

Climate Change Impacts on Urban Systems in Asia

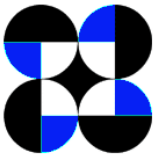
Graciano P. Yumul, Jr., D.Sc.

Department of Science and Technology

Taguig City, Metro Manila, PHILIPPINES

February 10, 2012

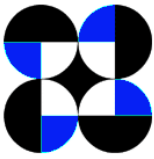




OUTLINE

- Climate and urban core updates
- Hazards, risks and impacts
- Solutions and adaptations
- Continuing saga

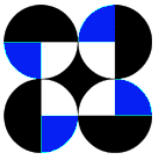




OUTLINE

- Climate and urban core updates
- Hazards, risks and impacts
- Solutions and adaptations
- Continuing saga

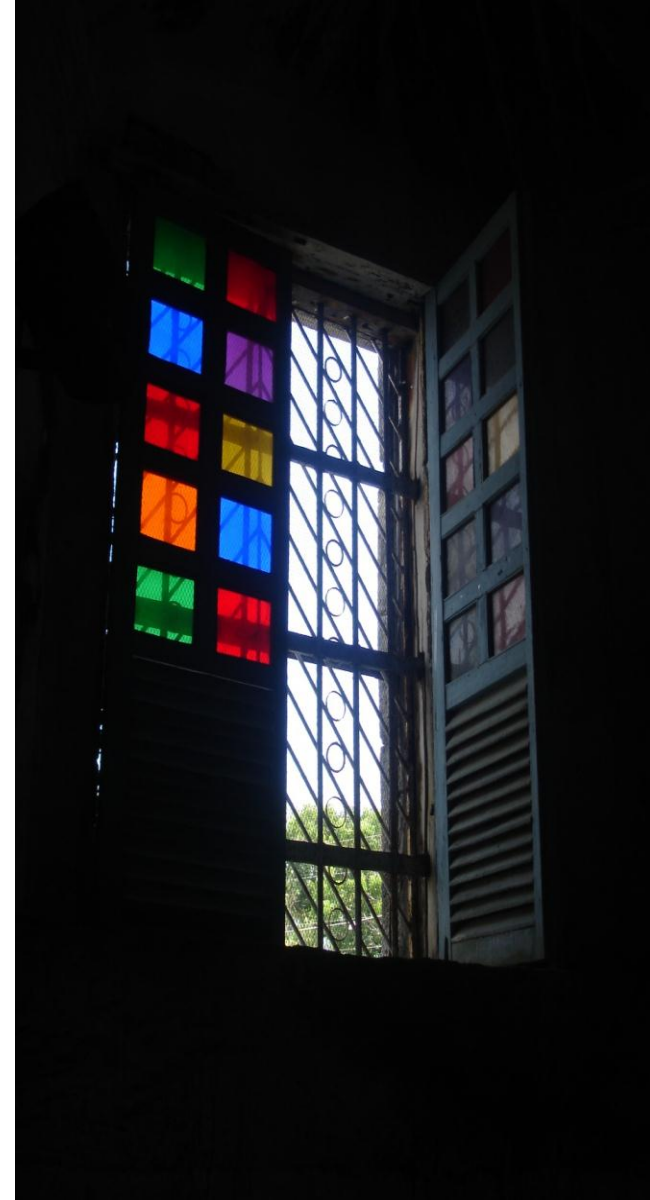


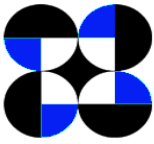


Good read!

*“Adapting Urban Water
Systems to Climate Change:
A handbook for decision
makers at the local level”*

Publisher: ICLEI European
Secretariat GmbH, 2011





Major Challenge

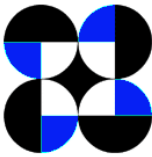
Convincing a questioning public that:

- Global warming is real and is being felt
- Exceeds natural climate variability magnitude and pace
- Climate uncertainty is the norm with serious consequences

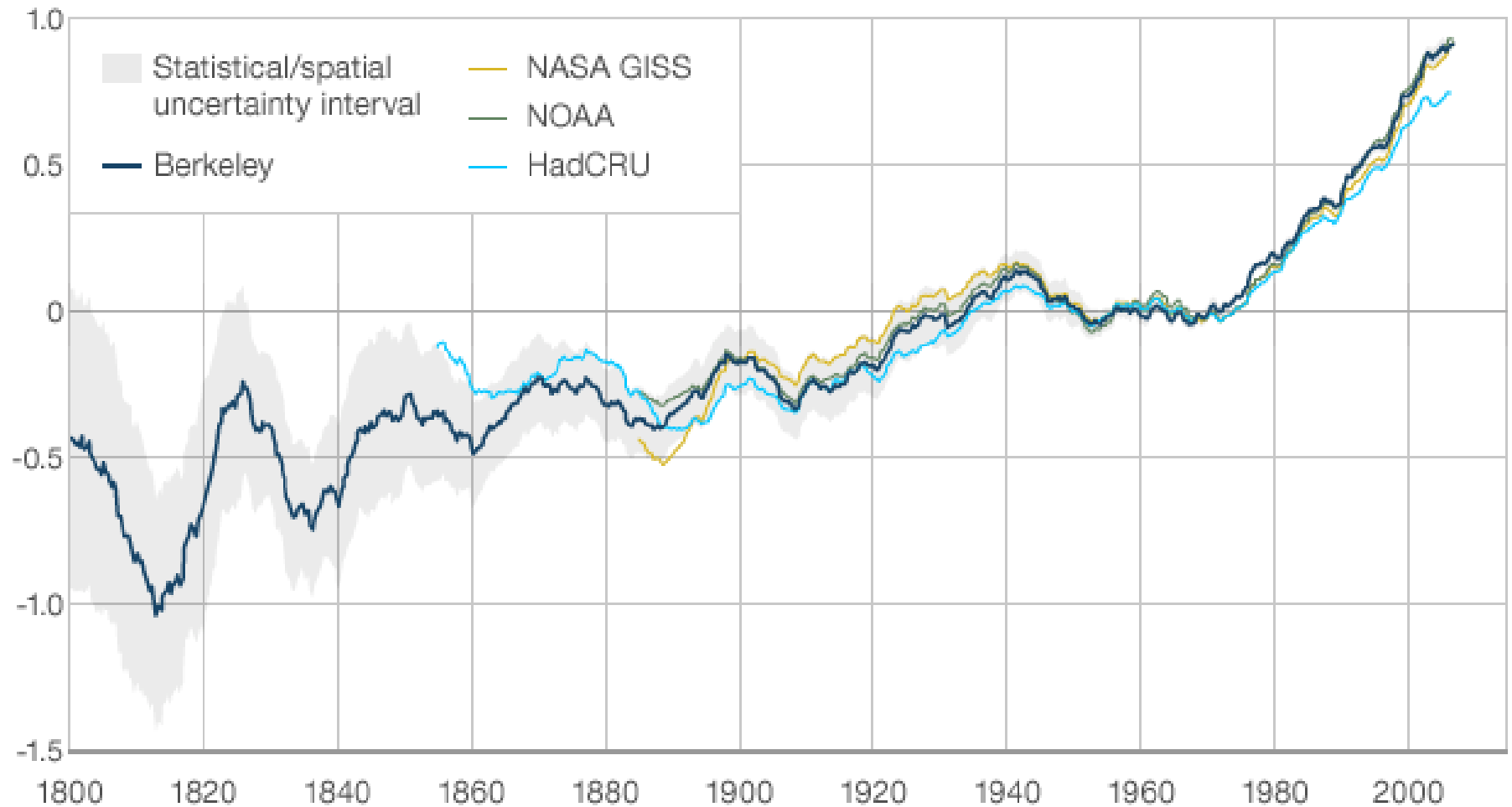
*Chapman and Davis, 2010.
Climate Change: Past, Present, And Future.
EOS vol.91, no.37*



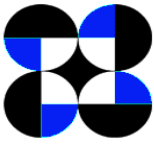
Decadal land-surface average temperature



Temperature anomaly (°C)



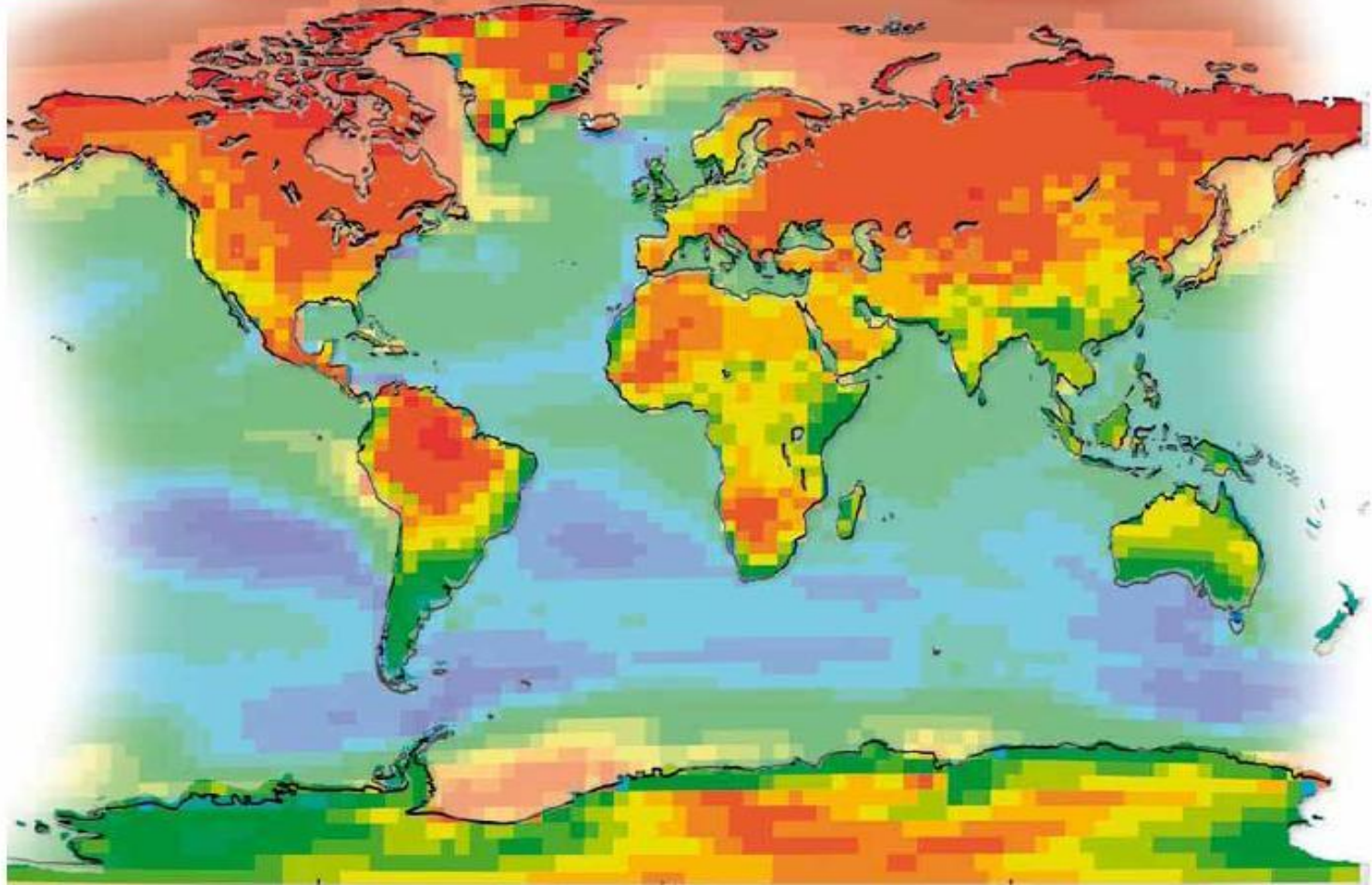
Source: Berkeley Earth Project



What warming?!

Temperature projections for a 4-degree warmer world

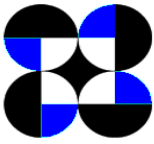
The average global temperature is likely to be 4°C higher than in pre-industrial times by 2055 if greenhouse gas emissions are not slowed – that means a 16°C rise in the Arctic (Source: Met Office Hadley Centre)



REGIONAL TEMPERATURE INCREASE (°C)
IN A 4°C WORLD, RELATIVE TO 1890

1 2 3 4 5 6 7 8 10 12 14 16

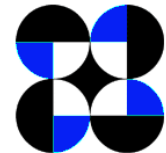




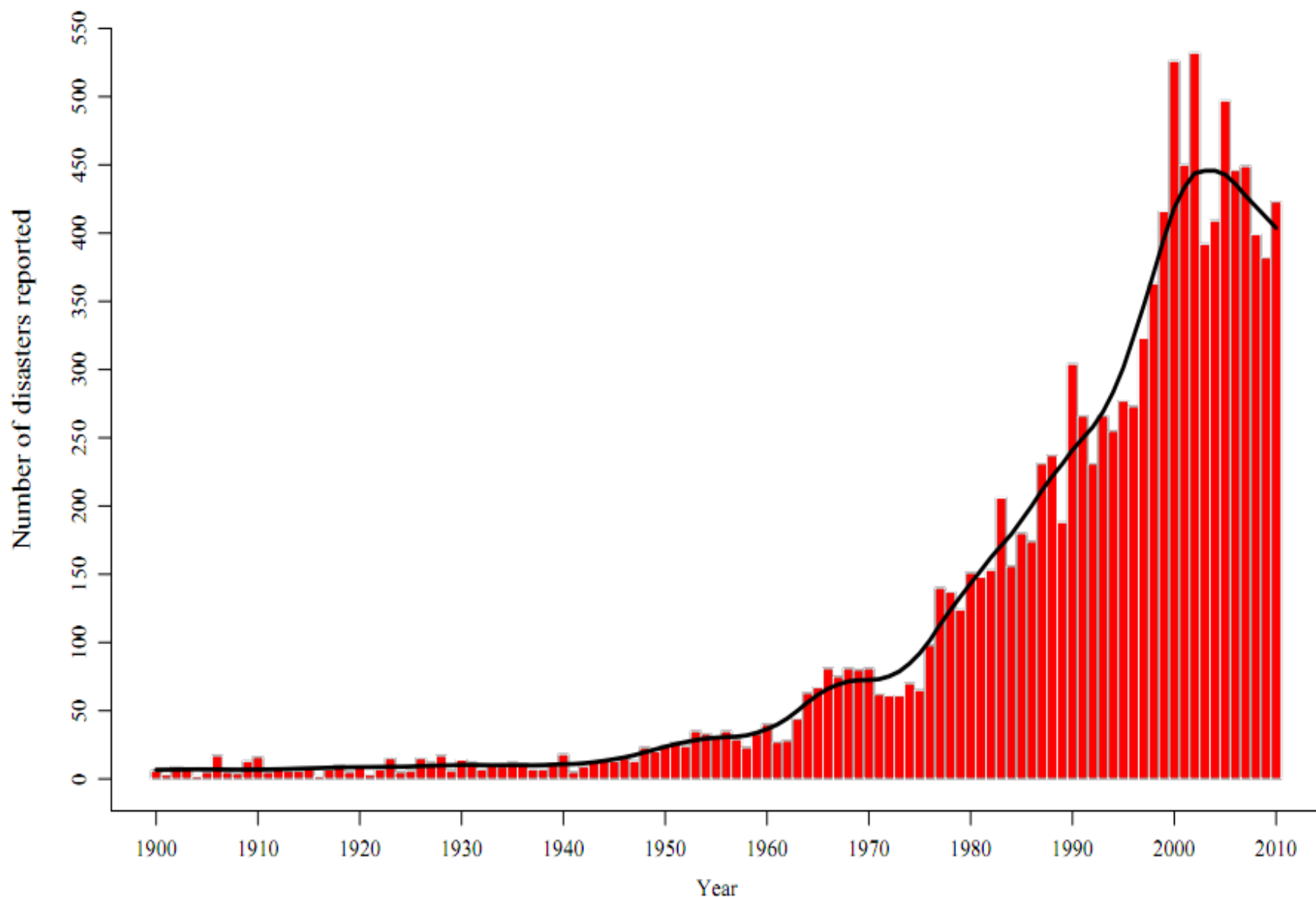
Waterworld...



Source: The Philippine Star, 2011



Natural disasters reported 1900 – 2010



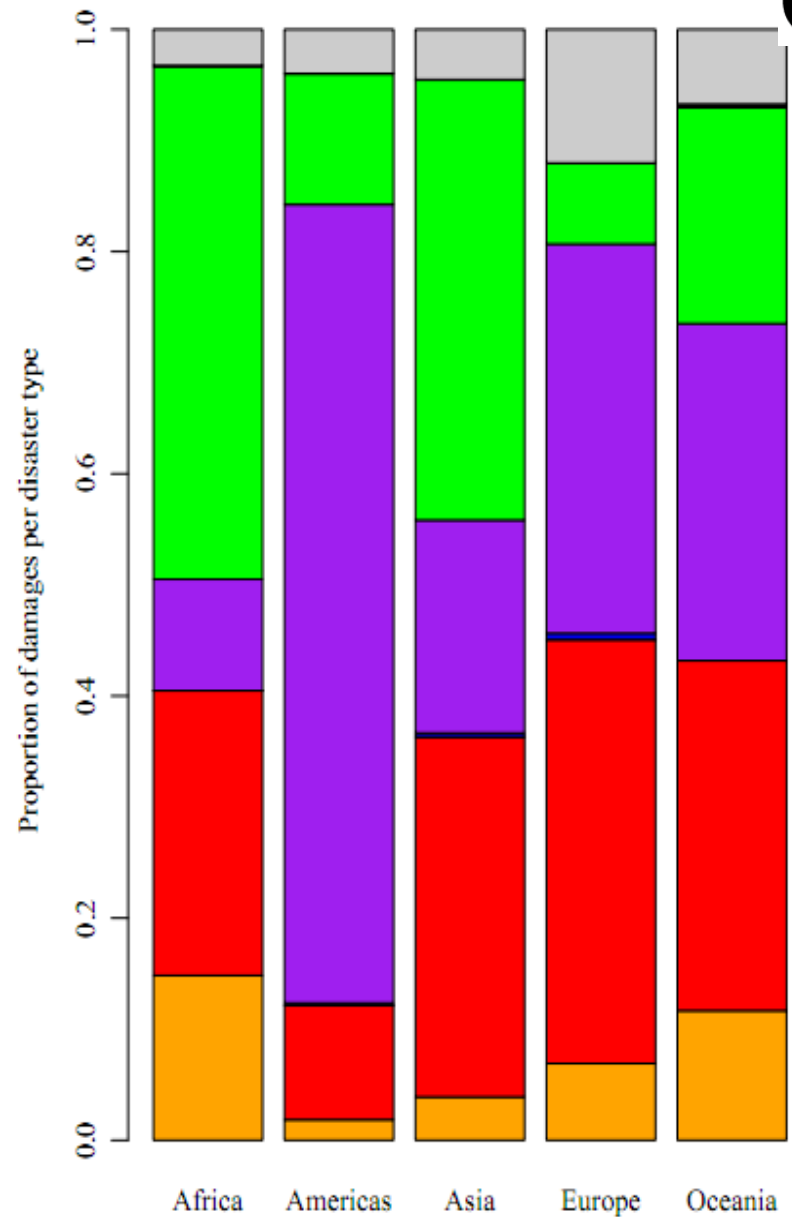
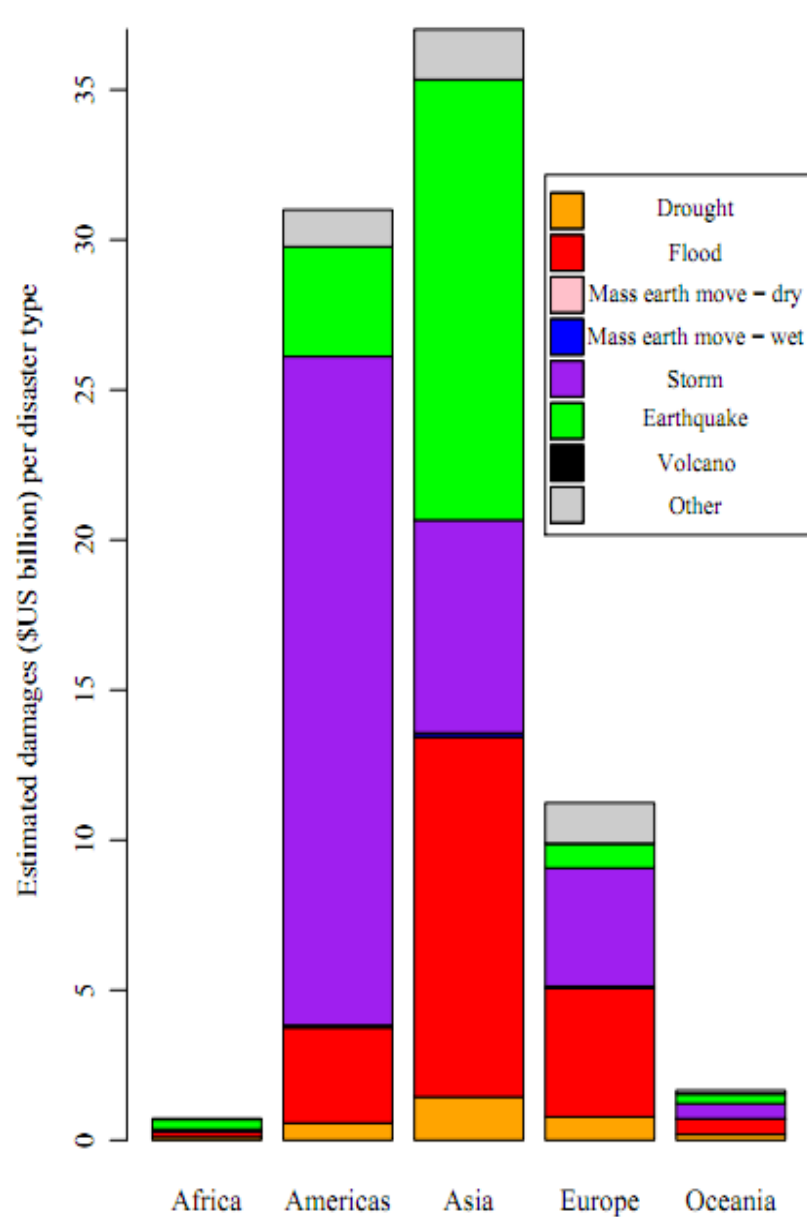


Natural disaster summary 1900 – 2010 (linear-interpolated smoothed lines)

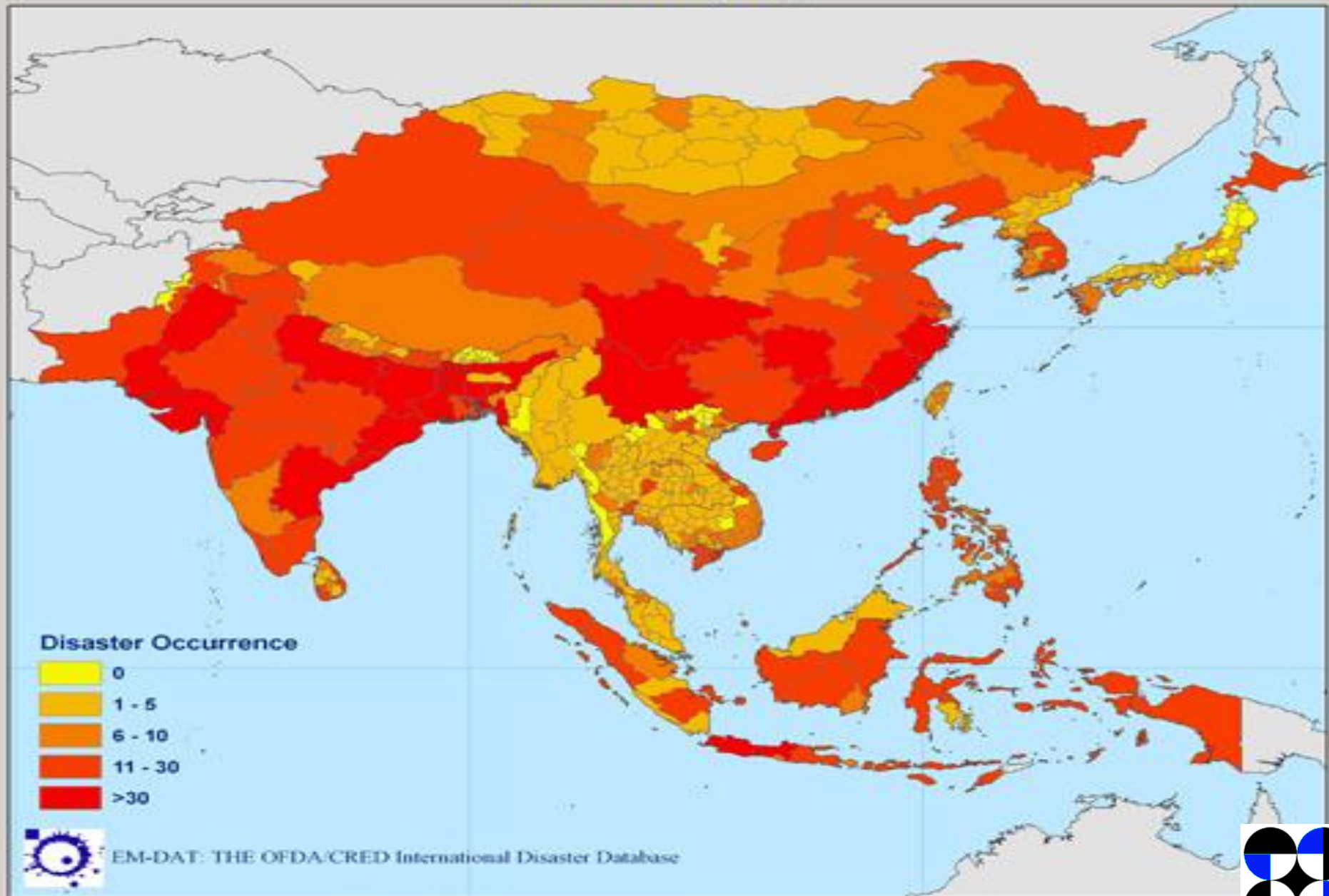


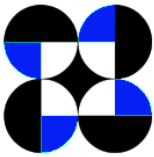


Average annual damages (\$US billion) caused by reported natural disasters 1990 – 2010

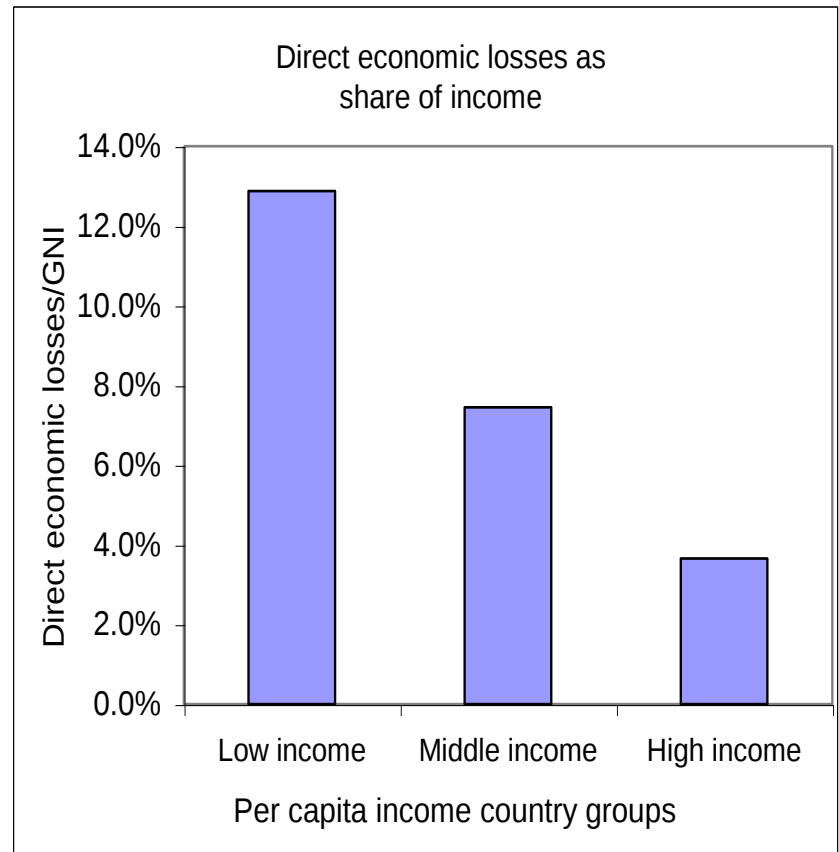
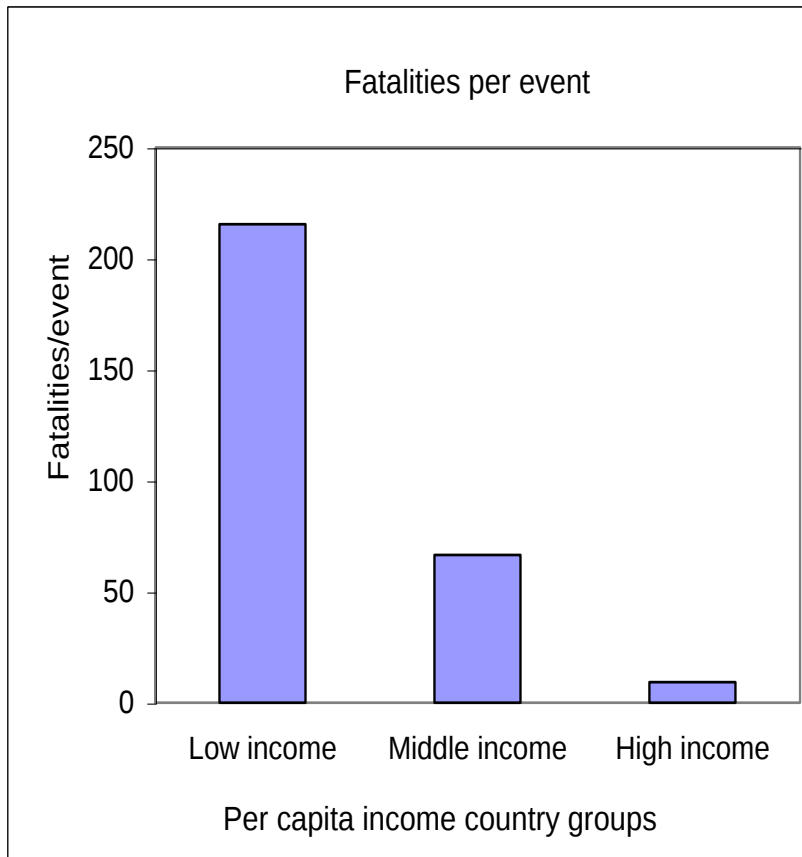


Natural disaster occurrence by first administrative level boundaries: 1975-2004 (Oct)

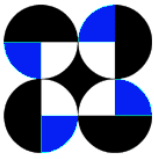




Impacts are magnitudes higher in low income countries



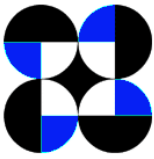
Source: Munich Re, 2005



Highlights

- Changes in weather and climate.
- Too much water in the atmosphere.
- Certain is extreme weather events will happen.
- Uncertain is what, where, when, and how.
- Adaptive capacity is a function of resources.

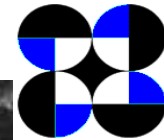




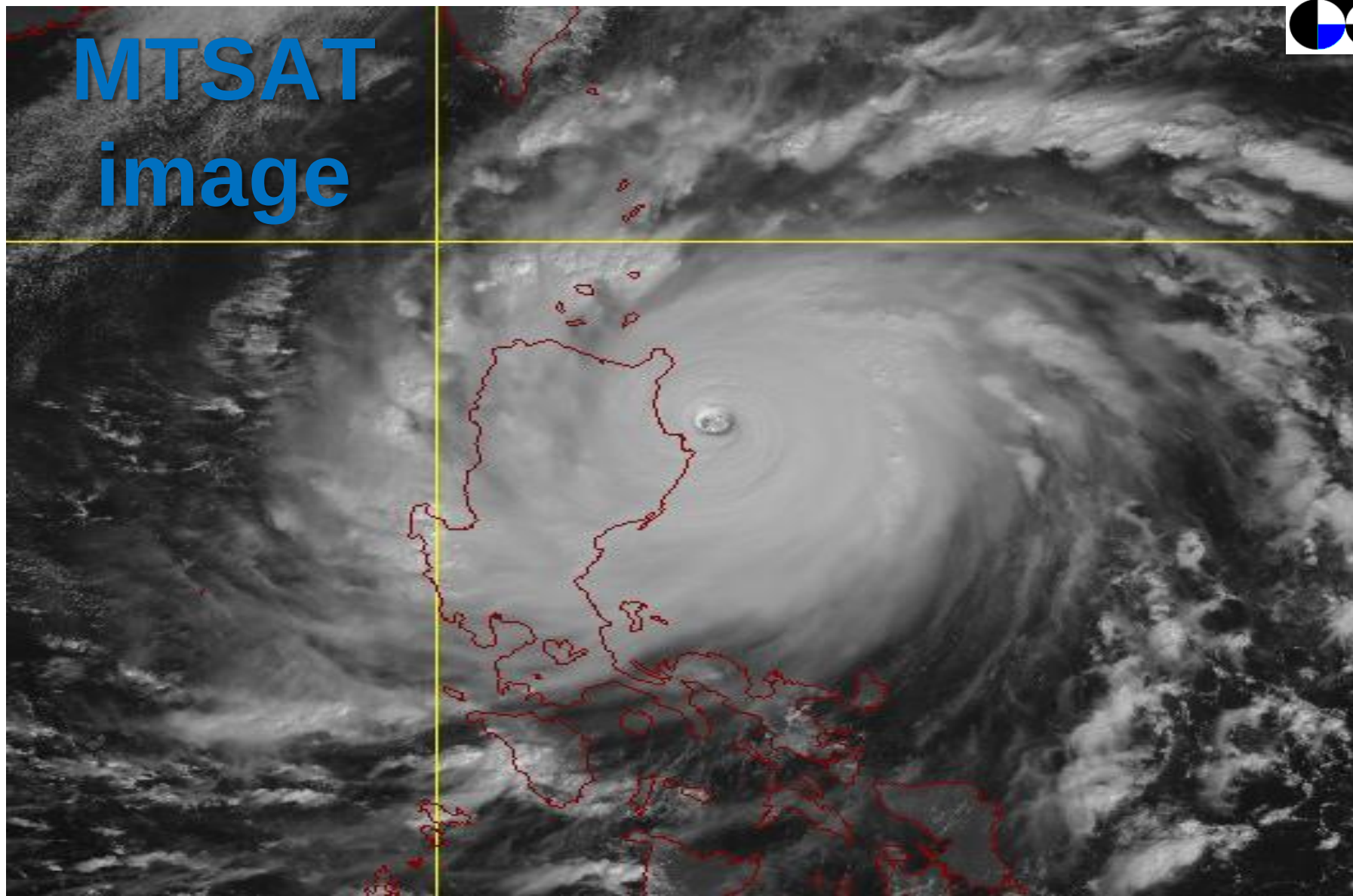
OUTLINE

- Climate and urban core updates
- Hazards, risks and impacts
- Solutions and adaptations
- Continuing saga



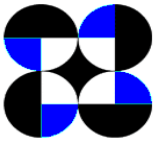


**MTSAT
image**

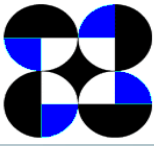


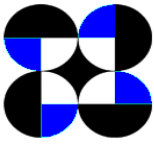
© PAGASA, 2010

10AM 18 Oct. 2010

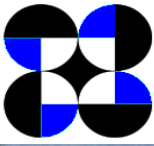


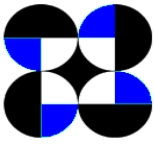
Source: The Philippine Star





Source: The Philippine Star





Metro-Manila Development Authority



H. BAUTISTA ELEMENTARY SCHOOL

NEWSROOM

WORLD

KALUSUGAN nangyayari sa ating mga

BARANGAY SA MARIKINA

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

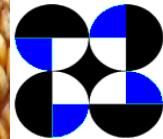
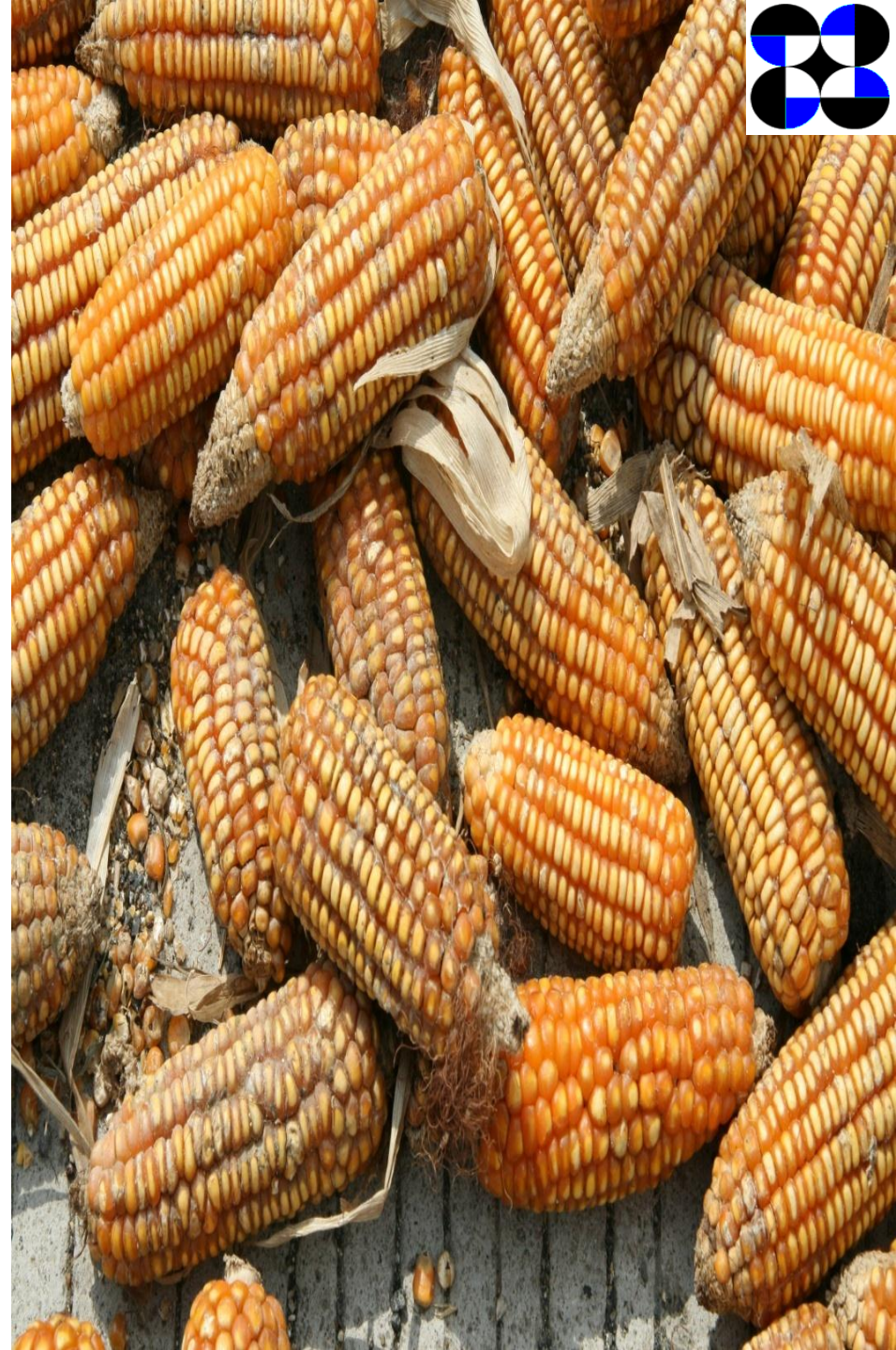
SA NAGNINILITO!

SA NAGNINILITO!

SA NAGNINILITO!

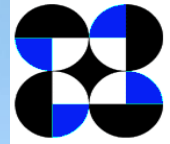


© Yumul, 2011

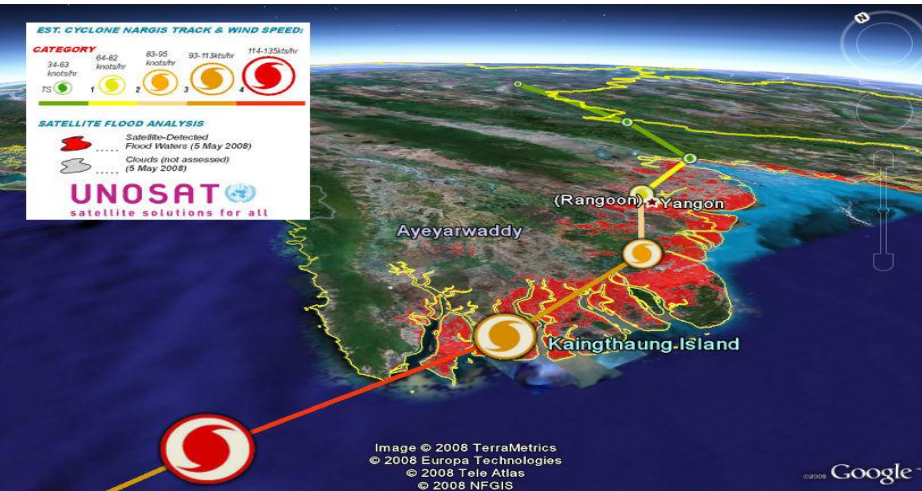




© Yumul, 2011



May 2, 2008 Typhoon Nargis in Myanmar



<http://www.gearthblog.com>
http://www.nytimes.com/slideshow/2008/05/05/world/0505-MYANMAR_4.html



August 2, 2009 Typhoon Morakot in Taiwan



http://www.boston.com/bigpicture/2009/08/typhoon_morakot.html



July 2010 Flooding in Pakistan



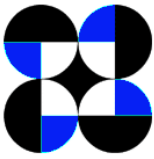
<http://northcoastvoices.blogspot.com/2010/09/>

http://www.frugal-cafe.com/public_html/frugal-blog/frugal-cafe-blogzone/2010/08/22/

<http://www.telegraph.co.uk/news/worldnews/asia/pakistan/7935008>



2011 Flooding in Thailand



These floods which affected 9.8 million people and destroyed 25% of the country's rice crop caused 45 billion dollars in damages.



<http://jpgreenword.wordpress.com/tag/thailand/>
<http://takepart.com>

September 2011 TS Nesat in Vietnam



<http://www.thejournal.ie/asia-reels-from-floods-as-storm-hits-vietnam-241403-Sep2011/>

<http://presstv.com/detail/202098.html>

<http://talkvietnam.com/2011/09/northern-vietnam-fronts-typhoon-nesat/>



August 2011 Flooding in Bangladesh



<http://thewatchers.adorraeli.com/2011/07/28/bangladesh-floods-displace-thousands/>
<http://www.ifrc.org/news-and-media/features/bangladesh-floods-photo-essay/>



2011 Flooding in India



This area is partially submerged after water levels rose following heavy rainfall at Sangam, the confluence of rivers Ganges and Yamuna in Allahabad, India on Sunday, July 24, 2011.

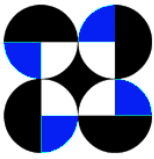


Train services in Mumbai were disrupted by the heavy rains

http://newshopper.sulekha.com/india-monsoon-flooding_photo_1914033.htm

<http://www.abc.net.au/news/2011-08-30/flooding-hits-mumbai/2861496>

Drought



Dam in China



An unusually severe drought in March 2010 across southern China and Southeast Asia brought the Mekong River's level to its lowest level in 50 years.



Farmers in Cambodia near the Mekong River

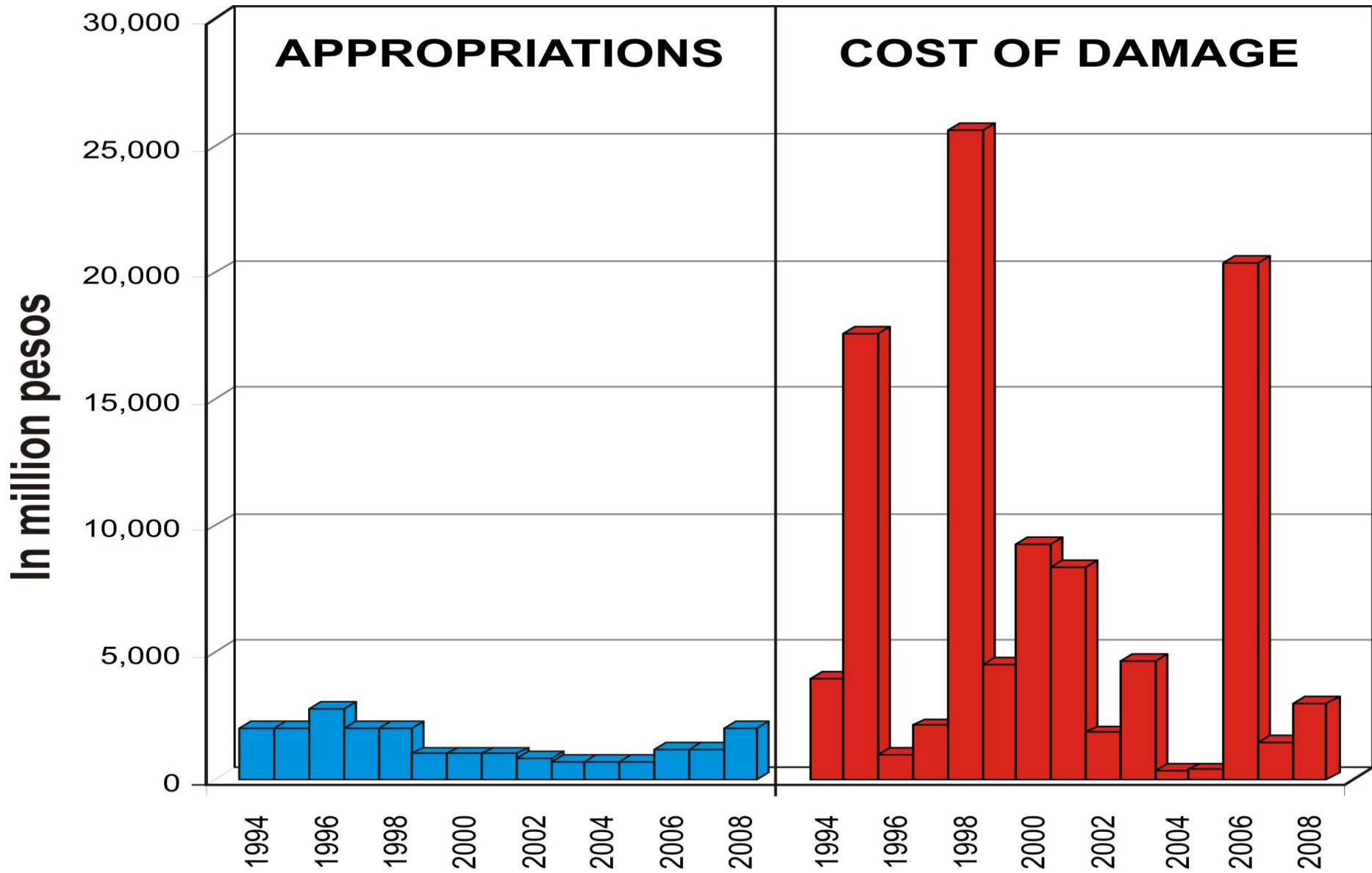
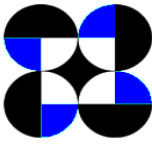


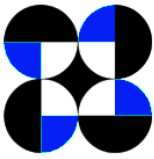
Rice field in Vientiane, Laos

<http://agriculture.imva.info/food-disasters/water>

http://www.monstersandcritics.com/science/news/article_1545720.php/Mekong-River-leaders-gather-to-discuss-drought

<http://vi-media.blogspot.com/2010/04/asian-countries-blame-chinese-dams-for.html>

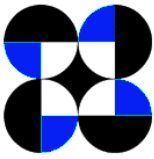




Warming Earth, urban core exposures...

- Coastal areas with sea level rise;
- Dry spell & less H₂O budget;
- Salt water intrusion, ground subsidence;
- Emergent and re-emergent diseases;
- Coral bleaching & marine degradation;

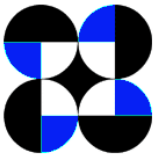




Warming Earth, urban core exposures...

- Transport facilities affected;
- Food security affected;
- Energy sourcing conflict;
- Women and children social issues;
- Unsustainable development.

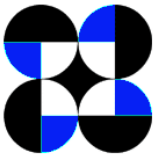




OUTLINE

- Climate and urban core updates
- Hazards, risks and impacts
- **Solutions and adaptations**
- Continuing saga





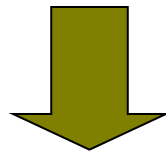
THREE RESPONSE OPTIONS

- **SOFT MEASURES**
- **PRO-ACTIVE MEASURES**
- **NON-STRUCTURAL**



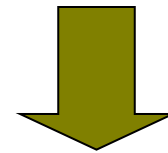
**PREVENTION
/ OFFENSE**

- **HARD MEASURES**
- **ENG'G MEASURES**
- **STRUCTURAL**

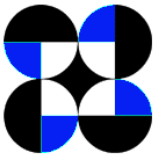


DEFENSE

- **COST-BENEFIT**
- **IDIOSYNCRACIES**
- **RESILIENCE**



ACCEPTANCE



Hazard, risk & disaster

- A place can be hazardous, but not necessarily risky;
- There can be risk, but not necessarily disastrous;
- Minimize factors (Hazard x Vulnerability x Exposure) involved;

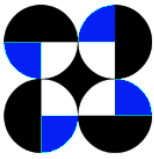




Possible solutions

- Reduction, not prevention, of disaster;
- Risk spreading, risk insurance;
- Offense, Defense, Acceptance concept;
- Adaptation is increased resilience;
- Adaptive capacity can be transformative.

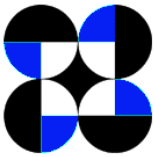




OUTLINE

- Climate and urban core updates
- Hazards, risks and impacts
- Solutions and adaptations
- Continuing saga





Continuing saga...

- Disaster risk reduction and management is about **NOW**. It is an **economic issue**;
- Climate change adaptation is about **TOMORROW**. It is a **socio-political issue**;
- A community may be **resilient**; It does not follow that the individual is not **vulnerable**!





We will not
only survive,
we will adapt...
THANK YOU!