International Water Association

Challenges and Opportunities for

Integrated Urban Water Management

in Low and Middle-Income Countries

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International Water Association

World Water Day: Water in cities

Oslo, Norway

22nd March

IWA – a global network for water professionals

Focus :

- All aspects of water management (inc. sanitation and wastewater management)
- Greater focus on urban water and sanitation than rural

Membership:

- 10,000 individual members, 400 organizations (90% public sector) in over 120 countries
- Utilities, consultants, regulators, manufacturers, academics and researchers.

Overview of presentation

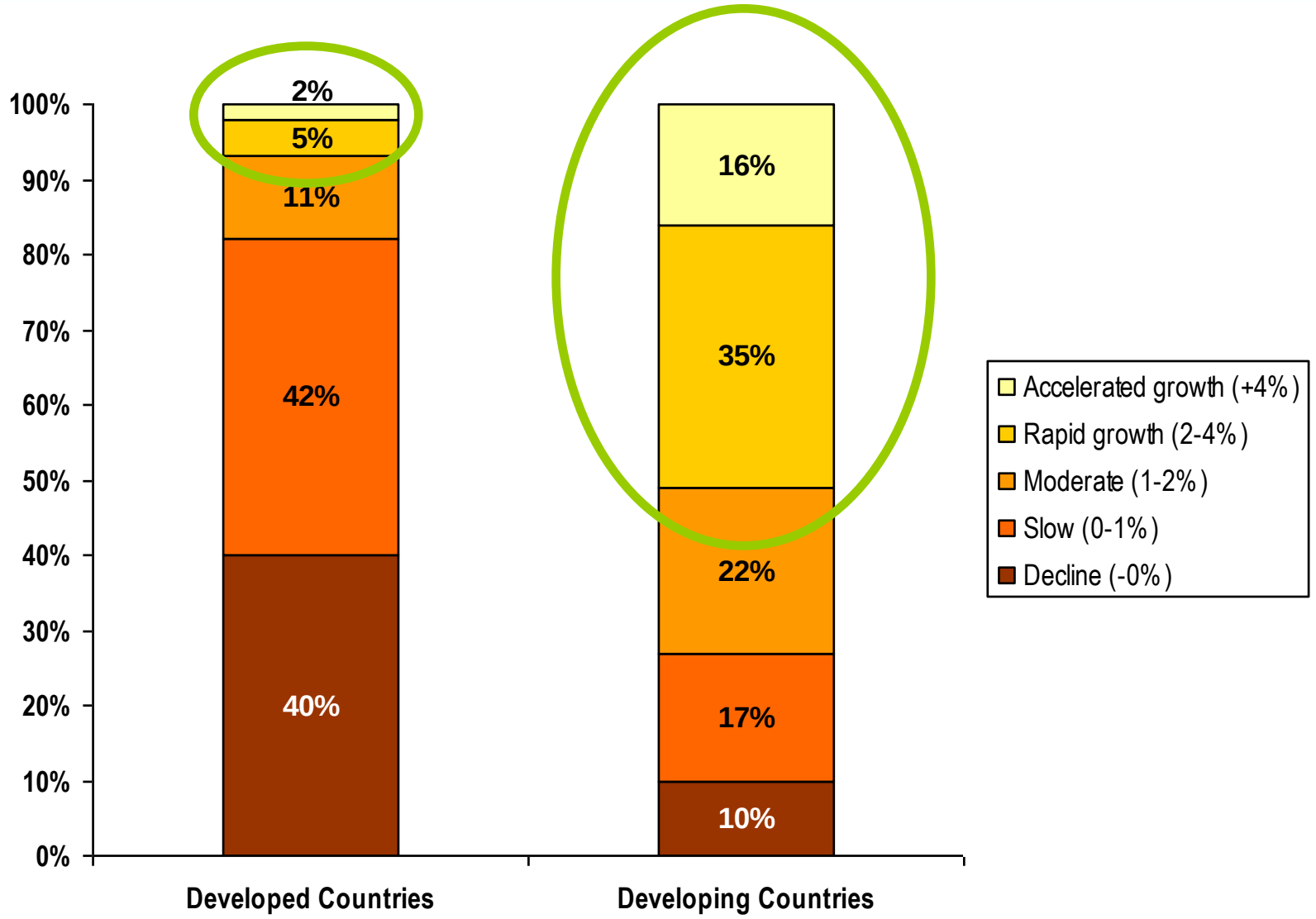
1. Global trends : Urbanization and climate change
2. Impacts on the urban water cycle
3. Key drivers towards sustainable urban development
4. Opportunities for integrated urban water management
5. Focus of international development co-operation
6. The role of the International Water Association

1) Global trends :

Urbanization and climate change

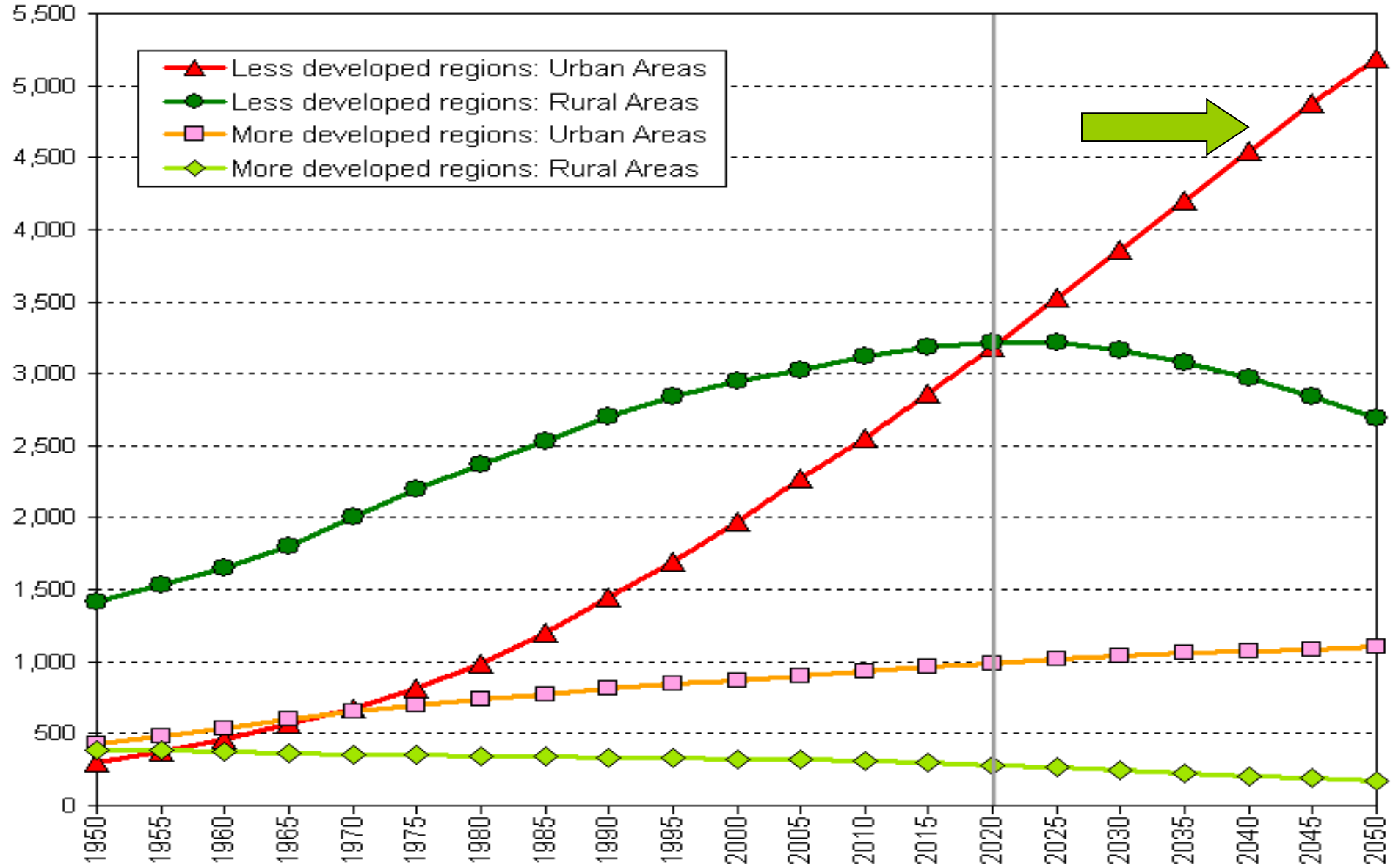
Source : UN-Habitat

Rate of population growth

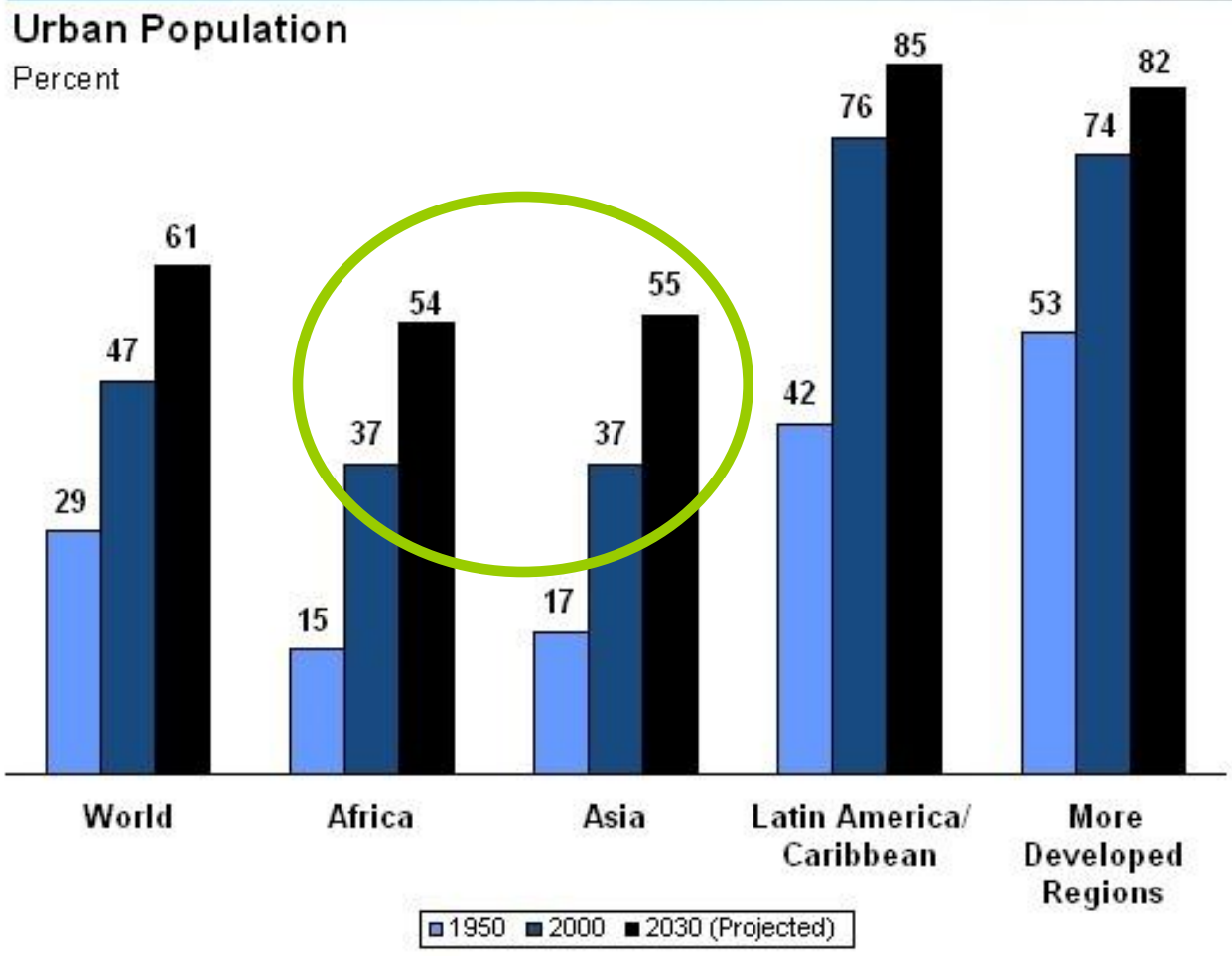


World Urbanization Prospects, the 2009 Revision

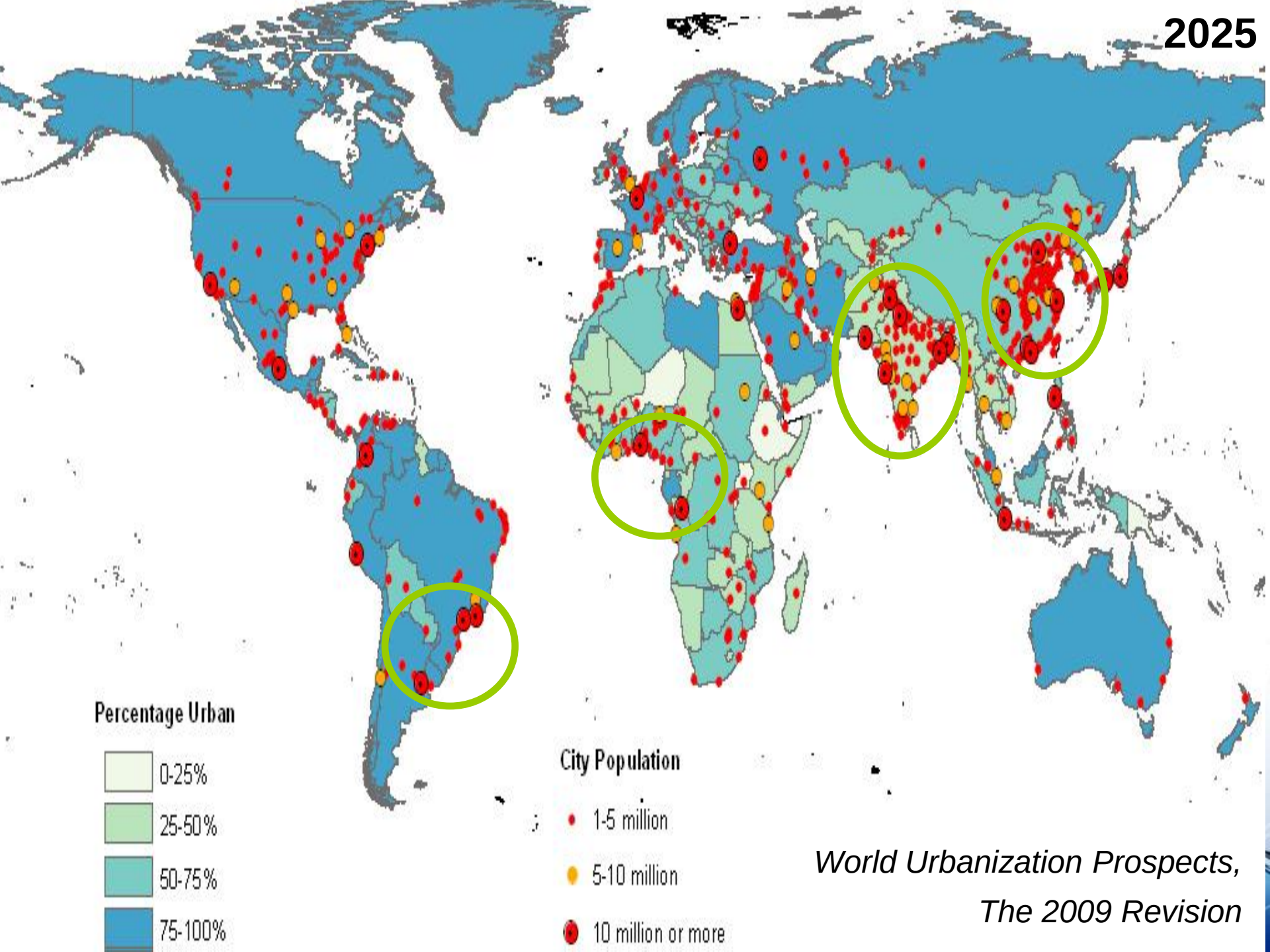
Urban and rural population growth (in millions)



Trends in Urbanization, by Region



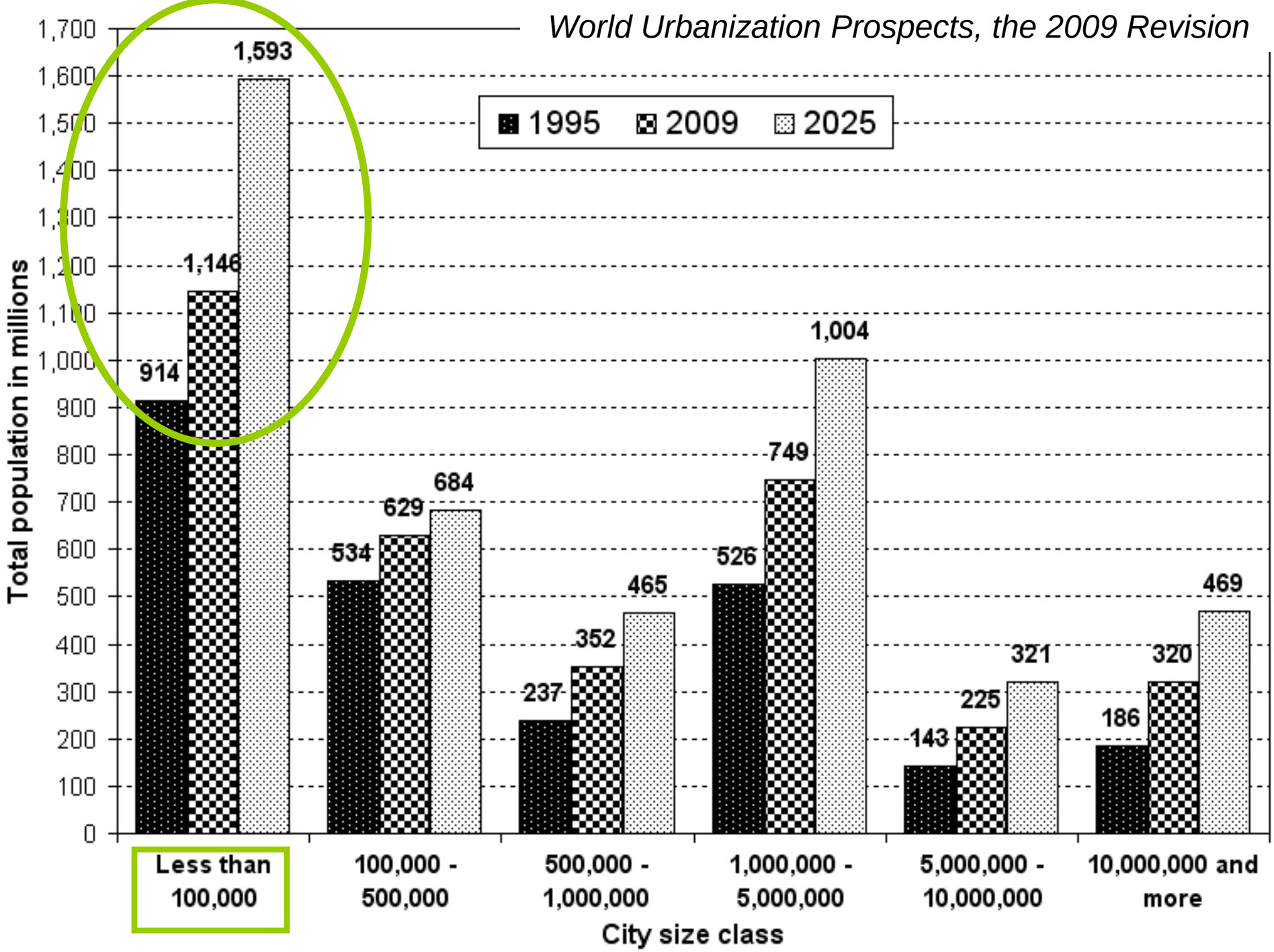
Source: United Nations, *World Urbanization Prospects: The 2003 Revision* (medium scenario), 2004.



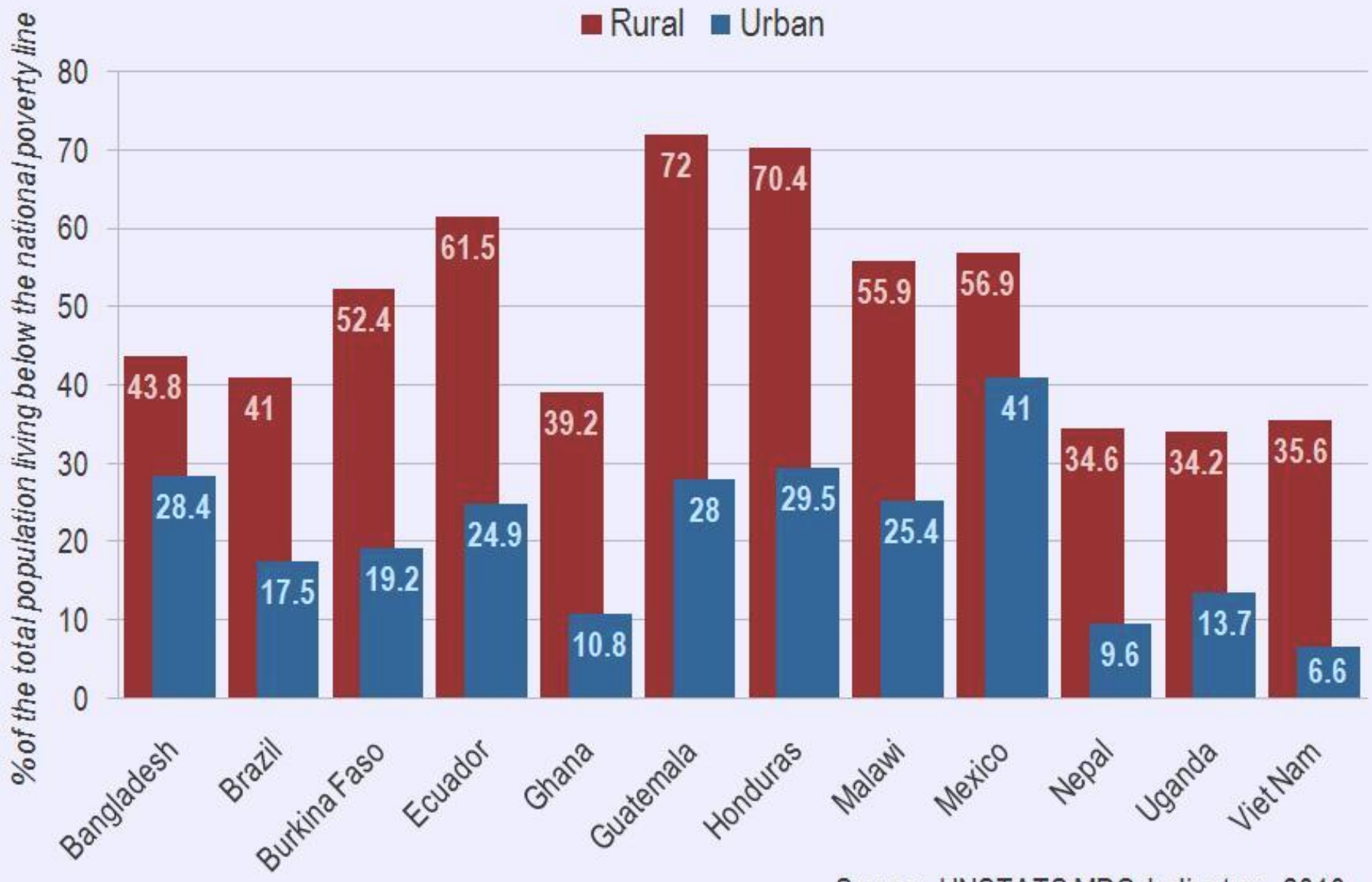
World Urbanization Prospects,

The 2009 Revision

World Urbanization Prospects, the 2009 Revision



Proportion of the Population Living Below the National Poverty Line, Latest Estimates (Urban and Rural)



Source: UNSTATS MDG Indicators 2010

2) Impacts on the urban water cycle

i) Urban hydrology and flooding

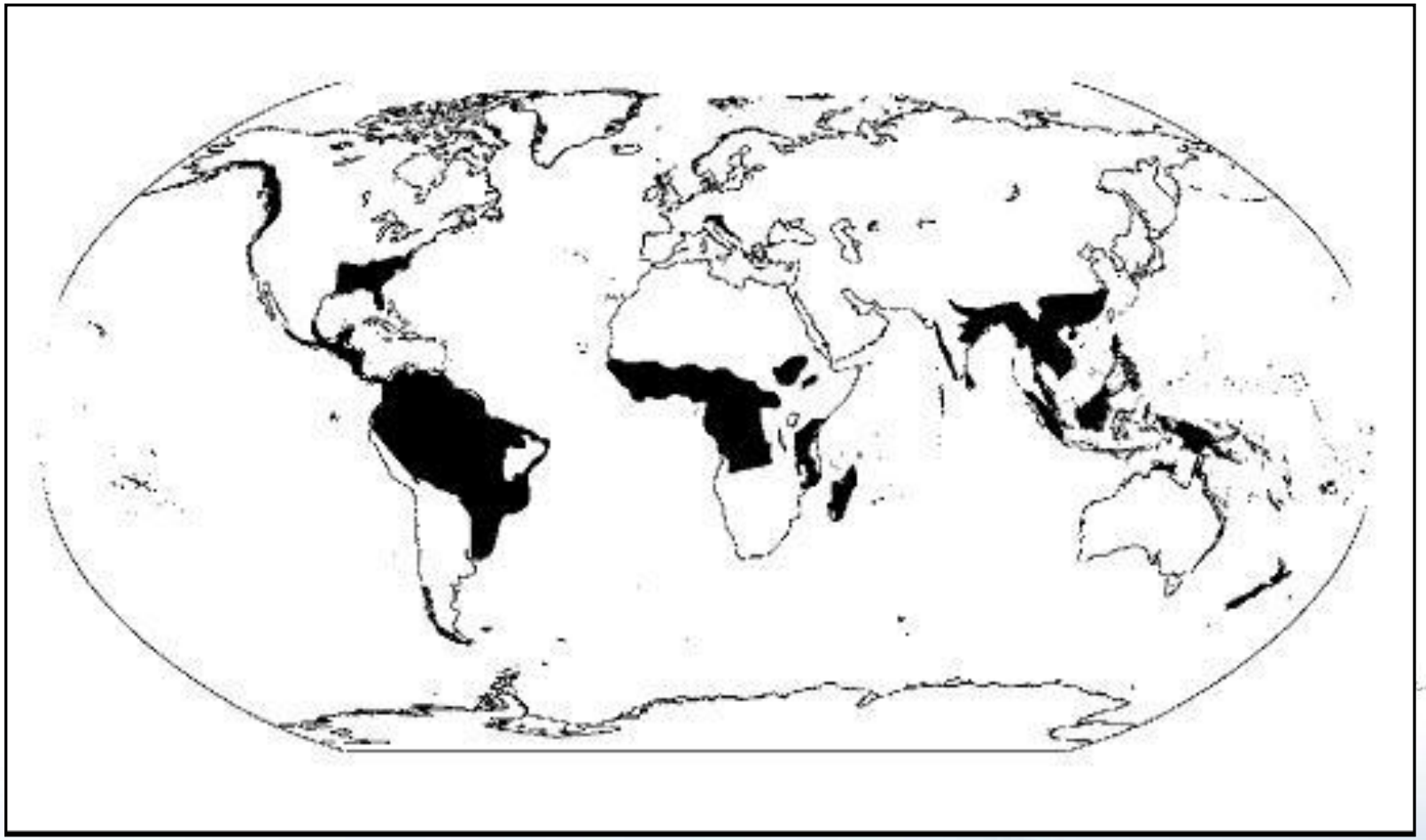
ii) Water scarcity

ii) Pollution of receiving waters

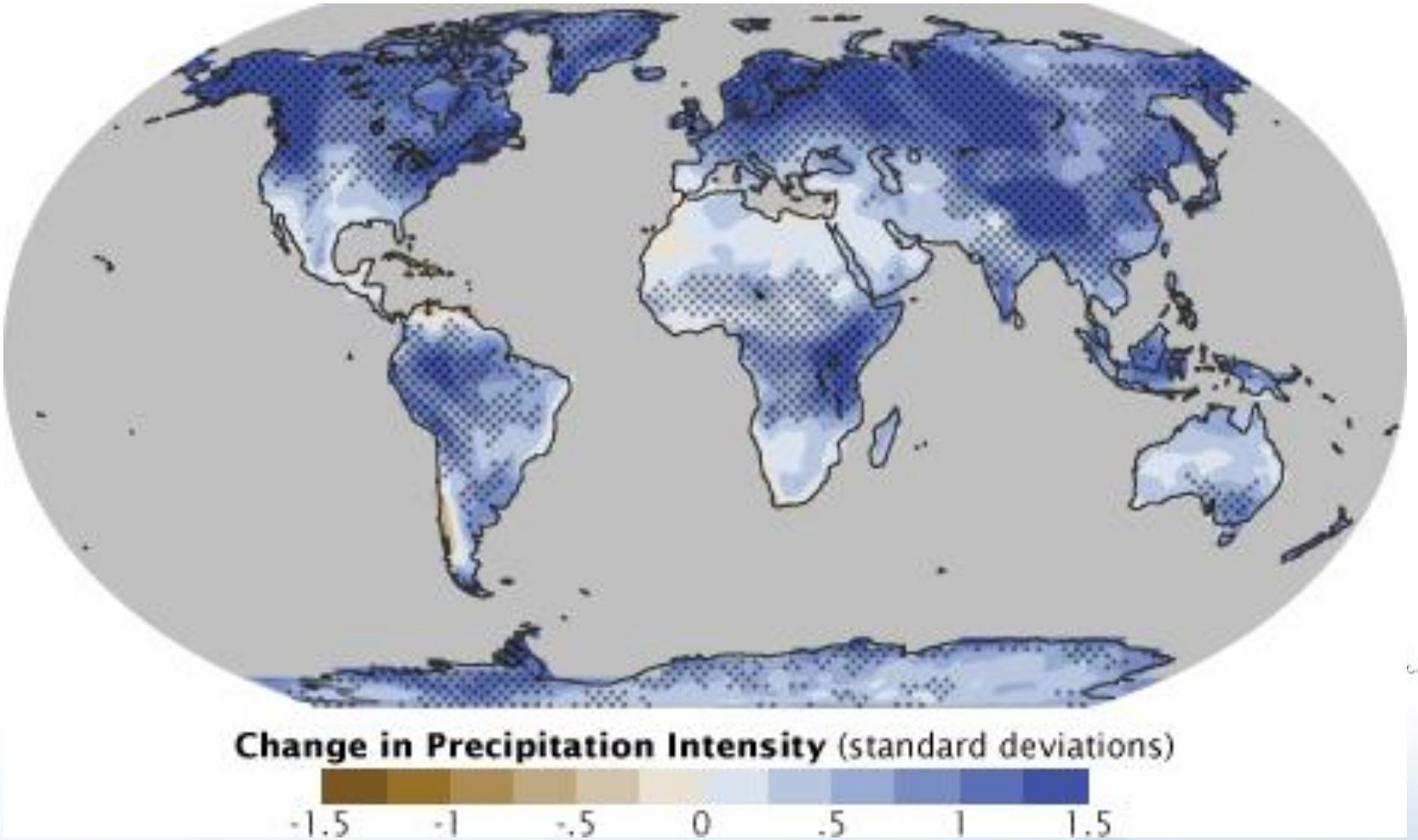
iv) Eutrophication and nutrient loss

i) Urban hydrology and flooding

Tropical climates – high rainfall intensity



Climate change: increases in rainfall intensity



Source:http://earthobservatory.nasa.gov/Features/Water/page3.php

Impacts on the urban hydrological cycle

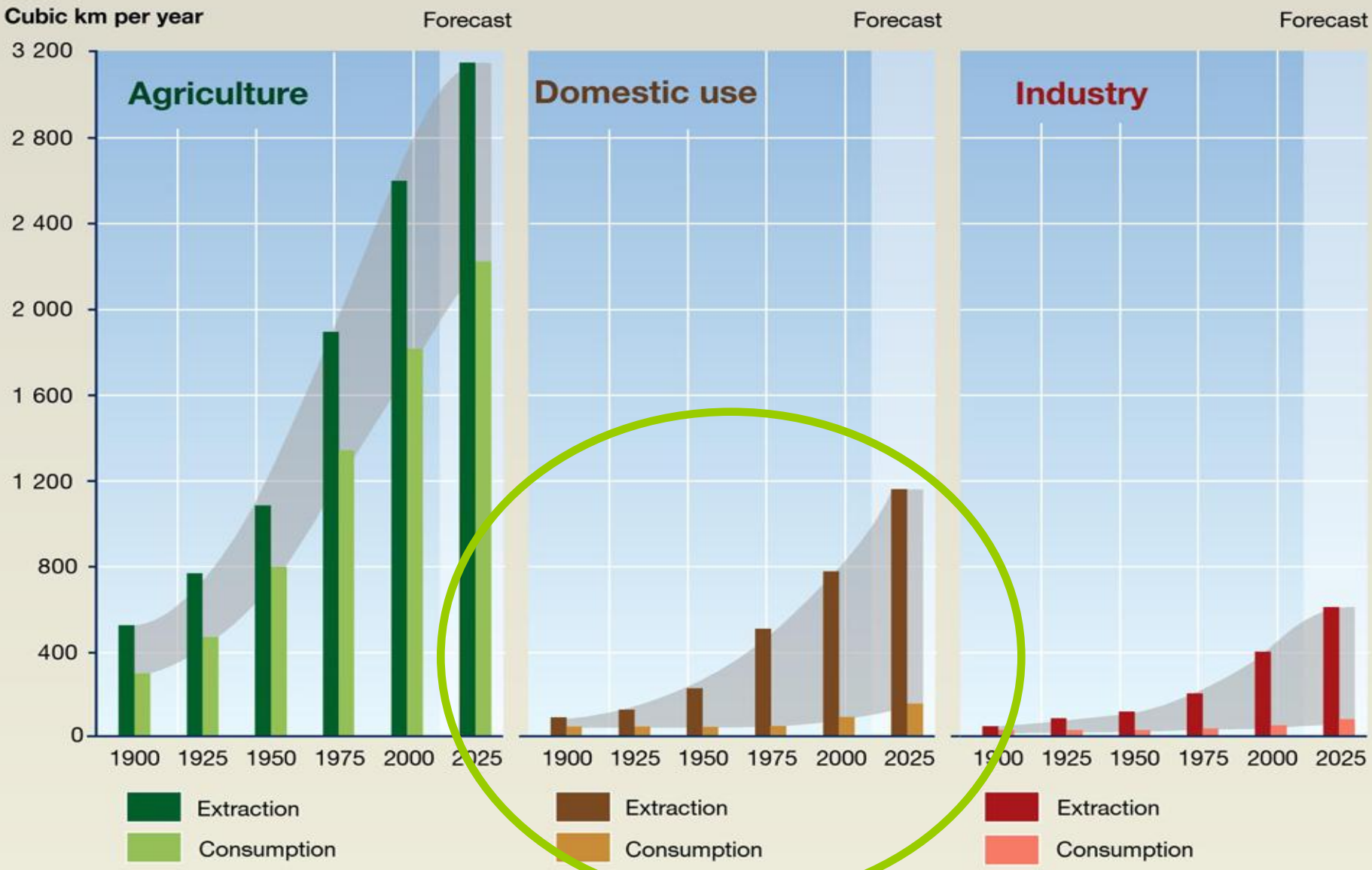
Photos: UN-Habitat

Proximity of slums to watercourses

Kolkata, India

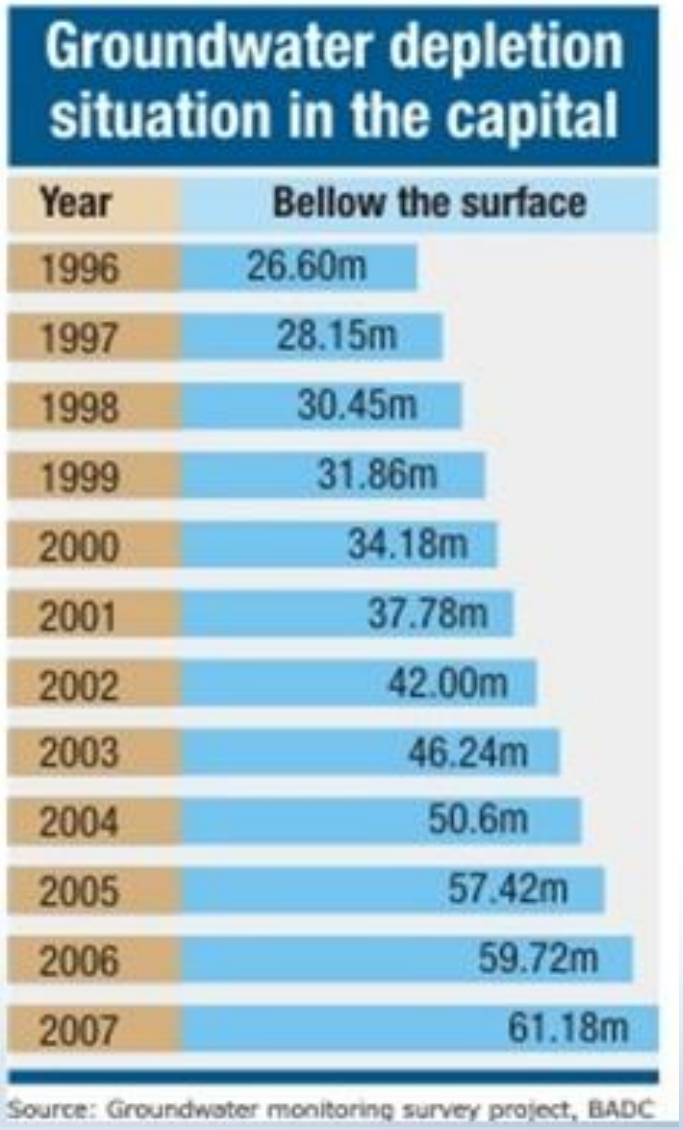
Phnom Penh, Cambodia

ii) Water scarcity



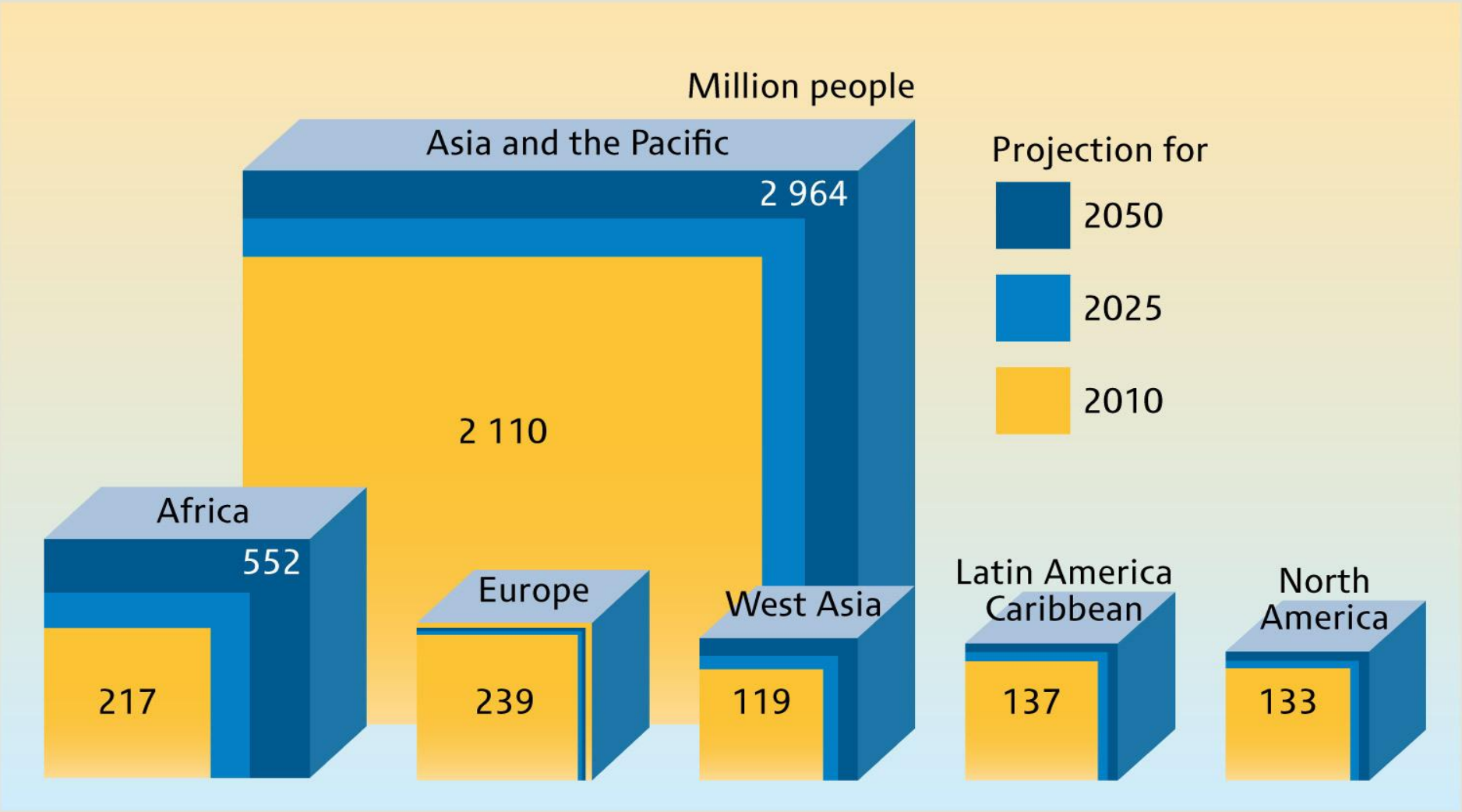
Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational,Scientific and Cultural Organisation (UNESCO, Paris), 1999.

Water scarcity: groundwater depletion in Dhaka



Groundwater table in Dhaka has dropped 35 metres in the last eleven years !!

Population living in river basins where freshwater withdrawal exceeds 40 per cent of renewable resources



Population by region was calculated averaging the results forecasted by the scenarios of the GEO-4 report using the WaterGAP modeling.

Source: Fourth Global Environment Outlook (GEO-4 report), UNEP, 2007.

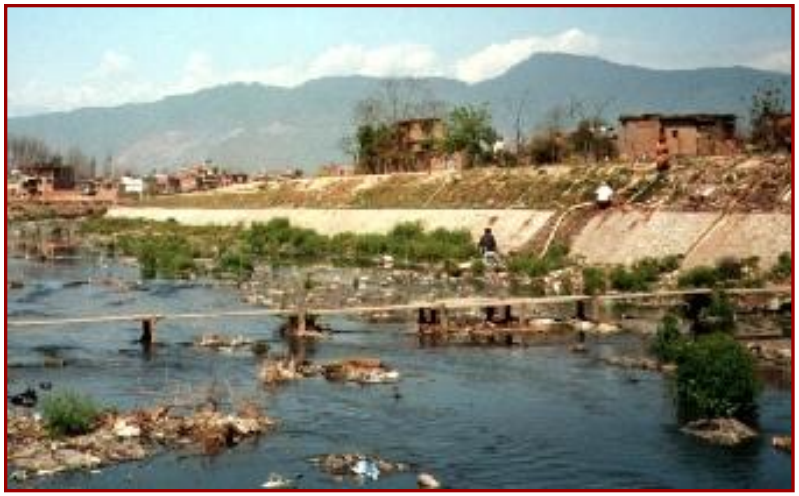
Water scarcity affects the poor the most

Wastewater reuse is prevalent in peri-urban areas

INDIRECT REUSE

Kathmandu Valley

Peri-urban communities pump water from polluted urban rivers to reuse for irrigation



DIRECT REUSE

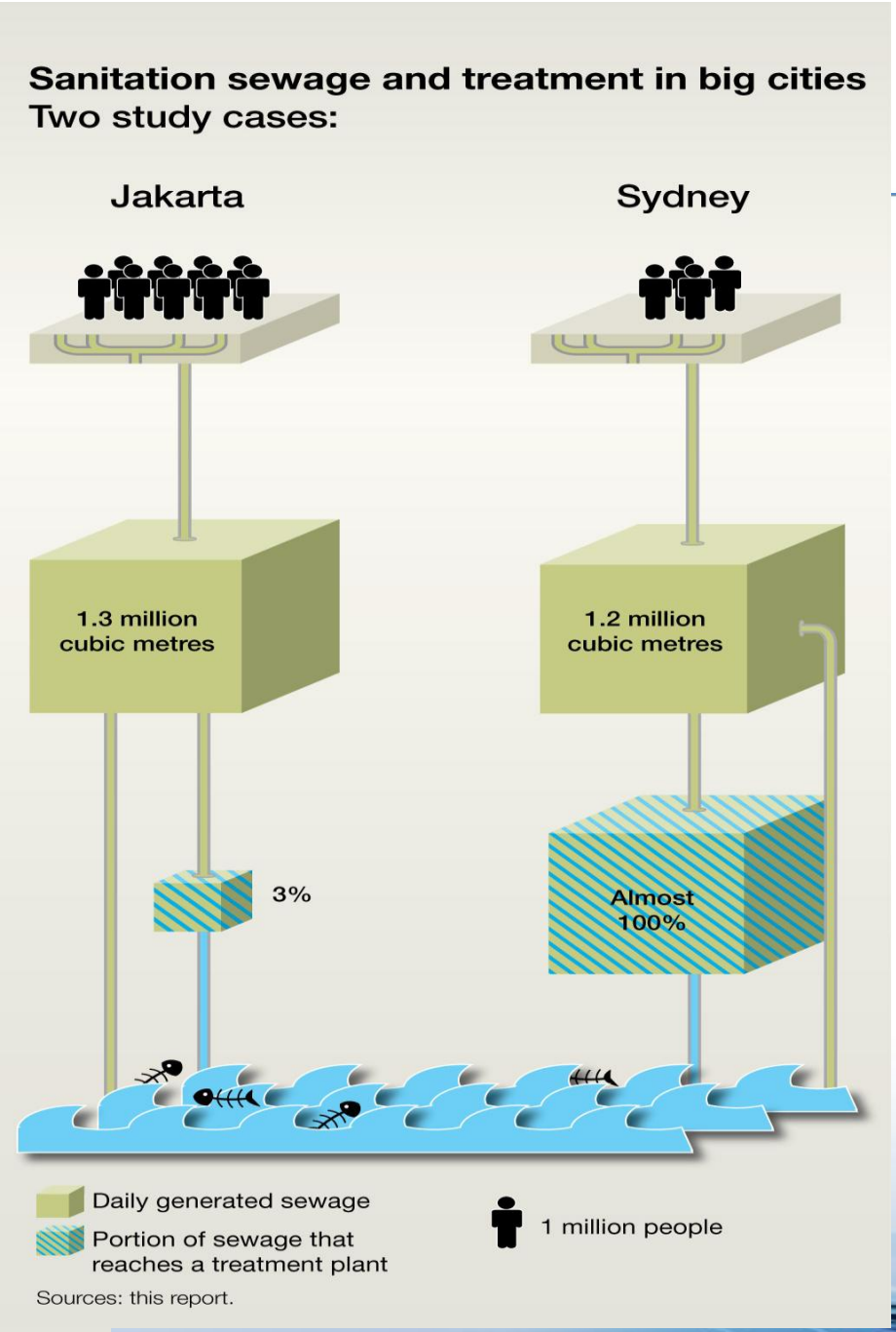
Faisalabad, Pakistan

Use of untreated wastewater results in health problems for farm workers and their customers.

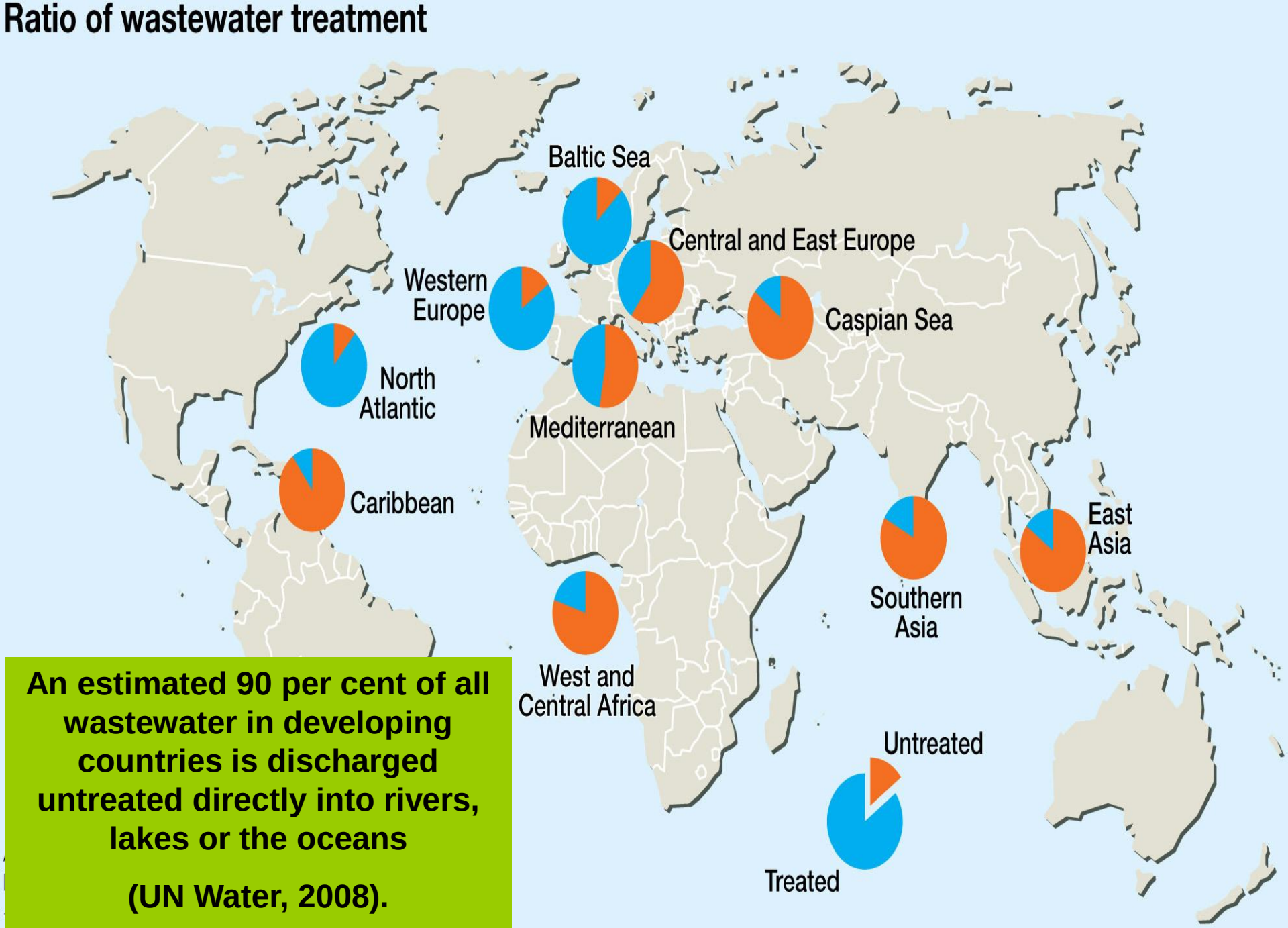
iii) Pollution of receiving waters

Source : Grid Arendal

Urban wastewater disposal



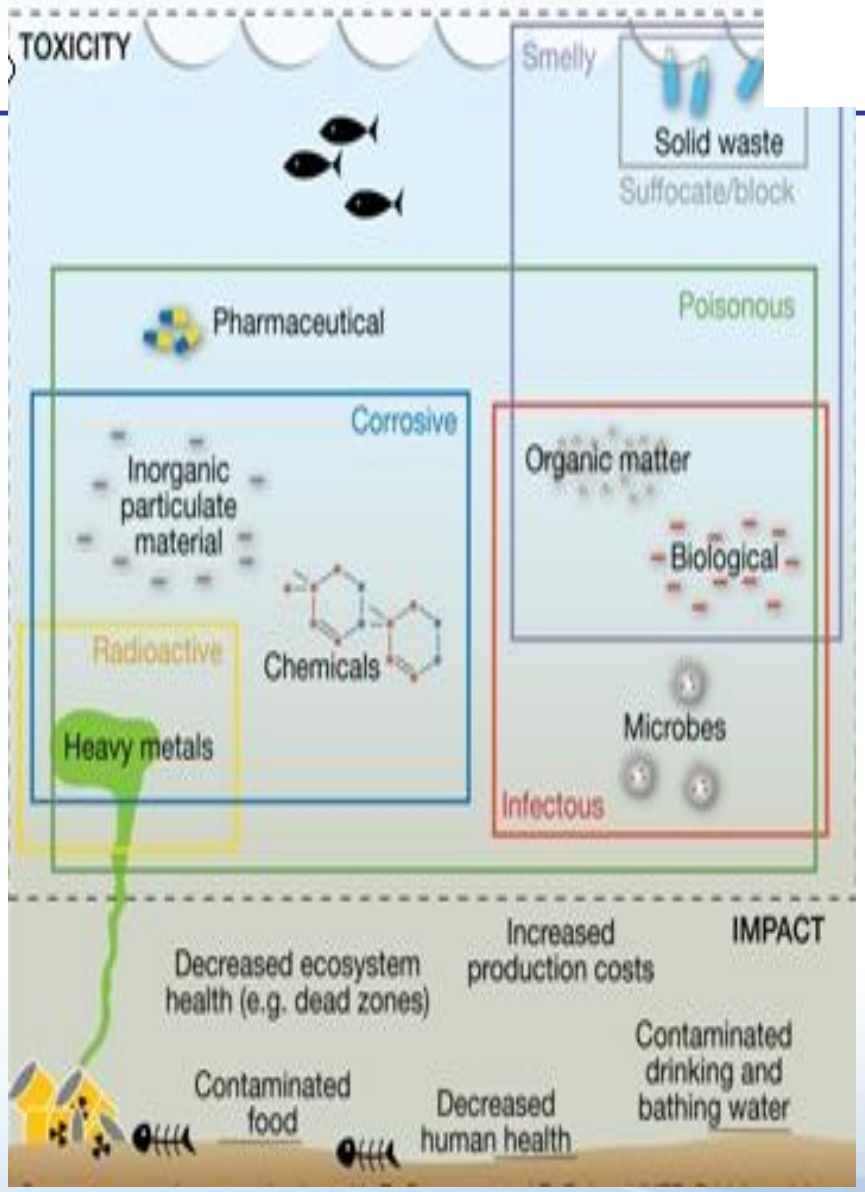
Source : Grid Arendal



An estimated 90 per cent of all wastewater in developing countries is discharged untreated directly into rivers, lakes or the oceans

(UN Water, 2008).

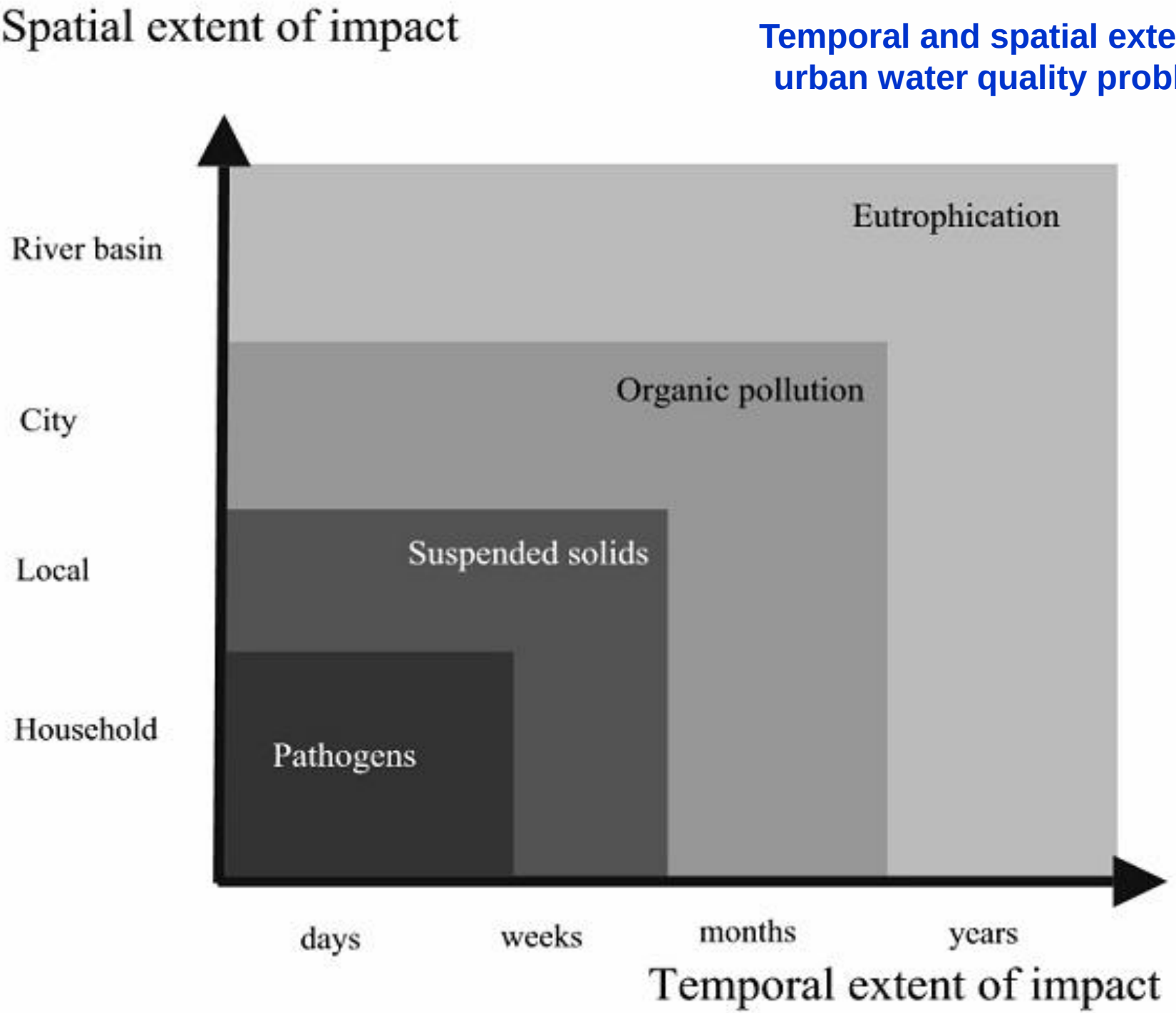
Urban wastewater – a ‘cocktail of pollutants’



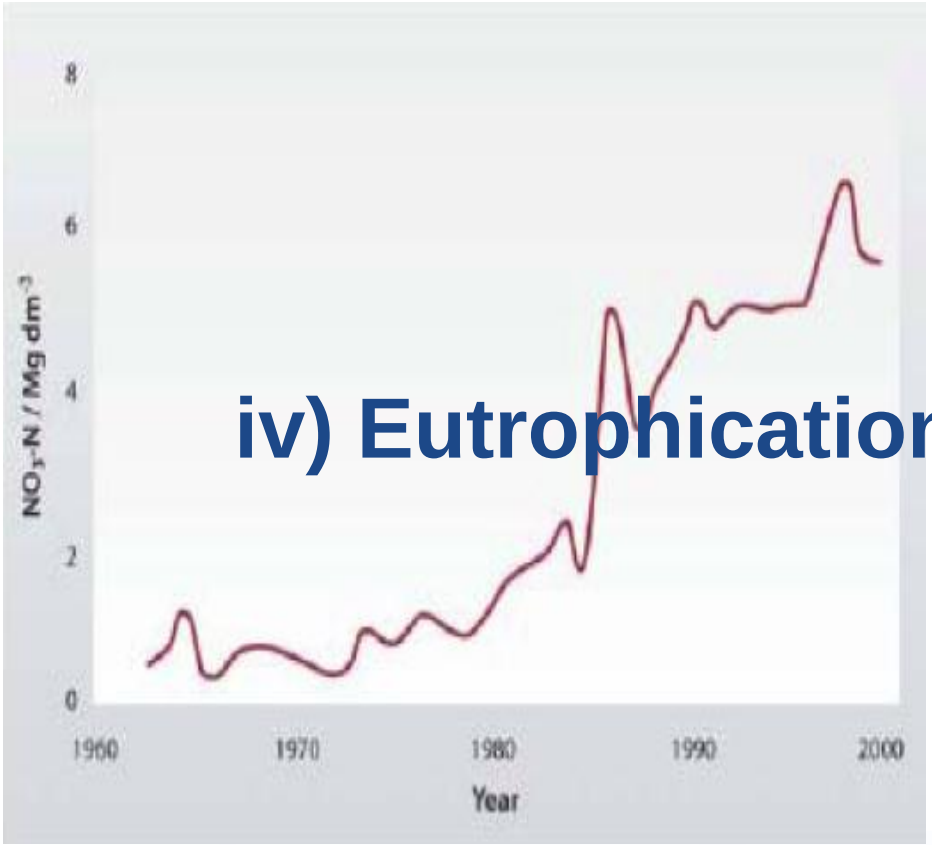
Source : Grid Arendal

Environmental health conditions in slums

Temporal and spatial extent of urban water quality problems



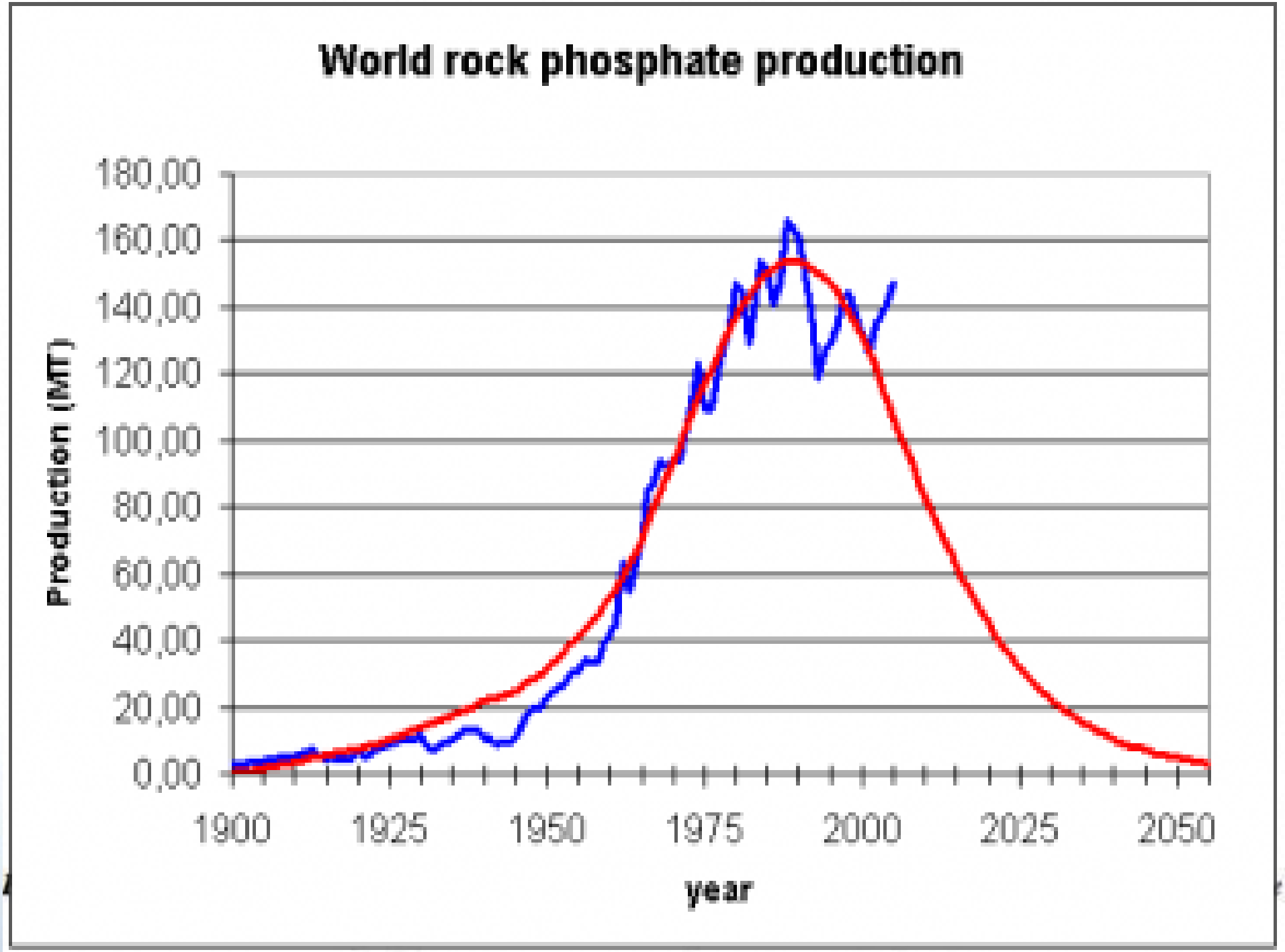
Nitrate concentrations at the mouth of Yangzte



iv) Eutrophication and nutrient loss

Figure 5. Historical variations of nitrate concentrations at Datong station (33).

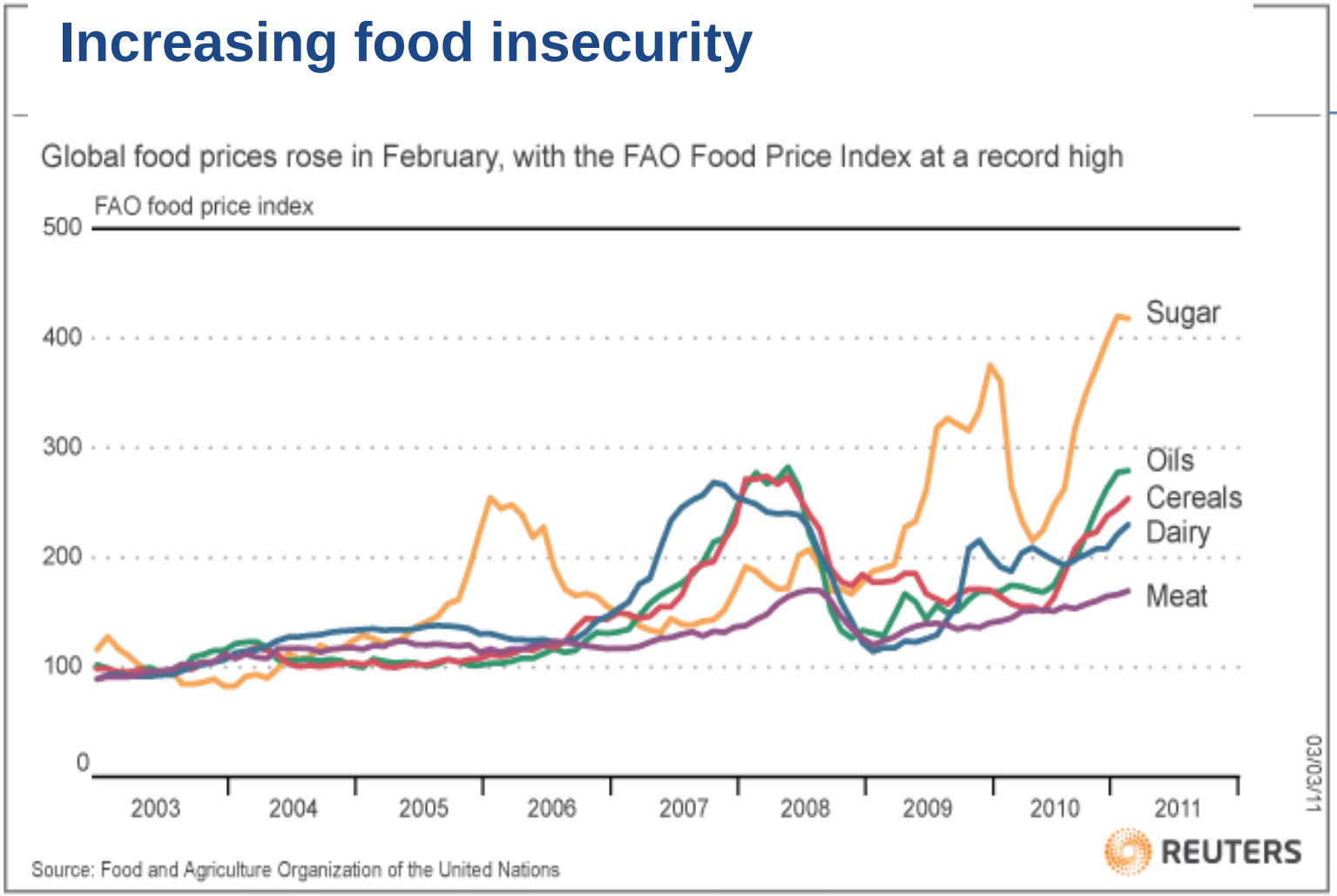
Ambio Vol. 33 No. 1–2, Feb. 2004


World rock phosphate production
180,00
160,00
140,00
120,00
100,00
80,00
60,00
40,00
20,00
0,00
Production (MT)
1900
1925
1950
1975
2000
2025
2050
year

Impact of eutrophication of productivity of aquatic systems

Excessive growth of water hyacinth in lake Dianchi, China (Source: UNEP)

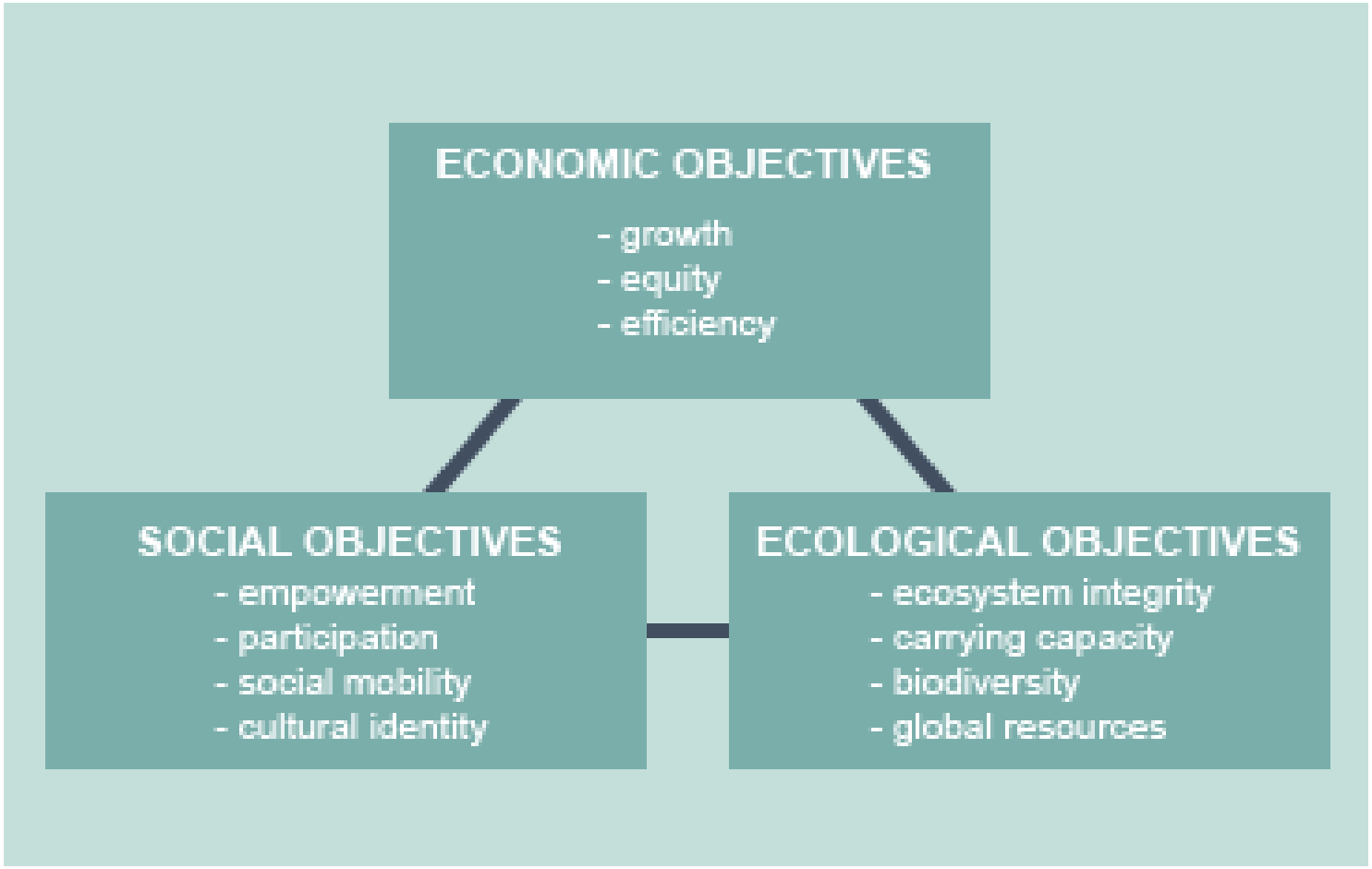
Increasing food insecurity



Reuters graphic/Scott Barber

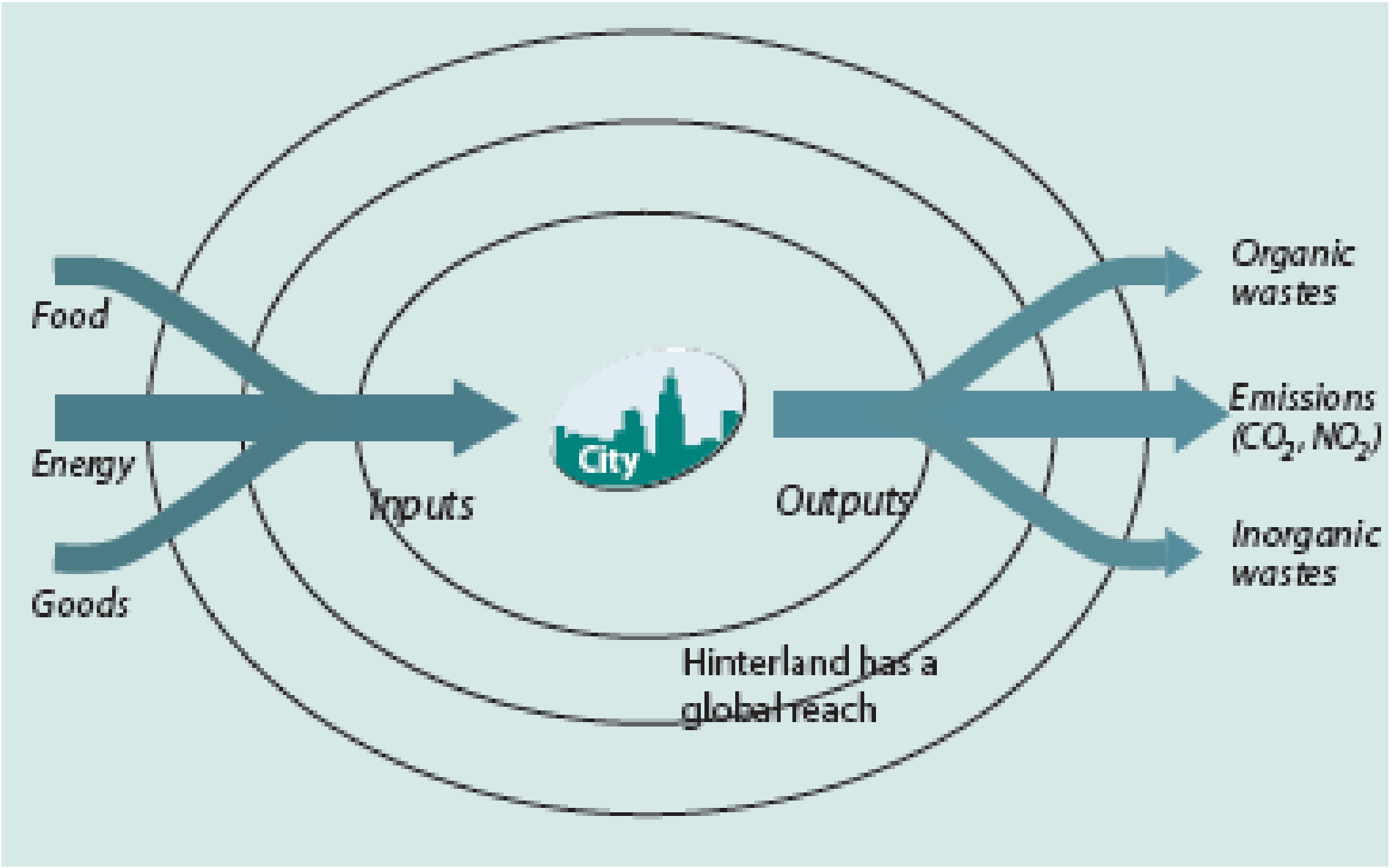
3) Key drivers towards sustainable urban development

Objectives of sustainable development

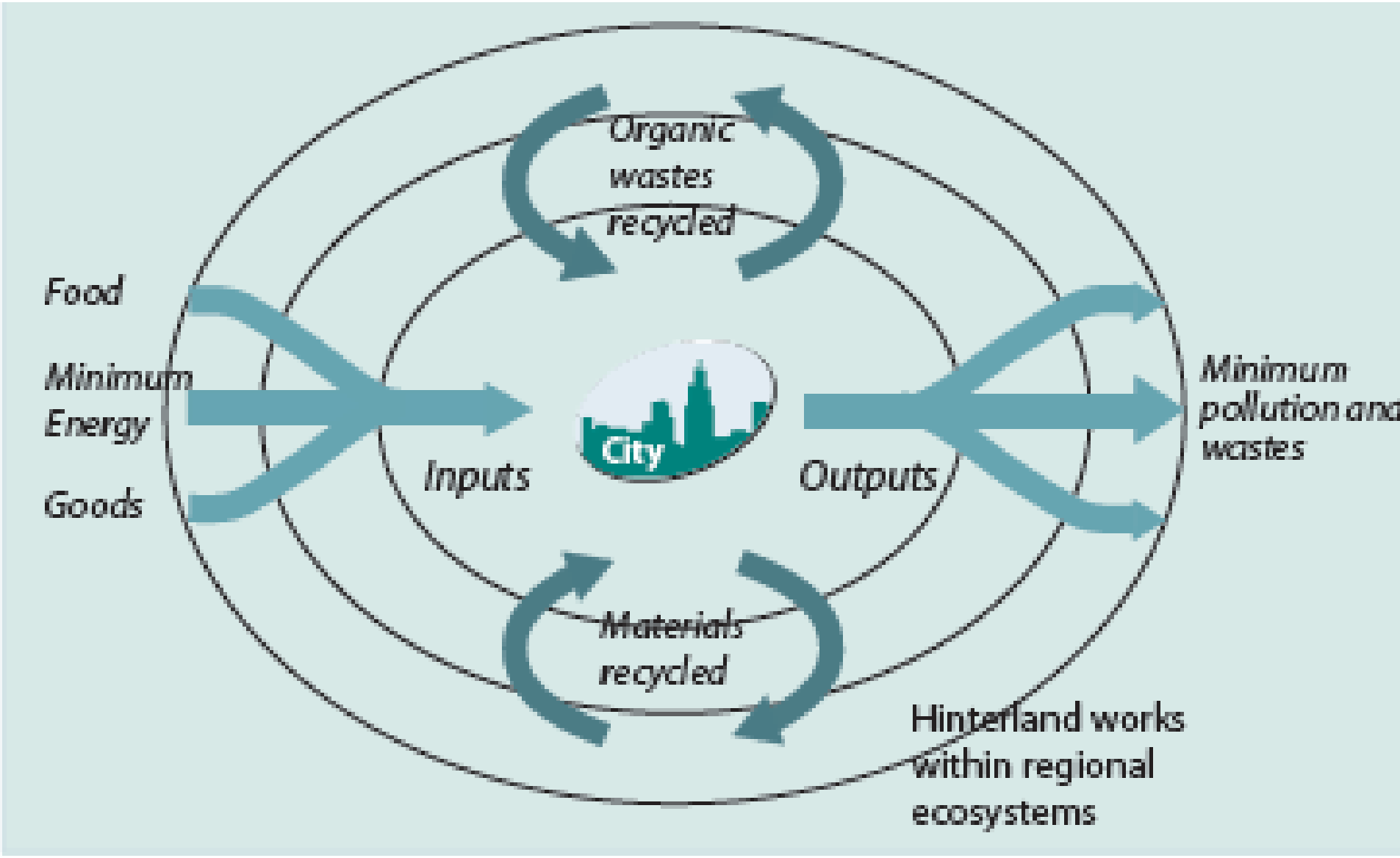


Source: Serageldin and Steer 1994

Linear metabolism cities consume resources and create waste and pollution (Source: Giradet 2002)



Circular metabolism cities reduce consumption and pollution and recycle/minimize renewables (Source: Giradet 2002)



4) Opportunities for integrated urban water management

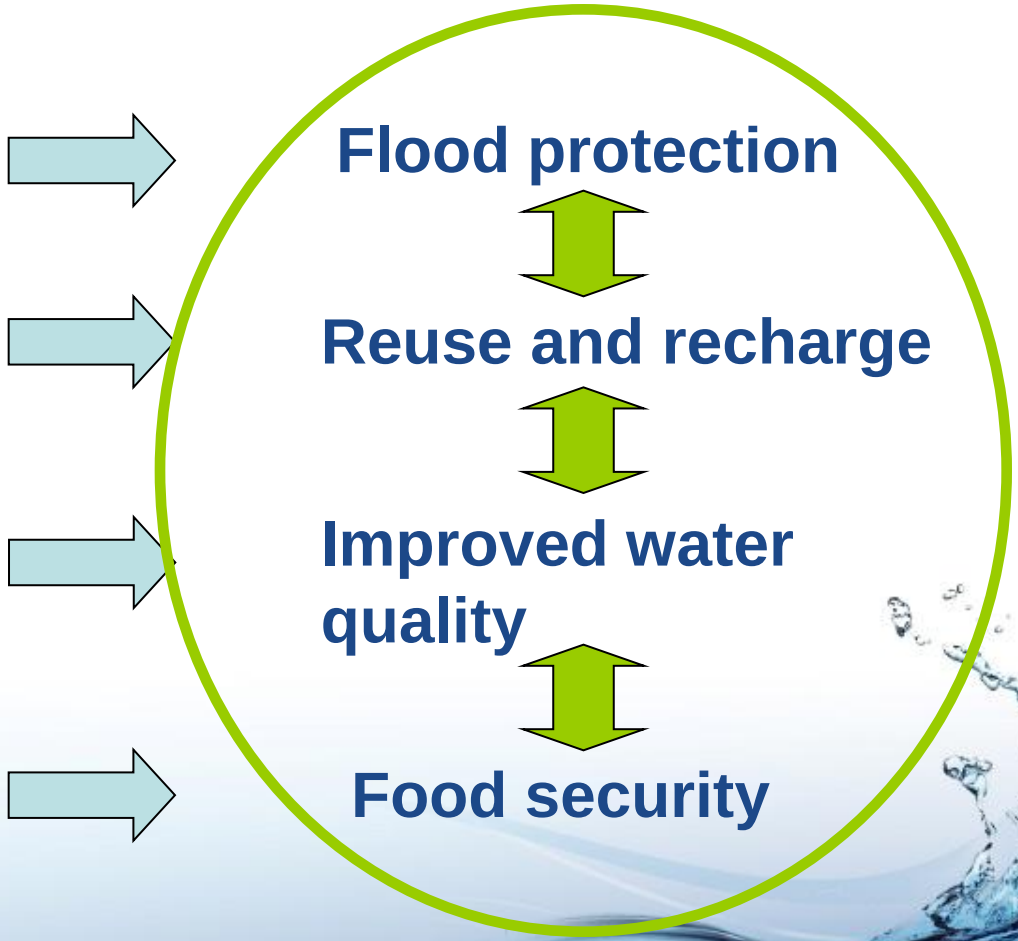
Integrated urban water management

i) Flooding

ii) Water scarcity

ii) Aquatic pollution

v) Nutrient loss



Socio-economic (livelihood) benefits

1. **Reduced impact of flooding:** Reduced loss of income and expenditure on repair from damage

2**. Reduced water demand:** Recycling of grey-water an increasing opportunity in urban and peri-urban areas

3**. Environmental health :** reduced diarroeal disease and impacts associated with poor hearth

4. **Food security :**2-3 % of a town/city population could derive an income from wastewater-fed agriculture and fisheries

AND a whole range of opportunities for service providers

5) Focus of international development co-operation

i) Flood protection

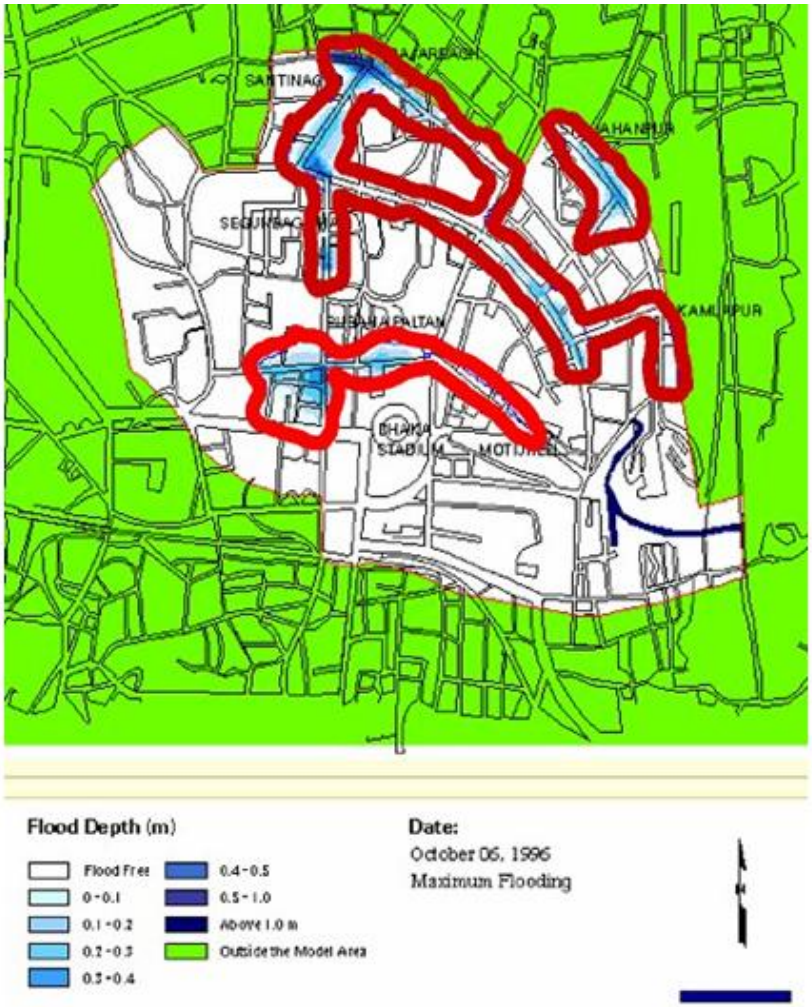
Construction of a drainage channel using local contractors

Source: Urban Stormwater Management in Developing Countries, 2005
Reproduced with permission of WEDC, Loughborough University

Example of flood proofing – house constructed on stilts to avoid flooding

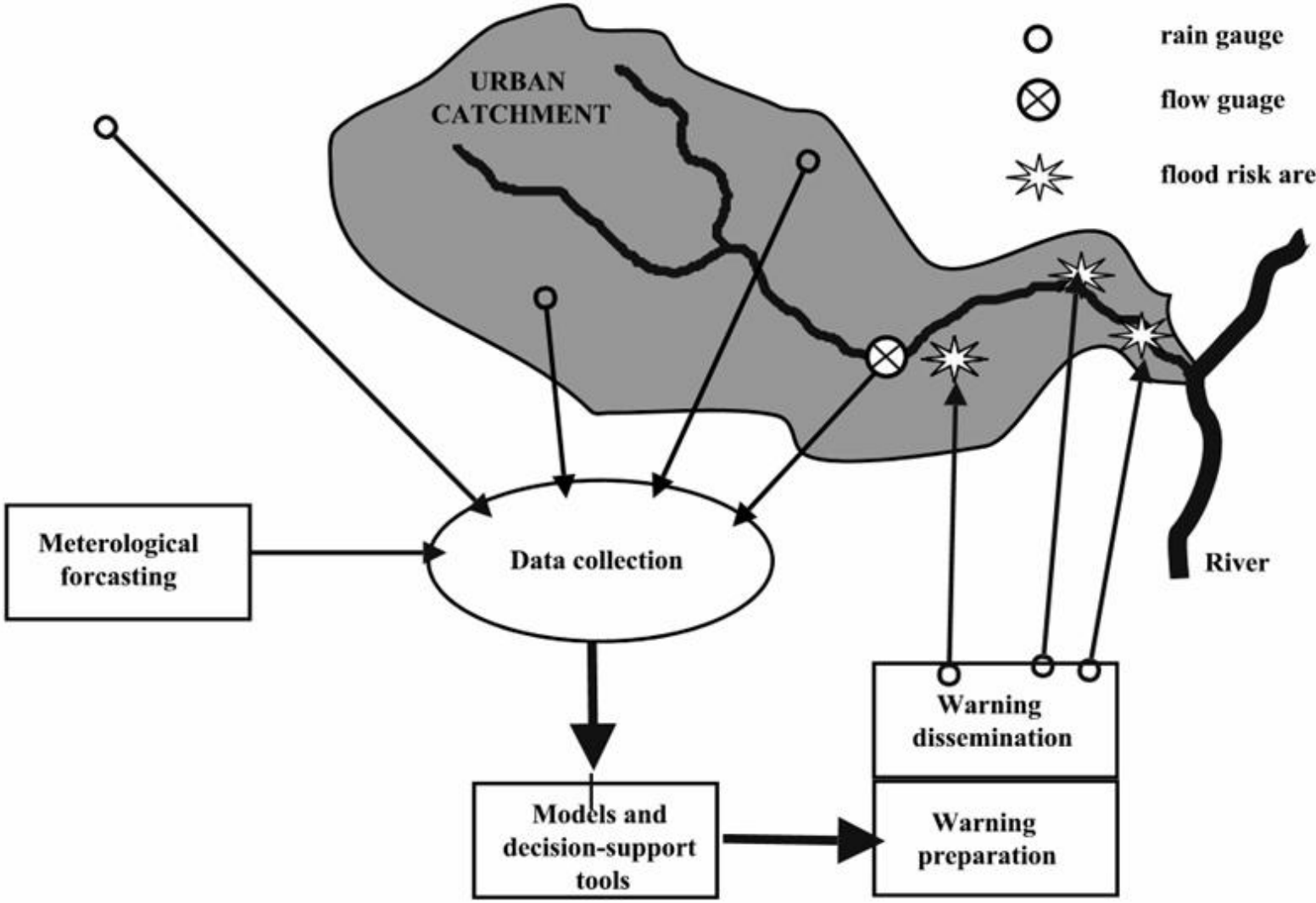
Source: Urban Stormwater Management in Developing Countries, 2005 Photo: Birgitte Helwigh

Flood inundation map, Dhaka



Source: Urban Stormwater Management in Developing Countries, 2005

Flood forecasting and warning



Source: Urban Stormwater Management in Developing Countries, 2005 Adapted from Rowney et al. 1997

ii) Water scarcity : Reuse and recharge

Rainwater harvesting in Bangalore

Rainwater Club, Bangalore

Greywater reuse in Yoff, Senegal

Photo: Claudia Weisburd

iii) Improved water quality

Integrated wastewater management

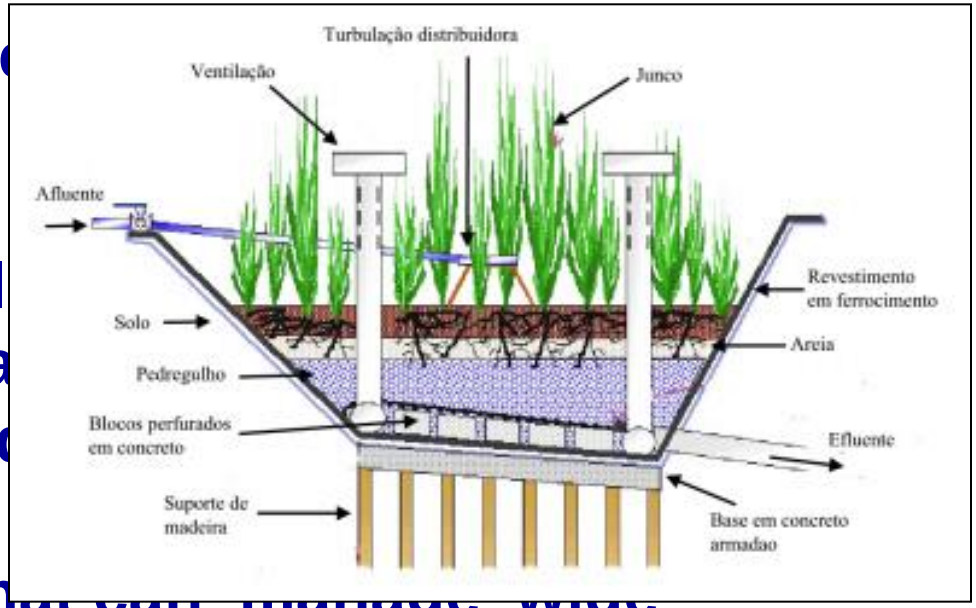
Focus on policies and practices that promote :

1) Progressive reductions of pollutant loads from catchments.

2) Waste collection and disposal systems compatible with a) local demands for reuse and b) technical and managerical capacity

Decentralised wastewater treatment systems (DEWATS)

Photo: Roshan Shresta



for towns/urban areas

Treatment of domestic wastewater in reedbeds in Nepal

iv) Ecological sanitation

Reuse of nutrients – integration with agriculture

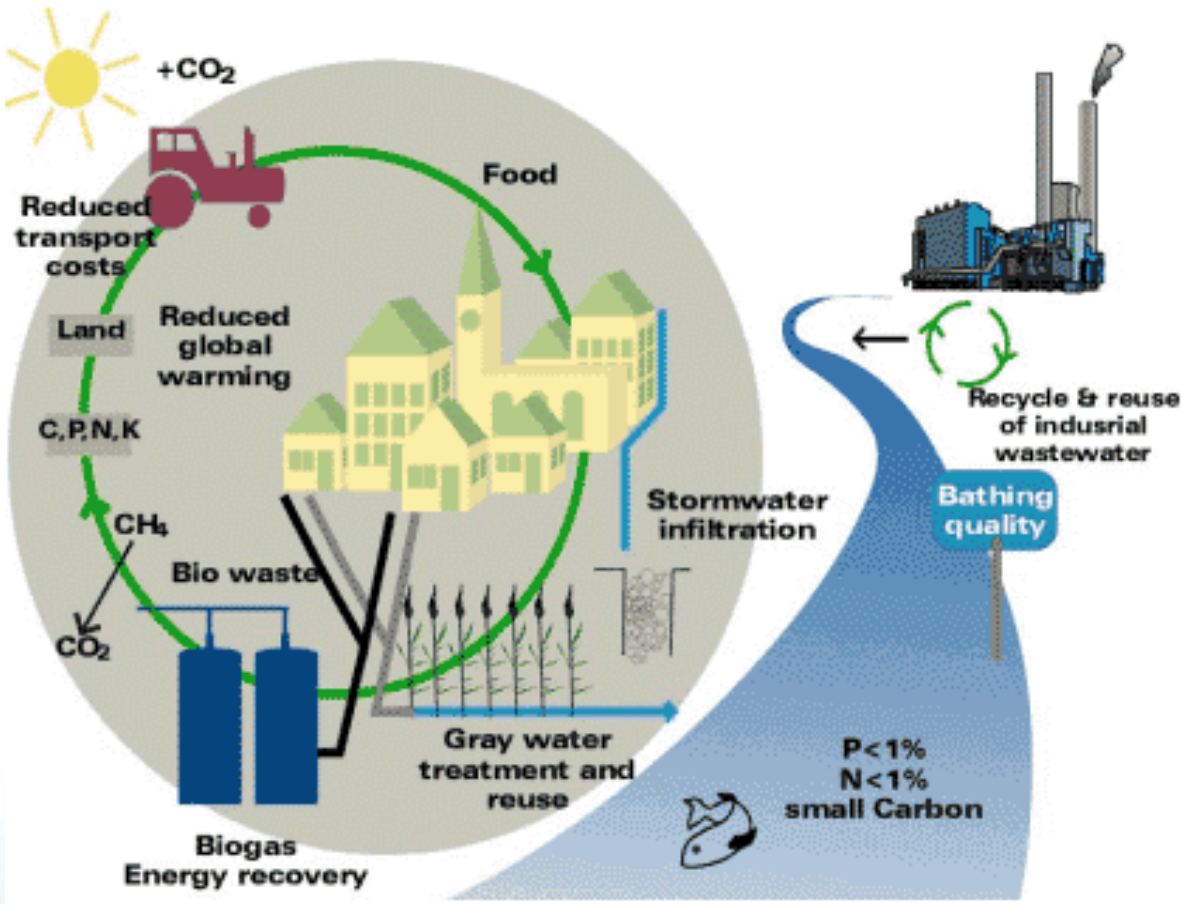
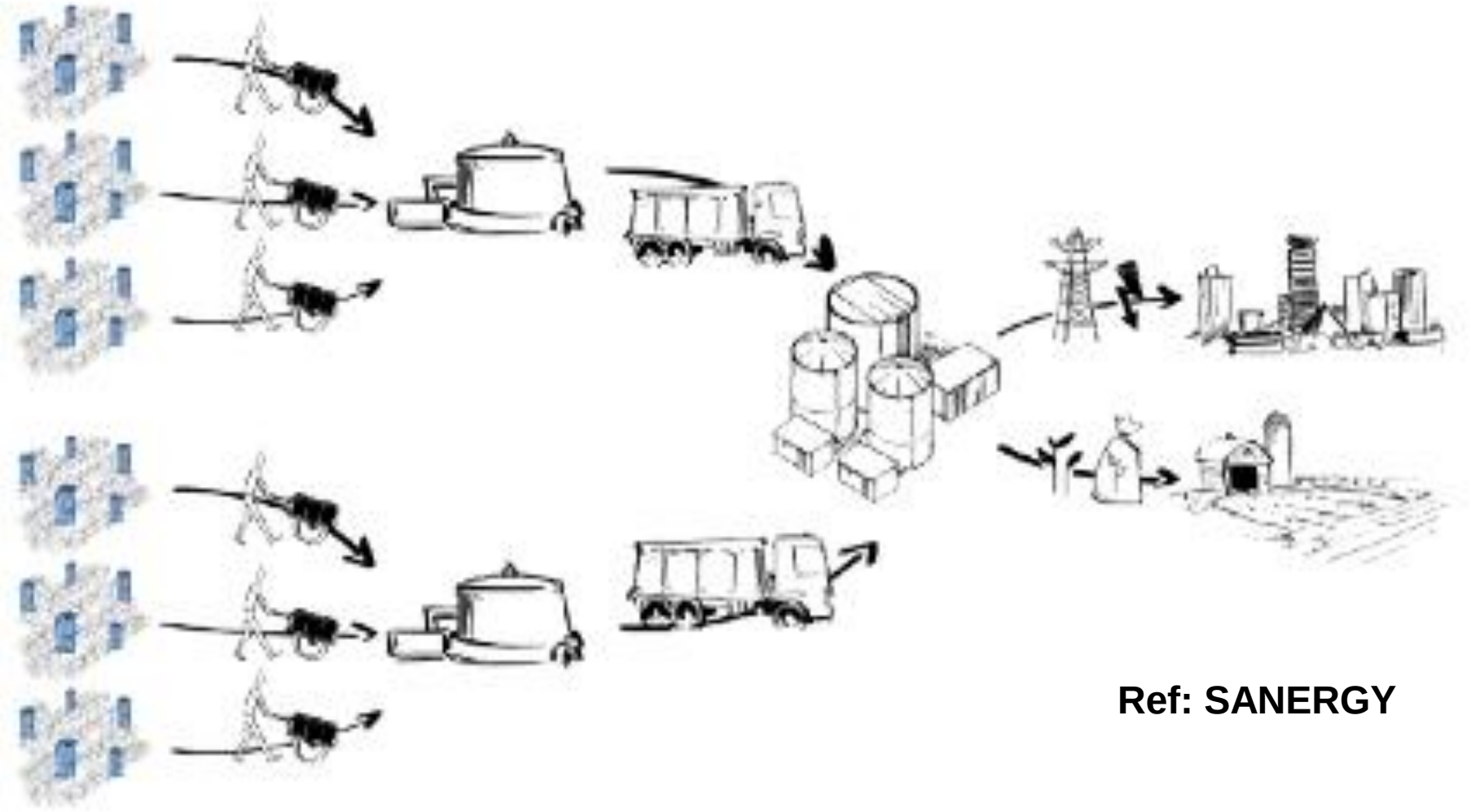


Figure 3: Sustainable wastewater management practice (Lange and Otterpohl, 1997).

- **Recycling phosphorus contained in human excreta and returning it to soil is becoming an imperative.**
- **Policies that engrain ecological sanitation into mainstream sanitation and agricultural practices are required.**

Reuse of carbon – integration with energy production



Ref: SANERGY

Constraints

1) Lack of awareness and understanding about technical options

2) Complexities of the urban environment

3) Political interference

4) Regulatory constraints e.g. inappropriate standards

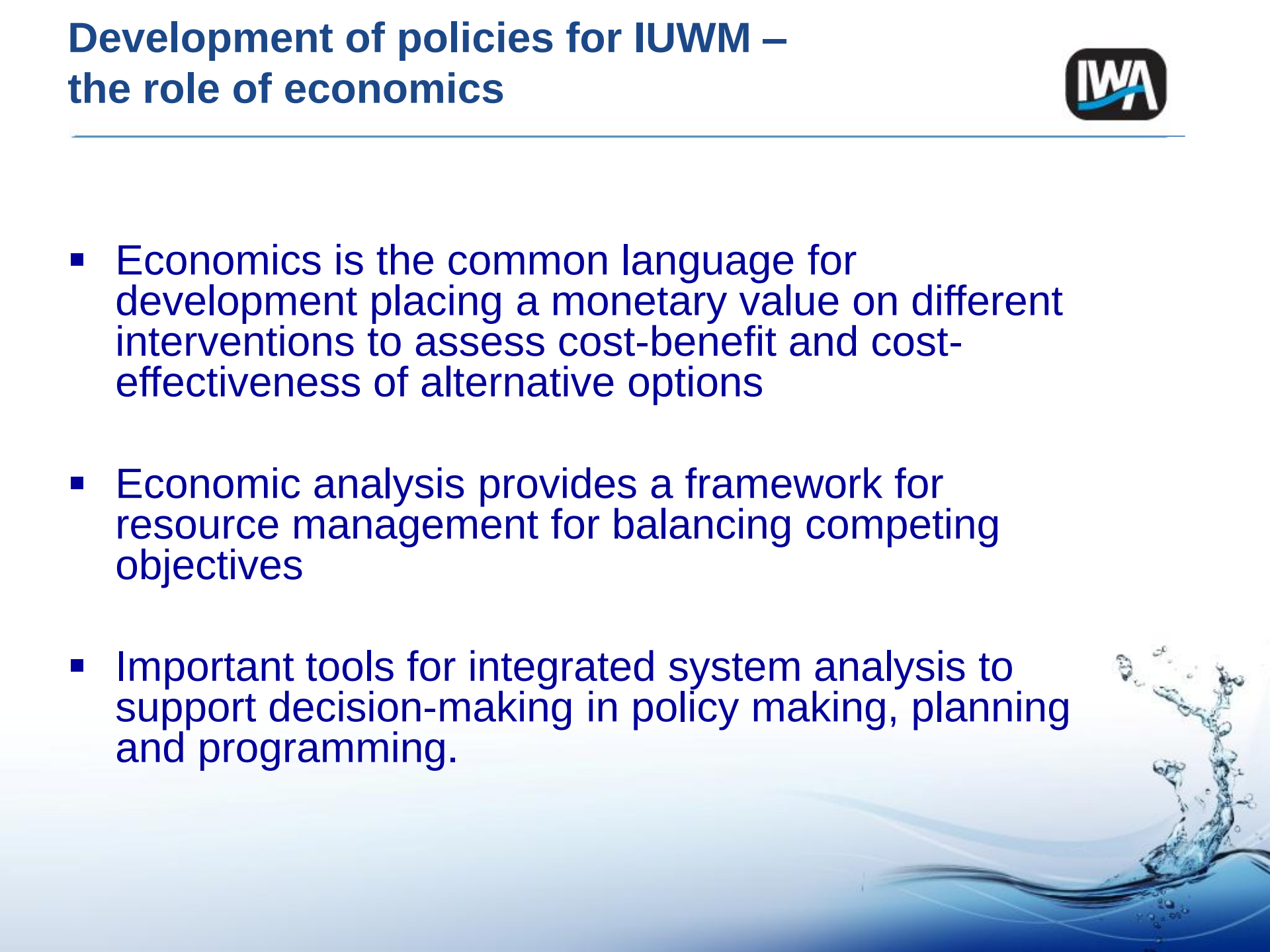
5) Financial and economic constraints

Development of policies for IUWM – the role of economics

- Economics is the common language for development placing a monetary value on different interventions to assess cost-benefit and cost-effectiveness of alternative options

- Economic analysis provides a framework for resource management for balancing competing objectives

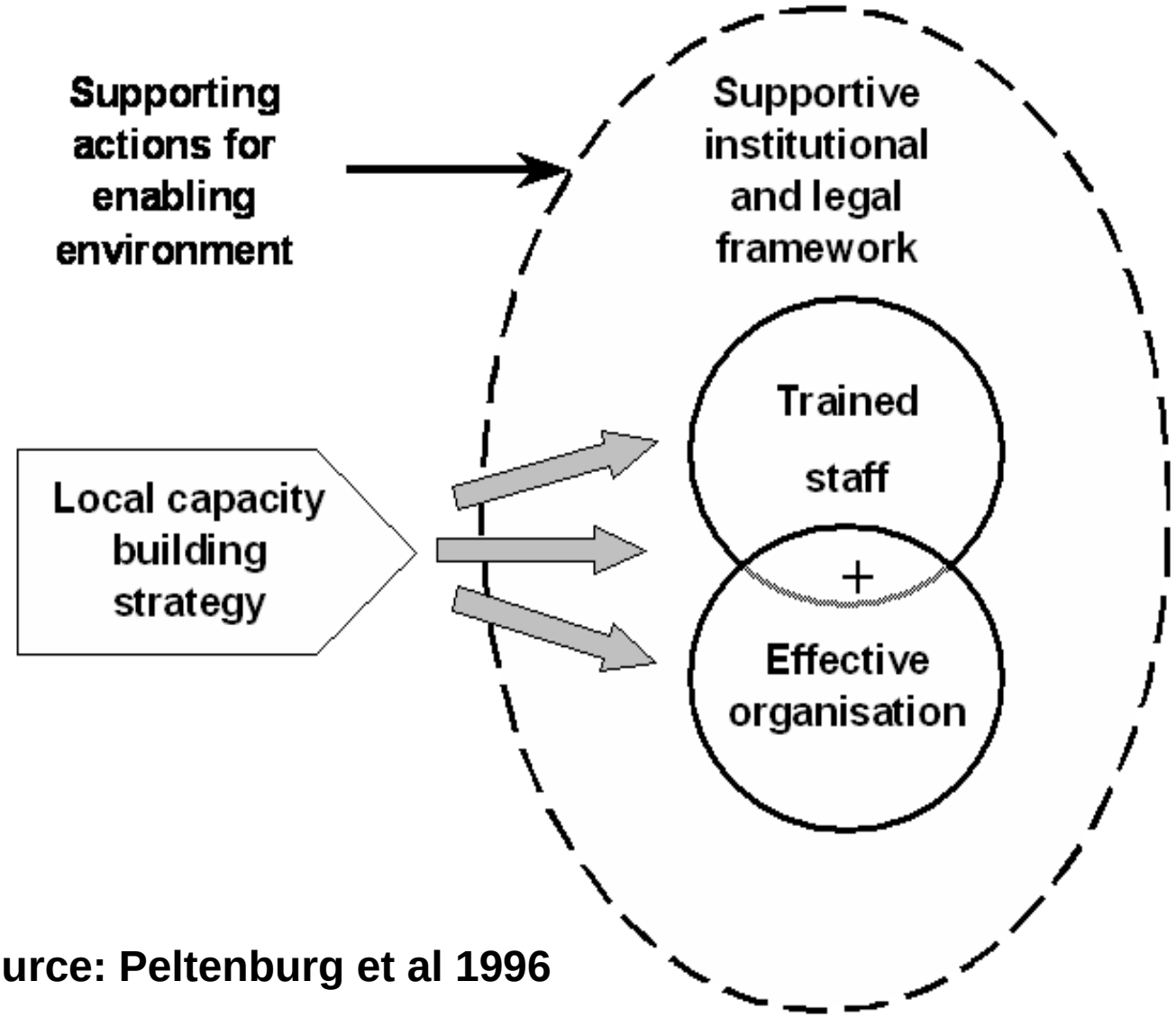
- Important tools for integrated system analysis to support decision-making in policy making, planning and programming.



6) The role of the International Water Association

- **Knowledge exchange, synthesis and dissemination**
- **Stimulate innovation, technological advancement and promotion of best practices**
- **Technical assistance and long term capacity building**
- **Advocate the views of water sector professionals and support policy development**

Capacity building to support policy and practice



Source: Peltenburg et al 1996

Thankyou for your attention

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