



National Technical University of Athens

# Cadastral and Climate Change

*Chryssy A Potsiou*  
*Associate Professor NTUA*

*chryssyp@survey.ntua.gr*

# Climate Change

## – The challenge

- Climate change is a fact... that has serious impacts
- The UN Global agenda

## – Society's response

- political- professional- citizen level
- reduce – adjust

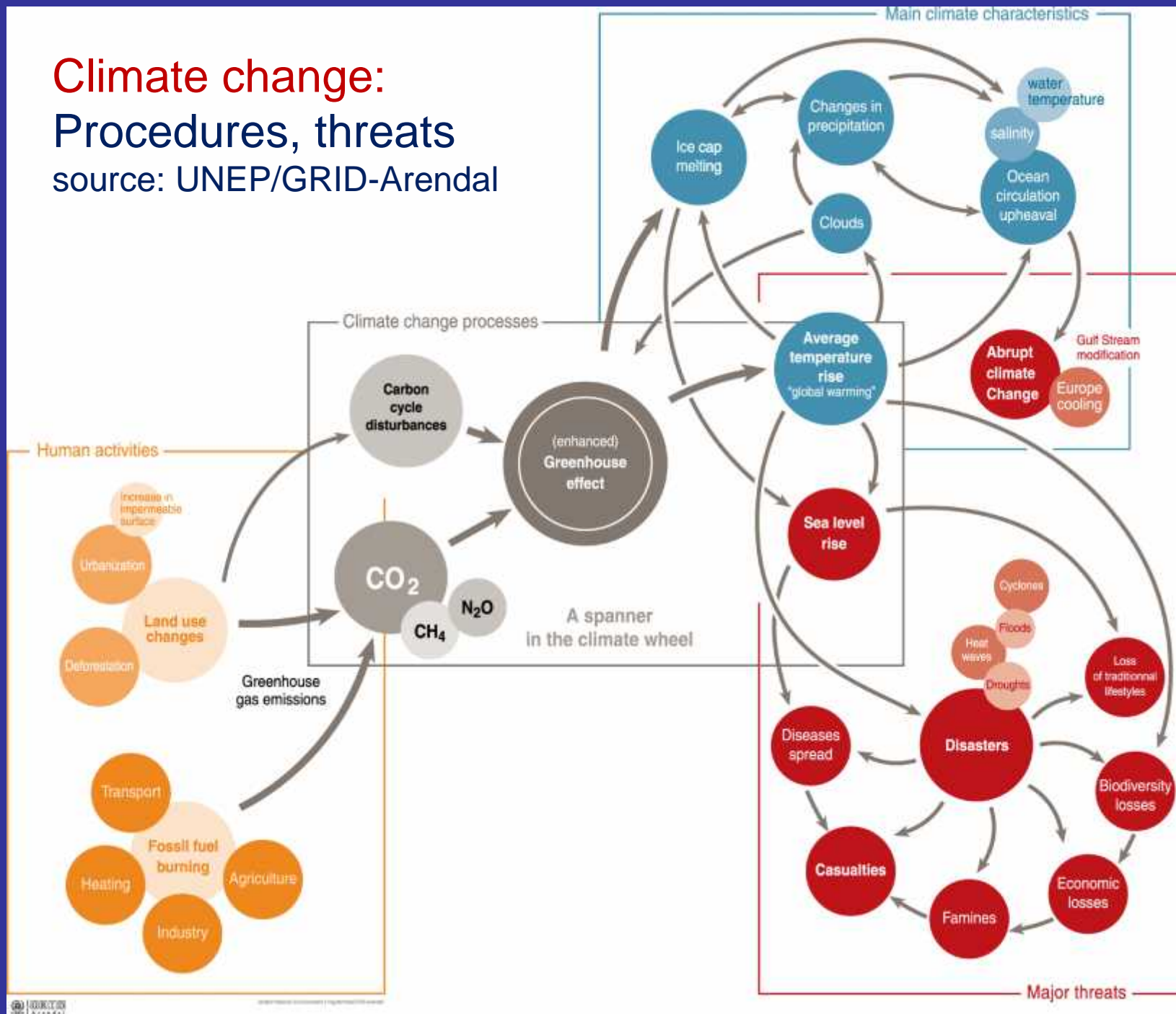
## – Cadastre's & Surveyors' response to climate change

- Green tools for sustainable land management
- **FIG, UN, World Bank** : Surveyors have a leading role

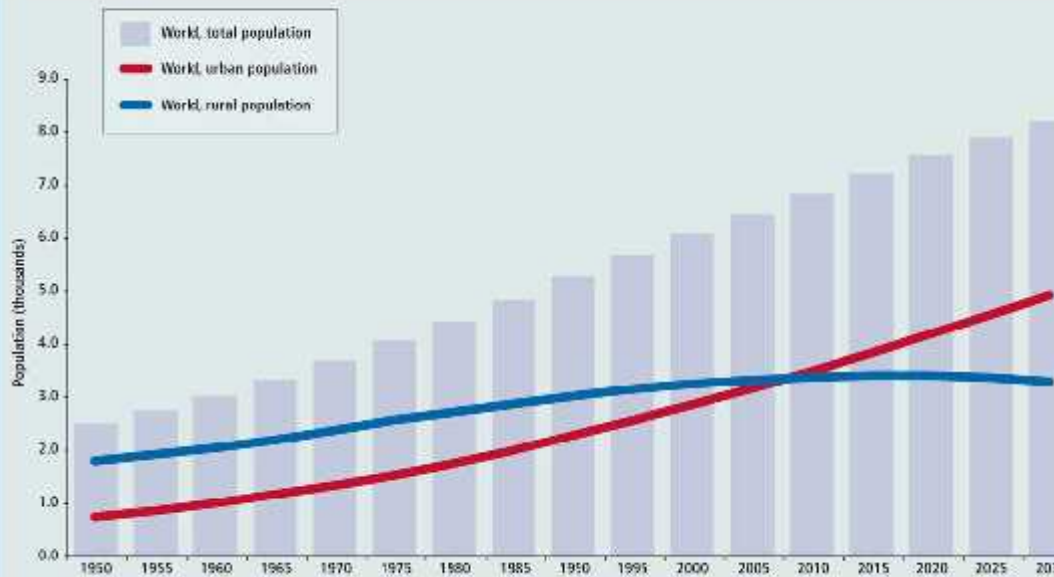


# Climate change: Procedures, threats

source: UNEP/GRID-Arendal



The urban and rural population of the world, 1950-2030



## The World Goes to Town

Urban centers are only 2.8% of earth's surface but they house >50% of population  
~1 billion live in slums

## Increase of global urban population

year	Urban population	%
1900	220 million	13 %
1950	732 million	29 %
2005	3.2 billion	49 %
2030	4.9 billion	60 %
2050	5.3 billion	63%

**Average increase of urban population in the developing areas: 5.000.000 new comers per month!**

*source: UN Population Division*

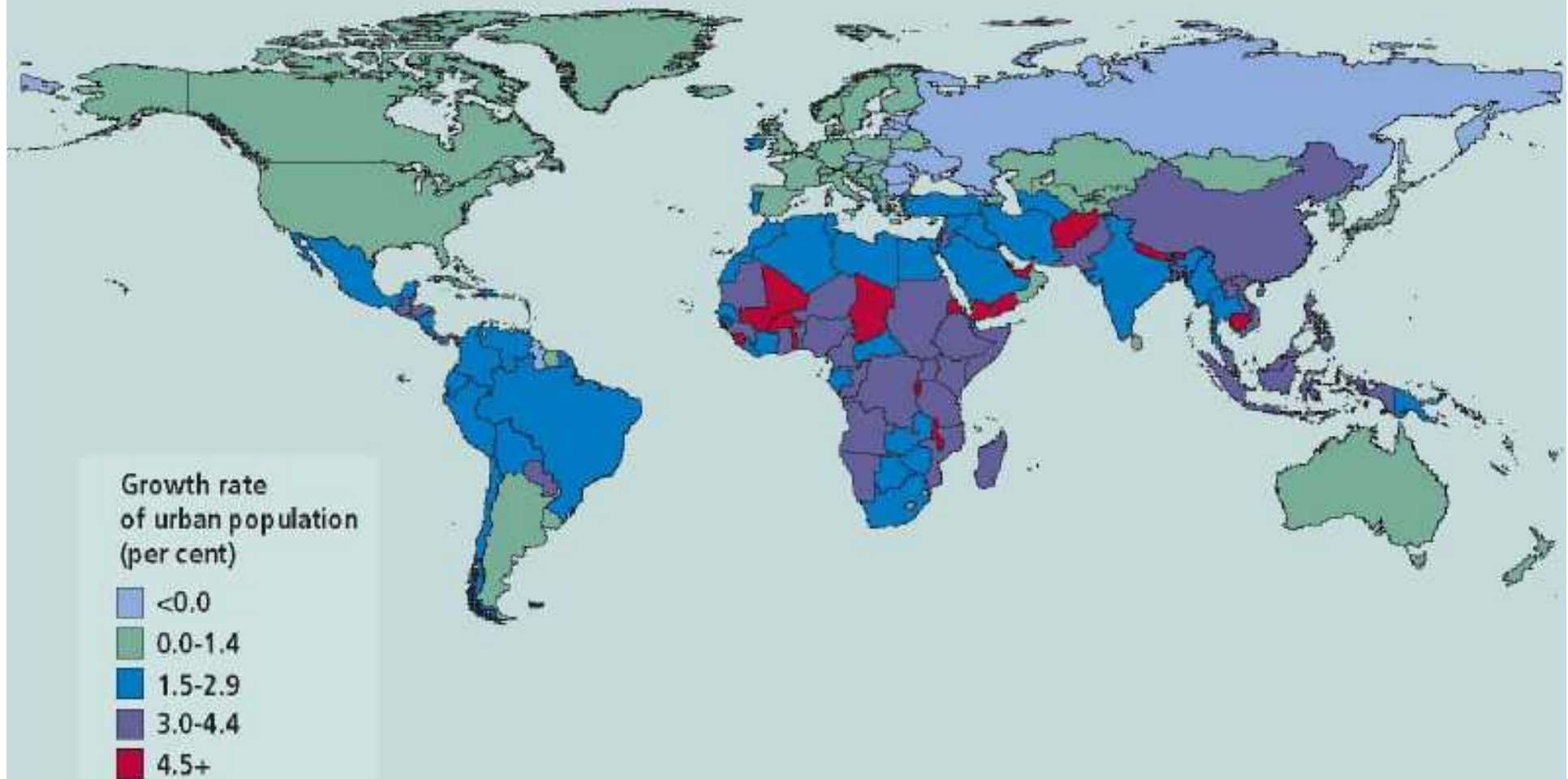
# Change of urban population

year	Developed countries		Developing countries	
	Population (billion)	%	population (billion)	%
1900	0.15		0.07	14 %
2005	0.9	74 %	2.3	43 %
2030	1.0	81 %	3.9	56 %

*source: UN Population Division*



# Growth rates of urban population



UN predictions: by 2020, millions of climate change immigrants

Buenos Aires, Rio de Janeiro, Los Angeles, New York, Lagos, Alexandria, Mumbai, Kolkata, Dhaka, Shanghai, Osaka, Tokyo are in <1 m from sea level  
expected sea level rise: 1.6 m by 2100

## Likely Scenarios if Climate Change Continues

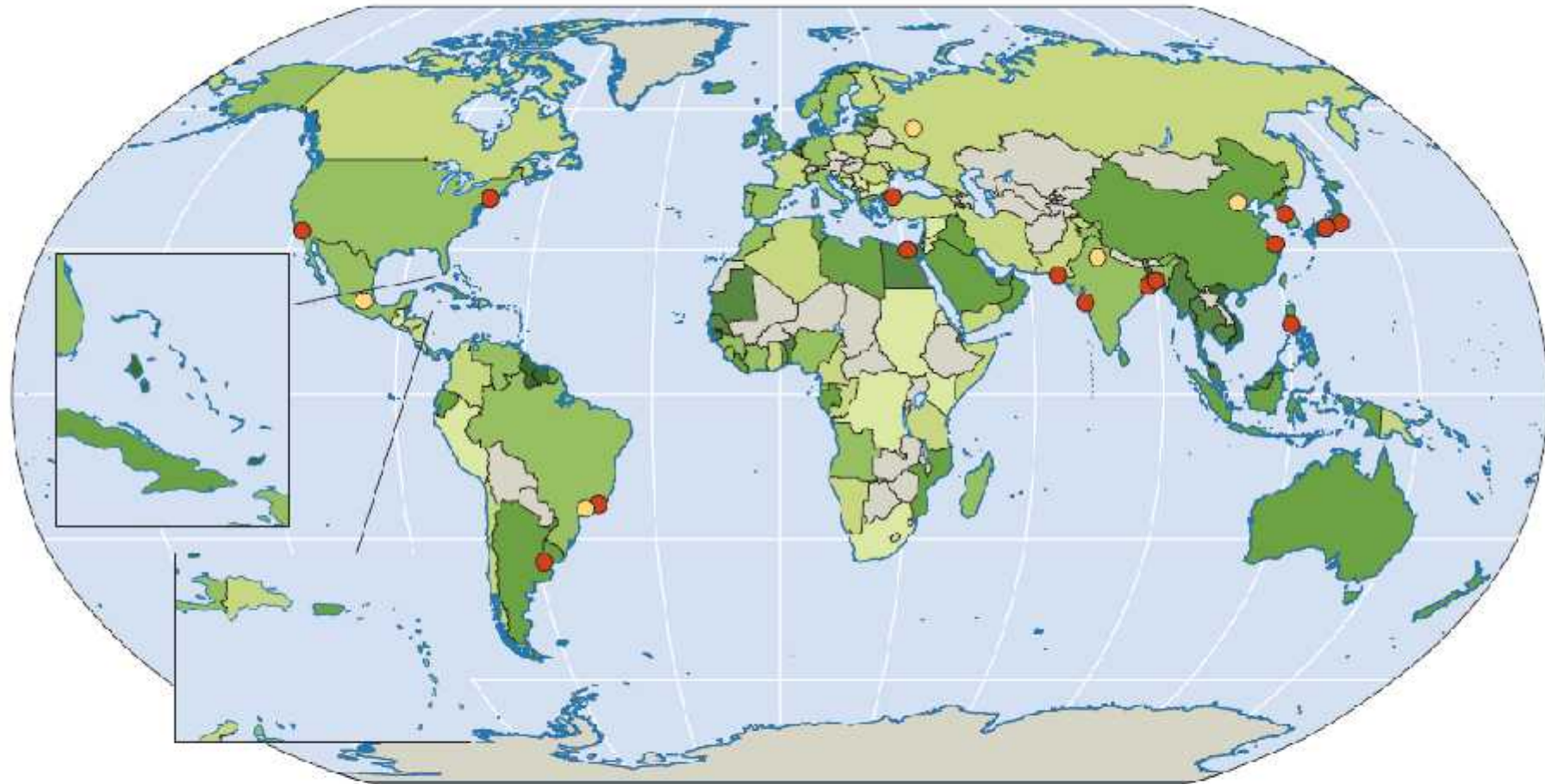
▼ SELECT CLIMATE IMPACTS





# Sea level rise in...low elevation coastal zones

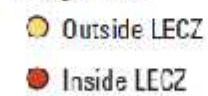
Map 2.1 At risk: Population and megacities concentrate in low-elevation coastal zones threatened by sea level rise and storm surges



Population in low elevation coastal zones (LECZ) (%)



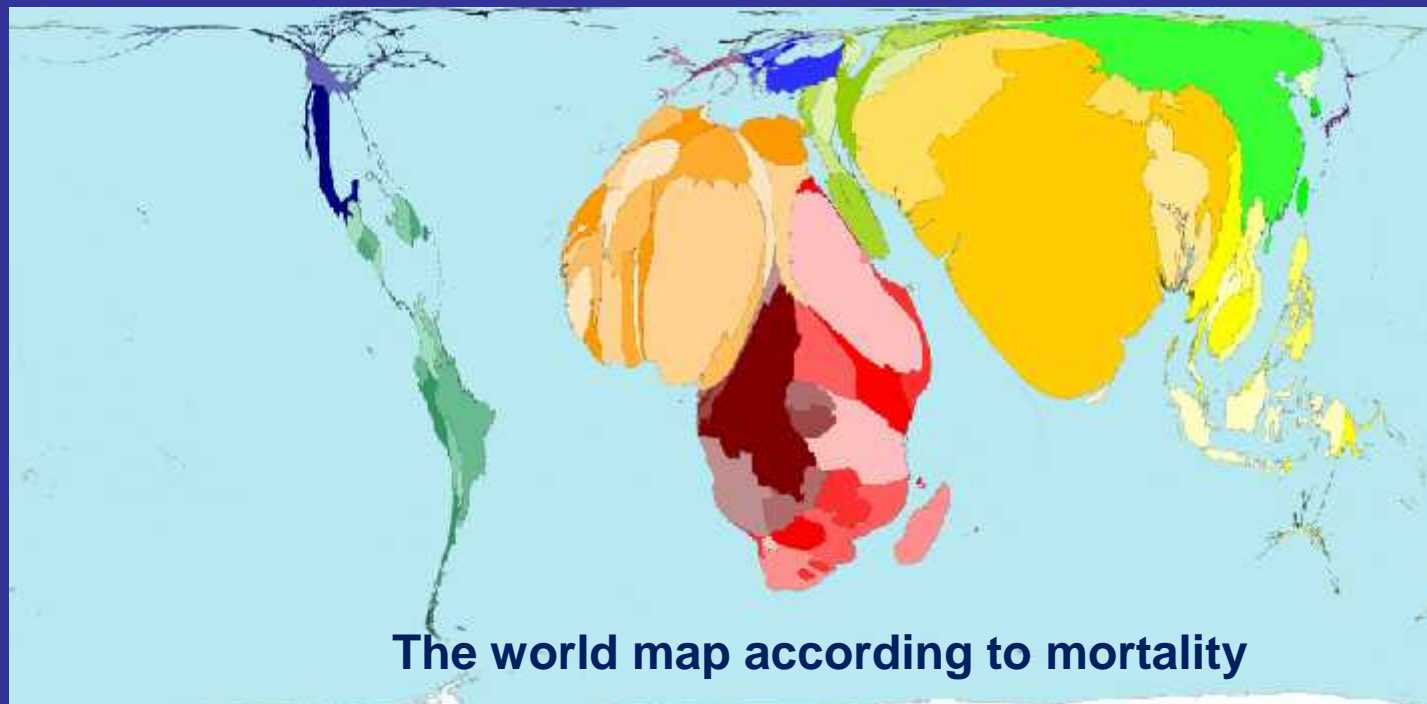
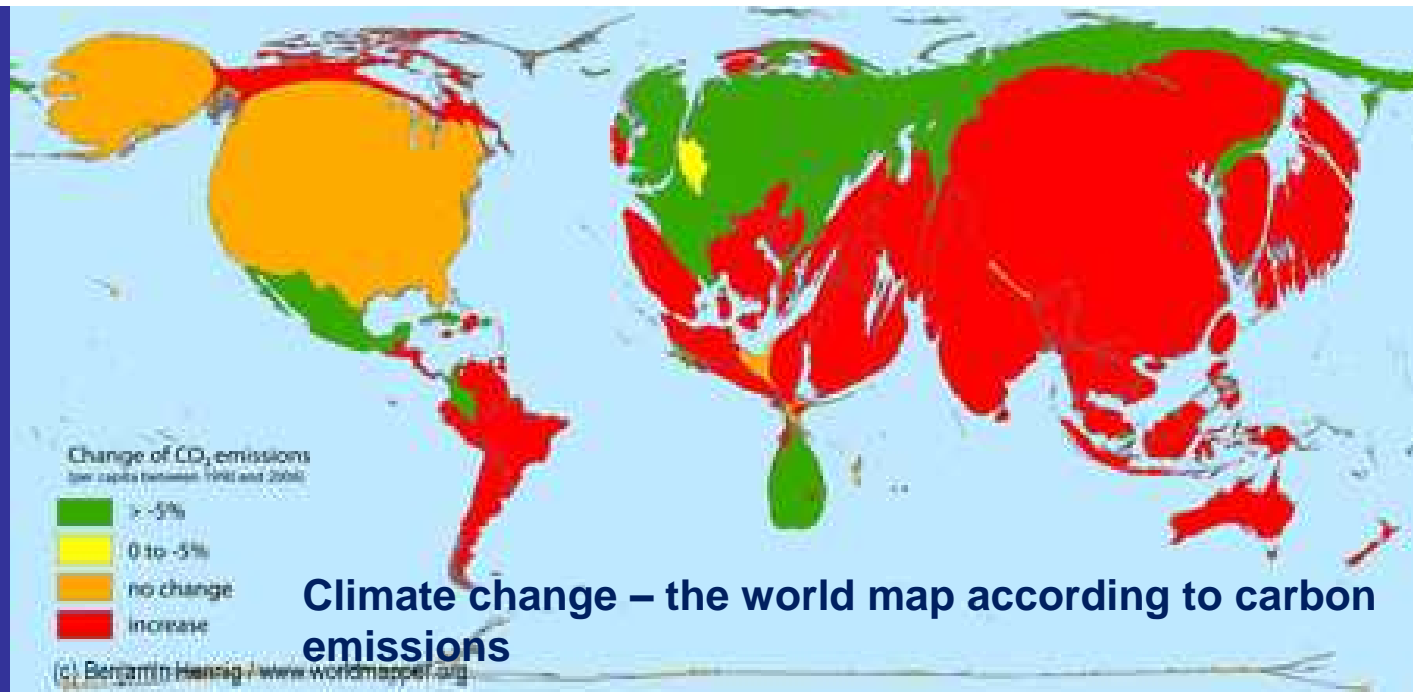
Mega cities



LECZ  $\leq$  10 metres

Source: United Nations 2008a.

Note: Megacities in 2007 included Beijing, Bombay, Buenos Aires, Cairo, Calcutta, Dhaka, Istanbul, Karachi, Los Angeles, Manila, Mexico City, Moscow, New Delhi, New York, Osaka, Rio de Janeiro, São Paulo, Seoul, Shanghai, and Tokyo. Megacities are defined as urban areas with more than 10 million inhabitants.



# Climate change is a fact...

- overheating
- drought
- Environmental degradation



A series of impacts  
and indicators



Sea level rise  
floods  
Natural disasters



Climate change has an impact on basics – access to potable water, food security, health – environment (*UN-Habitat 2009*)



# Flooding in Athens



# Extreme weather conditions



**Global Warming:**

<http://www.climatecentral.org/blogs/131-years-of-global-warming-in-26-seconds/>



# Response

## political level

- Global effort for reducing emissions CO2 – COP15, 16, 17...
- Reducing the phenomenon– adjust country policy

## professional level

- Adopt global agenda
- Scientific monitoring
- Revision of spatial & urban planning  
& building regulations

## Citizen level

- Adjust our consuming activity and behavior

# The Global Agenda



## climate change

natural disasters

food scarcity

environmental degradation

## MDGs Goals

poverty elimination

health, education

Global partnership

## sustainable development

economic growth

social issues

environment

# Climate change statement



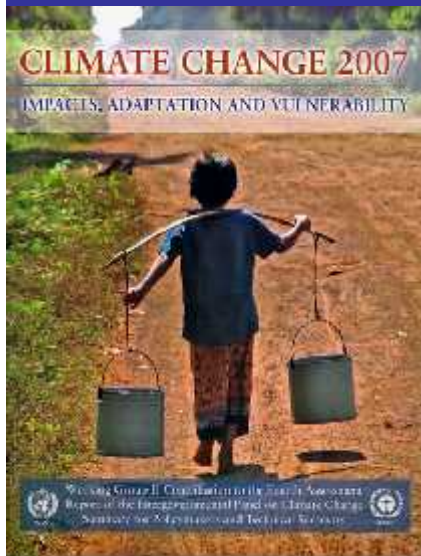
**“climate change is the major challenge of our days”**

Combined with the

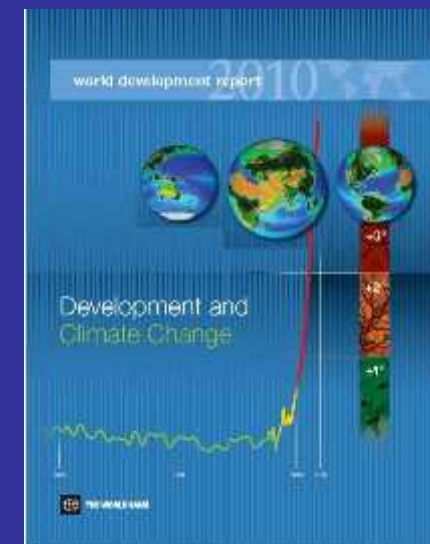
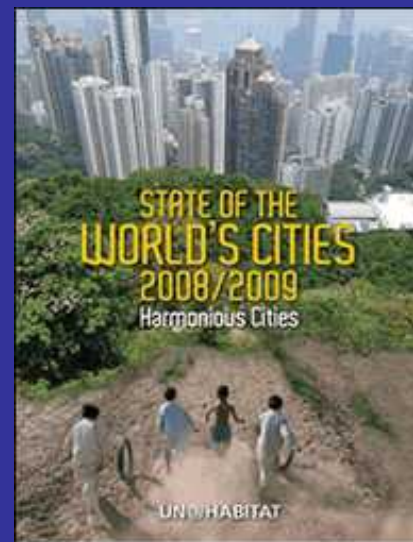
Global economic crisis

All efforts for the MDGs are in high risk.

**Ban Ki-moon, SG, United Nations, 2009**



**Intergovernmental Panel on Climate Change, 2007**  
**UN-HABITAT, 2008**  
**World Bank, 2010**



# Climate change statement



**“climate change offers opportunities ”**

Prevention can be achieved through a better land use zoning and building regulations

So that cities will reduce their emissions  
And all citizen and especially the poor  
Will be protected from natural disasters

**Anna Tibaijuka, Past ED, UN-Habitat, 2009**

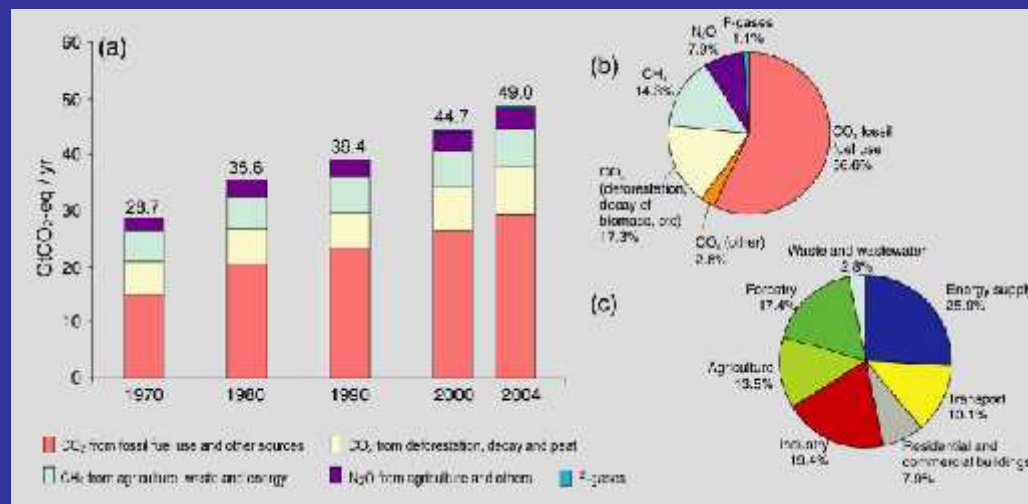
# 75% of energy consumption happens in **urban & peri-urban areas** (+80% of garbage, 60% of gas emissions)

80% of CO<sub>2</sub> is caused by the energy sector

2010: US\$243 billion investment on green energy. Goal: 80% of energy consumption will be derived from renewable energy sources by the middle of the century

**Cities are part of the problem, let's make them part of its solution.**

**Climate change measures and policies will be challenged in cities and urban settlements**





# The role of urban areas in reducing climate change

Urban areas are the engine of the economy  
climate change measures require reforms:

- land use
- Transportation system
- Building design

Increase of **urban density** and **building to lot ratio** is a key factor (merging of property parcels, redistribution of property rights)

e.g., CO<sub>2</sub> emissions per person are less in NY as 70% of citizen use public transportation

e.g., Atlanta USA and Barcelona Spain have the same population (2.5 million), however Atlanta has an area of 4200 Km<sup>2</sup> and Barcelona 162 Km<sup>2</sup>

As a result: **Atlanta consumes more energy**

- green investment– good job opportunities

building restoration, renewal of transportation, improvement of sewerage system, energy efficiency of old buildings(2800 have agreed to reduce their annual emissions)



# The role of urban areas in adaptation

measures to improve **quality of life and security of tenure** :

- **Formalization of informal settlements** in the sub-urban areas that are vulnerable to natural disasters due to a lack of infrastructure, combined with pro-growth measures, **motivations to participate**, job opportunities in these areas)
- **Improvement of energy efficiency** has a dual impact: both to climate change and to economy
- Revision of the **building regulations**
- **Revision of land use planning** and of urban management, flexible zoning
- **Participatory and inclusive planning**

**Bill Clinton:** “ *for each 1 billion \$US investment on improving the energy efficiency oh houses 6000 new job positions are created. This is 6 more efficient than the average state investment.*”

**Plus:** *the achieved energy saving facilitates the investment recovery within the next 7 years”*



# Priorities and green land tools

- **Reforms of property rights:** privatization and security of tenure, provision of clear property titles, activate the dead capital, best use of land and real estate, affordable housing policy
- **cadastre:** reduce transaction costs
- **Land use zoning:** affordable planning, inclusive planning

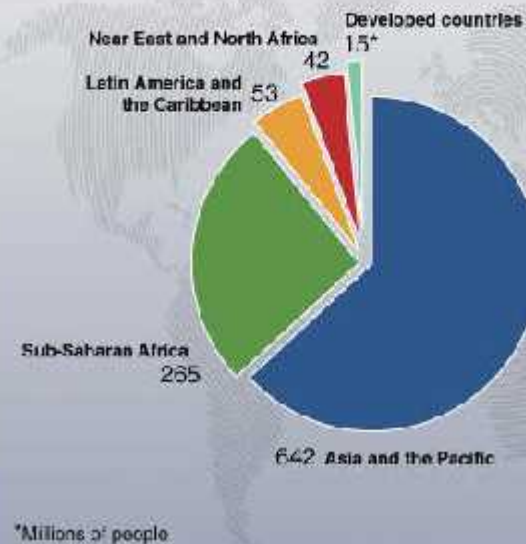
# Priorities and green land tools

- Revision of legal framework to support green improvements in property market (sales market and rental market) , certificates of energy efficiency improvements for the buildings
- **Brownfield redevelopment:** motivations, subsidies
- Pilot projects
- Information of citizens, simple language
- Education
- Citizen participation in projects , in order to reduce costs
- Improvement of forests, provision of rights to use



# Rural reforms- increased productivity- land consolidation

More than 1.02 billion hungry people



*1/6 of humanity is underfed*



Food supply and food security, FAO 2008.



# Examples of land policy changes due to climate change

**New regulations replace the old ones at environmentally sensitive areas**

**Protection of forests:** ) fuel free zones around settlements, ) implementation of fixed points in the forest areas in order to be able to restore the boundaries after a fire

**Due to the sea level rise:** e.g., floating houses

**Extension of property boundaries in the areas close to rivers that have no more water for a number of years, etc,**



## Private property rights may help environmental monitoring

New legislation to protect private rights against actions of neighbors related to climate change



**New rights:** carbon rights, water rights

**New reforms:**

- servitudes,
- common pool rights in natural resources
- carbon rights trade
- etc



*Carbon rights are given to local people in order to protect forests (> 1/4).*

Climate change measures require:  
collaboration among politicians, NGOs, state and private sector, academics, etc  
information & education  
international cooperation  
legal flexibility  
political will  
and a good land administration system that will provide security of tenure and  
access to funding mechanisms

