

# CITIES AND CLIMATE CHANGE IN THE 5<sup>TH</sup> IPCC REPORT 2014

agbigio@gwu.edu

Anthony G. Bigio, GWU Professor, IPCC Lead Author

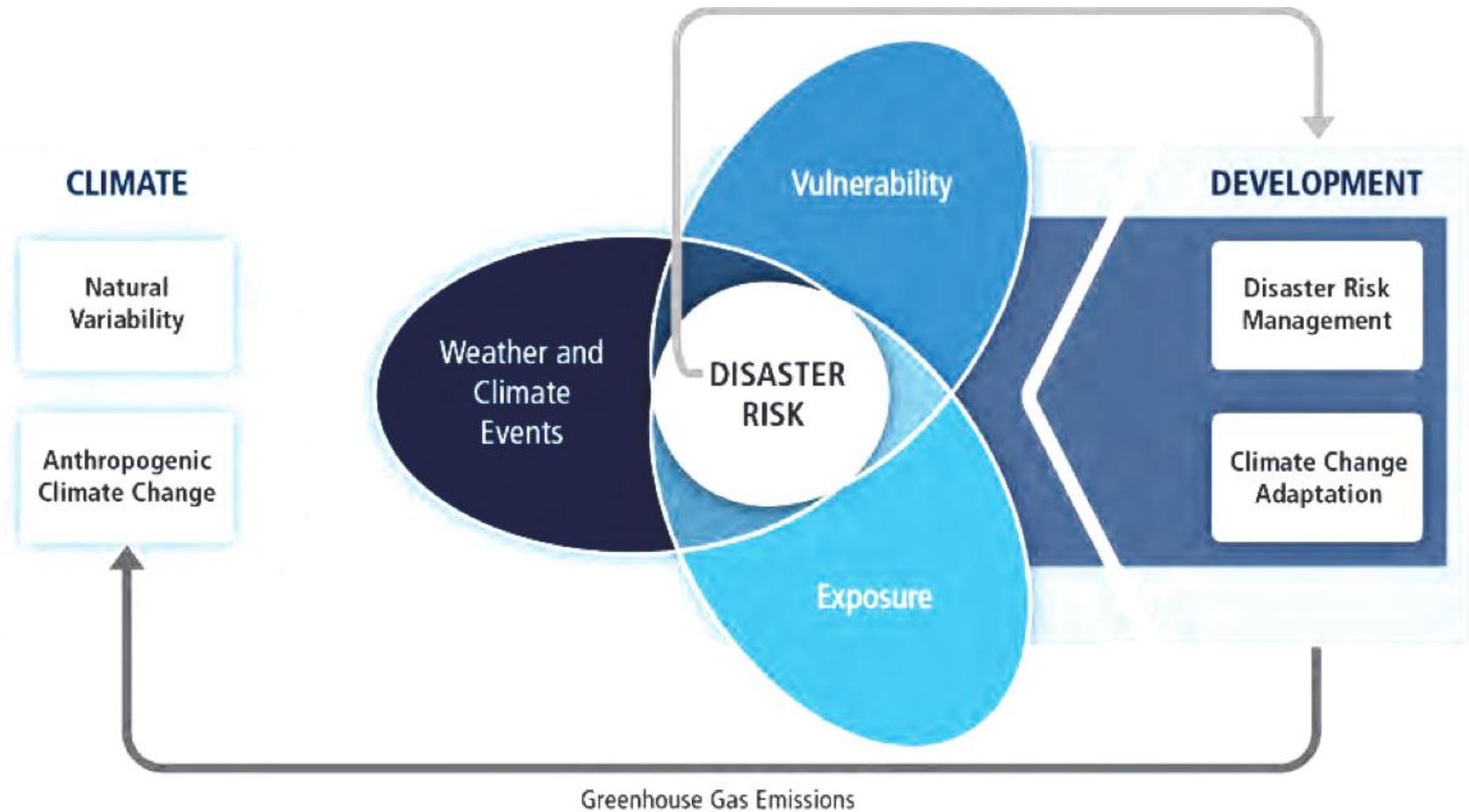
# Climate change impacts on cities

- ❑ SLR, marine inundation, storm surges, coastal erosion
- ❑ Hurricanes and cyclones
- ❑ Extreme precipitation events and urban flooding
- ❑ Landslides
- ❑ Droughts, water scarcity
- ❑ Higher ambient temperatures
- ❑ Increased heat-island effect
- ❑ Heat-waves
- ❑ Worsened air quality



Bangkok floods, November 2011

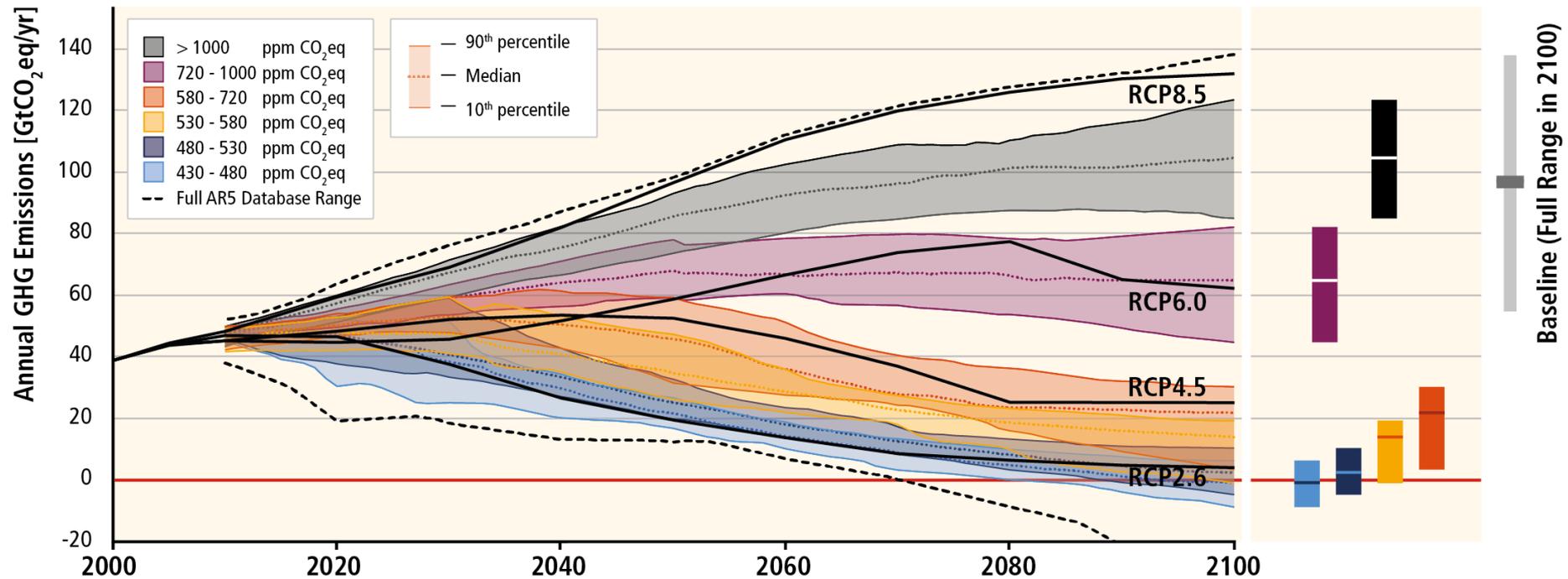
# Natural hazards and climate change



Source: IPCC Special Report on Extreme Events (SREX), 2012

# Future global warming scenarios

GHG Emission Pathways 2000-2100: All AR5 Scenarios



“Without more mitigation, global mean surface temperature might increase by 3.7° to 4.8°C over the 21<sup>st</sup> century” IPCC Summary for Policymakers, WGIII, 5<sup>th</sup> Assessment Report

# MENA urbanization prospects 2030

	<b>Total Pop. 2005</b>	<b>Urban Pop. 2005</b>	<b>Total Pop. 2030</b>	<b>Urban Pop. 2030</b>	<b>Total increase</b>	<b>% Increase of</b>
	in thousands	in thousands	in thousands	in thousands	urban population	urban population
<b>Algeria</b>	32,854	20,804	44,726	34,096	13,292	63.89%
<b>Libya</b>	5,918	4,557	8,447	7,001	2,444	53.63%
<b>Egypt</b>	72,850	31,062	104,070	51,950	20,888	67.25%
<b>Lebanon</b>	4,011	3,473	4,925	4,435	962	27.70%
<b>Morocco</b>	30,495	16,763	39,259	25,883	9,120	54.41%
<b>Syria</b>	18,894	10,049	29,294	18,746	8,697	86.55%
<b>Tunisia</b>	10,105	6,603	12,529	9,417	2,814	42.62%
<b>West Bank and Gaza</b>	3,762	2,693	7,320	5,653	2,960	109.91%
<b>Turkey</b>	72,970	49,097	92,468	71,874	22,777	46.39%
<b>TOTAL</b>	<b>251,859</b>	<b>145,101</b>	<b>343,038</b>	<b>229,055</b>	<b>83,954</b>	<b>57.86%</b>

Source: "World Urbanization Prospects: the 2007 revision ", United Nations

**A projected 58% growth of urban population between 2005 and 2030 will cause huge urban development challenges AND increase urban exposure to natural hazards and impacts of climate change**

# W.G. II and W.G. III urban chapters

## Ch. 8 “Urban Areas”

16 authors 2011-2013

Technical Support Unit

Carnegie Institution for  
Science, Stanford, USA

63 pages of text

<http://ipcc-wg2.gov/AR5/>

## Ch.12 “Human Settlements, Infrastructure and Spatial Planning”

36 authors 2011-2013

Technical Support Unit

Potsdam Institute for  
Climate Impact Research,  
Germany

70 pages of text

[www.mitigation2014.org](http://www.mitigation2014.org)

# Key messages on urban adaptation

- “City-based disaster risk management with a central focus on risk reduction is a strong foundation on which to address increasing exposure and vulnerability and thus to build adaptation”.
- “Urban adaptation provides opportunities for incremental and transformative adjustments to development trajectories towards resilience and sustainable development”
- “Urban adaptation action that delivers mitigation co-benefits is a powerful, resource-efficient means to address climate change” “Ecosystem-based adaptation is a key contributor to urban resilience”

# Urban risk management, adaptation

- “**Accumulated resilience** resulting from the the build-up of piped water, sewers, drains, health care and emergency services and standards set and enforced on housing quality and infrastructure over the past 100-150 years... helped build the **institutions, finances and governance systems** that can support climate change adaptation”
- Capacity of cities to adapt to climate change is **highly correlated** with the percentage of residents with adequate access to urban infrastructure and formal housing.
- Typically, **the larger the deficit in infrastructure and service provision, the larger the differentials in exposure to most climate change impacts between income groups”**

# Key messages on urban mitigation

- Expansion of urban areas is taking place at **twice the rate** of urban population growth. **The expected increase in urban land-cover 2000-2030 is greater than the cumulative urban land-cover in all human history**
- Likelihood that expansion of urban areas will occur in **areas of increasing vulnerability to extreme climate events** including floods, storm surges, sea level rise, droughts, and heat waves.
- The existing infrastructure stock of the average Annex I resident is **3 times that of the world average** and about 5 times higher than that of the average non-Annex I resident
- **The largest opportunities for future urban GHG emissions reduction might be in rapidly urbanizing countries where infrastructure inertia has not set in**

# The “governance paradox”

- Governance and institutional capacity are scale and income dependent, i.e., tend to be weaker in smaller scale cities and in low income/revenue settings.
- In so far as the bulk of urban growth momentum is expected to unfold in small- to medium-size cities in non-Annex-I countries, mitigation of GHG emissions at the scale of human settlements faces a new type of “governance paradox”:
- The largest opportunities for GHG emission reduction (or avoidance of unfettered emission growth) might be precisely in urban areas where governance and institutional capacities to address them are the weakest

# Policy leverages for urban mitigation

## Stylized Hierarchy of Urban Energy/GHG Drivers and Policy Leverages

