URBAN FORESTS AND WELLBEING

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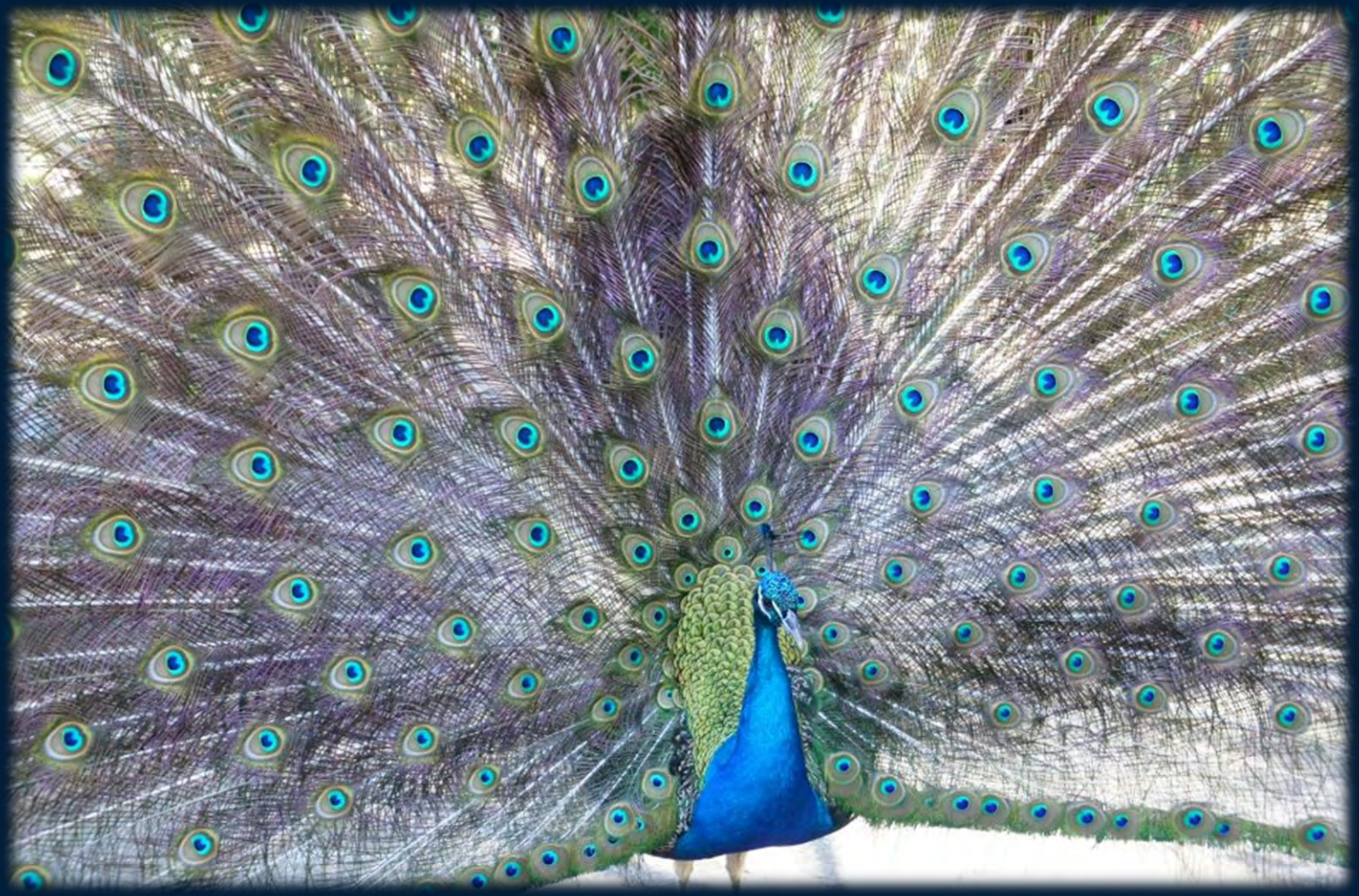
WELCOME!



OVERVIEW

Detailed information on Thursday, 5th of January

Tuesdays = Lectures, Thursdays = Seminars

Recommended readings before class

Why come to lectures? (“*No sleep is so deeply refreshing as that enjoyed during a lecture.”, Nobel Laureate P.B. Medawar*)

Interrupt, ask, discuss, disagree

Midterm exam: given in class, mix of short-answer and multiple choice, covering literature, and lecture and seminar contents

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Contents of the day

Urban forestry as a public health discipline

Snapshots from medicine, public health, and ecology

BY THE END OF THIS LECTURE YOU SHALL BE ABLE TO….

- Reflect on how human health depends on ecosystems
- Discuss interaction points between environmental health and human health
- Contemplate on concepts like One Health, Ecohealth, Planetary health

WHAT IS HEALTH?

WHAT DOES BEING HEALTHY MEAN TO YOU?

BIOMEDICAL DEFINITION

Absence of physical illness or pain

Functional vital organs

World Health Organization

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

WHO, 1948, Ottawa

HEALTH DETERMINANTS (PUBLIC HEALTH)

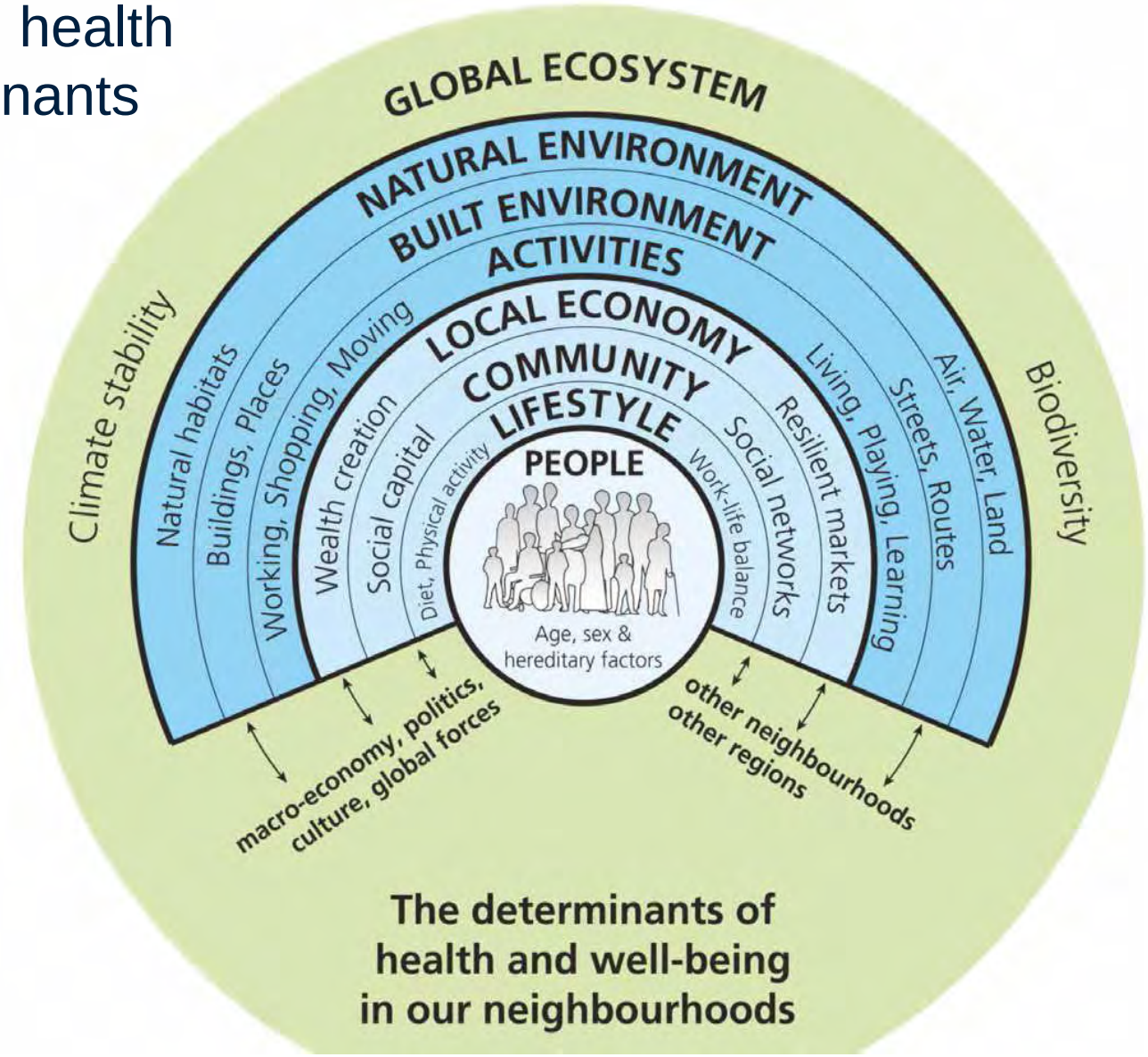
- Our economy and society *("The social and economic environment")*

- **Where we live, what is physically around us *("The physical environment")***

- What we are and what we do *("The person's individual characteristics and behaviors")*.

Time – person – place

Human health determinants



WHAT IS NATURE?

Photo: Alan Simson

Wilderness, not touched by humans

Ecosystems

Urban parks

National parks

Gardens

Single tree

Single human being

NATURE IN HEALTH

"The art of medicine consists of amusing the patient while nature cures the disease." (*Voltaire*)

"Water, air, and cleanliness are the chief articles in my pharmacopoeia." (*Napoleon*)

"We must turn to nature itself, to the observations of the body in health and in disease to learn the truth." (*Hippocrates*)

"Nature, time and patience are three great physicians." (*H.G. Bohn*)

THE HOLISTIC APPROACH

One Health

“improving the lives of all species - human and animal - through the integration of human medicine, veterinary medicine and environmental science”
[http://www.onehealthinitiative.com/mission.php)

Ecosystem Approaches to Health (EcoHealth)

“health and well-being are the result of complex and dynamic interactions between determinants, and between people, social and economic conditions, and ecosystems”

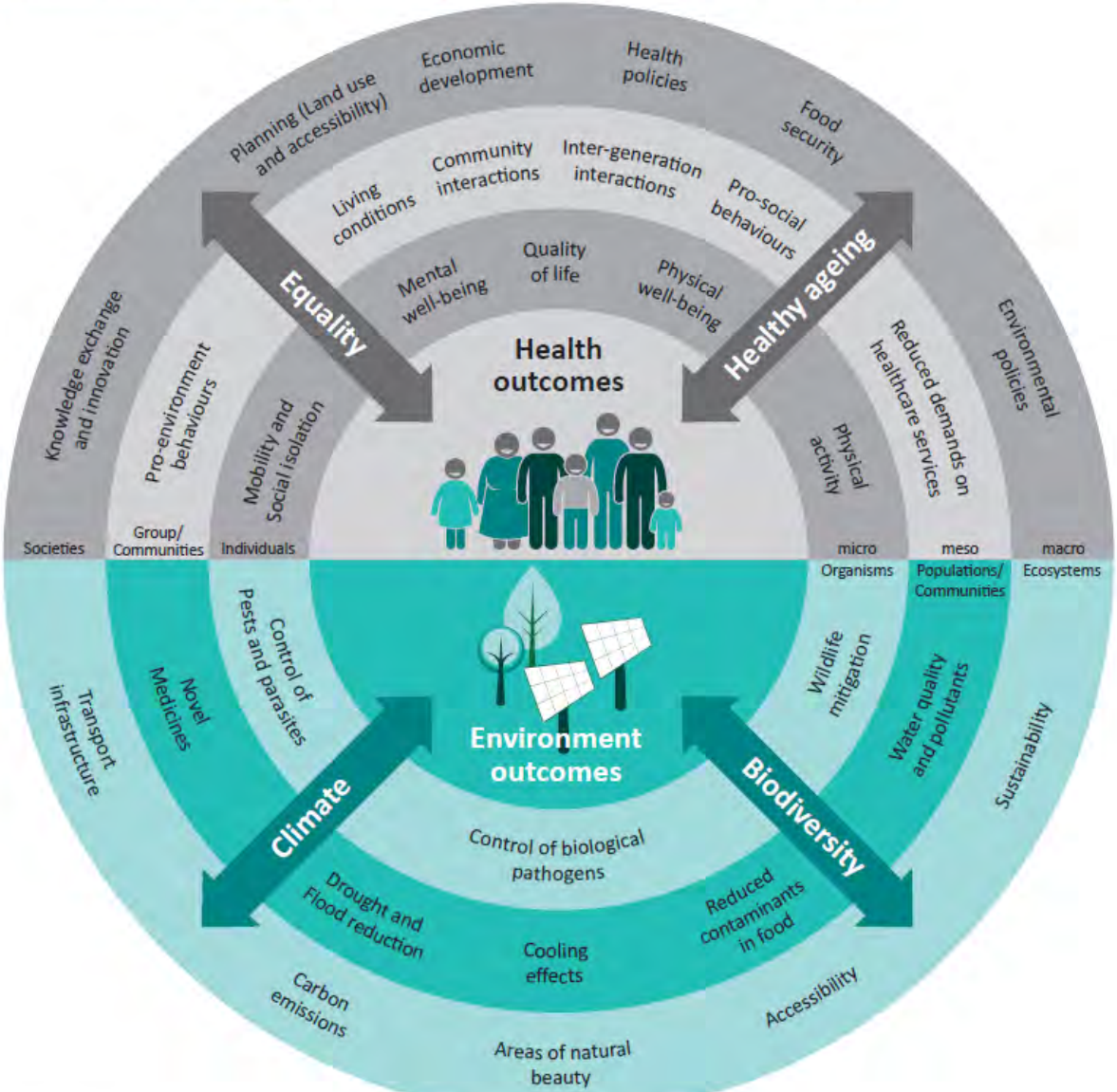
Healthy Planet, Healthy People

Some of the main messages:

1. Address **interlinkages between environmental sustainability & human health and well-being & building resilient ecosystems**
2. Many human development gains over the last century have been made **at the cost of ecosystems**, both within and outside the region
3. Reducing harmful environmentally-related impacts on human health by:
   - **Implementing ecosystem-based solutions**
   - **Promoting healthy green urban environments and encouraging healthy lifestyles**

Healthy Planet, Healthy People

Figure 1.2.1: Overview and examples of interlinkages between the environment and human health



- **A healthy environment underpins human health and wellbeing**
- **This relationship is a complex web of inter-actions**
- **The understanding and recognition of these interactions should be further enhanced at the national and regional scales to achieve a healthier society for all**

Biodiversity loss impacts on human & ecosystem health

- *Human Health*: **e.g. loss of pollinators reduces provision of healthy fruits, nuts and vegetables:**
  - **under-nutrition**
  - **less healthy food**
  - **increase in non-communicable diseases**
  - **Increased transmission of infectious diseases**
  - **altered exposure to infectious diseases across regions**

- *Ecology*:
  - **invasive alien species**
  - **species loss**
  - **severe affect on critical ecosystems**
  - **Further biodiversity loss, vicious circle**

The Rockefeller Foundation, https://www.rockefellerfoundation.org/our-work/initiatives/planetary-health/

LIFE EXPECTANCY

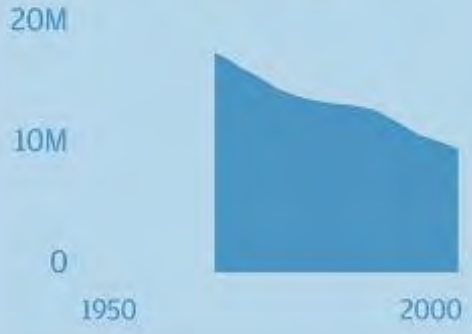
Mean global life expectancy at birth (years)

POVERTY

Population of world in poverty (%)

CHILD MORTALITY

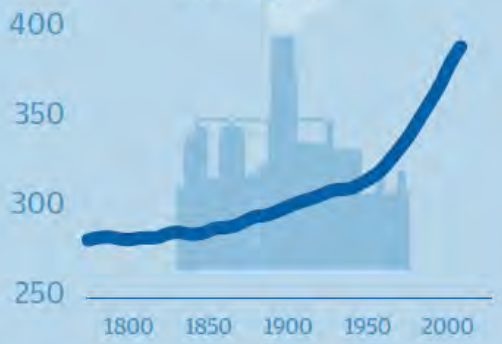
Recorded deaths of under-fives[1]



BUT TO ACHIEVE THIS WE'VE EXPLOITED THE PLANET AT AN UNPRECEDENTED RATE

CARBON DIOXIDE EMISSIONS

Atmospheric concentration of CO_2 (ppm)

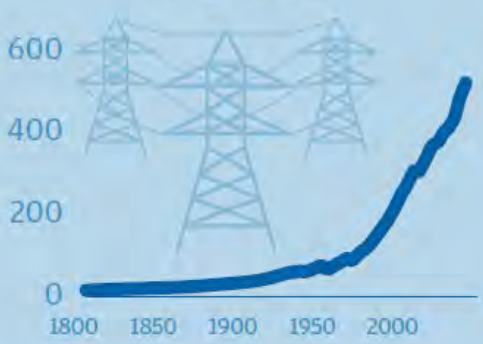


OCEAN ACIDIFICATION

Global ocean acidification (mean hydrogen ion concentration, nmol/kg)

ENERGY USE

World primary energy use (EJ)

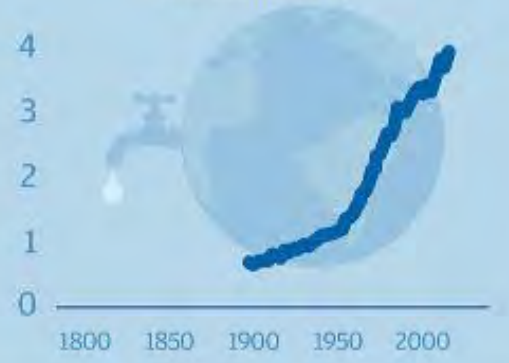


TROPICAL FOREST LOSS

Global tropical forest loss compared with 1700 baseline (%)

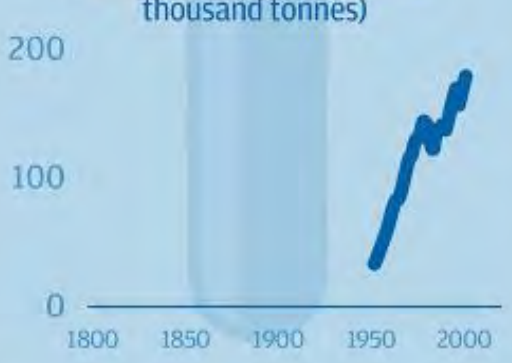
WATER USE

Water use (thousand km³)



FERTILISER USE

Global fertiliser use (nitrogen, phosphorus, and potassium; thousand tonnes)



The period of environmental changes induced by human exploitation of the planet defines a new geological era: the Anthropocene epoch

DAMAGING THE PLANET DAMAGES HUMAN HEALTH

If unchecked climate change related impacts could cause an extra

250,000

deaths per year

between 2030 and 2050[1]

Overfishing together with increasing acidity and other environmental changes threaten fish supplies

Millions of people are at risk of under nutrition due to the combined effects of

climate change and other environmental changes

By 2050 over

40%

of the world's population could be living in areas under severe water stress

This leads to a loss of

1-2

million hectares of agricultural land per annum

These environmental threats could also exacerbate each other

TO SAFEGUARD HUMAN HEALTH WE NEED TO MAINTAIN THE HEALTH OF THE PLANET ON WHICH WE DEPEND

LEARN ABOUT PLANETARY HEALTH

Planetary health is the highest standard of health, wellbeing and equity worldwide. Human systems are responsible for shaping the future of human civilisation and the Earth's natural systems

REDUCE FOOD WASTE

30-50% of all food produced is never consumed. Reducing food waste means less land is needed for agriculture; saving energy, water, helping to protect biodiversity and improving food security

HEALTHY DIETS WITH A LOW ENVIRONMENTAL IMPACT

Diets low in red meat with plenty of fruit and vegetables reduce the risk of heart disease. Dietary changes could reduce greenhouse gas emissions and land use requirements by up to 50%

BETTER GOVERNANCE

Coordinated global, national and local policies that reduce environmental damage and improve health need to be implemented

USE WATER MORE EFFICIENTLY

Although drip or trickle irrigation methods are more expensive to install, they can be 33% more efficient in water use

END DEFORESTATION

Since 2000 we have cut down over 2.3 million km² of primary forest. The REDD+ mechanism aims to reduce greenhouse gas emissions and improve local livelihoods

FAMILY PLANNING

Around 225 million women who want to avoid pregnancy are not using effective contraception. Access to family planning could cut maternal deaths by almost 30% and improve food security

CITY PLANNING

Planning healthy and sustainable cities can increase resilience to environmental change, reduce environmental impacts and improve people's health

WHAT CAN UFOR200 STUDENTS DO?

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AN URBAN FOREST -
WHAT COMES TO YOUR MIND?

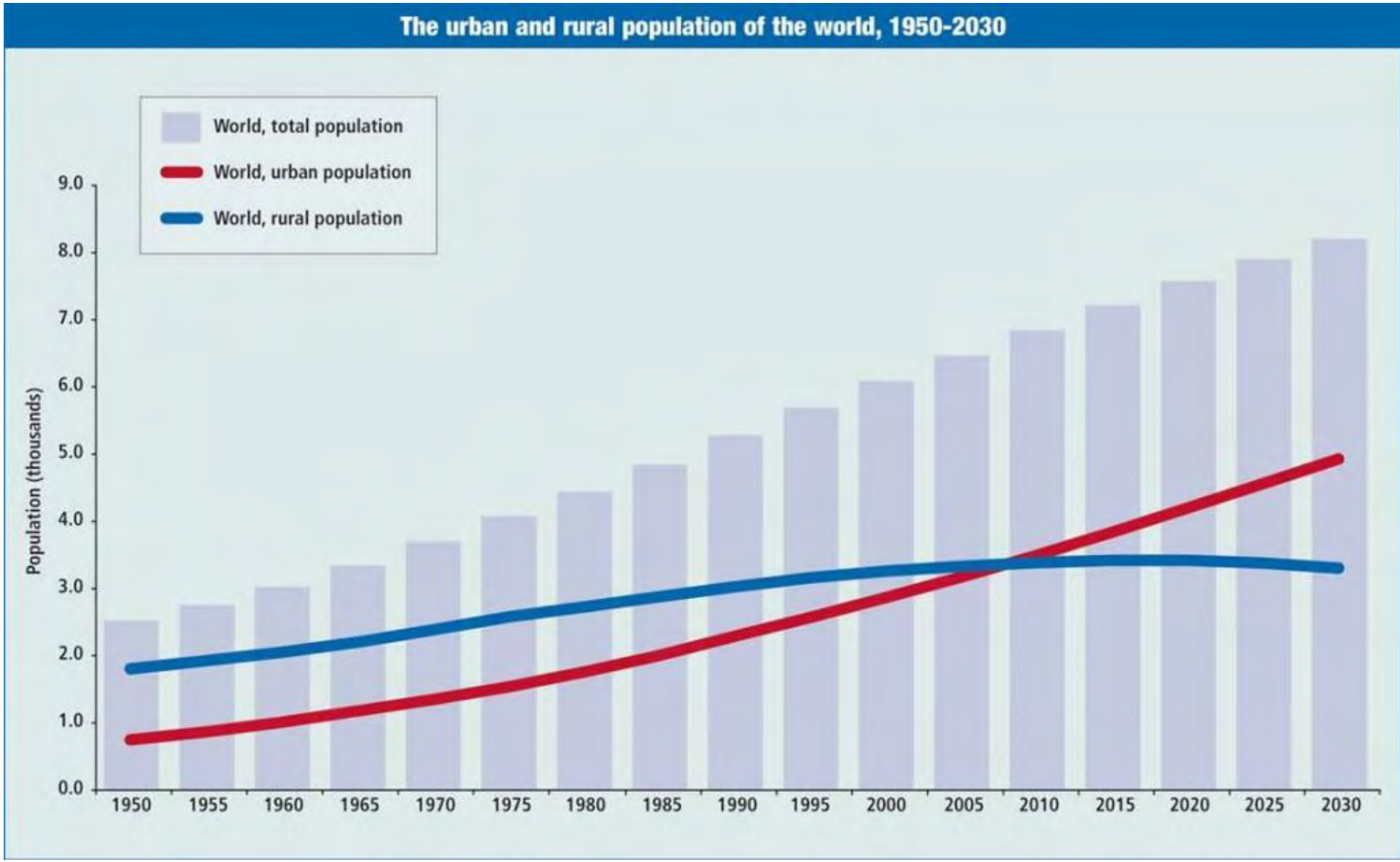
“A forest or a collection of trees that grow within a city, town or a suburb.
May include any kind of woody plant vegetation growing in and around human settlements”

Wikipedia

“…for economic, environmental, social, and public health benefits for people”

Deneke, 1993

GLOBAL URBANIZATION



PEOPLE – CITIES – FORESTS

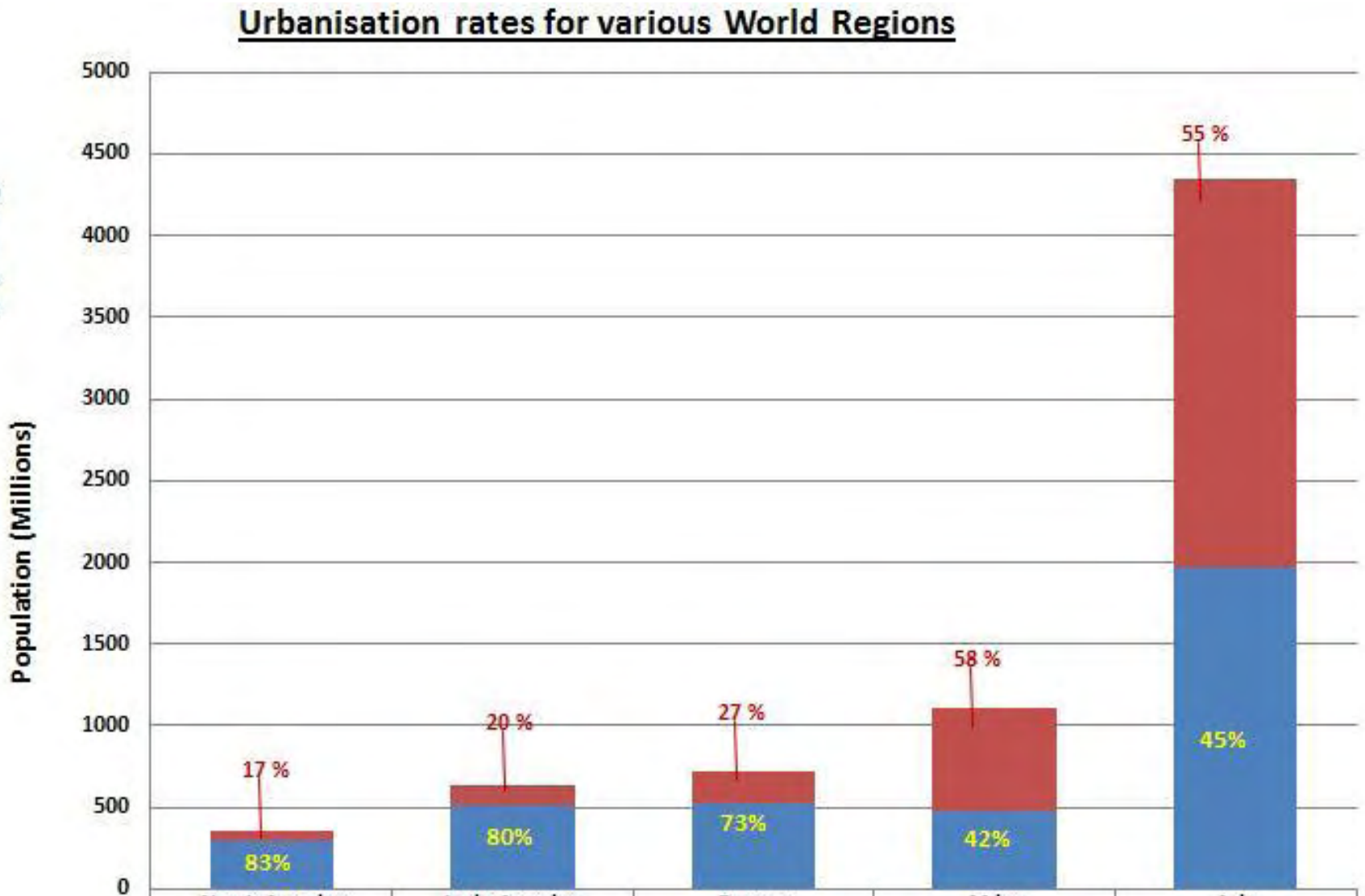
RANK THE 5 WORLD REGIONS IN TERMS OF URBANIZATION:

- **Africa**
- **Asia**
- **Europe**
- **Latin America**
- **North America**

(1=highest urbanization rate)

NA, LA, Europe, Asia, Africa

Source - http://news.bbc.co.uk/1/shared/spl/hi/world/06/urbanisation/html/urbanisation.stm



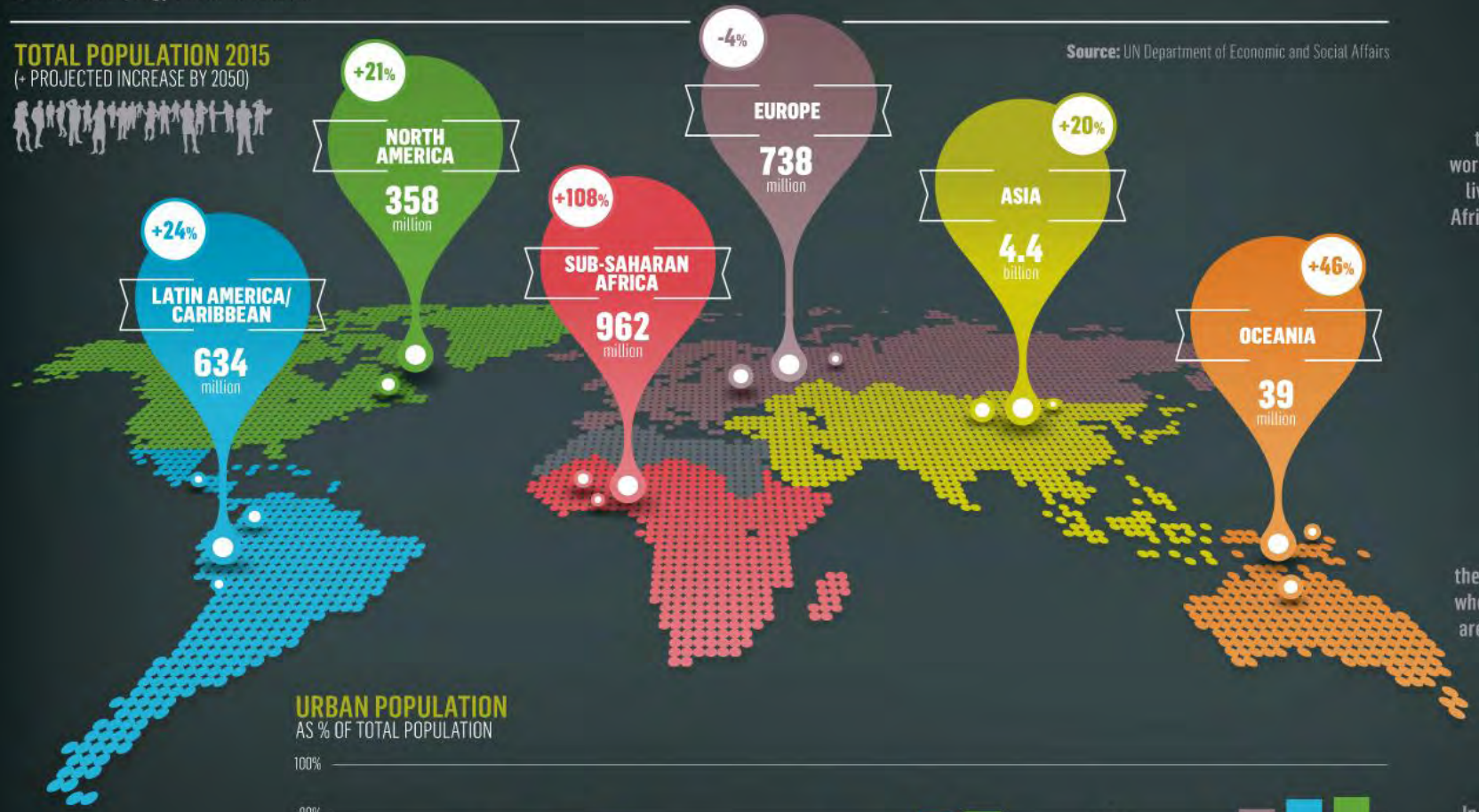
	North America	Latin America	Europe	Africa	Asia
Rural Population (Millions)	59	123	188	637	2380
Urban Population (millions)	301	510	532	477	1970

THE RISE IN URBAN DWELLERS

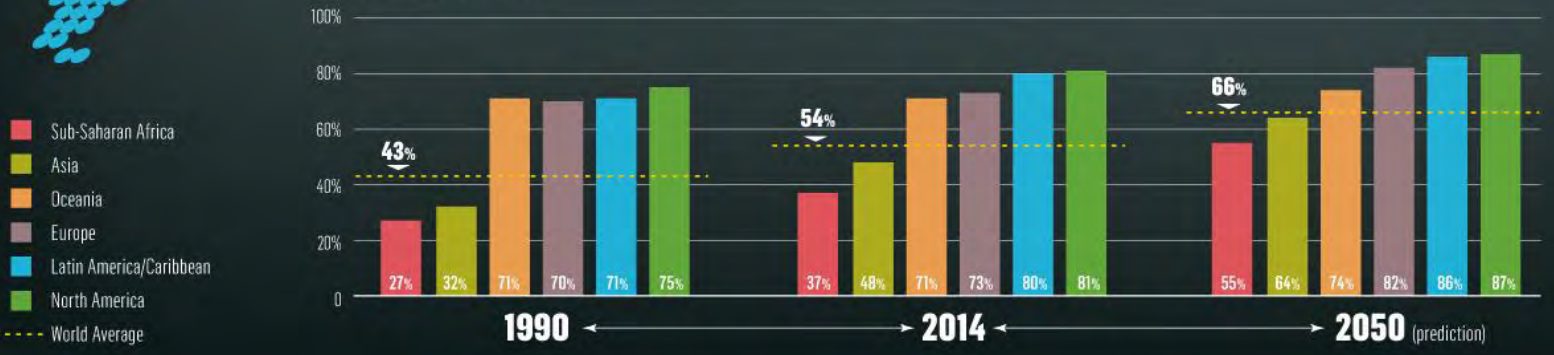
Sub-Saharan Africa is urbanising faster than any other area on the planet and key cities like Nairobi, Johannesburg and Lagos are experiencing robust growth rates that far outstrip those of the region as a whole. With city dwellers tending to have more money to spend, this rapid urbanisation is creating investment opportunities in retail, financial services, technology and construction.

TOTAL POPULATION 2015
(+ PROJECTED INCREASE BY 2050)

Source: UN Department of Economic and Social Affairs



URBAN POPULATION
AS % OF TOTAL POPULATION



25%

the proportion of the world's population that will live on the continent of Africa by 2050. The current figure is **16%**

50%

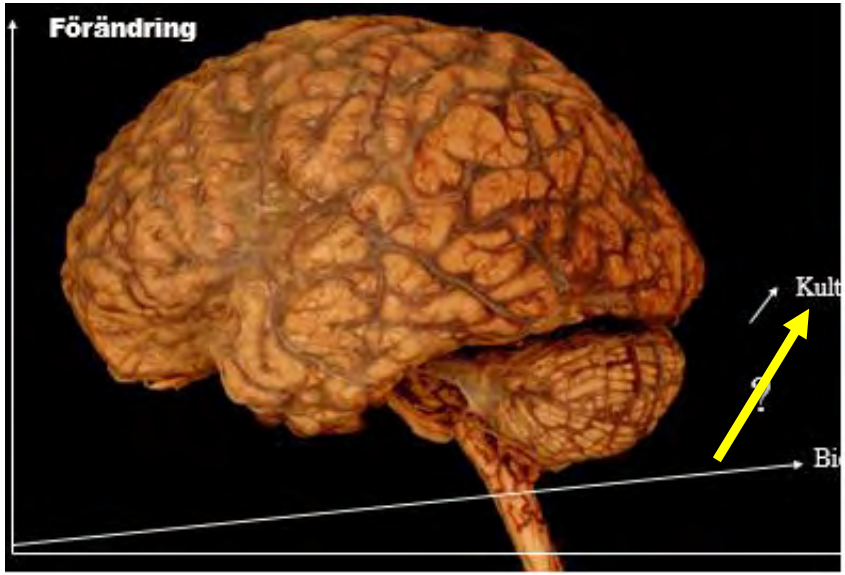
the proportion of Africans who will be living in urban areas by 2030. The figure for 2010 was **36%**

> In the current economic environment, investors want areas where success is proven, growth is strong and will remain strong. Big African cities give you that.
>
> – Jacob Kholi, a partner at private equity firm Abraaj

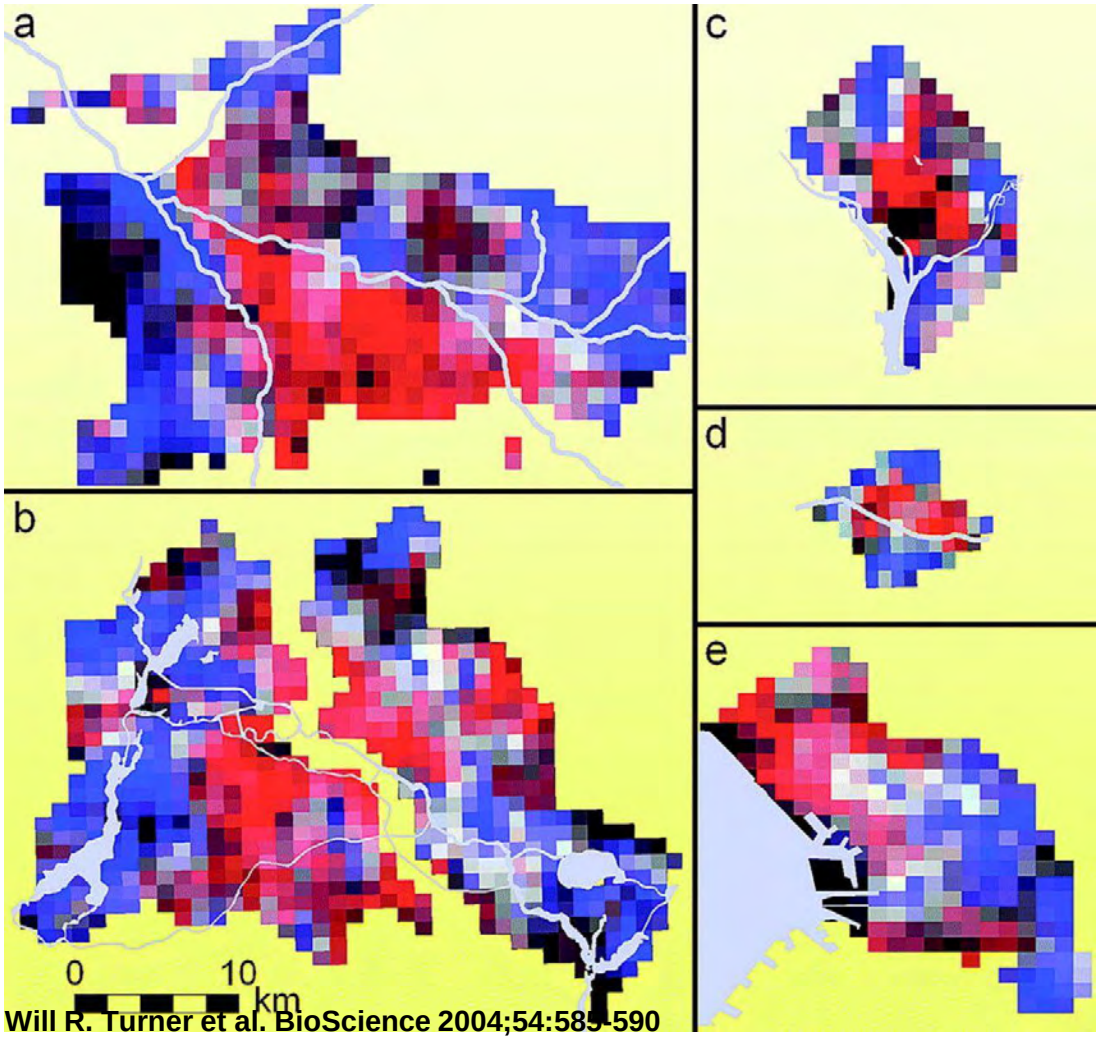
Forum

Global Urbanization and the Separation of Humans from Nature

WILL R. TURNER, TOSHIHIKO NAKAMURA, AND MARCO DINETTI



Maps revealing an inverse relationship between urban human population and the neighborhood diversity (ND) of (a) birds in Tucson, Arizona; (b) birds in Berlin, Germany; (c) birds in Washington, DC; (d) birds in Florence, Italy; and (e) ferns in Chiba City, Japan.

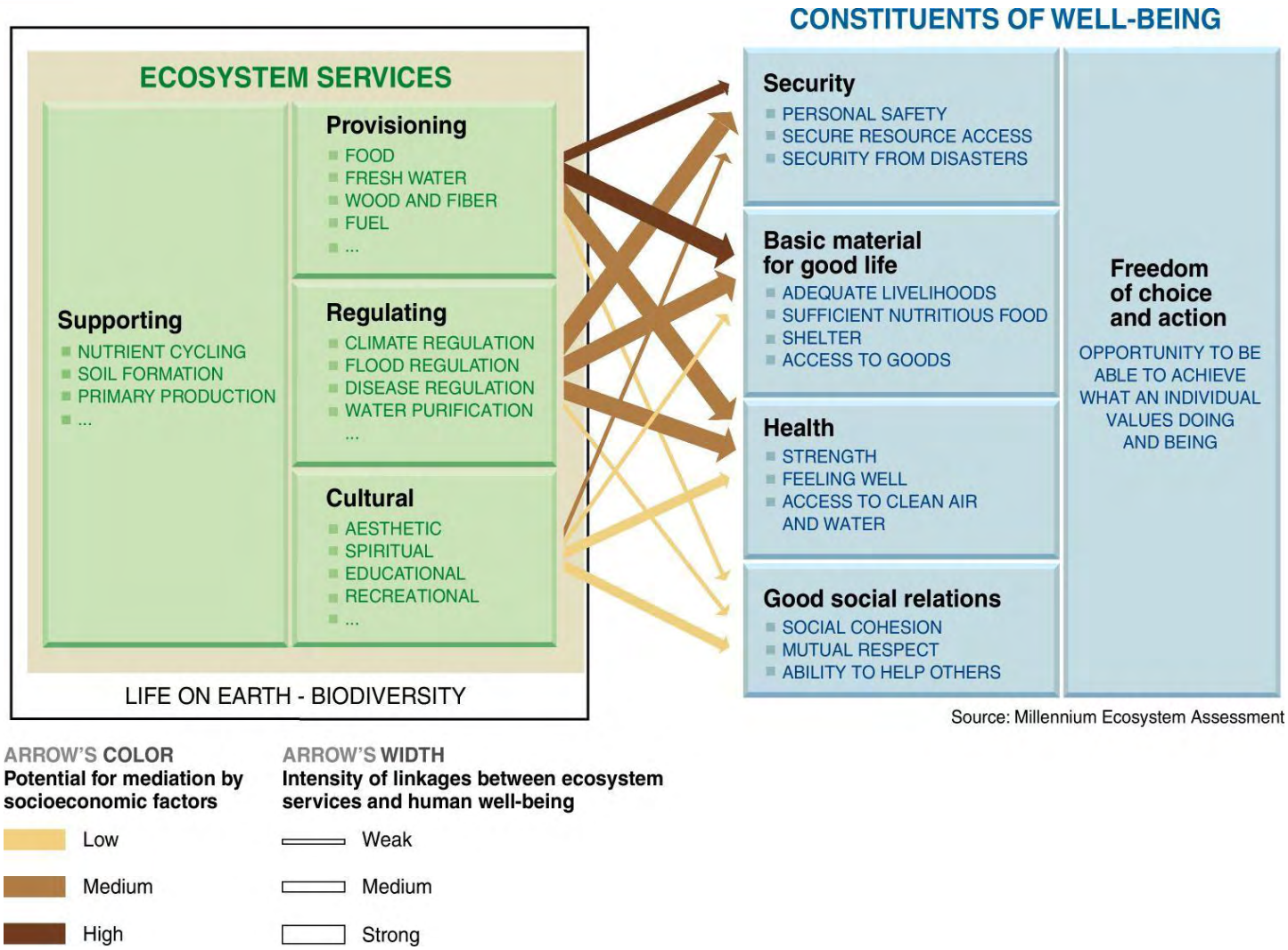


Will R. Turner et al. BioScience 2004;54:585-590

BioScience

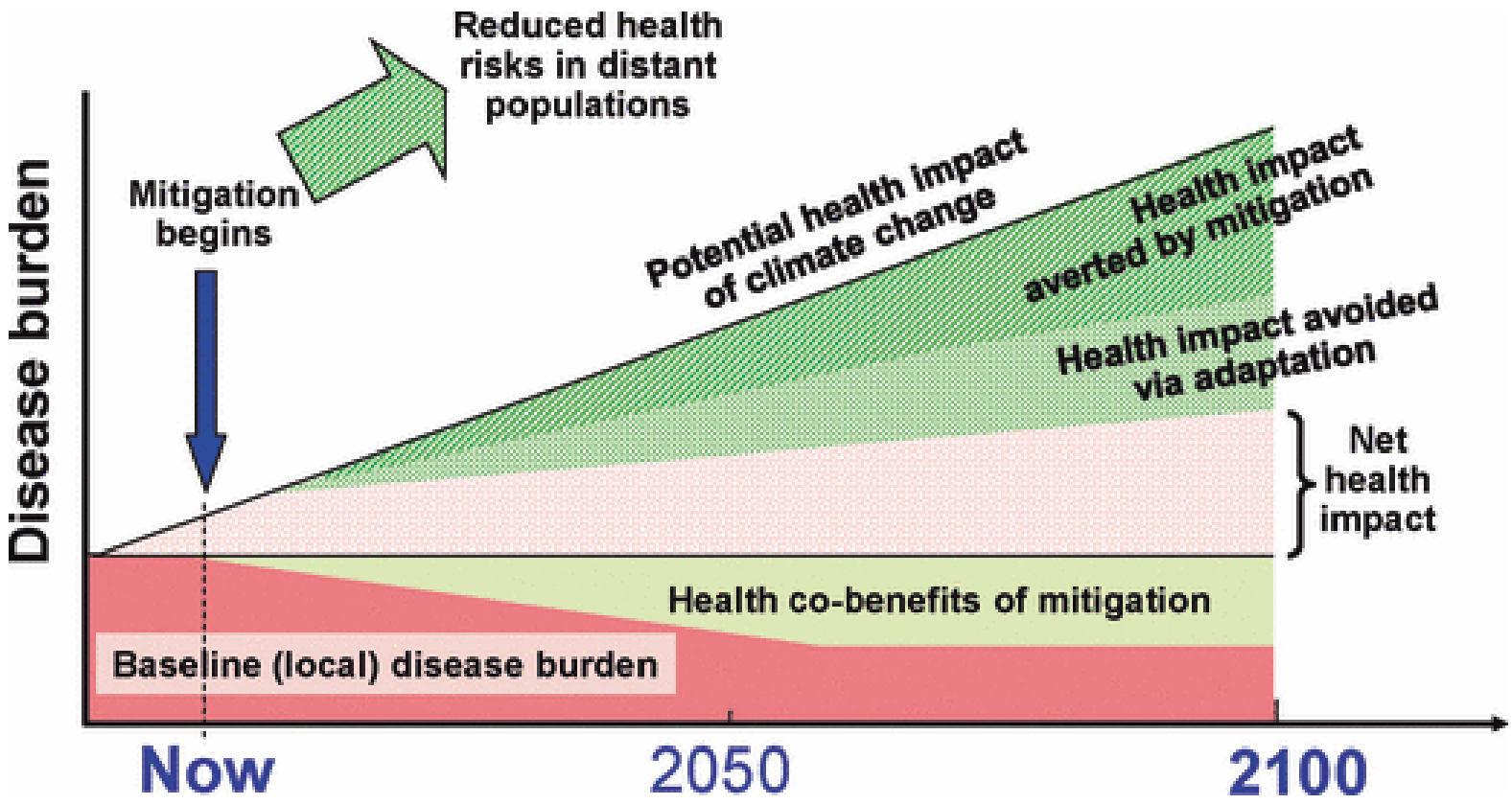
Millennium Ecosystem Assessment

Urban ecosystem services



Source: Millennium Ecosystem Assessment

Climate change: present and future risks to health, and necessary responses



McMichael and Lindgren, 2011. Journal of Internal Medicine
Volume 270, Issue 5, pages 401-413, DOI: 10.1111/j.1365-2796.2011.02415.x
http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2796.2011.02415.x/full#f5

URBAN FORESTS AND ECOSYSTEM SERVICES

- Cooling of cities (decrease heat stress and related morbidity and mortality)

Exhausted worker in Dubai, 2015, *photo: Kamran Jebreili*

Urban green spaces and mitigation

- **Reduced energy consumption (cooling by AC).**

Examples:

- One tall deciduous tree – **10-15% energy savings** for one villa (*McPherson & Rowntree, 1993*)
- Green roof on an 8-storey building (Madrid) – **6%** reduced energy demand during summer (*Saiz et al. 2006*)
- Green roof on a two-storey building in Athens – **6 – 49%** reduction during summer (*Santamouris et al. 2007*)
- Net reduction of **CO2** emissions (*Pataki et al. 2006*)

Urban green spaces and adaptation

- Shade and evapotransipration
- Large parks: 1 - 2°C cooler daytime, 5 – 6 °C during night (*Fryd et al. 2011*)
- Green networks
- Land cover structure, percentage of built etc.
- Green roofs and walls (5 - 20 °C lower)
- 5 – 30% of solar irradiance beneath a tree (0.7 – 3.5 °C lower) (*Ali-Toudert, Mayer, 2007*)

If all buildings were covered with vegetation on roofs and walls the average daytime air temperature in the urban canyon would decrease by 9.1°C in Riyadh (*Alexandri & Jones, 2008*)

- A green cover increase by 10% would almost compensate for the climate change related increase in temperature by 2080
- A reduction by 10% would give a rise in surface temperature by 8.2%

(Gill et al. 2007)


wake up world
IT'S TIME TO RISE AND SHINE
THINK OUTSIDE.
NO BOX REQUIRED.

NATURE IS EVERYWHERE

https://www.ted.com/talks/emma_marris_nature_is_everywhere_we_just_need_to_learn_to_see_it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