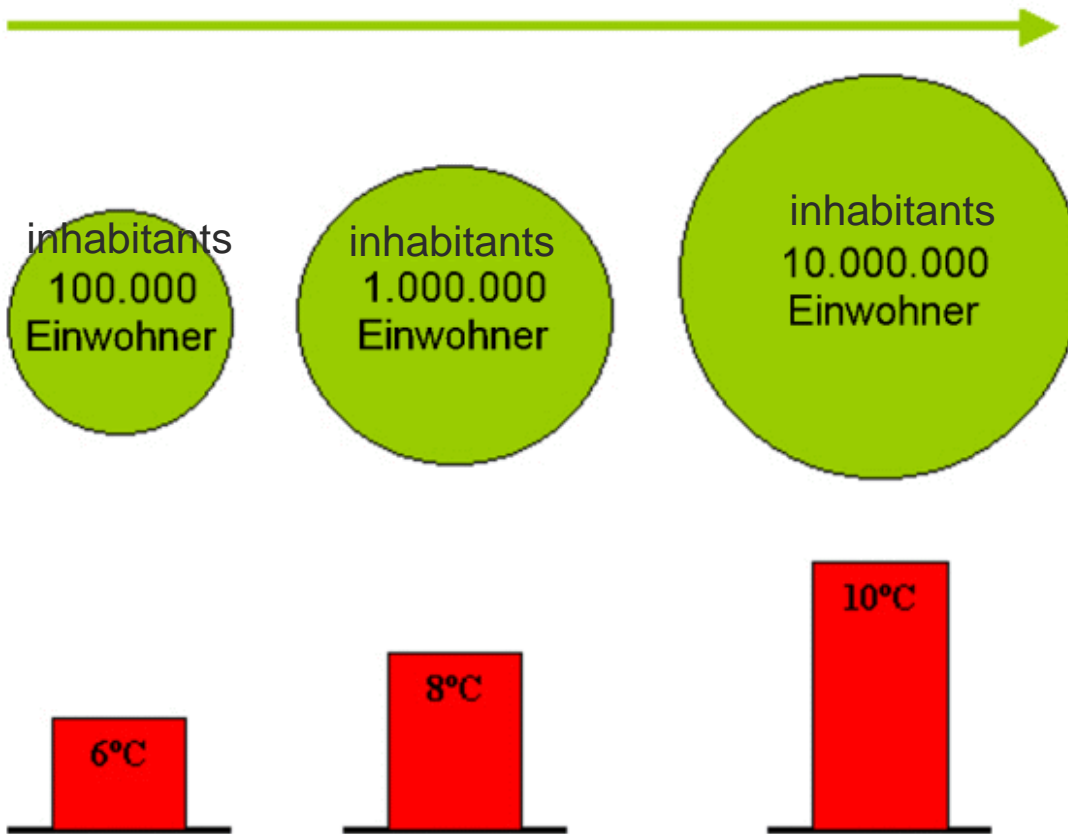
Heat islands are often largest over dense development but may be broken up by vegetated sections within an urban area.



Ozone forms when precursor compounds react in the presence of sunlight and high temperatures.

<http://www.epa.gov/heatislands/resources/pdf/HIRIbrochure.pdf>

City size



The impact of the urban heat island effect is depending on the *number of citizens*, on the *size of the city*, on the *amount of blue-green areas* and on *concentric city-expansion*.

This has little to do with temperature *averages* but deals with increasing *extremes*.

Grafik: Anita Bokwa, Pawel Jezioro
(From S. Lippke, 2010)

Some Asian examples.

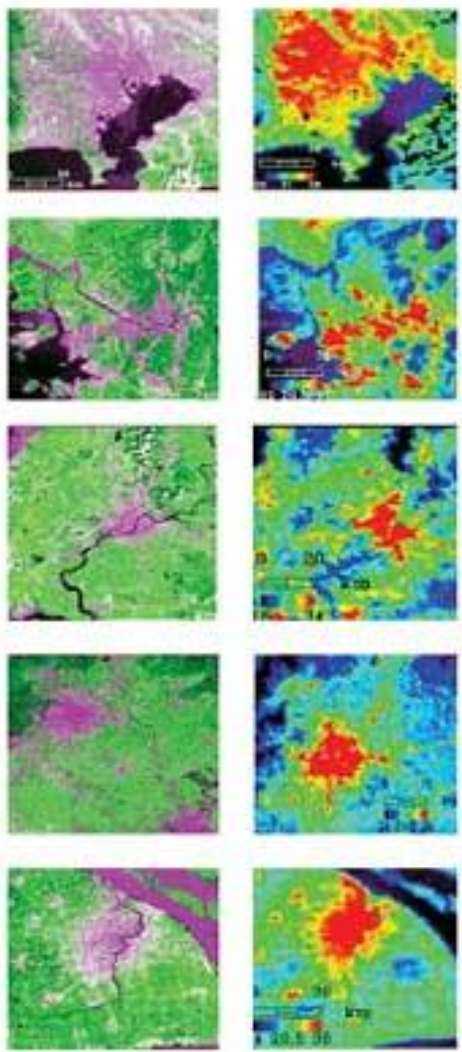
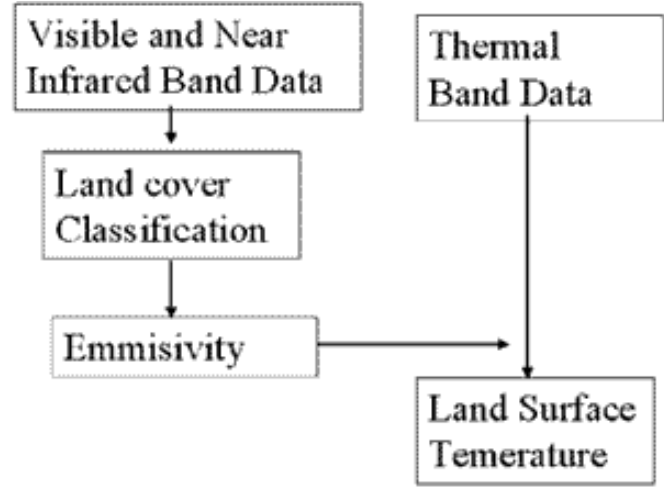


Fig-3 Visible band and thermal band for the study sites (Tokyo, Seoul, Pyongyang, Beijing and Shanghai, from top)

Monitoring Urban Heat Environment in East Asia, Shiro Ochi et al, Institute of Industrial Science, University of Tokyo

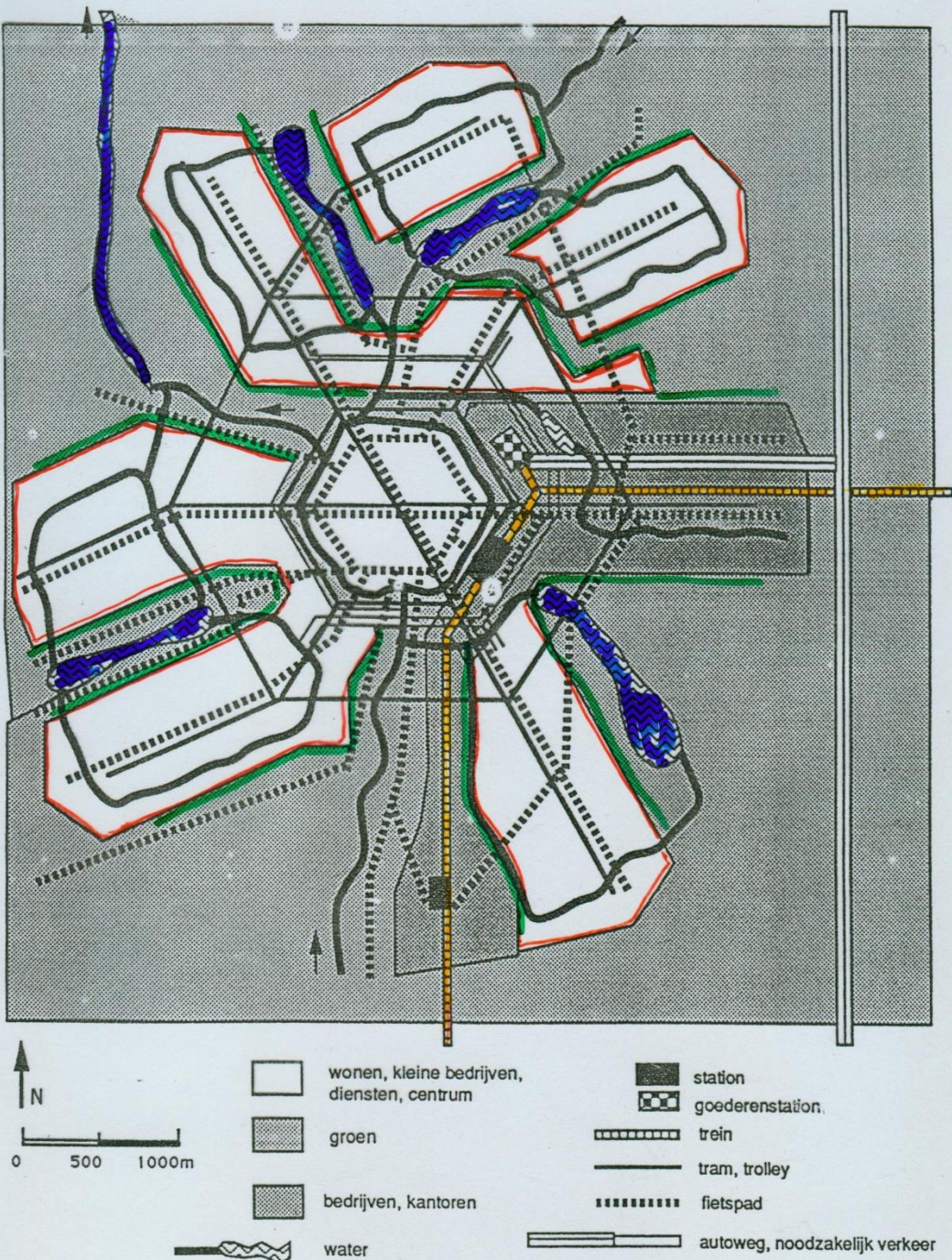
Source: <http://www.gisdevelopment.net/application/urban/overview/urbano044pf.htm>

There is a Solution:
Building cities following
the lobe-city model.

Compact high-dynamic city
lobes (fast lane)

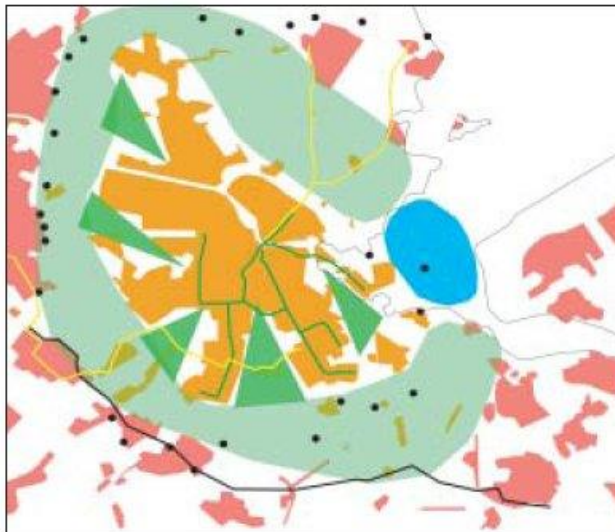
Separated from each other by

Low-dynamic blue-green
fingers (slow lane)



From Tjallingii, 1996

In lobe-cities the blue-green fingers are penetrating deep into the city-centre.



De Amsterdamse lobbenstad ligt een
zone. Daaromheen ontstaat langzamer-
en krans met bebouwing, een
amde kranstad.
Amsterdam 'finger city' is surrounded by
belt. A garland of construction is
ly appearing around it, a so-called
city.

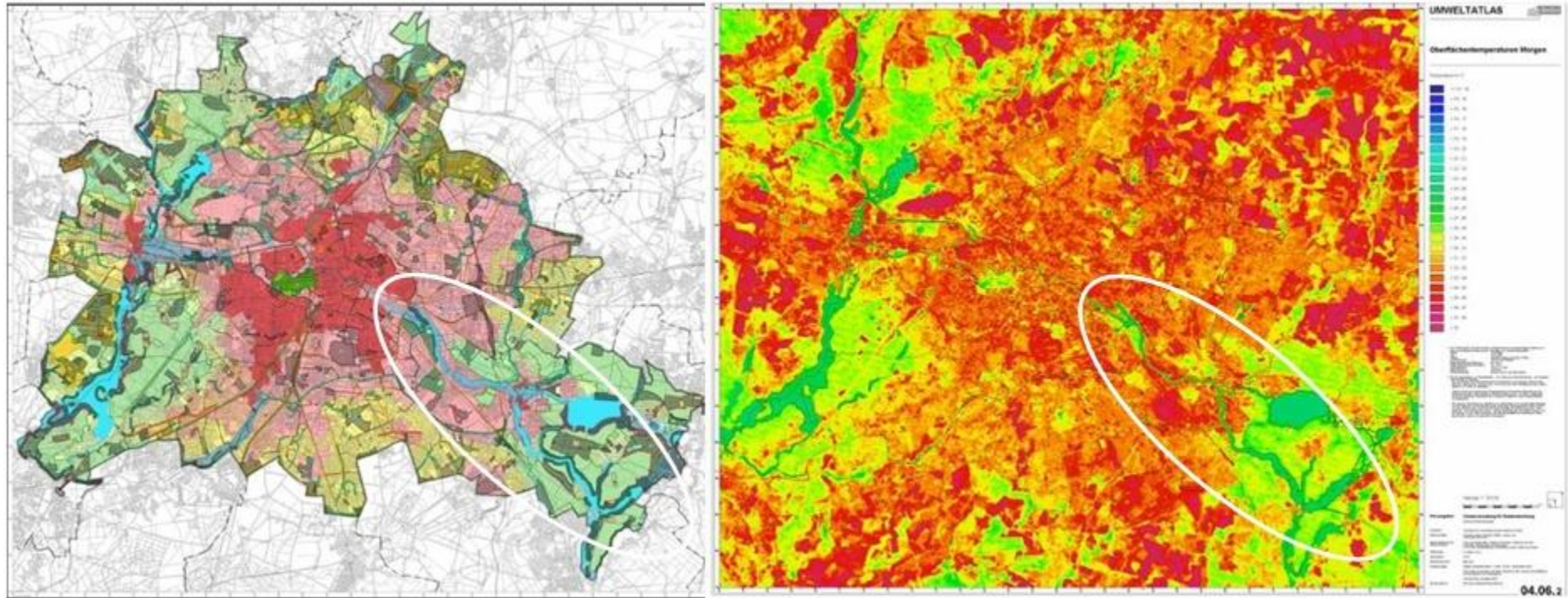


Amsterdam (750,000 inhabitants ;
The Netherlands). From Gieling, 2006

The lobe-city model

- The lobe-city model was developed in the first half of the 20th century.
- To varying degrees, this model was used in Denmark for the “fingerplan” in Copenhagen (Denmark) (1948), the general plan to extend Amsterdam (The Netherlands) (1935) and in cities such as Hamburg, Köln (1927), Berlin, Tübingen, Stuttgart (Germany) and Stockholm (Sweden). Etcetera
- Also the planners developing Shanghai Dongtan (China) as an eco-city, use the concept of blue-green fingers.

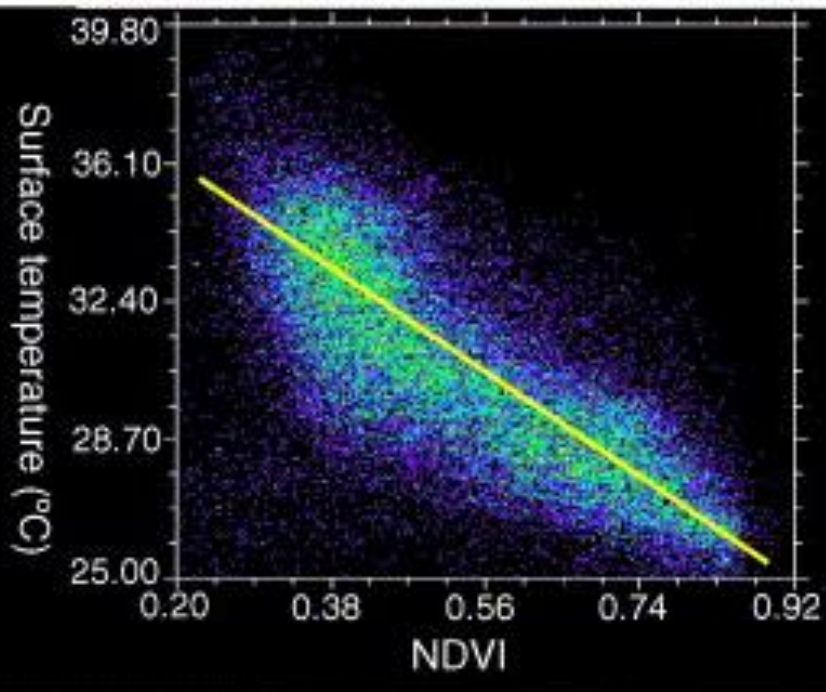
The blue-green fingers are tempering the heat island effect in Berlin (3,400,000 inh. ; Germany)



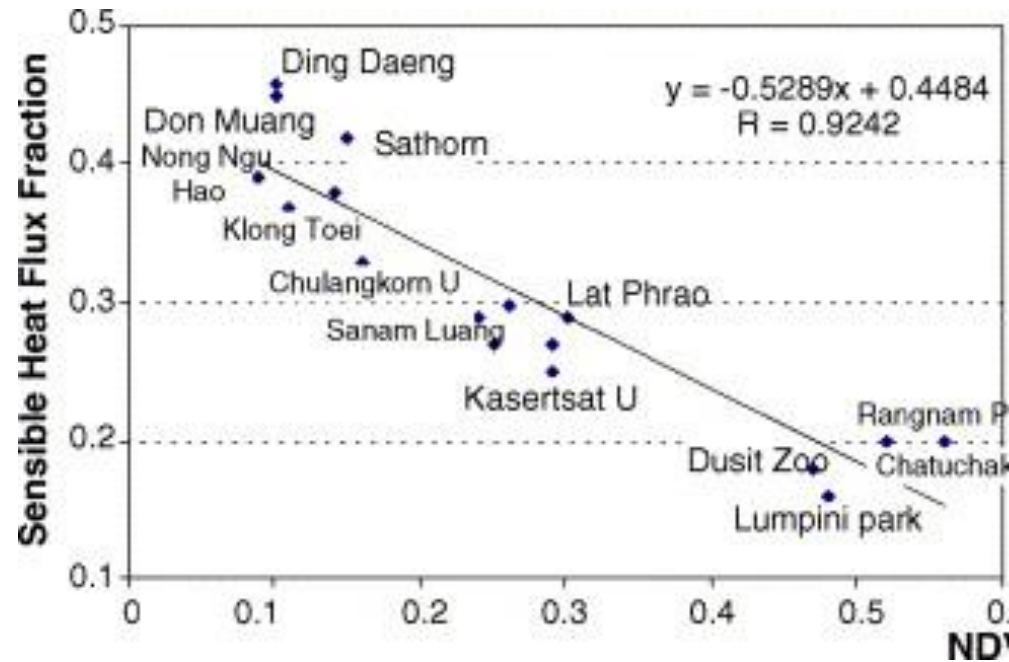
Infrared picture of hot city-lobes and cooler blue-green fingers of the city Berlin. (Cloos, 2006)

Effects of vegetation: The example of Bangkok

(International Journal of Applied Earth Observation and Geoinformation Volume 8, Issue 1, January 2006, Pages 34–48)



Scatterplots of day-time surface temperature vs. vegetation index for Bangkok in February 2002.



Effects of vegetation cover on the sensible heat fluxes in 18 sampled Bangkok's neighborhoods.

Source: Assessment with satellite data of the urban heat island effects in Asian mega cities, by Hung Trana, et al, Daisuke Uchihama, Shiro Ochiai, Yoshifumi Yasuokab

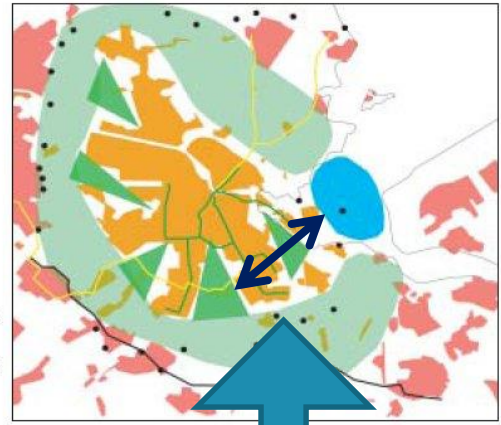
Advantages of a lobe-city city expansion.



Cross-section
Built-up city-lobe - bluegreen finger



► Rond de Amsterdamse lobbenstad ligt een groenzone. Daaromheen ontstaat langzamerhand een krans met bebouwing, een zogenaamde kransstad. The Amsterdam 'finger city' is surrounded by a green belt. A garland of construction is gradually appearing around it, a so-called garden city.



Cross-section of a lobe-city

The finger plan of Copenhagen (DK)



Finger Plan (Local Plan Office for Greater Copenhagen, 1947)
http://www.pashmina-project.eu/doc/PASHMINA_D2.3.pdf

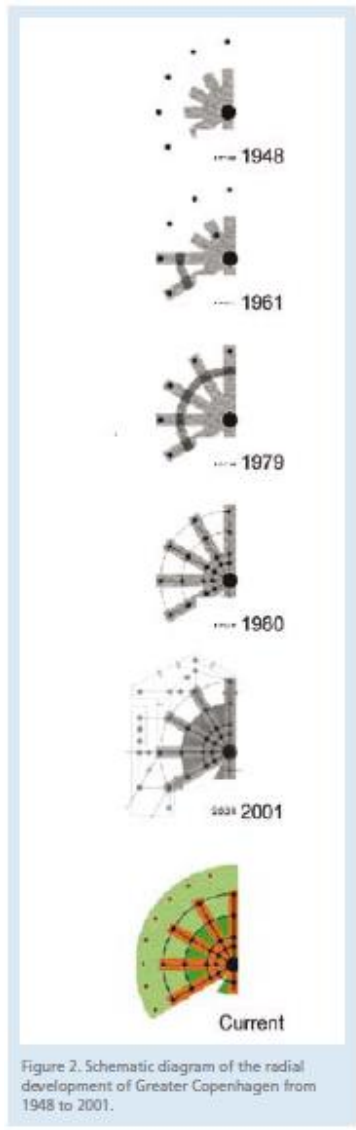


Figure 2. Schematic diagram of the radial development of Greater Copenhagen from 1948 to 2001.

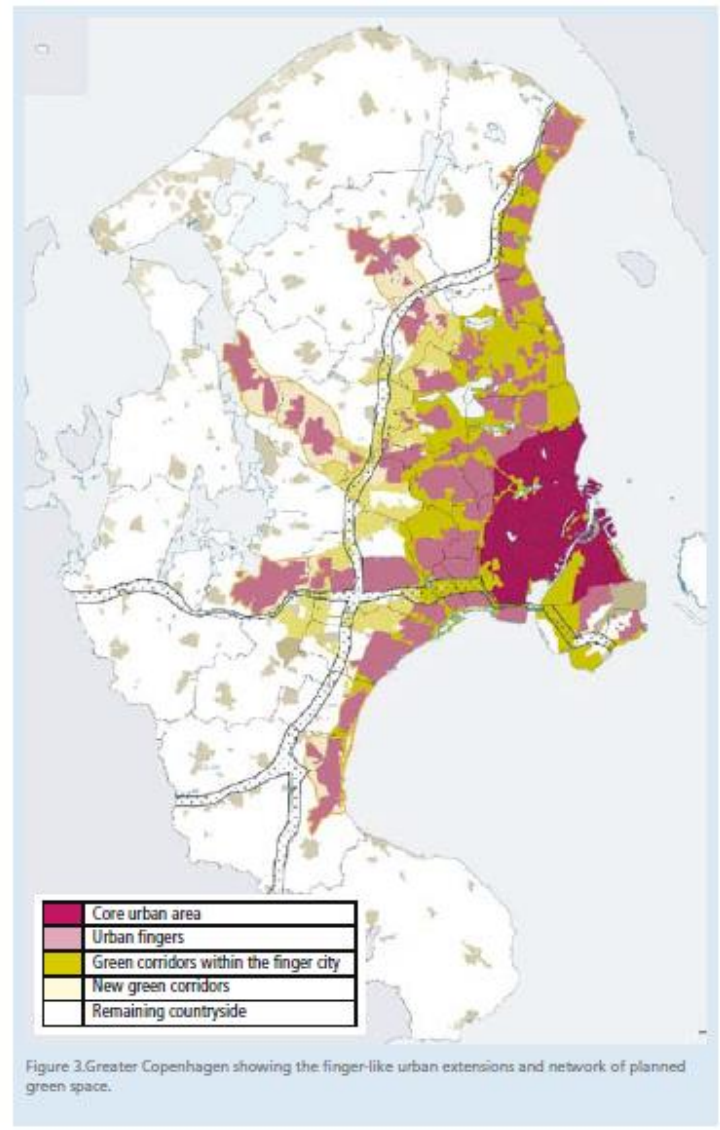
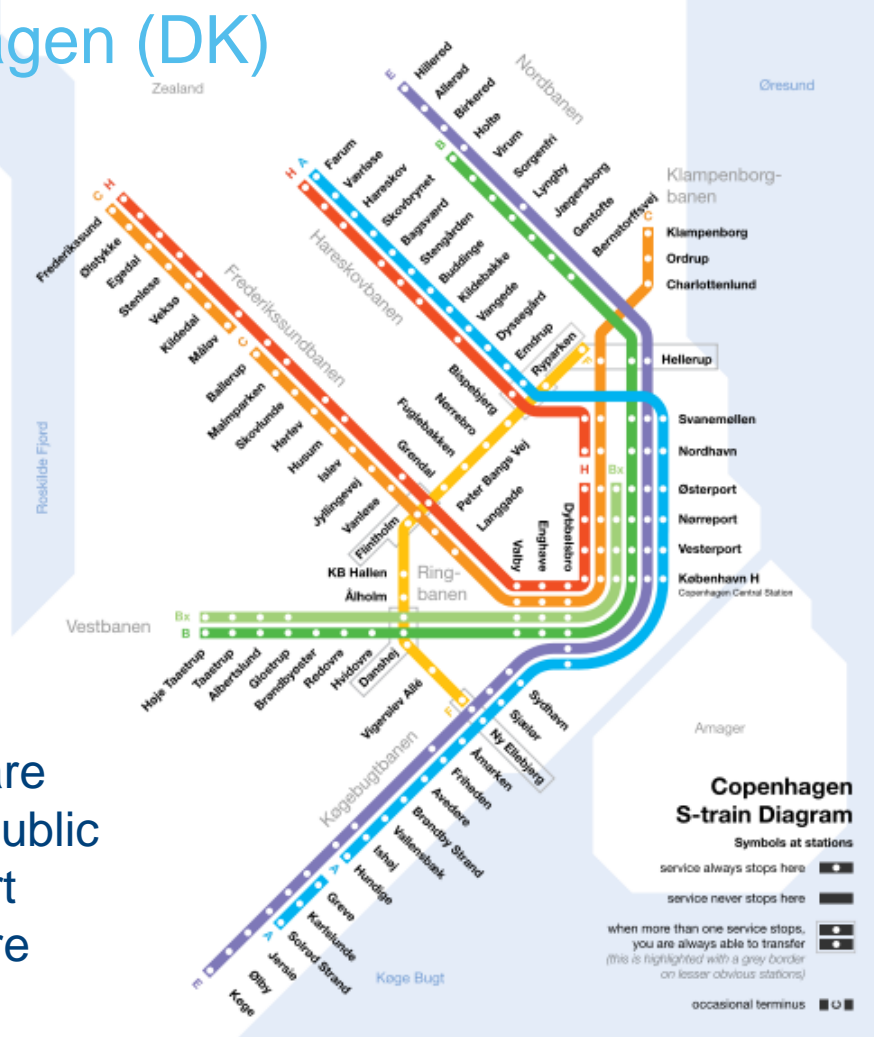


Figure 3. Greater Copenhagen showing the finger-like urban extensions and network of planned green space.

source: UCD, 2008.

The Finger Plan includes not only the relatively small Municipality of Copenhagen covering the centre part of the city with app. 0.5 mill citizens but in addition take in the Greater Copenhagen Area, and thus also covers 34 adjacent municipalities.

Copenhagen (DK)



City-lobes are carried by public rail transport infrastructure



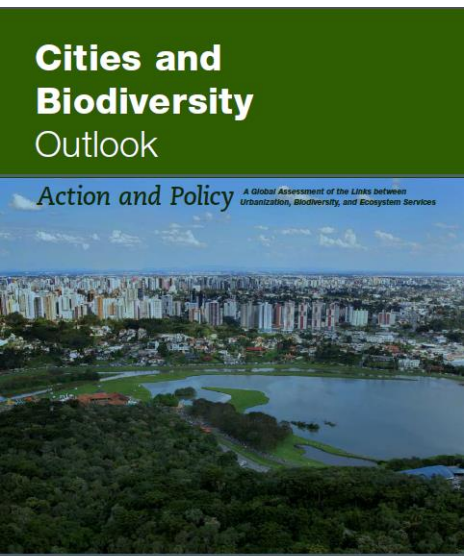
1947 and 2007 Finger Plans

Historically, the Copenhagen suburbs have been developed according to the **Finger Plan** from 1947 which intends for the suburbs to develop as fingers along commuter rail lines separated by green wedges.

Cities and biodiversity do not exclude each other.

- Do not separate urban and rural planning.
- Consider cities as ecosystems.
- Use the scientific knowledge on high- and low-dynamic ecological conditions and arrange these in an ecologically sound way (blue green fingers, lobe-city, ...)

<https://www.cbd.int/doc/health/cbo-action-policy-en.pdf>



Ten Key Messages

- 1 Urbanization is both a challenge and an opportunity to manage ecosystem services globally.
- 2 Rich biodiversity can exist in cities.
- 3 Biodiversity and ecosystem services are critical natural capital.
- 4 Maintaining functioning urban ecosystems can significantly enhance human health and well-being.
- 5 Urban ecosystem services and biodiversity can help contribute to climate-change mitigation and adaptation.
- 6 Increasing the biodiversity of urban food systems can enhance food and nutrition security.
- 7 Ecosystem services must be integrated in urban policy and planning.
- 8 Successful management of biodiversity and ecosystem services must be based on multi-scale, multi-sectoral, and multi-stakeholder involvement.
- 9 Cities offer unique opportunities for learning and education about a resilient and sustainable future.
- 10 Cities have a large potential to generate innovations and governance tools and therefore can—and must—take the lead in sustainable development.

Tropical and subtropical wildlife versus urban blue-green fingers

- Of course there is a need for more research to look carefully whether blue-green wedges close to dwellings in tropical and subtropical regions always are safe in terms of wildlife.
- One can imagine citizens in south Asia, Africa or south America being anxious living too close to dangerous wildlife.
- The European situation is quite different, for dangerous animals for example are rarely living close to cities.
- Further social and biological research on this topic is urgently needed.

Conclusion: towards an ecopolis

- Ecosystem services have urgently to be taken into account in urban and rural planning.
- My course '*environmental sustainability*' aimed to awake architects and planners to implement ecology in their designing of dwellings, city quarters, cities and rural areas and provided tools and guidelines for the urgent transition towards an **ecopolis**.

- Read more: <http://www.abllo.be/ecopolis-e-rombaut>
<http://www.abllo.be/publications-papers>

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