

stba Sommer 2012

Städtebau I
Prof. Alex Wall

THE CONTEMPORARY CITY –

URBANISMS / SUSTAINABILITIES

The city and architecture in the age of urbanization
and climate change

URBANISMS/SUSTAINABILITIES

The Contemporary City

Vorlesung in Englisch, 4SWS

Prof. Alex Wall, Marcus Kopper

Mo 09:45-11:15 Neuer HS

Theme: Architecture and the city in the age of urbanisation and climate change
Relating urban form, resource conservation, and sustainability concepts

Lecture: I Context II Science III Design

Goal: How will the diverse patterns of the contemporary city evolve to mitigate and adapt to climate change risks
To: achieve a resilient and socially just city.
To: exploit opportunities for design and planning.

Work: Develop a graphic design supported by 3 tutorials;
Research an aspect of urbanisation and climate change;
Diagrams that are analytical, critical, and envision spatial information.

Presentation: 20 minute presentation based on graphic research;
Hand-in finished presentation as CD

LECTURE STRUCTURE

INTRODUCTION: URBANISATION AND CLIMATE CHANGE

01 16.04 **Clean:** Urbanisms for the Anthropocene: Challenges and opportunities

Science: Definitions and concepts: urbanization, climate change

Urbanisms: The city is a laboratory; old and new urbanisms

Design: Introduction graphic representation project “Making complexity simple”

02 23.04 **Weather:** Climate and Urban Place Form

Science: Urban climate basics; Thermodynamics and the Carbon cycle

Urbanisms: Urban place forms: dry and hot, wet and hot, temperate

Design: Well tempered environment and moulding micro-climates

03.05 1st Graphic Project Tutorial

TRENDS AND TRANSFORMATIONS IN THE DEVELOPED WORLD

03 07.05 **Density:** From Reconstruction to New Concepts

Science: Principles of energy efficient city building, solar gymnastics,

Urbanisms: Compact urban forms; towards a spacious density

Design: Low to no carbon

04 14.05 **Networks:** From Regionalism to Network Intelligence

Science: Energy networks and renewables

Urbanisms: Cityregion as overlapping networks

Design: Energy: Enropa and Desertec; Transmillenio; soft and fun Copenhagen

LECTURE STRUCTURE

05 21.05 **Green:** Cool City Regions to Landscape as Performative Space

Science: Performance of vegetation, biodiversity

Urbanisms: from low density urban form to Agropolis

Design: From Guerilla Gardiners to Metrobosco and La Grande Paris

29.05 2nd Graphic Project Tutorial

06 04.06 **Cycles:** Landscape ecology and Cyclical Metabolisms

Science: Cyclical metabolisms: Water; flows and cycles, rain, rivers,

Urbanisms: Learning from Field Ecology, Watershed Urbanism

Design: From the Paulini Code, Venice to Rising Currents, NYC

07 11.06. **Re-use:** Building in the already built city, Waste: recycle, re-use, repair

Science: Ecologies of waste, externalities and rucksacks

Urbanisms: From Drosscape to Agrarianism

Design: Creative re-use and Retrofitting social housing

LECTURE STRUCTURE

URBANISATION AND THE MARKET: A WORLDWIDE PROCESS

08 18.06 **Exchange:** The Shopping Center: International Symbol of the Age of Consumption; Globalisation and the Rise of the Real Estate Industry; A Global Building Type for the Age of Consumption; Can Retail Centers Support Social and Cultural Development?

09 25.06 **Enculturate:** Tourism – Migration: A World on the Move
Industrial Flows of Tourists; Political and Natural Disasters; Tourist cities; Refugees: From Camps to Cities; Link Tourists with the Context; Can a Camp be designed?

26.06 3rd Graphic Project Tutorial

CITIZENS AND GOVERNMENTS

10 02.07 **Actors:** Right to the City to New Stakeholder Alliances
The Phenomenon of Informal Citybuilding; Models of collective planning, participation and individual action; Activism, Participation, Behaviorology, Entrepreneur

WHAT IS SUSTAINABILITY?

11 09.07 **Dirty Sustainability:** Wicked Problems, Resilience and Redundance
“What’s wrong with sustainability?”; Towards Sustainable Urban Place Form;
Urban Quarter performance: passive, active, cradle to cradle

12 **30.07 Graphic Projects Presentation**

CHAPTER STRUCTURE

Context: Urbanisms and Sustainabilities

Link morphological pattern or spatial structure with lifestyle

Wirth - “urbanism as a way of life,” make city livable for families,

Lefebvre – the right to the city; justice and socially sustainable citybuilding processes

The Spear of Science

With its roots in the Enlightenment, the role of science emerged to control the natural world for human purposes..

New science shifts from facilitating the restructuring of nature to helping people adapt to natural variability, and to mitigate and adapt to the emerging conditions of the Anthropocene.

Design

Adaptive urban form that is resilient to flooding, fire, hurricanes and social upheaval;

A performative concept of form adapting and shaping environmental conditions.

Rather than complete, open-ended strategies of participation, execution and form.

COURSE DEFINITION + GOALS

Challenges I: Twin phenomena of urbanization and climate change:

- we are now in the Anthropocene age (M. Davis: man-made time of the earth), thus...
- we will be forced to create a new synthesis between nature and the man-made

History:

Public health and conservation

from modern (consumerist notions of) environmental comfort

post-modern awareness of limits, balances, and need for a new paradigm

today's acceptance and engagement with ecosystems

(city = environment – working together to create ONE world)

Challenges II: Conceptual Design vs. Checklist Design:

Potentials and conflicts of certification systems – DGNB, LEED, BREEAM

How to exploit new regulatory system to make conceptual leaps.

Approach: How shall we think then? Nature and City are no monoliths

- rather than ‚nature‘, think habitats, ecologies, flows
- think not ‚city‘, but urbanization patches, corridors, dynamic systems

Urbanisation

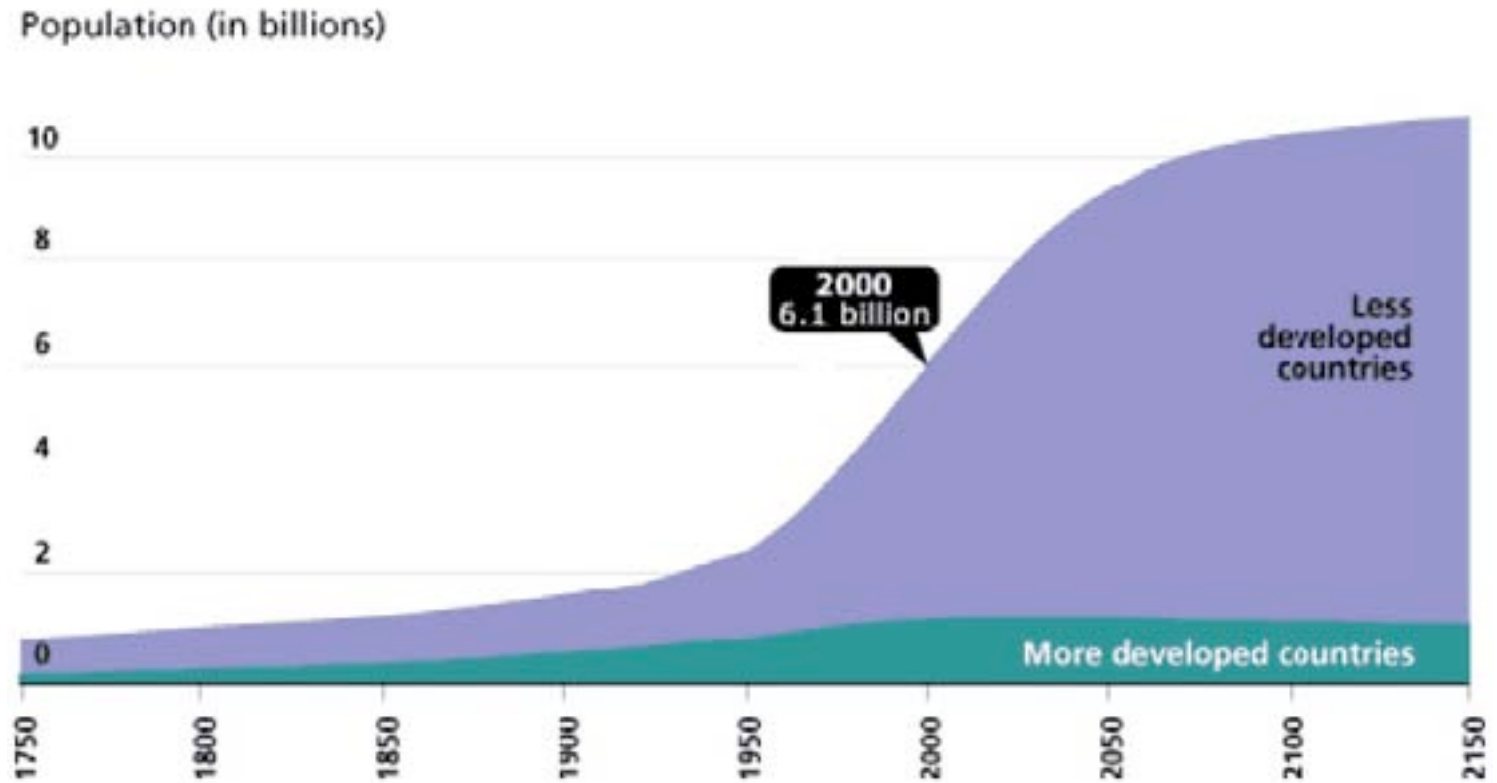
Urbanisation - as of 2008: 50 % of world population in cities;

2006: UN estimate 1 bio slum dwellers (1 in 3); 2030 – 2 bio (1 in 2)

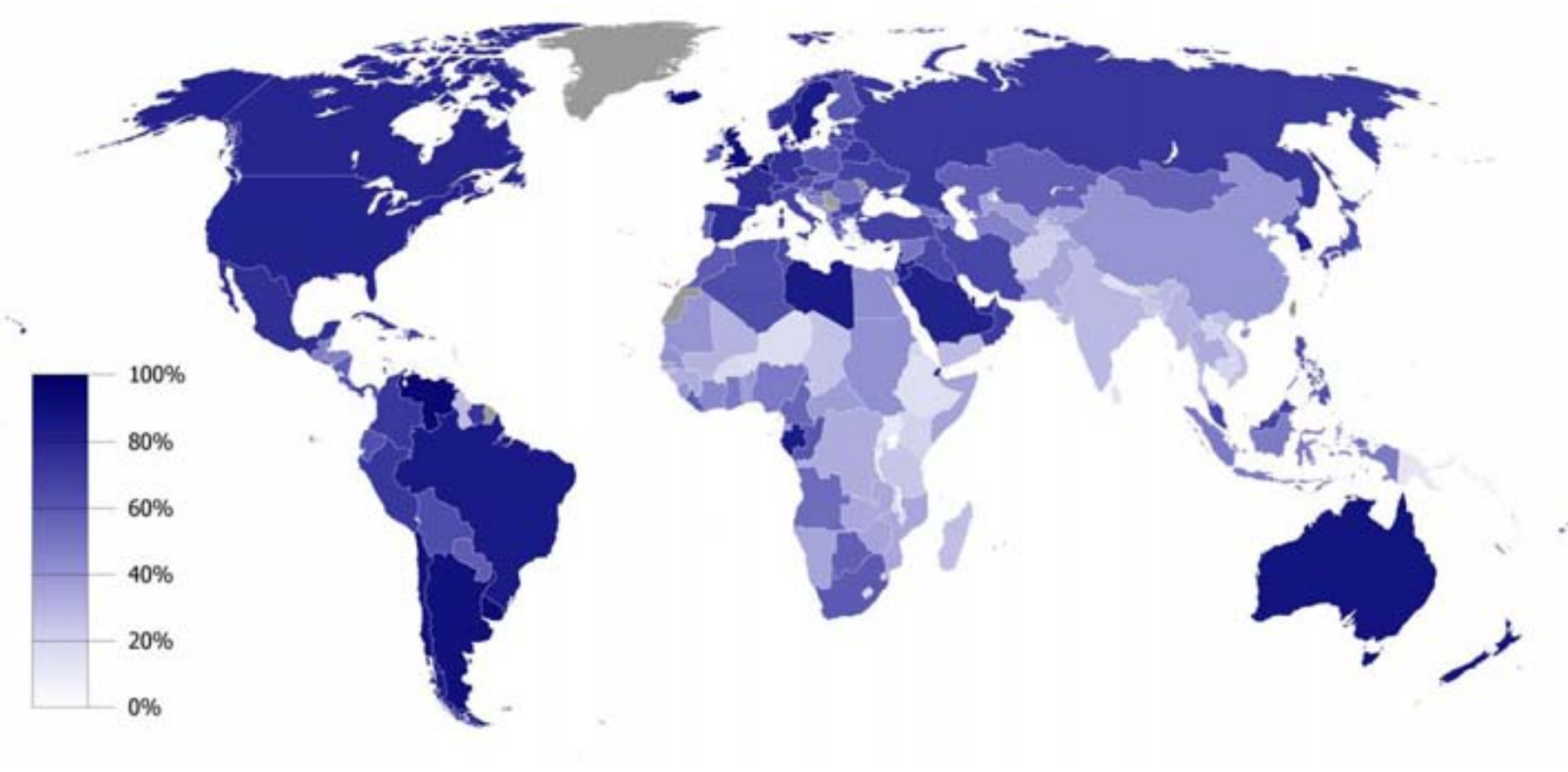
imbalanced investment
segregation
environmental exploitation
dangerous cities

balanced investment
social equity
balanced ecologies
livable cities

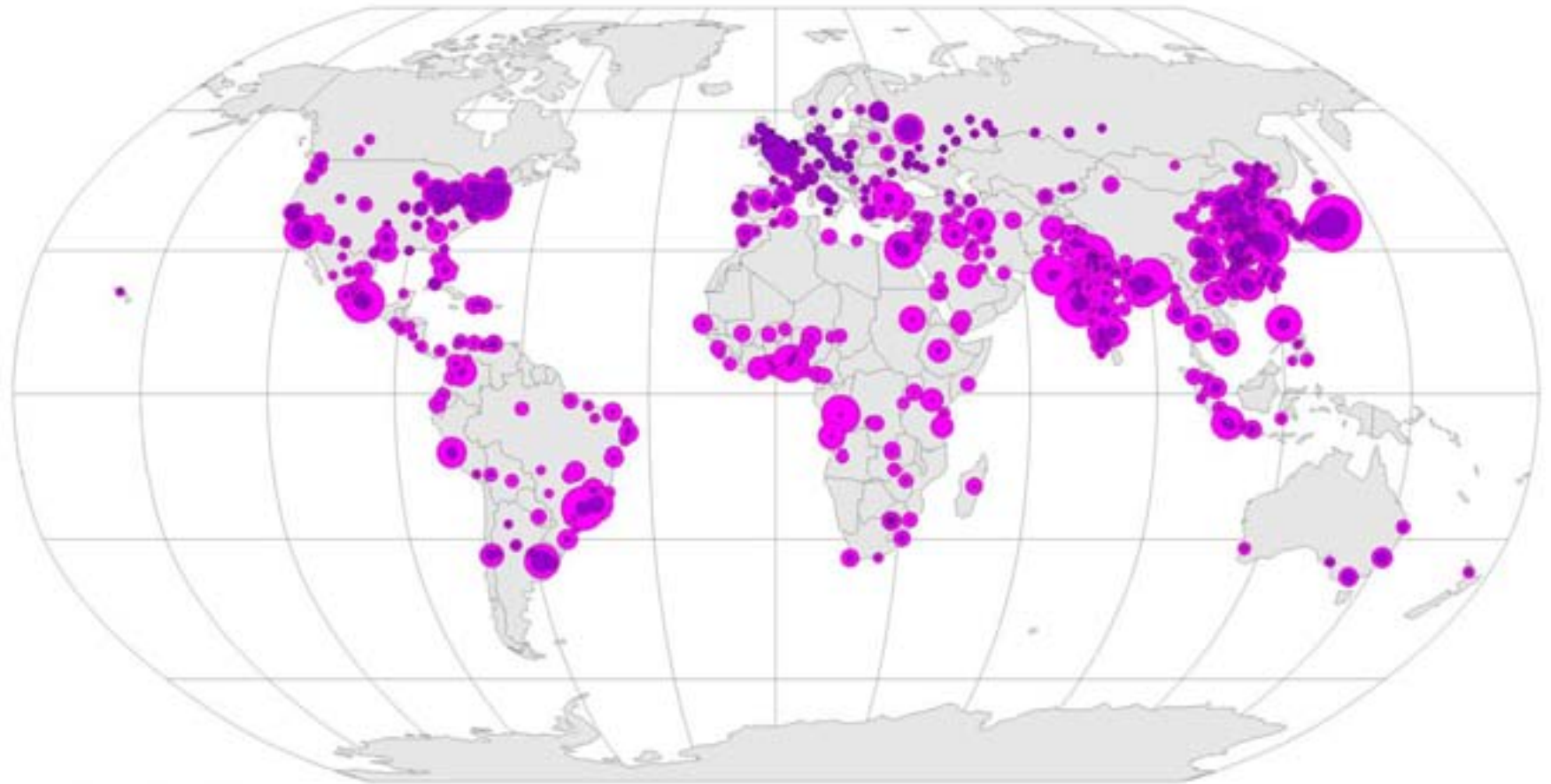
Population growth



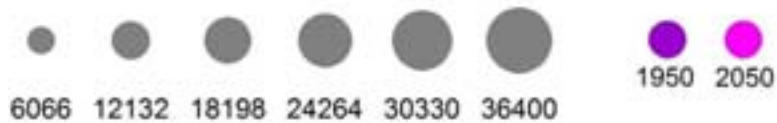
Urbanised Population 2006



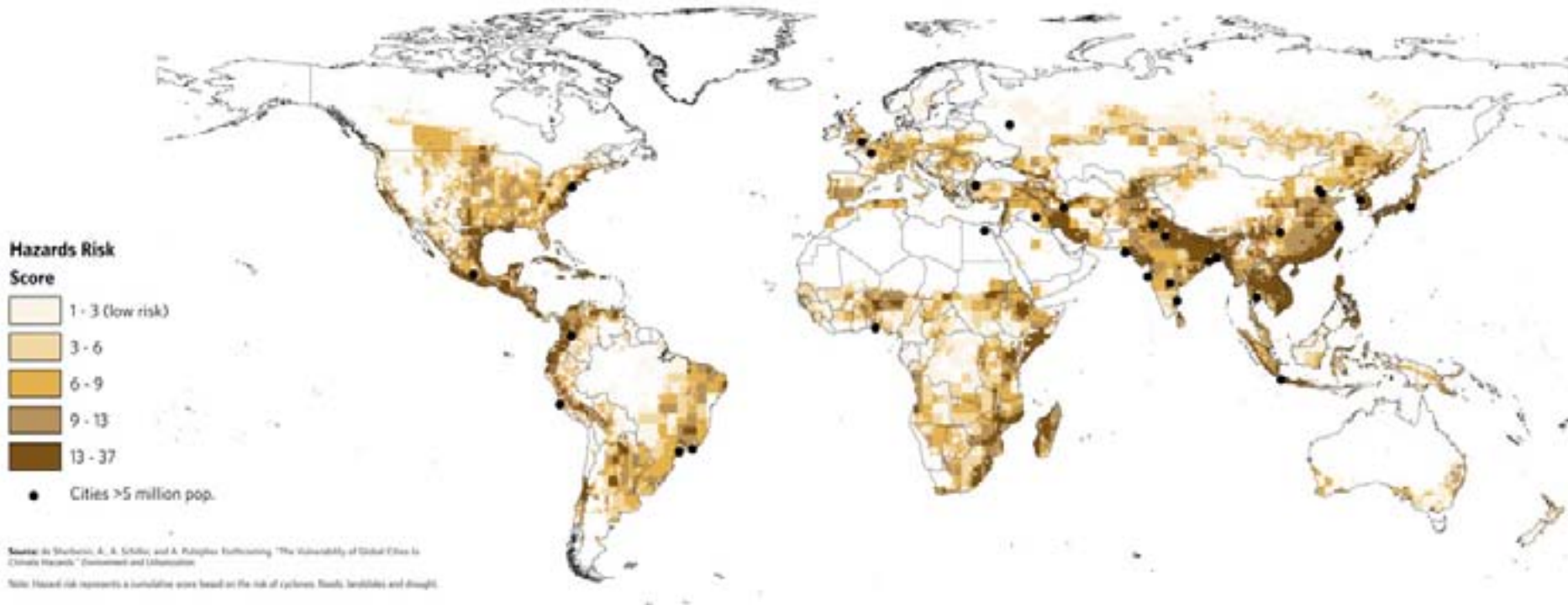
Agglomerations 1950-2050



Einwohner (x 1000)



Large Cities in Relation to Current Climate-related Hazards



Understanding the carbon cycle - including the green house effect

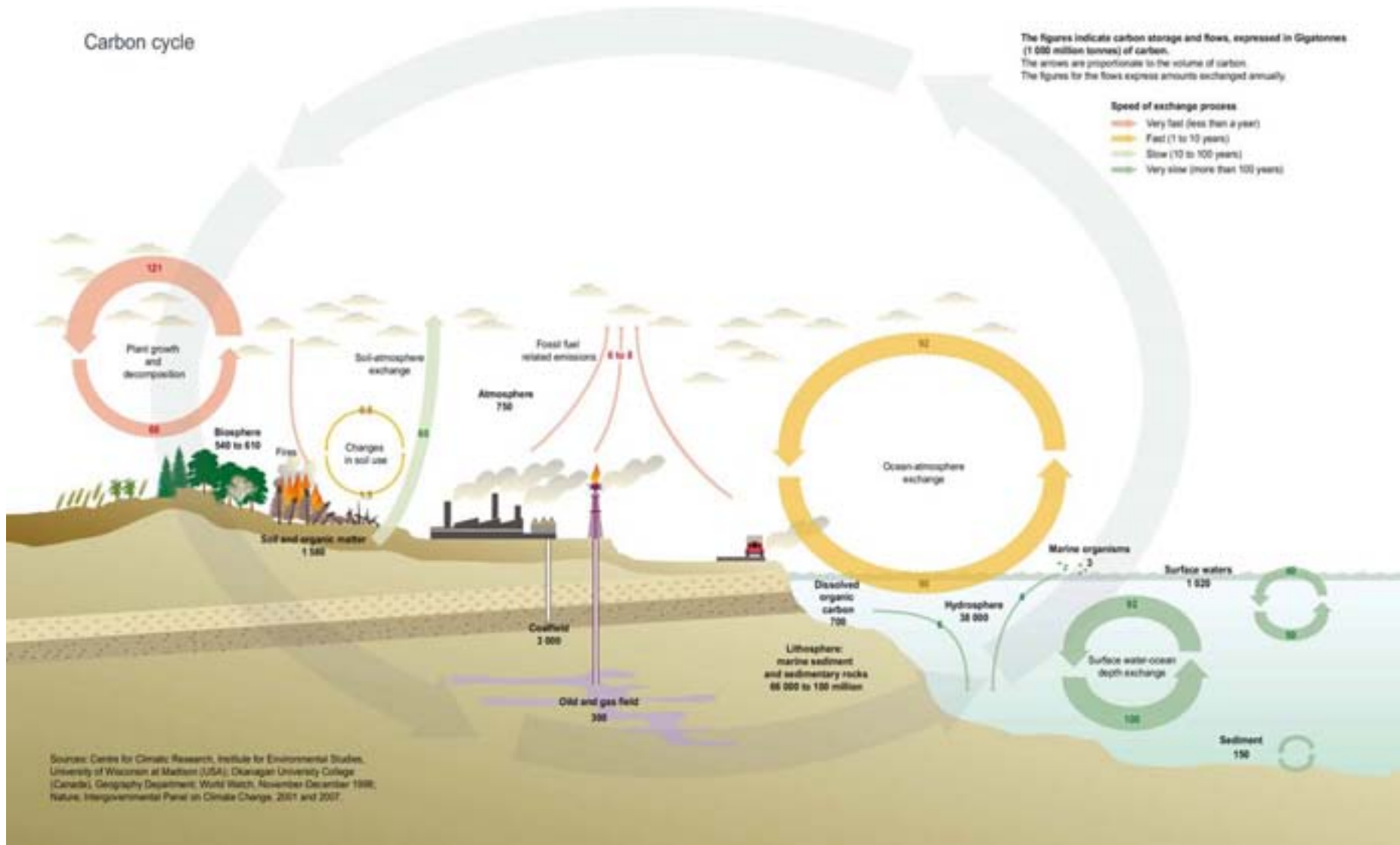
The Carbon cycle is the exchange of carbon in the biosphere;
Carbon neutral: CO₂ released by living things v CO₂ absorbed in photosynthesis;
CO₂ from fossil fuels has been outside the cycle for millions of years;

Global Warming: Anthropogenic activity produces green house gases (GHG):
CO₂-carbon dioxide, CH₄-**methane**, N₂O-nitrous oxide

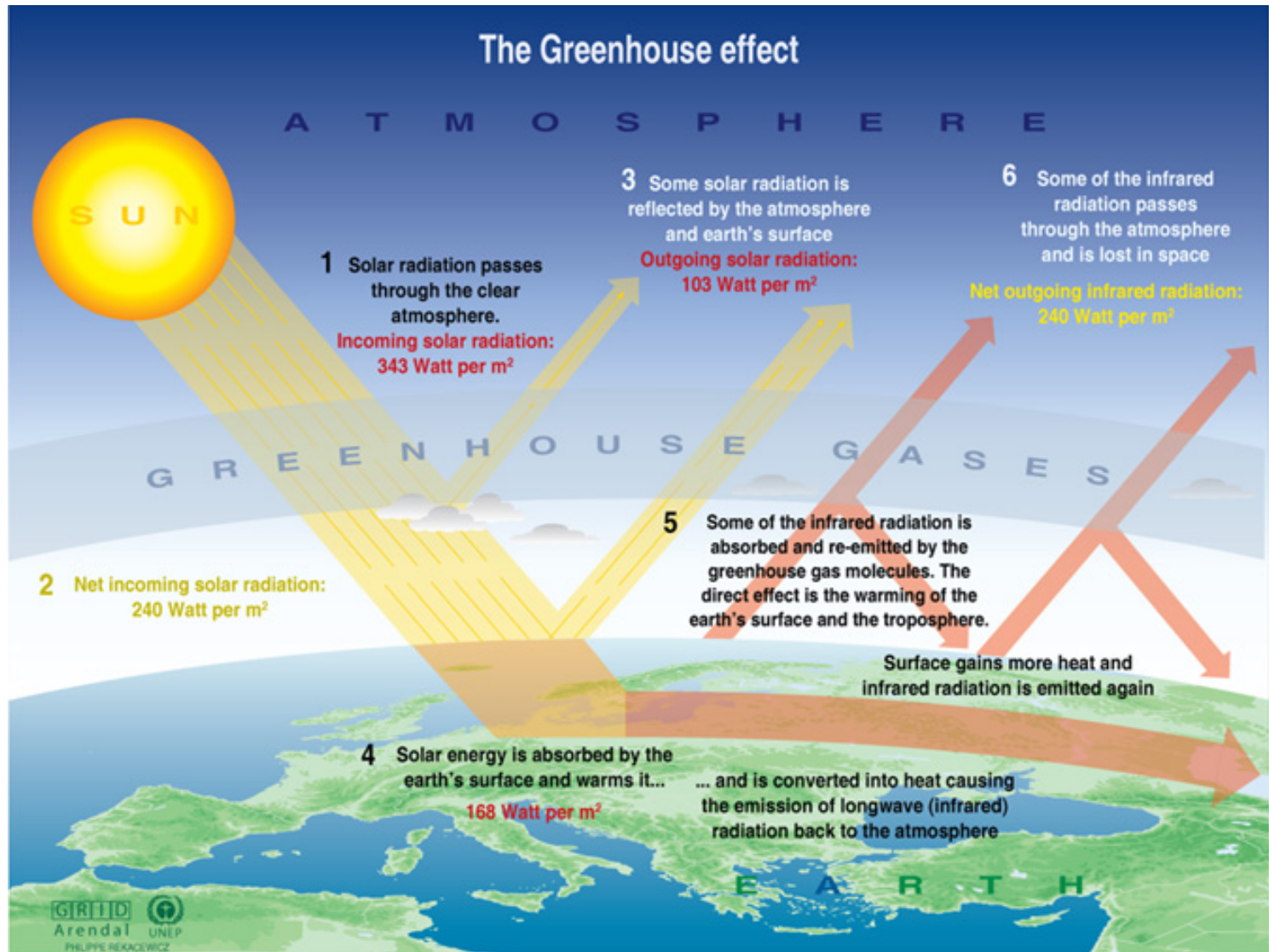
How does urbanization interact within these processes? Emissions from the building process:

- 1 raw materials extraction,
- 2 manufacture,
- 3 transport,
- 4 construction,
- 5 use (heating, cooling and lighting)
- 6 demolition/disassembly,
- 7 recycle - (diagram)

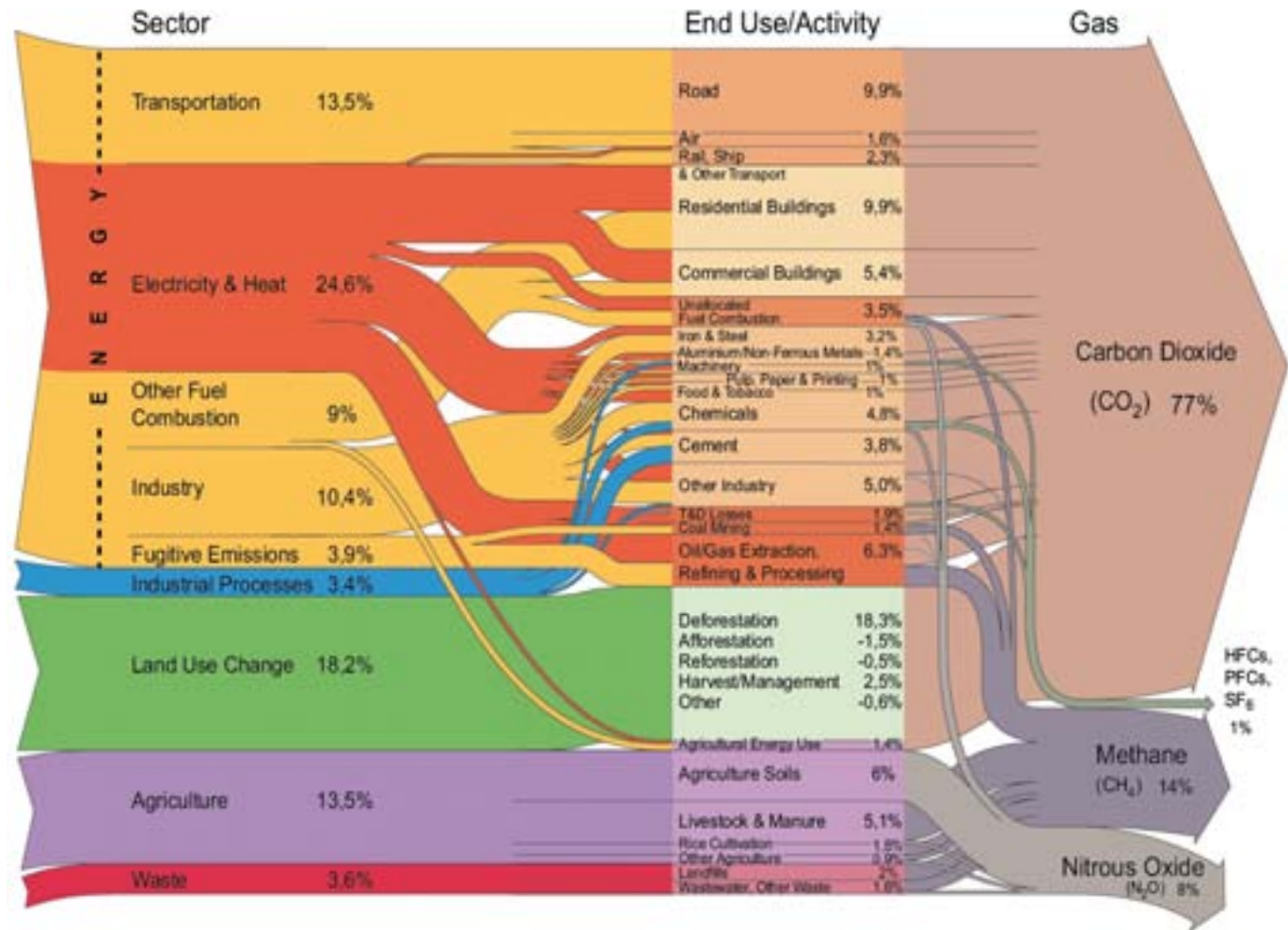
Carbon cycle



Greenhouse effect



World Greenhouse gas emissions by sector, World Resources Institute, 2000



All data is for 2000. All calculations are based on CO₂ equivalents, using 100-year global warming potentials from the IPCC (1996), based on a total global estimate of 41 755 MtCO₂ equivalent. Land use change includes both emissions and absorptions. Dotted lines represent flows of less than 0.1% percent of total GHG emissions.

Climate change

Climate Change: is global in scale, and will influence every human endeavor

Temperature: expected change of – Berlin similar to Zaragoza

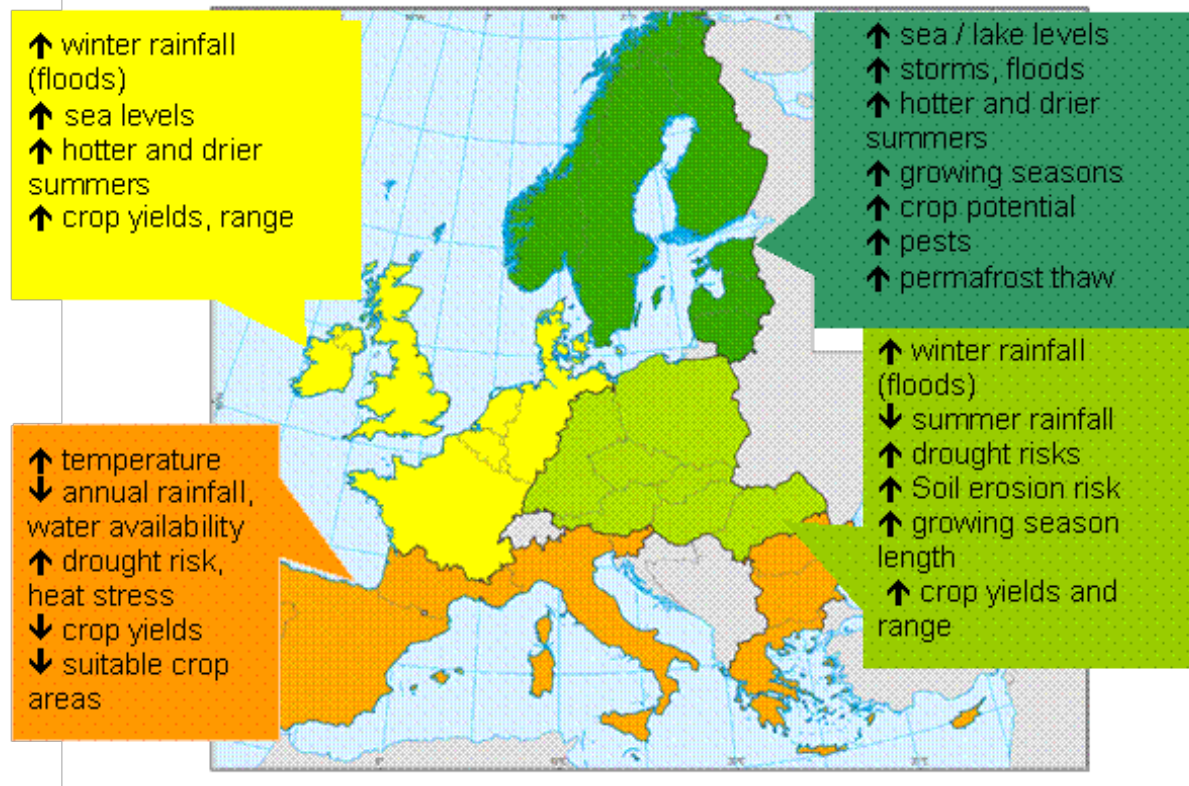
Sea-level rise: coastal cities at risk: London, Amsterdam, Kolkhata, Miami

Desertification: cities in hot and dry climates: Dubai, Murcia, Las Vegas, Adelaide

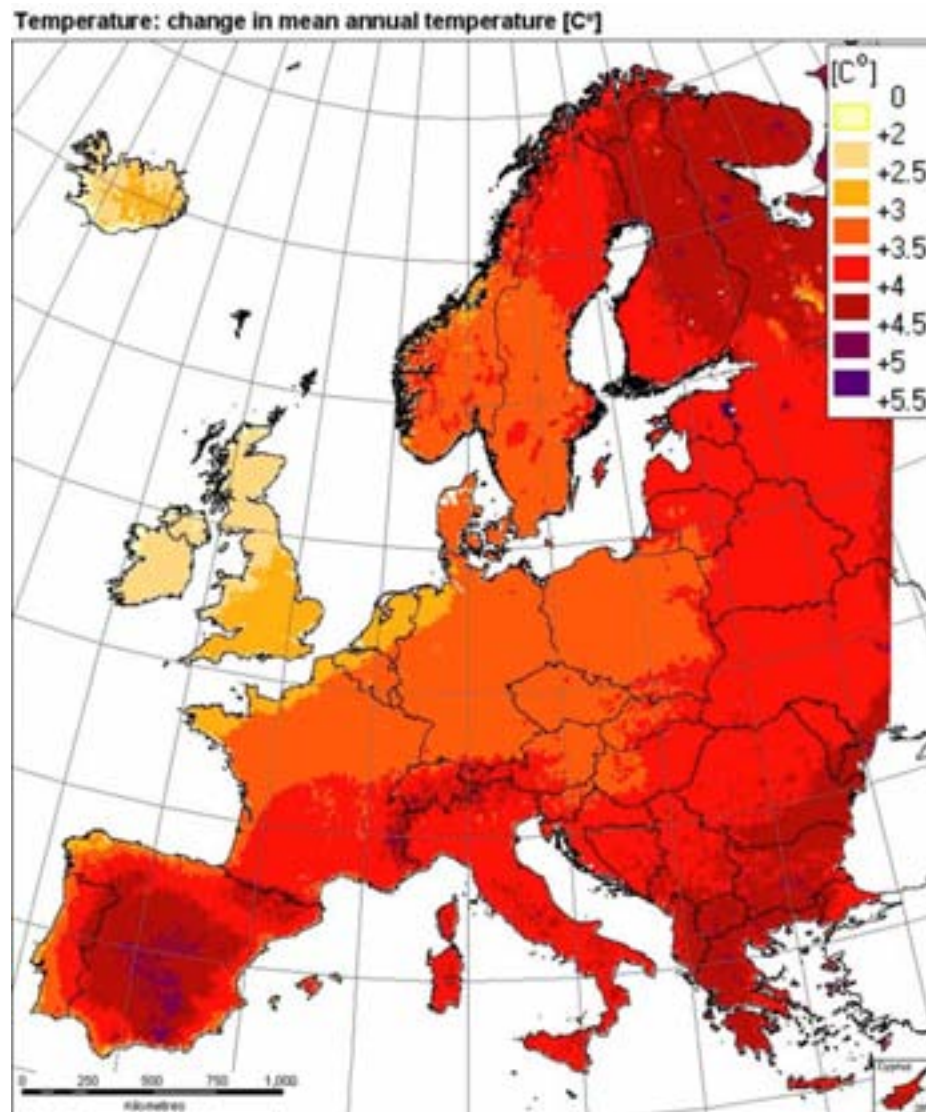
Rainfall and food production: cities, regions, countries may be no longer viable?

Defensive barriers (adaptation) or
the transformation of the form of the city (mitigation);
Critical rereading of vernacular building and settlement form

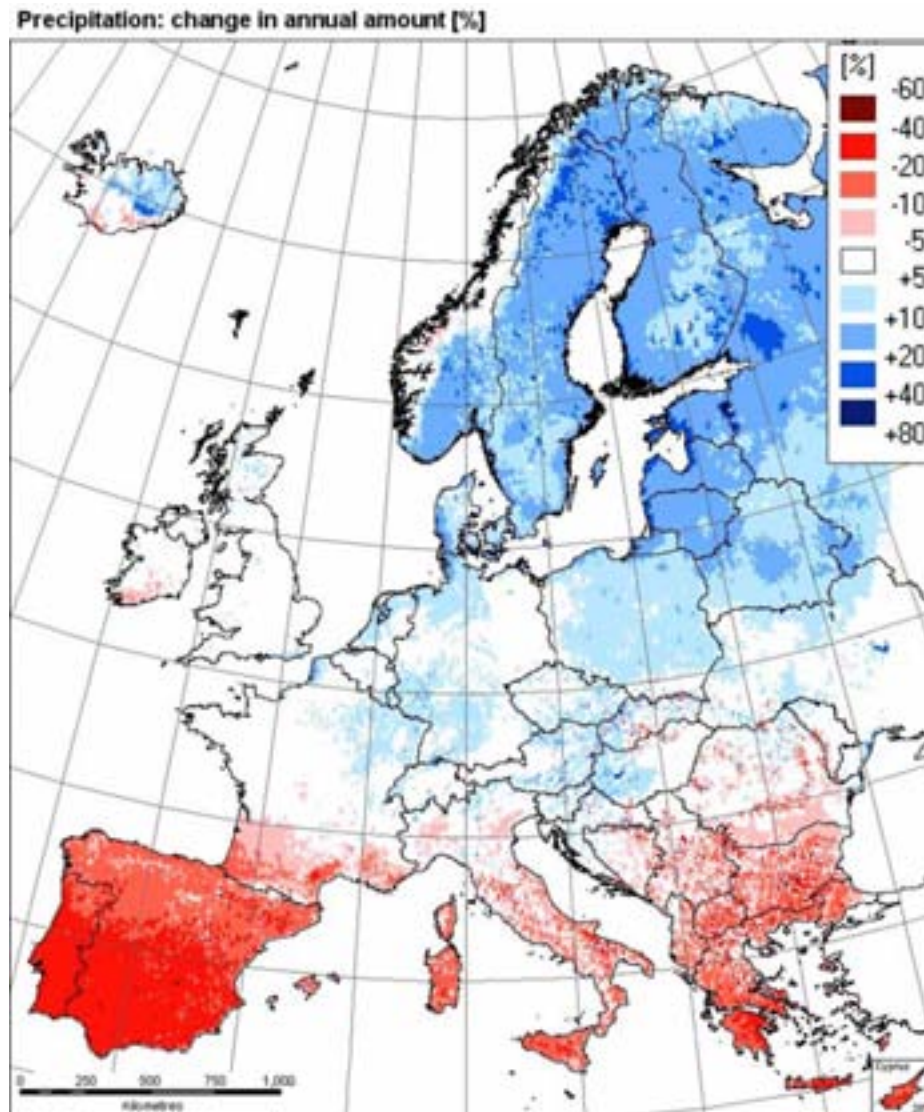
Climate change zones



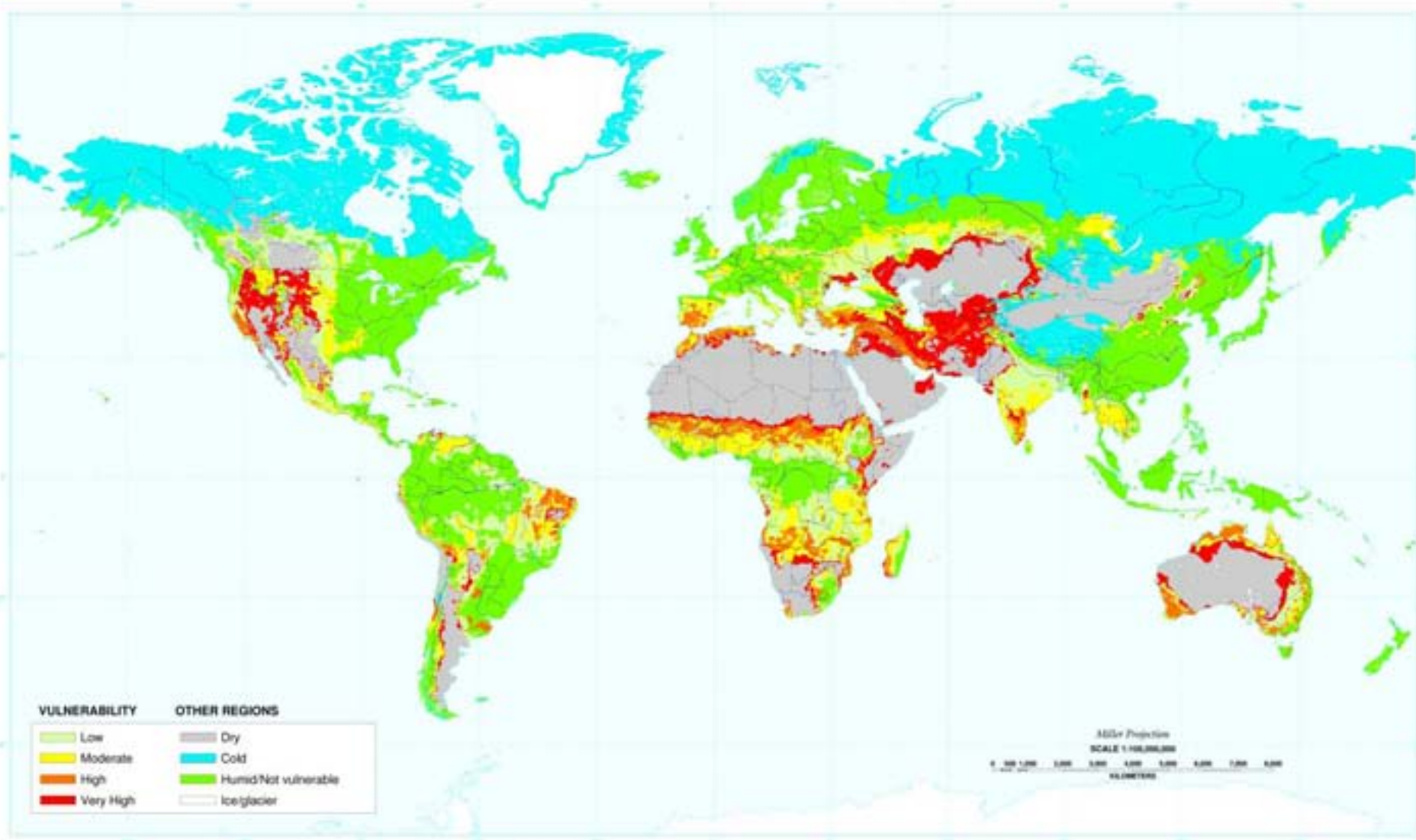
Temperature



Precipitation




Desertification Vulnerability

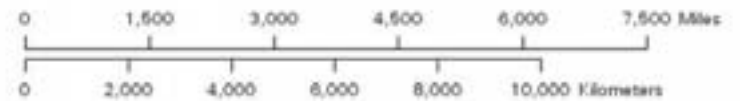


Sea Level Rise, World, 6 Meter Inundation



CReSIS Haskell Indian Nations University

 Inundated Area



stba

Fachgebiet Städtebau Prof. Alex Wall

16.04.2012

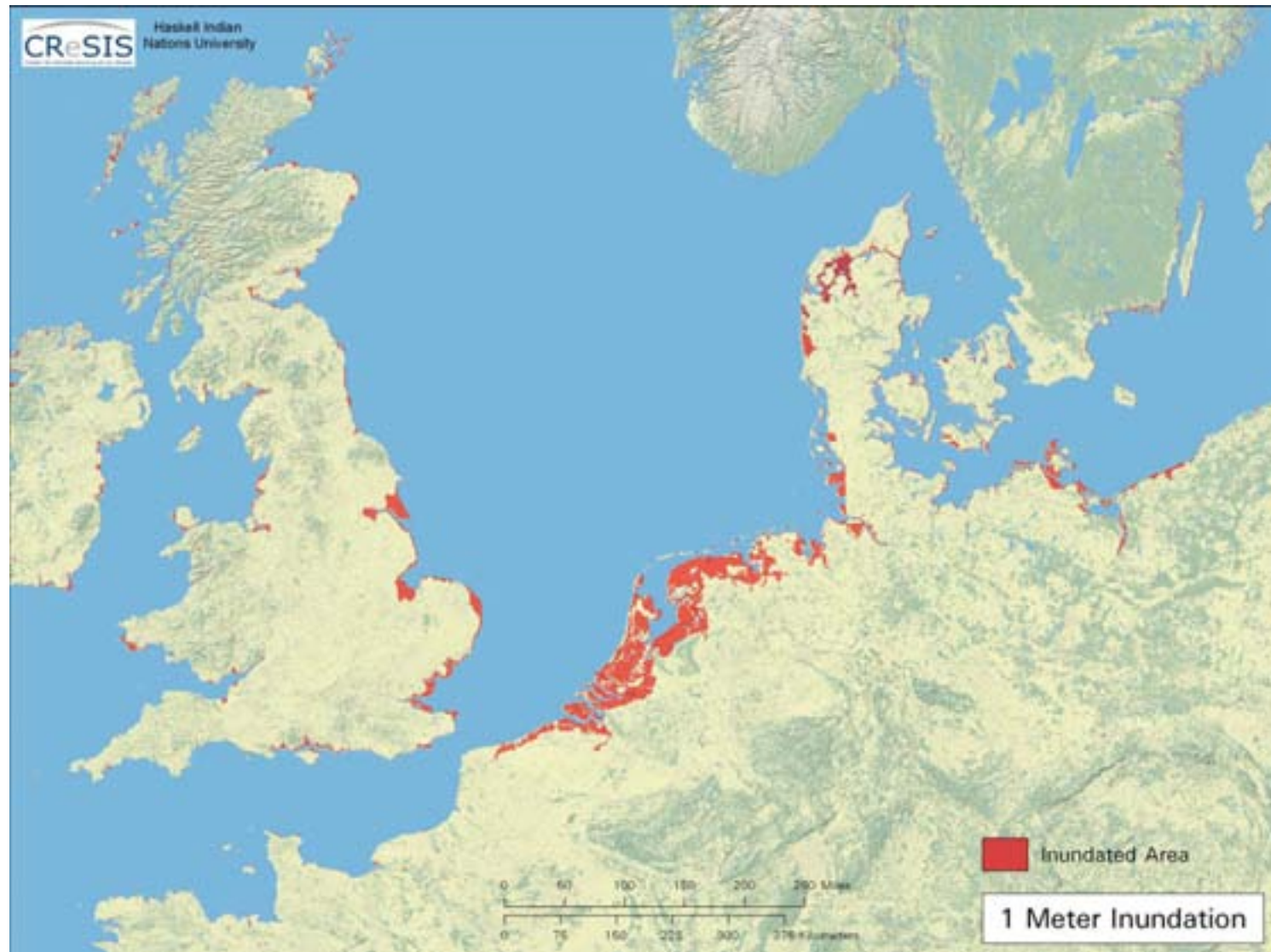
Sea Level Rise

Table 1: Per Cent of Population and Land Area in Low Elevation Coastal Zone by Region, 2000

Region	Shares of region's population and land in LECZ			
	Total Population (%)	Urban Population (%)	Total Land (%)	Urban Land (%)
Africa	7	12	1	7
Asia	13	18	3	12
Europe	7	8	2	7
Latin America	6	7	2	7
Australia and New Zealand	13	13	2	13
North America	8	8	3	6
Small Island States	13	13	16	13
World	10	13	2	8

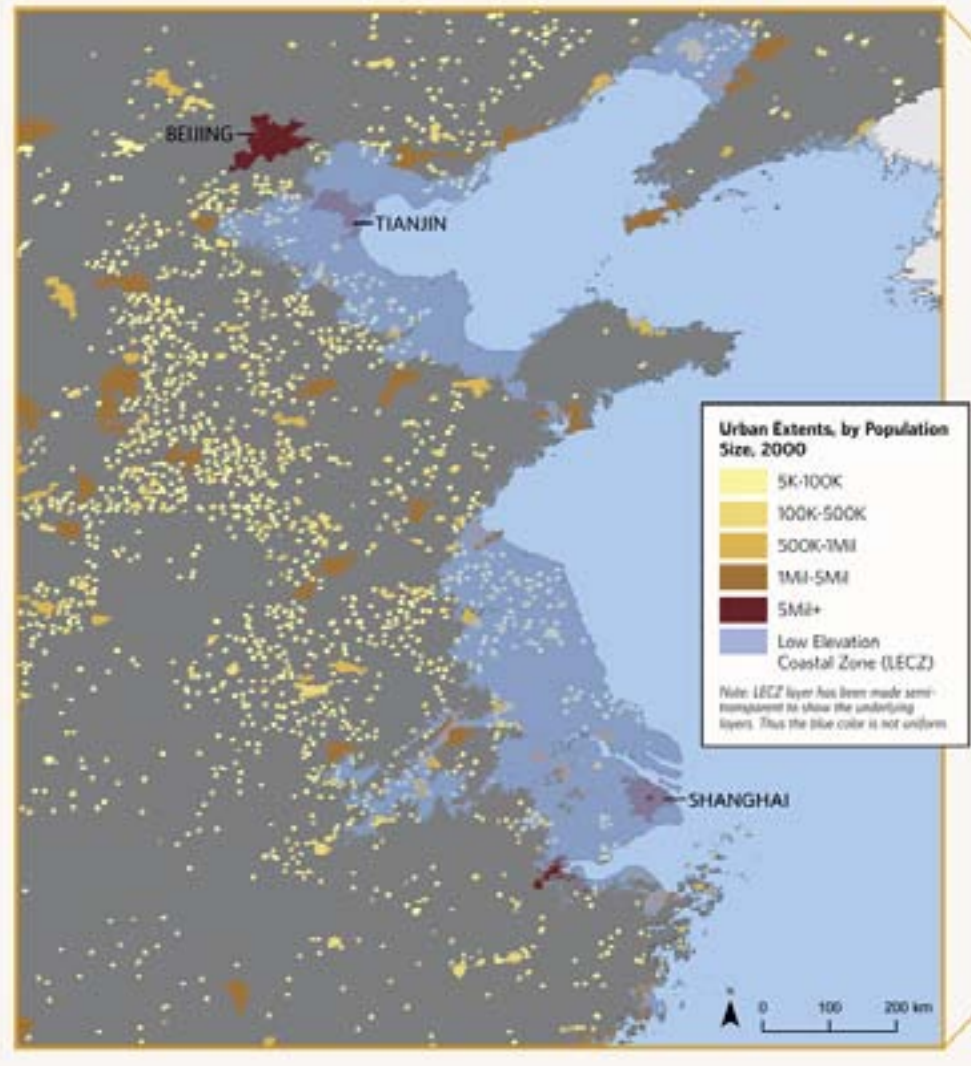
Source: McGranahan, G., D. Balk and B. Anderson. Forthcoming. "The Rising Risks of Climate Change: Urban Population Distribution and Characteristics in Low Elevation Coastal Zones." *Environment and Urbanization*.

Sea Level Rise, Northern Europe, 1 Meter Inundation



Sea Level Rise, China

Figure 8: China: Yellow Sea Coastal Region



Source: McCreath, C., D. Balk, and B. Anderson. Forthcoming. "The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones." *Environment and Urbanization* 19(2).

Strategies and action: Adaptation and Mitigation

Adaptation: addresses „back end“ of the problem.

It includes actions that will safeguard a person, a community, a business or a nation; both anticipation (before impact events); and responsive measures

Mitigation: addresses „front end“ of the global warming problem.

It includes actions to prevent the release excess CO2 emissions; putting a price on carbon, renewable energy, replanting forests

Adaptation, Deltawerken, Netherlands



Adaptation, Deltawerken, Netherlands



Adaptation, Deltawerken, Netherlands



Adaptation, salting of soil, Bangladesh



Adaptation, Rice Paddies to Prawn Farms , Bangladesh



Adaptation, DUNE, Magnus Larsson

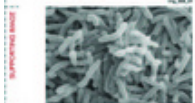
>> PREPARATION



01 PROCESS: artificial dunes, artificial structures, artificial sand phase
INITIAL PHASE

a double-aimed prosthesis-like lattice must be placed next to an actively migrating sand dune in order to prevent it from passing by the green wall surface attached. Following the microclimate, it forms a three-dimensional program of the water project. From its conceptual construction through to its practical implementation.

- A ACTIVE DUNE
- B BACILLUS VESSEL
- C CIRCULATORY NODE
- D TREE NURSERY



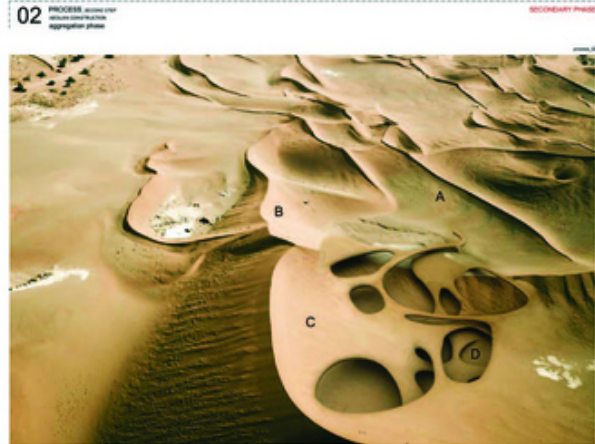
MICROCLIMATE
The bacillus construct microorganisms are either grown on site, while in an artificial environment this should in turn give new species development, or shipped to the desert, where they are kept inside of the bacillus vessel structure. This is in turn placed next to an appropriate dune (shipped out in advance through a gas-based system that requires some microclimate and feeds them into a permeable industrial model. This model can arrange between generation components and their arrangement in the basis for the structural process that generates the final form of the entire space.

year 00

DEPENDING ON CLIMATIC CIRCUMSTANCES

CHRONOLOGY
project development over time

>> IMPLEMENTATION



02 PROCESS: artificial dunes, artificial structures, artificial sand phase
SECONDARY PHASE

the sandstone structure migrates against the very next dune, so well as the other dunes that will come after that. It also allows the potential of its in the desert sliding down into the ground from the structure (cannot run directly when the top into the ground to begin with), but also sometimes to stabilize and prevent areas for soil cultivation. The slippage top surface in this example gives as a possibility of harvesting rainwater.

- A NEXT ACTIVE DUNE
- B DUNE STRUCTURE
- C BACILLUS STRUCTURE
- D AQUIFER CONNECTION



AQUIFER CONNECTION
In a comparatively beautiful desert - an advanced turning of the water - the construction. One is, the correct aggregation of the means of material that are already on site in left to another form. The wind, another way of putting this would be to say that the construction is done by the very form that the structure is supposed to mitigate against. In the wind pushes the sand towards its modification and it reaches the bottom structure, the next nodes of the tube network is planned and permeated through the regeneration structure overall system, so that the construction phase can be planned accordingly.

year 05

DEPENDING ON AQUIFER CIRCUMSTANCES

CHRONOLOGY
project development over time

>> CULTIVATION



03 PROCESS: artificial dunes, artificial structures, artificial sand phase
TERTIARY PHASE

after a decade or so, the structure will be cultivated with people growing their own food in the self-permeable microclimate and there, each individual on the top surface leads every step of structure in the amount between pure and settled down into the underground. The structure harvest solar energy, and holds a great thermal mass which assists in heating up the interior during cool desert nights.

- A DUNE CONNECTION
- B TREE APERTURES
- C RAINWATER CATCHMENT
- D WATER RESERVOIR



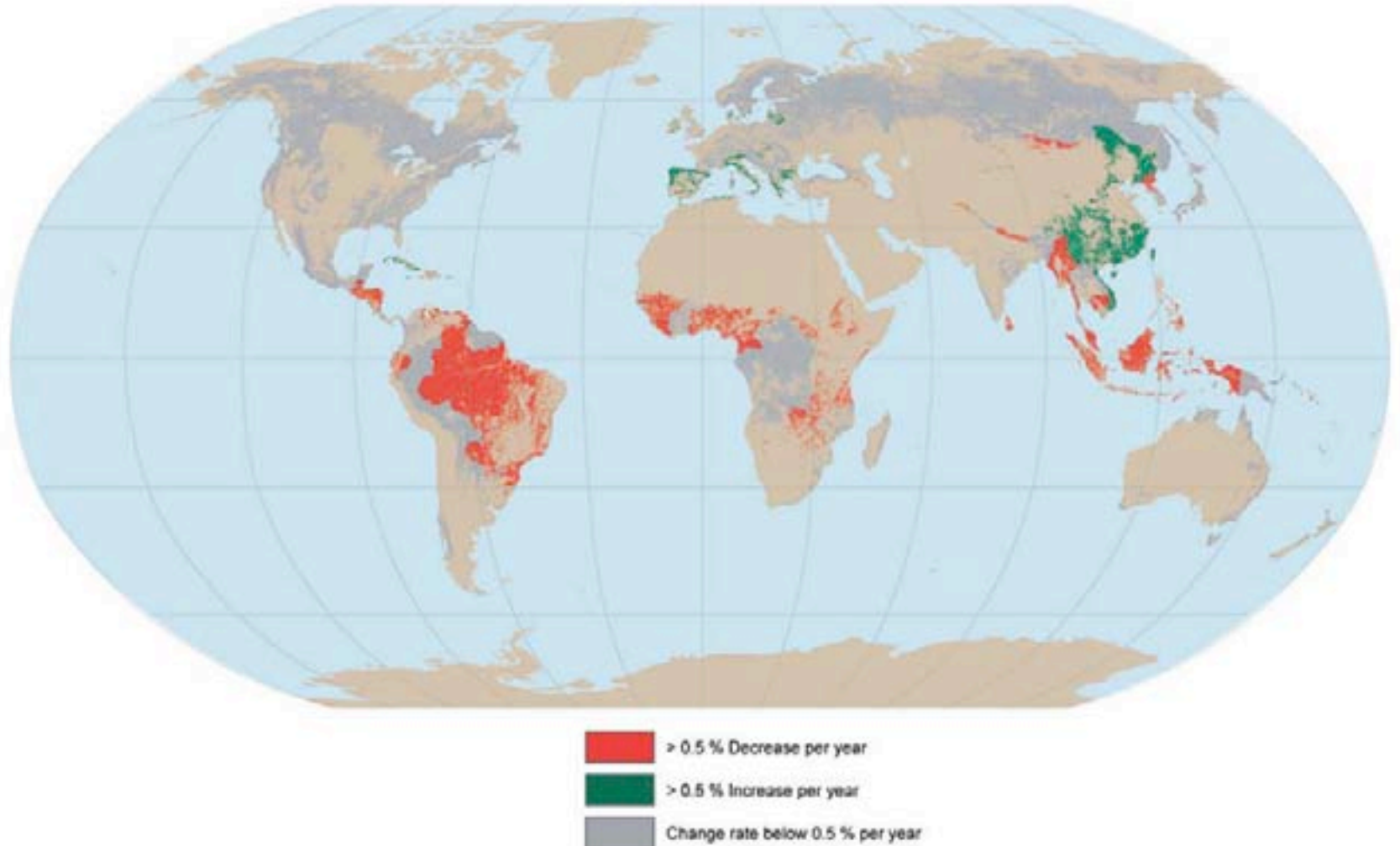
PERMANENT CULTURE
There can be great for migrating against migrating dunes. Trees that are produced by humans, however, stand a much better chance of doing well given many trees are shipped down for biomass by humans. Other and other kinds, and a 'gravel reef' against to the humans can also help in emergency situations arising from natural factors. The intention is to become a sort of permeable garden and landscape of the protected structure, planting new trees in the dune network zones, and supporting both humans and other through the agricultural possibilities opened up by the tubular conditions.

year 10

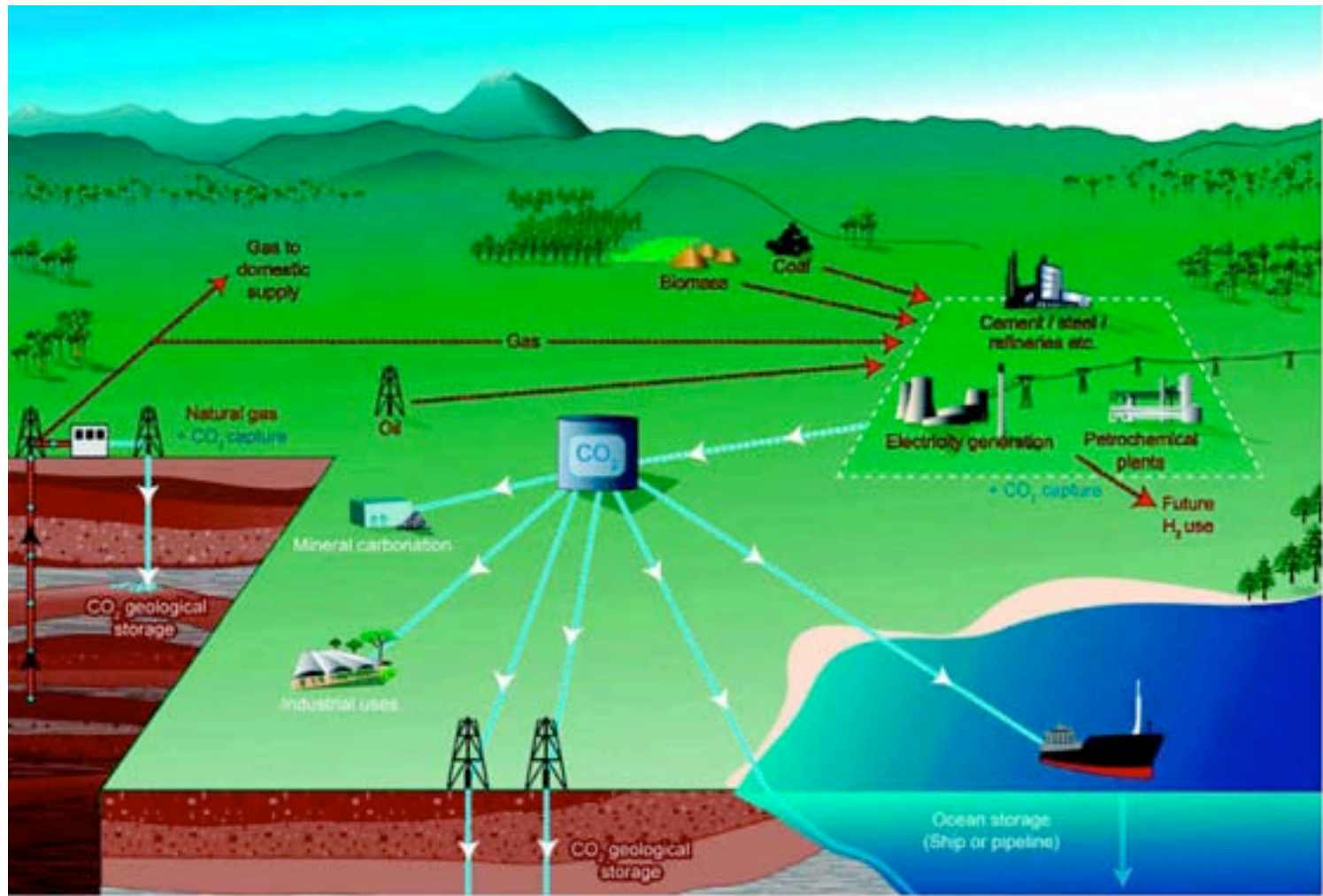
DEPENDING ON PERMANENT CULTURE CIRCUMSTANCES

CHRONOLOGY
experience and future projections

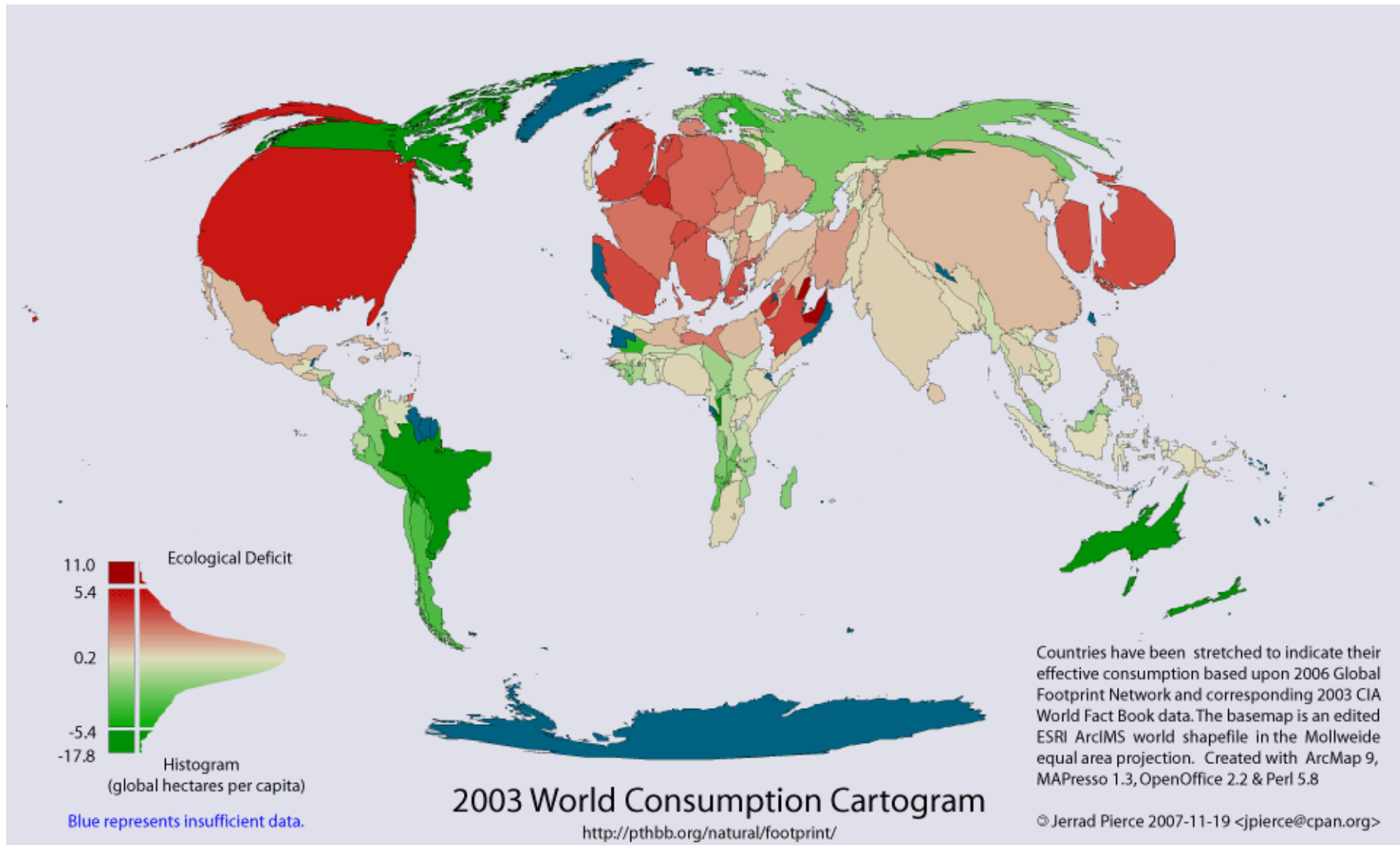
Mitigation, Forestry, Net change in forest area between 2000 and 2005



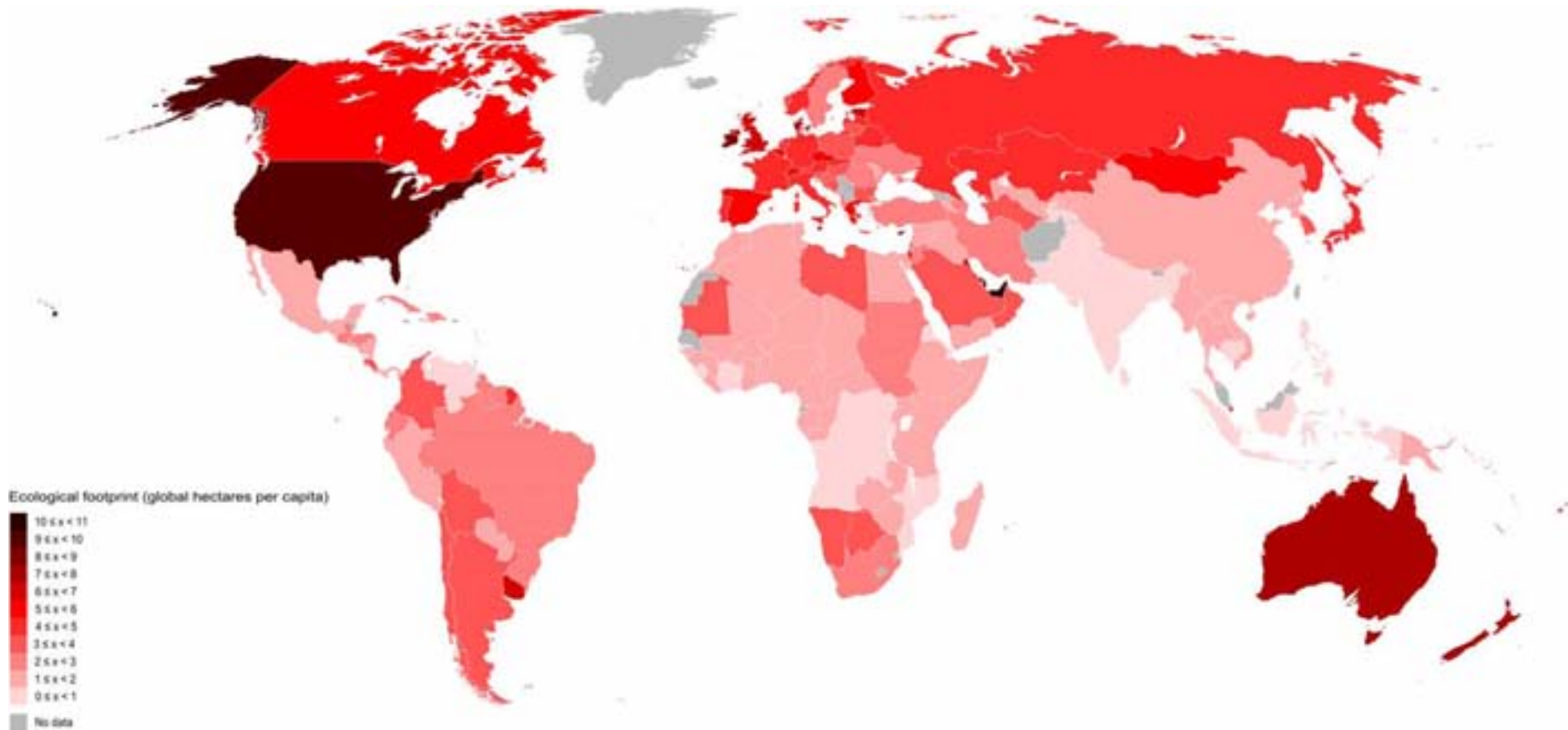
Mitigation, CO2 storage



Ecological Footprint



Ecological Footprint



Ecojustice, Neotopia, Manuela Pfrunder

↳ Der Übergang von den chaotischen zu den geordneten Besitzverhältnissen war ein unendlich langer Prozess der Auflösung und Neuverteilung aller erwünschten und unerwünschten, an dessen Ende alle gleich viel von allem hatten.

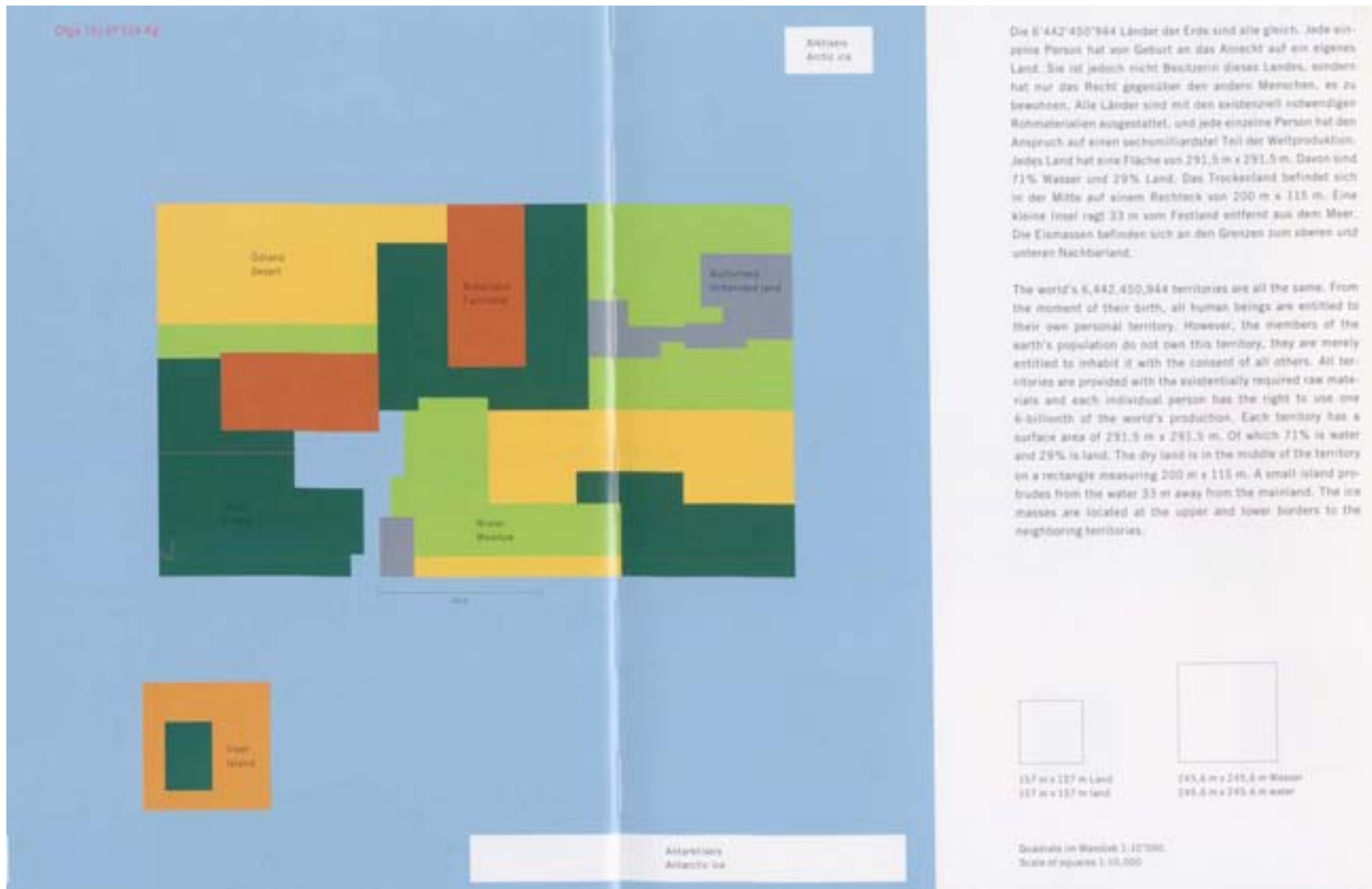
↳ The transition from chaotic ownership to order was an infinitely long process of dissolution and redistribution of all desirable and undesirable substances to the effect that in the end, everyone had the same amount of everything.



↳ Gebirg/Dewert ↳ Wald/Forest ↳ Weizen/Meadow ↳ Ackerland/Farmland ↳ Kulturbaum/Enhanced land ↳ Fluss/River ↳ Wasser/Water



Ecojustice, Neotopia, Manuela Pfrunder



Projects

Buckminster Fuller – Dome over Manhattan

Ralph Erskine – Arctic City

Dome over Manhattan, Buckminster Fuller



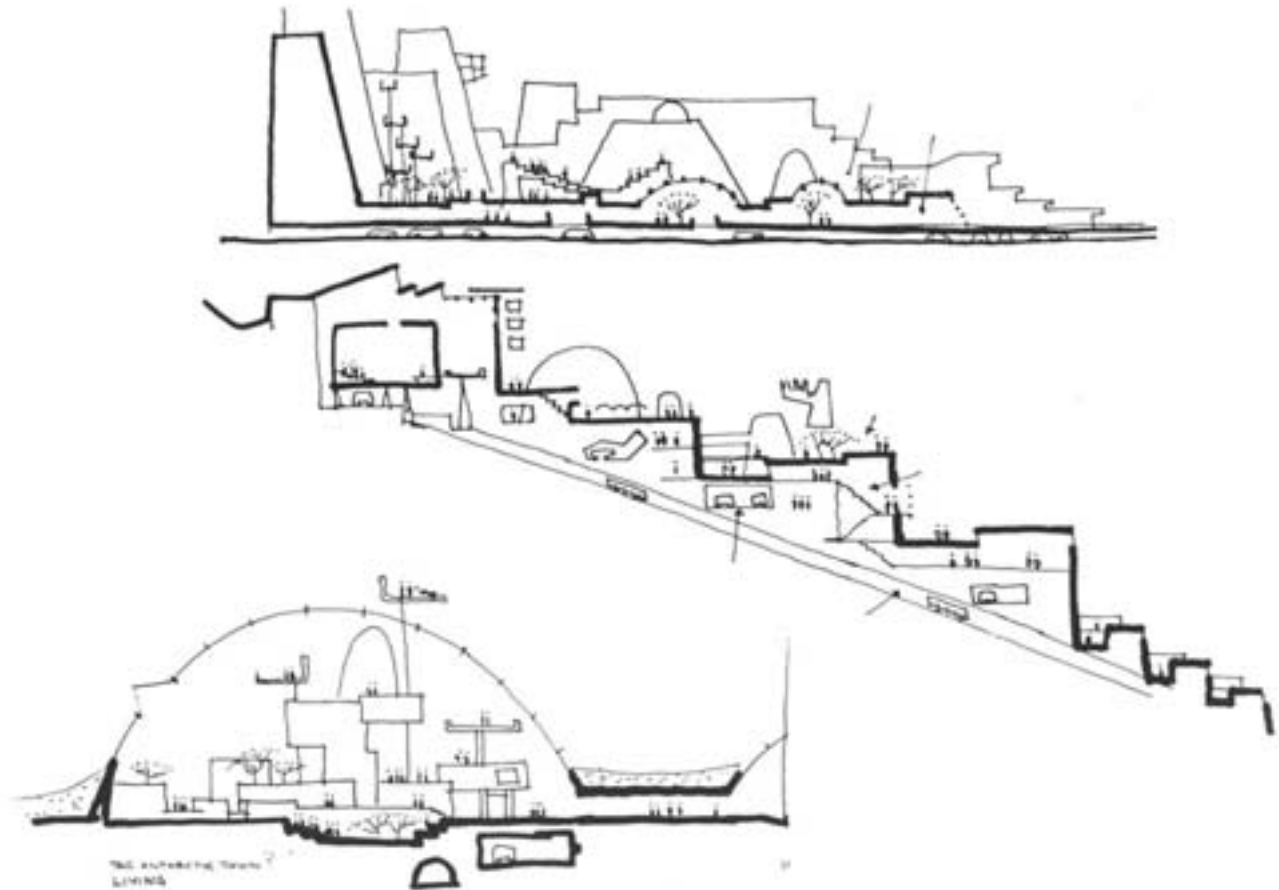
Dome over Manhattan, Buckminster Fuller



Ralph Erskine, Arctic City



Ralph Erskine, Arctic City



14 Zwei Querschnitte einer Stadt auf ebenem und abfallendem Boden; überkuppeltes Stadtzentrum für die Antarktis.

STUDENT WORK Diagrams for the Contemporary City

Sea level rise in Great Britain, heat islands in Paris, water consumption in Barcelona, energy savings out-ruled by rising living space demand, 4 liter toilets – do they have an urban dimension?

Most data provided by the media lacks the spatial and formal aspect that we as urban designers and architects need to know about. Maps, charts and diagrams are important tools to grasp, synthesize and finally spatialize information.

You are asked to research a chosen topic and visualize your findings with the help of:

- a self-produced map
- quantitative charts
- flow diagrams
- or typological schemes

Depending on the topic, it is:

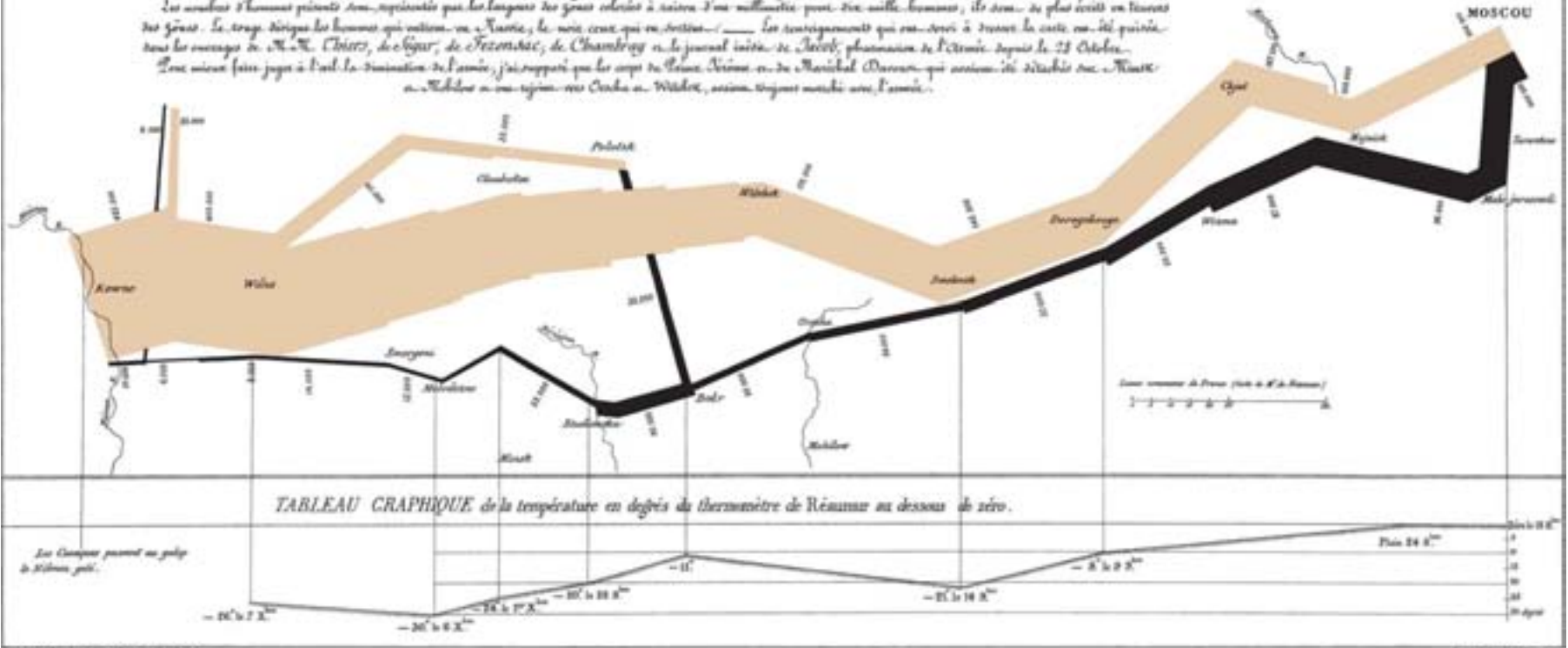
- geographical extend
- scale comparison
- effect quantification
- and /or reciprocity and interplay

that have implications on urban and architectural design.

Carte Figurative des pertes occasionnées en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dressée par M. MÉRISSE, Inspecteur Général des Ponts et Chaussées en retraite. Paris, le 20 Novembre 1869.

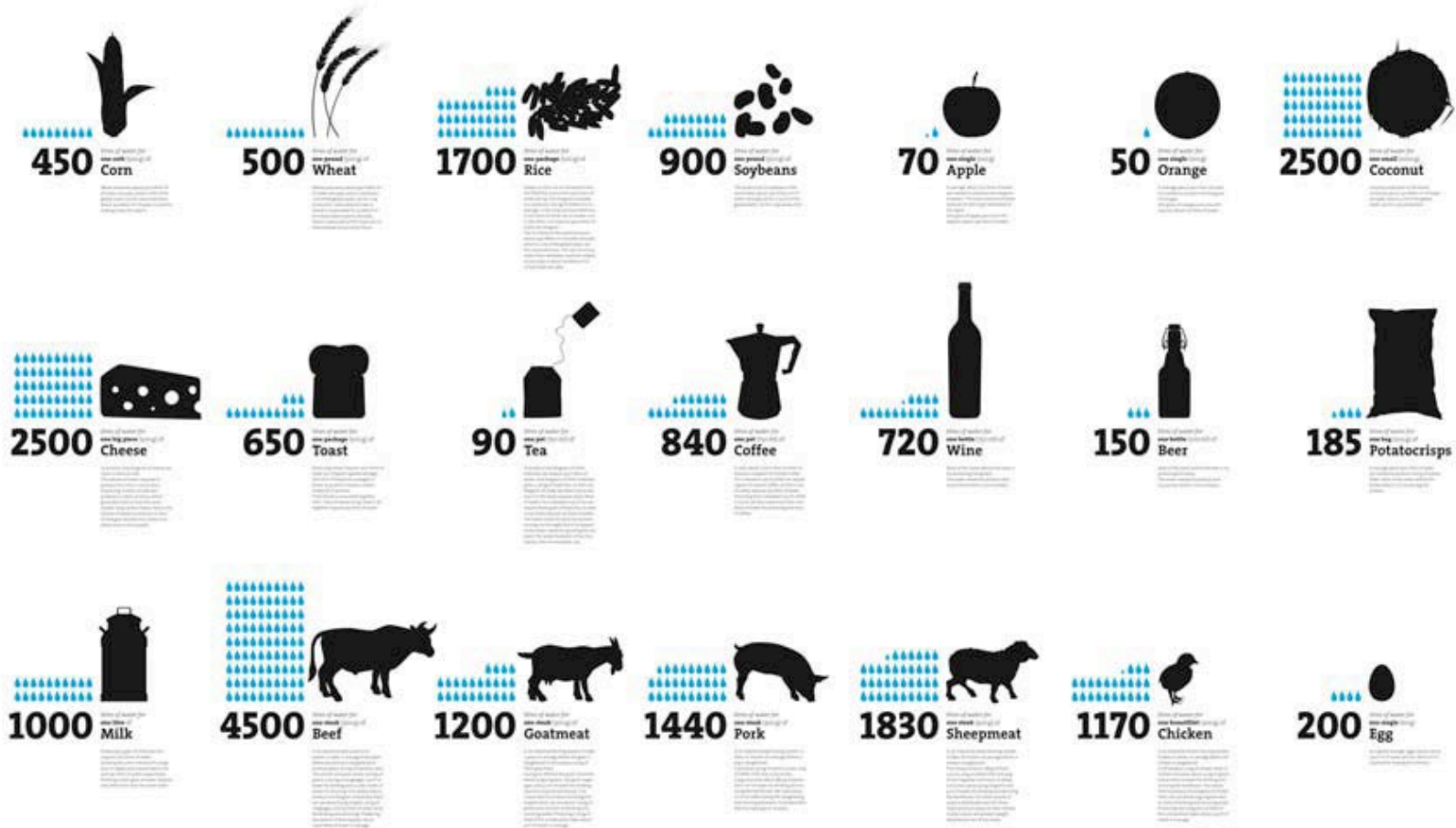
Les nombres d'hommes perdus sont exprimés par les longueurs des lignes colorées à raison d'un millimètre pour six mille hommes, ils sont le plus écrit en lettres des lignes. Le tracé désigne les hommes qui ont été en Russie, les noirs ceux qui en sont restés. Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. de Chateaubriand, de M. de Ségur, de M. de Fontenay, de M. de Camille et de M. de Ségur, pharmacien de l'Armée depuis le 23 Octobre. Pour mieux faire juger à quel point la dévastation de l'Armée, j'ai rapporté que les corps de Louis-Napoléon et de Maréchal Davout qui avaient été détachés en Russie en 1812 et qui furent vaincus à Smolensk, ont été vaincus avec l'Armée.



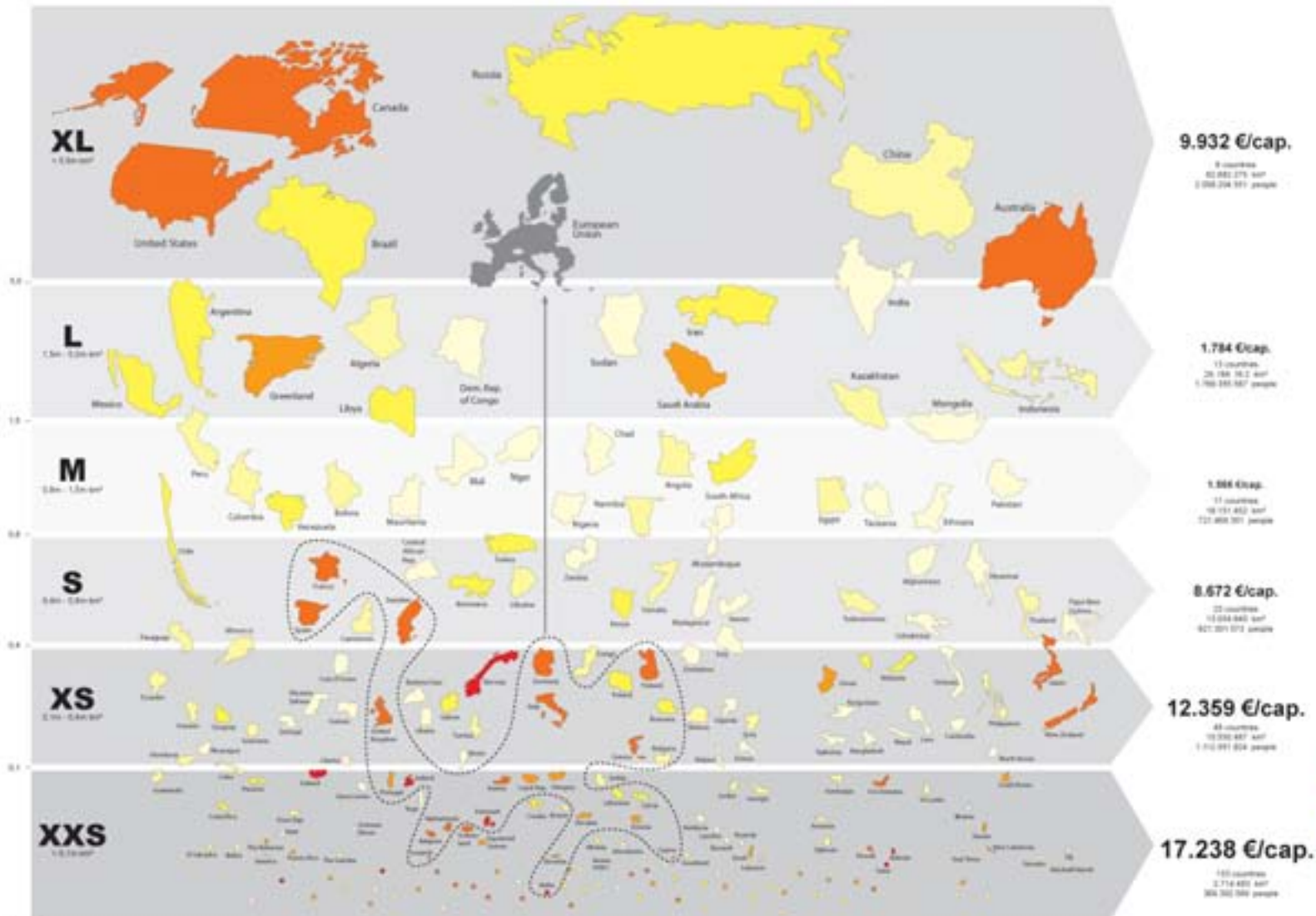
VIRTUAL WATER

inside products

Source: Global Water Footprint Accounts, 2011



Avoid the Center

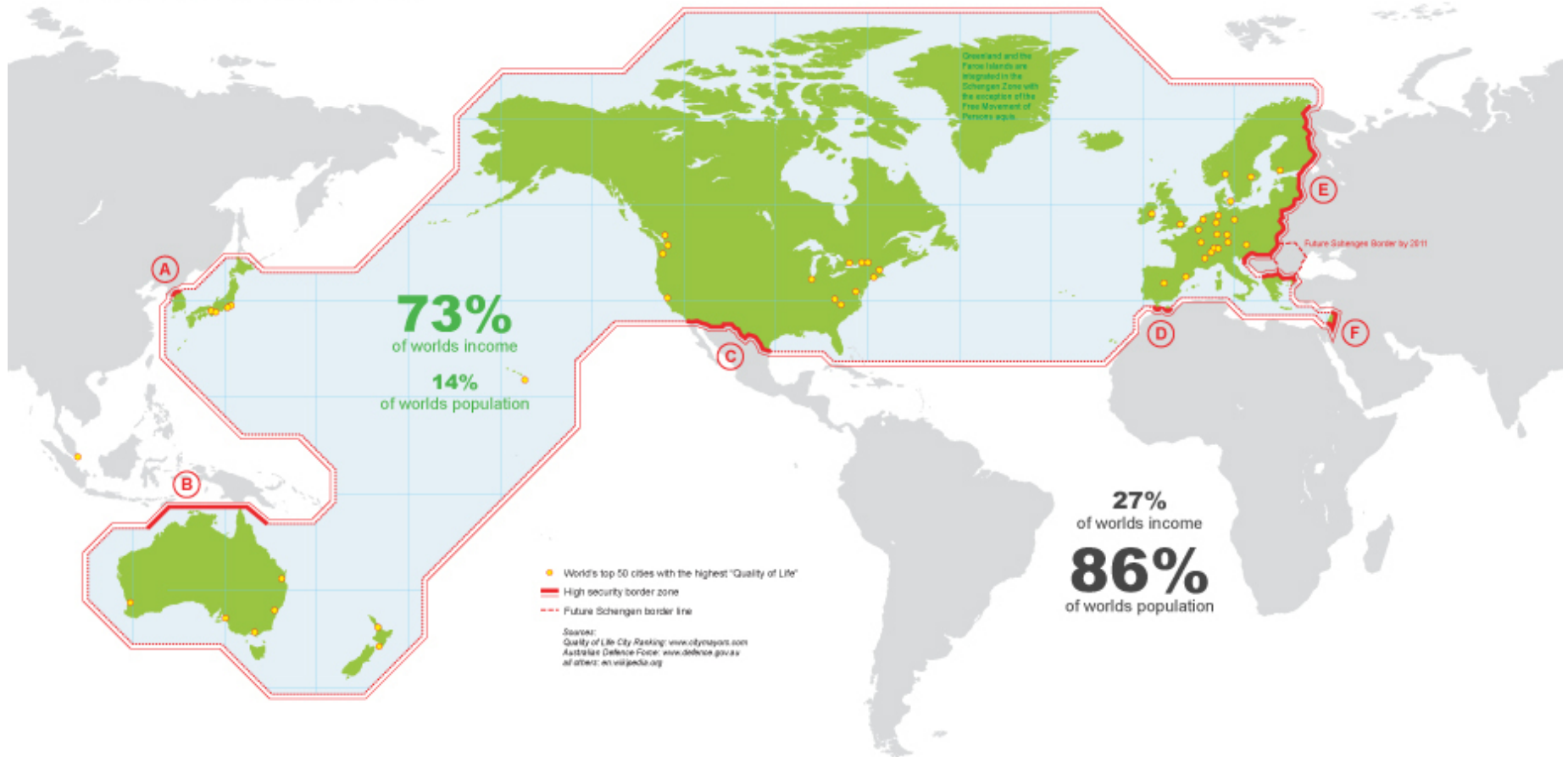


By reorganizing the countries of the world according to their physical size, an interesting phenomenon emerges that shows prosperity at the edges and meagerness in the middle of the scale. The segment of the super-sized countries is dominated by Canada, USA and Australia with the vastly developing BRIC-Countries (Brazil, Russia, India and China) joining in while the zone of XXS-States is dominated by countries like Luxembourg as world's richest country and tax-havens like the Cayman Islands. Seen in this light the European Union established itself as a perfect androgynous state that, at its will, is able to bridge this gap and appear wherever it is most suitable. Its member states can either appear as toothless dwarfs or, if the members are working together, the European Union can appear as important player amidst of world's largest and powerful countries.

Legend
 GDP / capita
 > 15.000 €
 10.000 - 15.000 €
 5.000 - 10.000 €
 1.000 - 5.000 €
 < 1.000 €
 Countries smaller than 10.000 km² are only indicated with dots
 Source: CIA World Factbook



Walled World



A The Demilitarized Zone (or DMZ)
in Korea is a strip of land running across the Korean Peninsula that serves as a buffer zone between North and South Korea. The DMZ was created in the ceasefire of July 27th 1953 and cuts the Korean Peninsula roughly in half. It is 246 km long and approximately 4 km wide.

B The Australian Defence Force
(ADF) conducts surveillance and response operations in Australia's northern approaches. Since September 2001 it doubled the number of days Customs vessels are at sea and increased flying hours for surveillance aircraft by 20 per cent. Under a proposed legislation from June 2006 all new boat arrivals would be transferred offshore to have their asylum claims processed. In May 2009 the Ministry of Defense laid out a plan for an enlarged navy to conduct independent military operations.

D The Melilla border fence
is a separation barrier between Morocco and the Spanish city of Melilla. The razor wire barrier cost Spain €33 million to construct. It consists of 11 km of parallel 3 m high fences topped with barbed wire. Its height is doubled to 6 m.

The Ceuta border fence

is a separation barrier between Morocco and the Autonomous City of Ceuta, in Spain. Construction of the €30-million razor wire barrier was financed by the European Union. It consists of parallel 3-metre fences topped with barbed wire.

E Schengen Border
is an agreement among European states which allows for common policy on the temporary entry of persons and a border system. A total of 31 countries – including all European Union states except the Republic of Ireland and the United Kingdom, but including non-EU members Iceland, Norway, and Switzerland – have signed the agreement and 25 have fully implemented it so far. The Republic of Ireland and the United Kingdom did not sign the Schengen Agreement but take part in the Schengen co-operation and use the Schengen Information System for law enforcement purposes.

C The United States–Mexico barrier
is actually several separation barriers designed to prevent illegal immigration into the United States. The 3,140 km border between the United States and Mexico traverses a variety of terrains, including urban areas and deserts. The barrier is located mainly in the urban sections of the border which include San Diego, California and El Paso, Texas. Between 1996 and 2004, 1,954 persons are officially reported to have died along the US-Mexico border. According to 'No More Deaths', 1,086 bodies of migrants have been recovered in the southern Arizona desert between 2004 and 2008. The 'Secure Fence Act of 2006' enacted in October 2006 allows for over 1,100 km of double-reinforced fence.

F The West Bank barrier
is a physical barrier being constructed by Israel consisting of a network of fences with vehicle-barrier trenches surrounded by an on average 60 meters wide exclusion area and up to 8 meters high concrete walls. As of January 2006 the length of the barrier as approved by the Israeli government is 670 kilometers. Approximately 56% has been constructed, 9% is under construction and construction has not yet begun on 33%.

Accelerated through the fear from the attacks of 9/11 and all what followed, the so called "Western Society" is constructing the greatest wall ever build on this planet. On different building sites on all five inhabitable continents, walls, fences and high-tech border surveillance are under construction in order to secure the citizens and their high quality of life within this system.

The fall of the Berlin Wall was described as the historical moment that marks the demolition of world's last barrier between nation states. Yet it took the European Union only six years to create with the Schengen Agreement in 1995 a new division only 80km offset to the east of Berlin. Together with the wall in Israel, the US- Mexican border, the Australian Coast Defence and the DMZ in Korea, it makes part of a worldwide system that contains an exclusive society (14% of worlds population) with an average income of € 2.500,-/month versus the ones in front of the wall with an average income of only € 150,-/month.

1993: PRE-ZUIDSTAD



REPLANNING: PHASE 1



PHASE 2



PHASE 3: COMPLETION



ZUIDSTAD: EXISTING DUTCH POPULATION
WITH L.A. DENSITY
15 MILLION INHABITANTS



ZUIDSTAD: EXISTING DUTCH POPULATION
WITH ALEXANDERPOLDER DENSITY
15 MILLION INHABITANTS

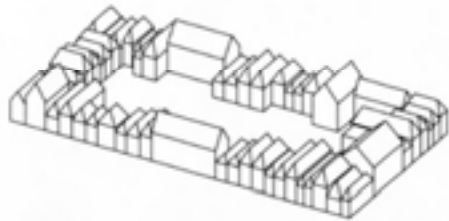


ZUIDSTAD: EXISTING DUTCH POPULATION
WITH MANHATTAN DENSITY
15 MILLION INHABITANTS

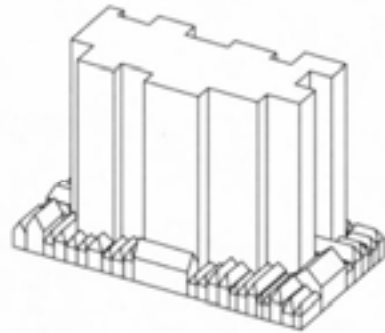


ZUIDSTAD: EXISTING DUTCH POPULATION
WITH MANHATTAN DENSITY ON DUTCH / BELGIAN BORDER
15 MILLION INHABITANTS

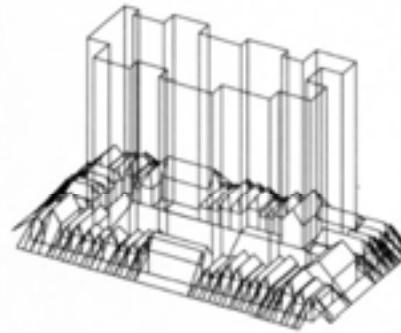




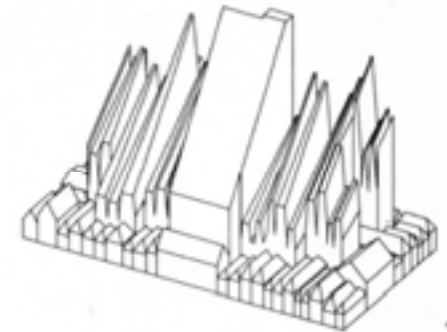
1. 18th century block
FAR = 0,8



2. extrusion of the inner court



3. viewlines from the street



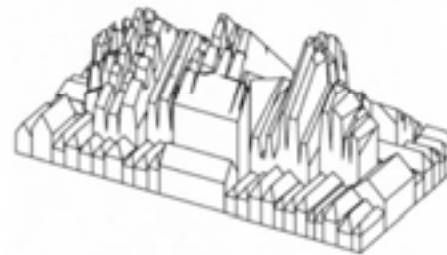
4. cut off 1



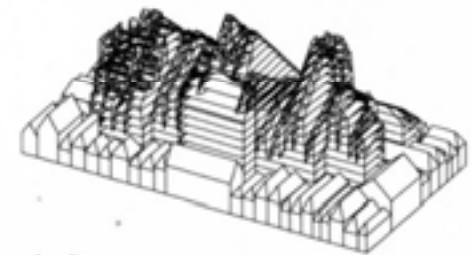
5. cut off 2



6. cut off 3

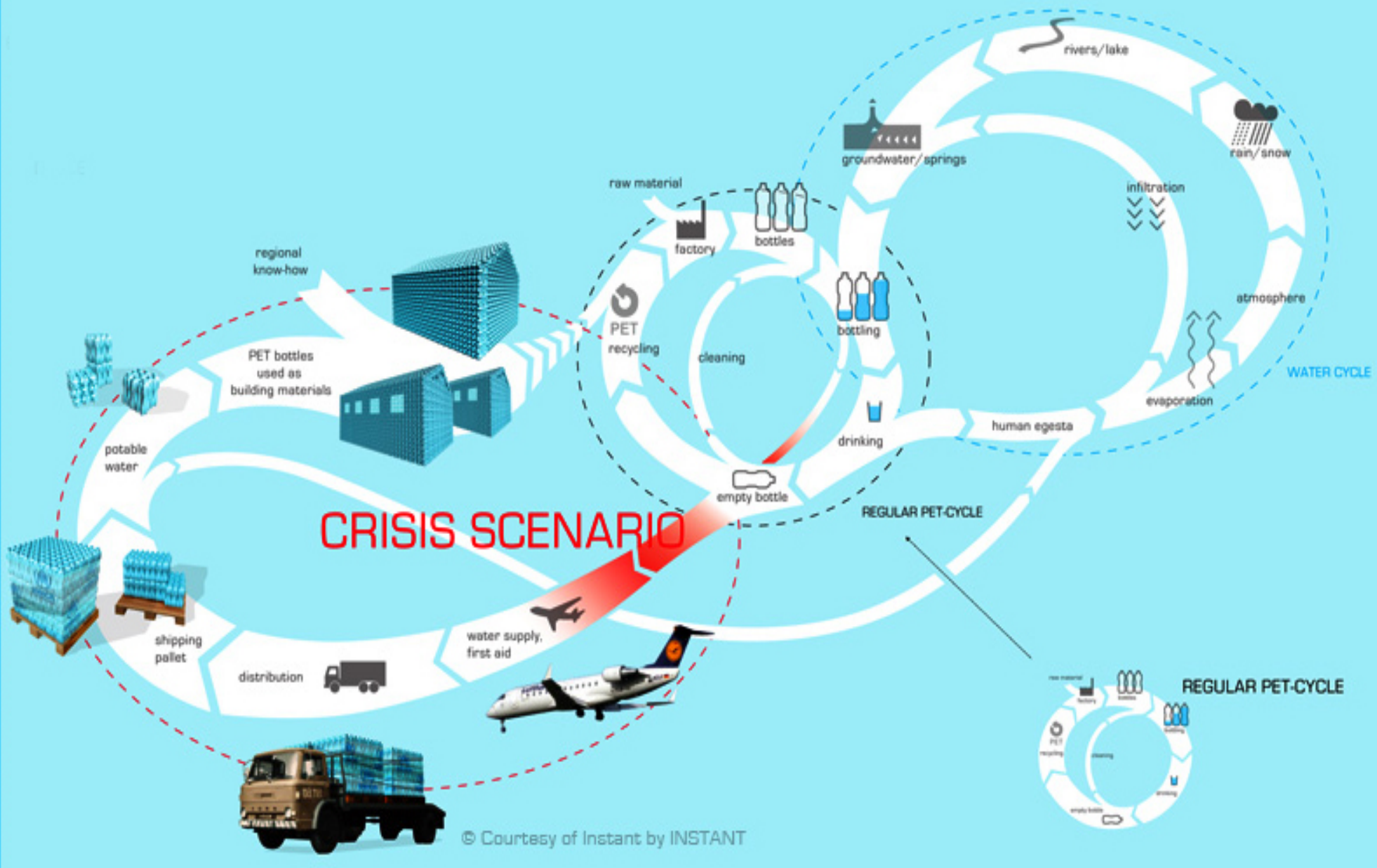


7. cut off 4



8. floors
FAR = 7,8

FIGURE



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STUDENT WORK Diagrams for the Contemporary City

Conceptual diagrams that are analytical, critical and envision spatial information

The stba1 homework consists of:

- Information search and gathering (newspapers, magazines, internet, books)
- Information ordering and synthesis - comparison, evaluation of effects
- Production of your own vector graphics,
- Abstract and argument (3000 characters without spaces)
- Layout in A4 booklet format (layout grid will be provided digitally)
- Indication of sources and list of references

1st Tutorial: Creating a graphic language as a critical design tool

2nd Tutorial: Theme, data, thesis, graphic language

3rd Tutorial: Representation: evaluation, questions, sources

References:

- AMO, MVRDV
- Edwin Tufte (Envisioning Information, 1990)
- Diagrams from engineers, scientists...