Lecture 18: Monday, March 31, 2008

HW#4 is due in class WEDNESDAY.
We will spend some time in class today discussing the homework questions.

For today:
- Finish discussion of sea level rise
- Impacts of climate change on agriculture,fresh water resources, natural ecosystems, human health

March 28, 2008

EDITORIAL

Broken Ice in Antarctica

Winter is coming to Antarctica, and that may be the only thing that keeps another of its major ice shelves from collapsing. On Tuesday, scientists from the British Antarctic Survey announced that there had been an enormous fracture on the edge of the Wilkins ice shelf, which started breaking last month.

That province of ice, a body of permanent floating ice about the size of Connecticut, lies on the western edge of the Antarctic Peninsula, the part of the continent regarded as most vulnerable to climate change. Scientists flew over the break — itself covering some 160 square miles — and what they saw is remarkable: huge, geometrically fractured slabs of ice and, among them, the rubble of a catastrophic breach. A great swath of the ice shelf is being held in place by a thin band of ice.

February 17, 2006

Glaciers Flow to Sea at a Faster Pace, Study Says

By ANDREW C. REVKIN

The amount of ice flowing into the sea from large glaciers in southern Greenland has almost doubled in the last 10 years, possibly requiring scientists to increase estimates of how much the world's oceans could rise under the influence of global warming, according to a study being published today in the journal Science.

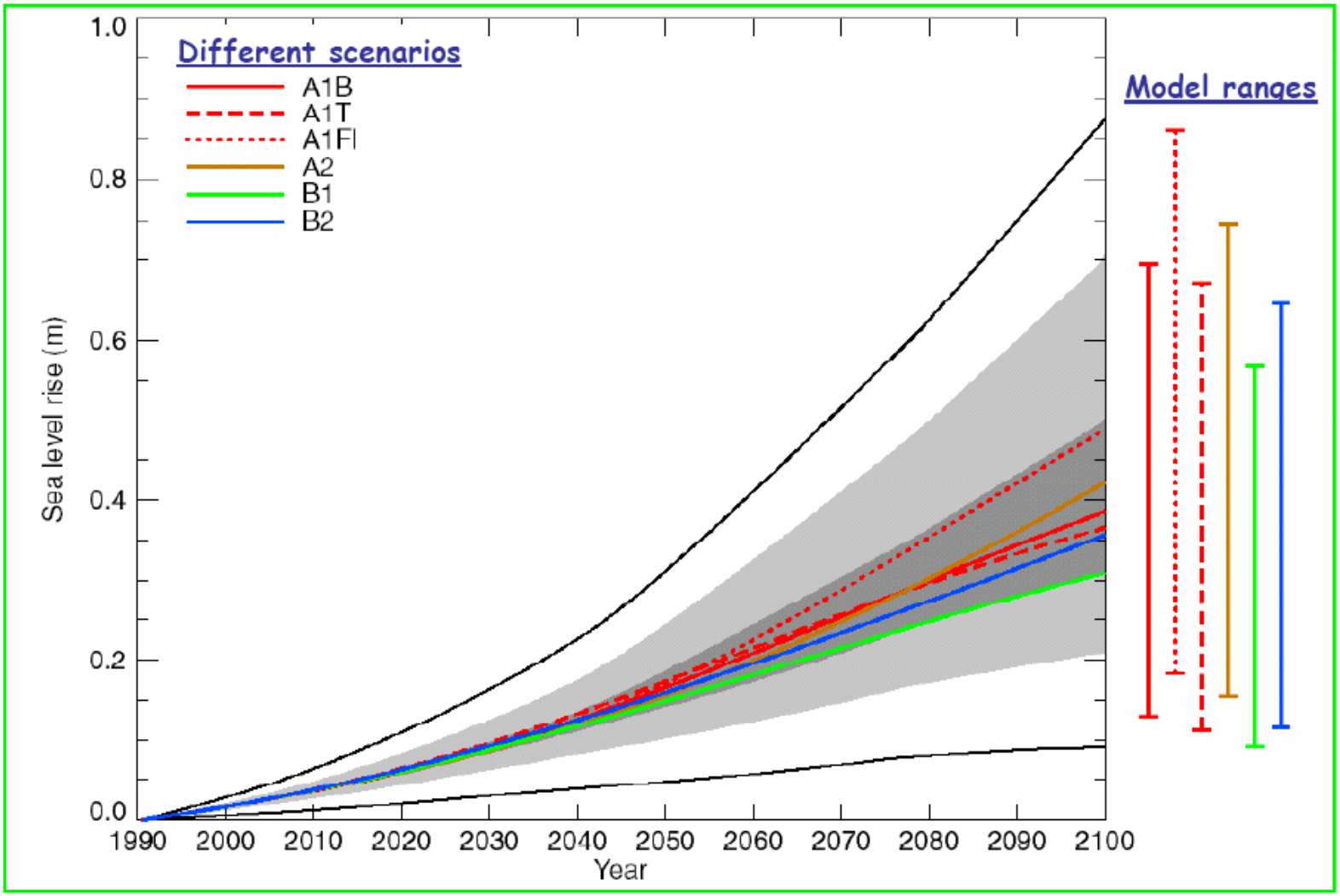
March 3, 2006

Loss of Antarctic Ice Increases

By ANDREW C. REVKIN

Two new satellite surveys show that warming air and water are causing Antarctica to lose ice faster than it can be replenished by interior snowfall, and thus are contributing to rising global sea levels.

Future Sea Level Projections



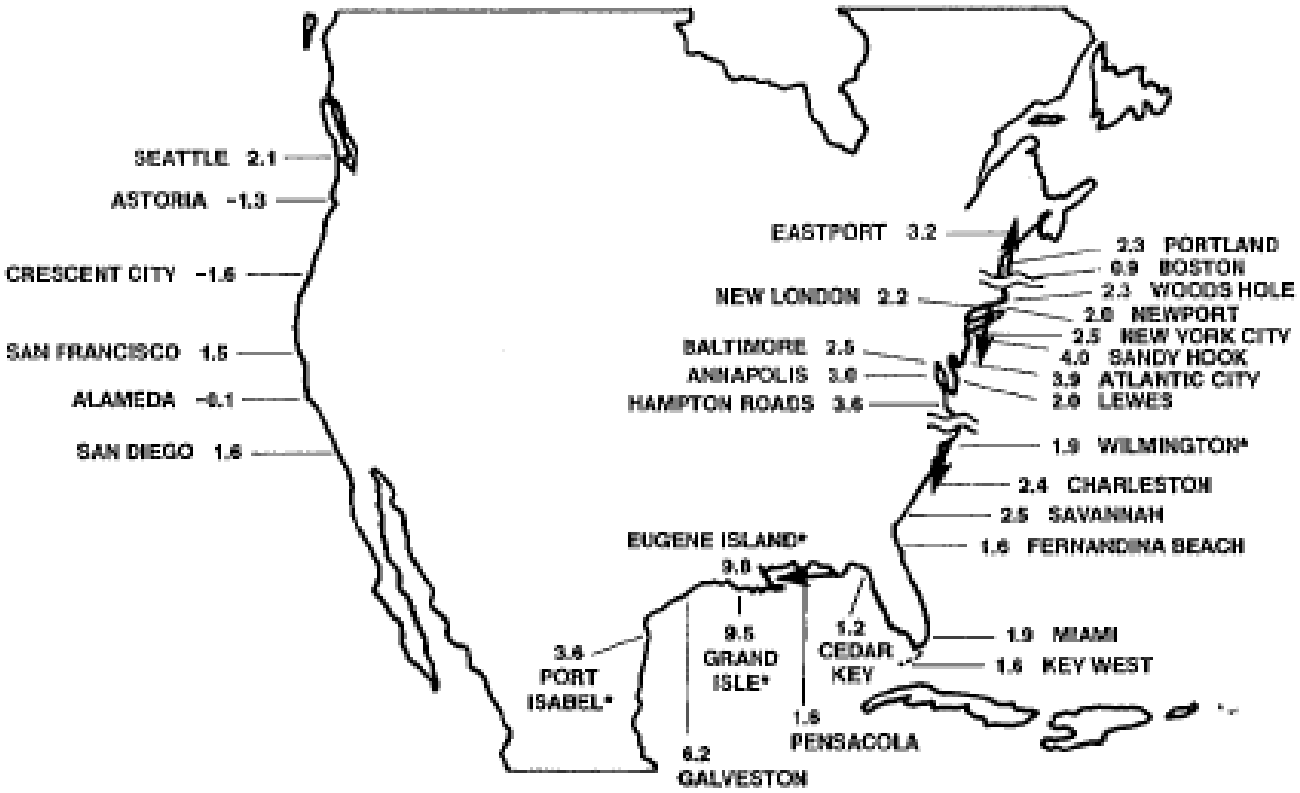


FIGURE 1-1 A summary of the present best estimates of local relative sea level changes along the U.S. continental coastline in mm/yr. The figures are based on the tide gauge records over different intervals of time during the period 1940–1980. Much regional variability is evident. Source: Adapted from Stevenson et al. (1986).

The New York Times
nytimes.com

March 28, 2007

Cities at Risk of Rising Sea Levels

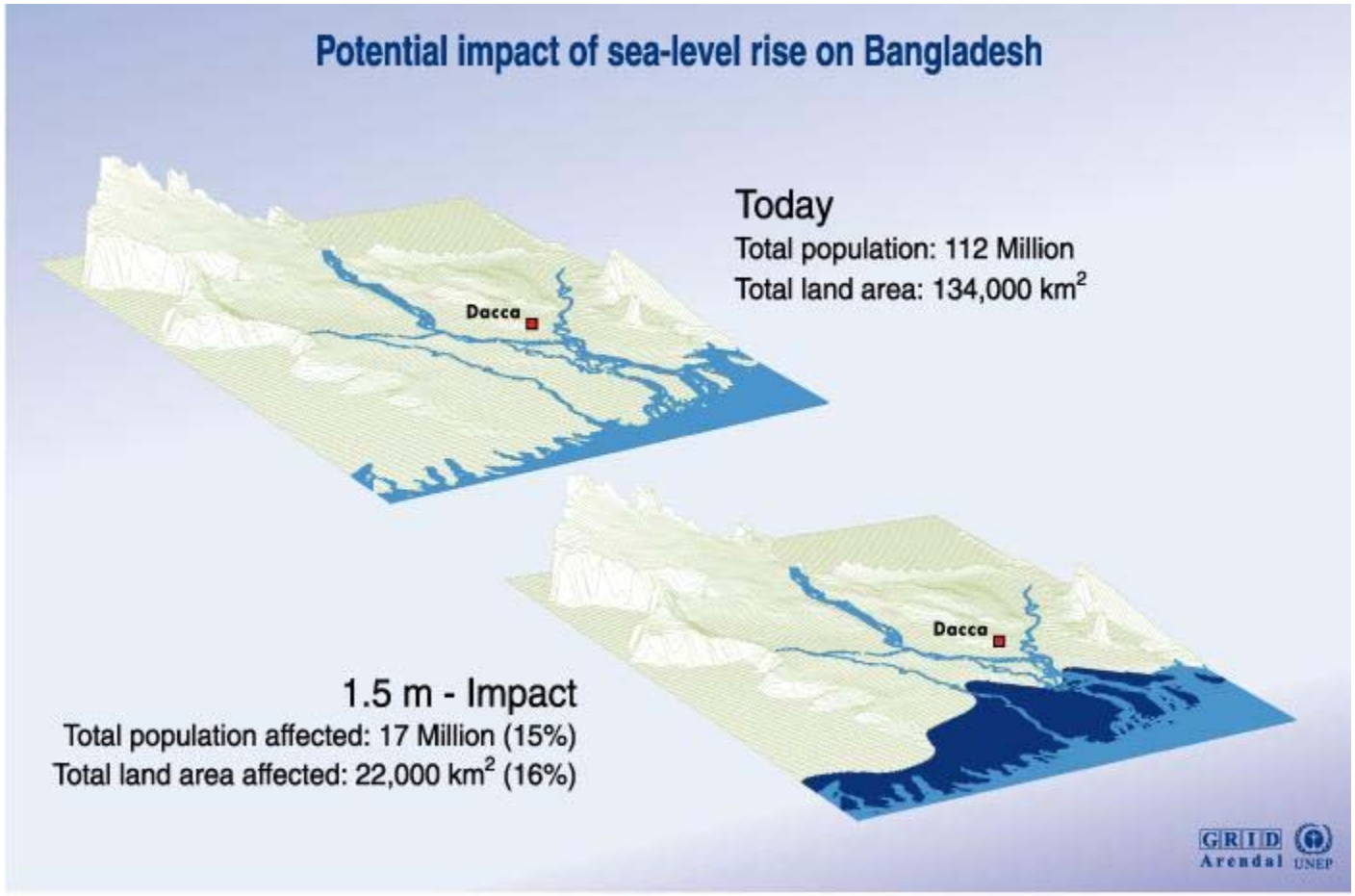
By THE ASSOCIATED PRESS

Filed at 12:19 a.m. ET

LONDON (AP) -- More than two-thirds of the world's large cities are in areas vulnerable to global warming and rising sea levels, and millions of people are at risk of being swamped by flooding and intense storms, according to a new study released Wednesday.

In all, 634 million people live in the threatened coastal areas worldwide -- defined as those lying at less than 33 feet above sea level -- and the number is growing, said the study published in the journal Environment and Urbanization.

More than 180 countries have populations in low-elevation coastal zones, and about 70 percent of those have urban areas of more than 5 million people that are under threat. Among them: Tokyo; New York; Mumbai, India; Shanghai, China; Jakarta, Indonesia; and Dhaka, Bangladesh.



Source : UNEP/GRID Geneva; University of Dacca; JRO Munich; The World Bank; World Resources Institute, Washington D.C.

Flood barriers on the Thames river
From NYTimes Sept 6, 2005

NEWS

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

NATIONAL ACADEMY OF SCIENCES • NATIONAL ACADEMY OF ENGINEERING • INSTITUTE OF MEDICINE • NATIONAL RESEARCH COUNCIL

Date: March. 11, 2008

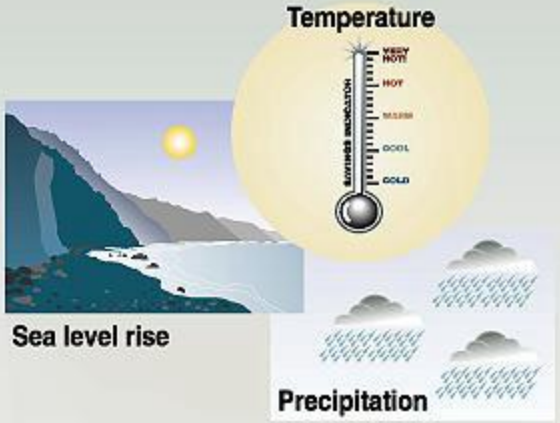
CLIMATE CHANGE WILL HAVE A SIGNIFICANT IMPACT ON TRANSPORTATION INFRASTRUCTURE AND OPERATIONS; RESEARCH, TOOLS, ACTION NEEDED TO PINPOINT VULNERABILITIES

WASHINGTON -- While every mode of transportation in the U.S. will be affected as the climate changes, potentially the greatest impact on transportation systems will be flooding of roads, railways, transit systems, and airport runways in coastal areas because of rising sea levels and surges brought on by more intense storms, says a new report from the National Research Council. Though the impacts of climate change will vary by region, it is certain they will be widespread and costly in human and economic terms, and will require significant changes in the planning, design, construction, operation, and maintenance of transportation systems.

The U.S. transportation system was designed and built for local weather and climate conditions, predicated on historical temperature and precipitation data. The report finds that climate predictions used by transportation planners and engineers may no longer be reliable, however, in the face of new weather and climate extremes. Infrastructure pushed beyond the range for which it was designed can become stressed and fail, as seen with loss of the U.S. 90 Bridge in New Orleans after Hurricane Katrina.

http://www.nationalacademies.org/morenews/20080311.html

Potential climate changes impact



Impacts on...

Health

Weather-related mortality
Infectious diseases
Air-quality respiratory illnesses

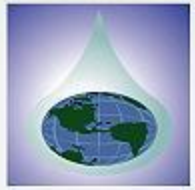
Agriculture

Crop yields
Irrigation demands

Forest

Forest composition
Geographic range of forest
Forest health and productivity

Water resources



Water supply
Water quality
Competition for water

coastal areas

Erosion of beaches
Inundation of coastal lands
additional costs to protect coastal communities

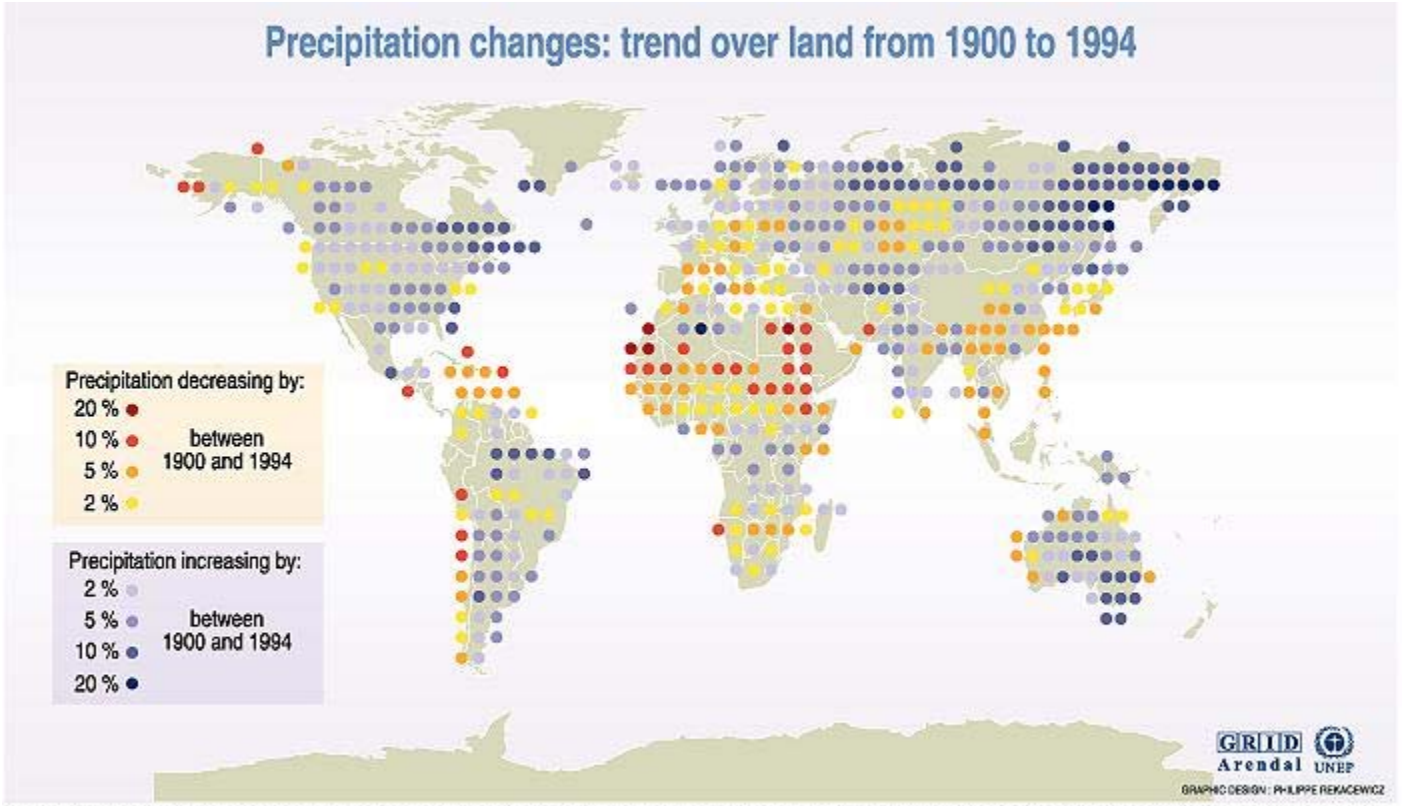
Species and natural areas

Loss of habitat and species
Cryosphere: diminishing glaciers

GRID Arendal UNEP

GRAPHIC DESIGN : PHILIPPE REKACEWICZ

Source: United States environmental protection agency (EPA).



Sources: Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996; Hulme et al., 1991 and 1994; Global Historical Climate Network (GHCN), Vose et al., 1995 and Eischeid et al., 1995)

Floods and droughts – need to take into account
effects of ocean cycles (e.g. El Nino/La Nina), changes in land use

March 18, 2008

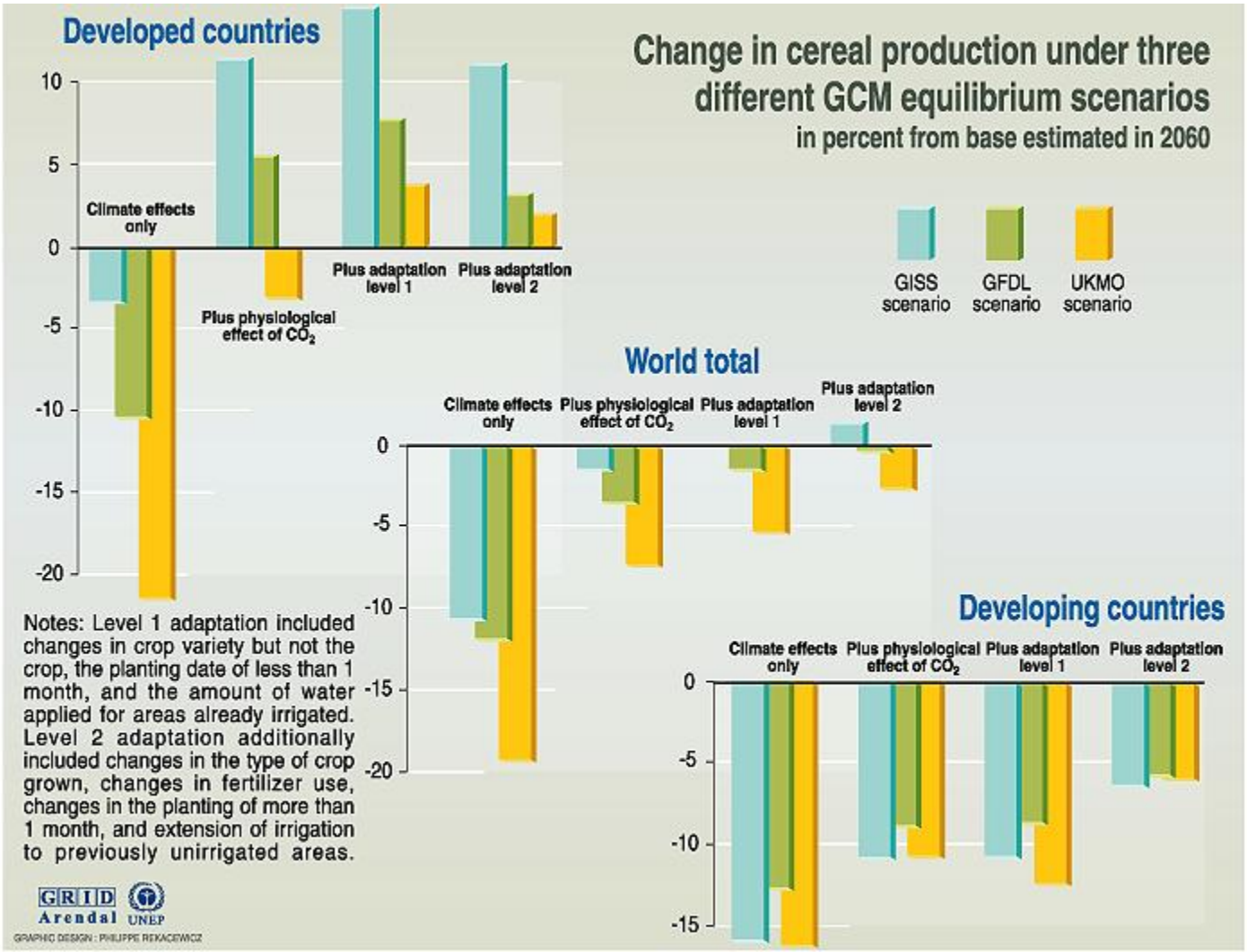
Investors Warm to Water as Shortages Mount

By REUTERS

Filed at 9:13 p.m. ET

LONDON (Reuters) - As liquidity is drained from credit and money markets and pours into oil and gold, another asset class that could offer long-term returns to the discerning investor is water.

Water shortages are on the rise -- stemming from soaring demand, growing populations, rising living standards and changing diets. A lack of supply is compounded by pollution and climate change.



Source: Climate change 1995, Impacts, adaptations and mitigation of climate change: scientific-technical analyses, contribution of working group 2 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996.

December 18, 2007

World Food Supply Is Shrinking, U.N. Agency Warns

By ELISABETH ROSENTHAL

ROME — In an "unforeseen and unprecedented" shift, the world food supply is dwindling rapidly and food prices are soaring to historic levels, the United Nations' top food and agriculture official warned Monday.

FOREIGN DESK

Frog Killer Is Linked to Global Warming

By ANDREW C. REVKIN (NYT) 716 words
Published: January 12, 2006

Scientists studying a fast-dwindling genus of colorful harlequin frogs on misty mountainsides in Central and South America are reporting today that global warming is combining with a spreading fungus to kill off many species.

The researchers implicate global warming, as opposed to local variations in temperature or other conditions. Their conclusion is based on their finding that patterns of fungus outbreaks and extinctions in widely dispersed patches of habitat were synchronized in a way that could not be explained by chance.

December 23, 2007

As Earth Warms Up, Tropical Virus Moves to Italy

By ELISABETH ROSENTHAL

CASTIGLIONE DI CERVIA, Italy — Panic was spreading this August through this tidy village of 2,000 as one person after another fell ill with weeks of high fever, exhaustion and excruciating bone pain, just as most of Italy was enjoying Ferragosto, its most important summer holiday.

Aided by global warming and globalization, Castiglione di Cervia has the dubious distinction of playing host to the first outbreak in modern Europe of a disease that had previously been seen only in the tropics.

Disease	Vector	Population at risk (million)[1]	Number of people currently infected or new cases per year	Present distribution	Likelihood of altered distribution
Malaria	Mosquito	2,400[2]	300-500 million	Tropics and Subtropics	
Schistosomiasis	Water snail	600	200 million	Tropics and Subtropics	
Lymphatic Filariasis	Mosquito	1 094[3]	117 million	Tropics and Subtropics	
African Trypanosomiasis (Sleeping sickness)	Tsetse fly	55[4]	250 000 to 300 000 cases per year	Tropical Africa	
Dracunculiasis (Guinea worm)	Crustacean (Copepod)	100[5]	100 000 per year	South Asia, Arabian Peninsula, Central-West Africa	
Leishmaniasis	Phlebotomine sand fly	350	12 million infected, 500 000 new cases per year[6]	Asia, Southern Europe Africa, Americas	
Onchocerciasis (River blindness)	Black fly	123	17.5 million	Africa, Latin America	
American Trypanosomiasis (Chagas disease)	Triatomine bug	100[7]	18 million	Central and South America	
Dengue	Mosquito	1,800	10-30 million per year	All Tropical countries	
Yellow Fever	Mosquito	450	more than 5 000 cases per year	Tropical South America Africa	

1. Top three entries are population-prorated projections, based on 1989 estimates.
2. WHO, 1994.
3. Michael and Bundy, 1995.
4. WHO, 1994.
5. Ranque, personal communication.
6. Annual incidence of visceral leishmaniasis; annual incidence of cutaneous leishmaniasis is 1-1.5 million cases/yr (PAHO, 1994).
7. WHO, 1995.

Highly likely Very likely Likely Unknown

GRID Arendal UNEP

GRAPHIC DESIGN : PHILIPPE REKACEWICZ

Source: Climate change 1995, Impacts, adaptations and mitigation of climate change: scientific-technical analyses, contribution of working group 2 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996.