

Poor people already live on the front lines of poverty, environmental degradation and natural disaster. Their livelihoods and food security depend directly on agriculture, forestry and fisheries. Their economies will suffer most from the heightened frequency of extreme droughts, floods and storms associated with climate change. There is a real risk that climate change could undermine efforts to achieve the Millennium Development Goals. We must not let that happen. Nor, on the other hand, should we pursue the goals in a way that exacerbates climate change.

- Kofi Annan, Secretary General of the United Nations

(Source: The Climate Group, British Council project NorthSouthEastWest)

At the crossroads of poverty reduction and climate change

new challenges, new opportunities for CARE

Dr. Charles Ehrhart
CARE International
Poverty-Climate Change Coordinator



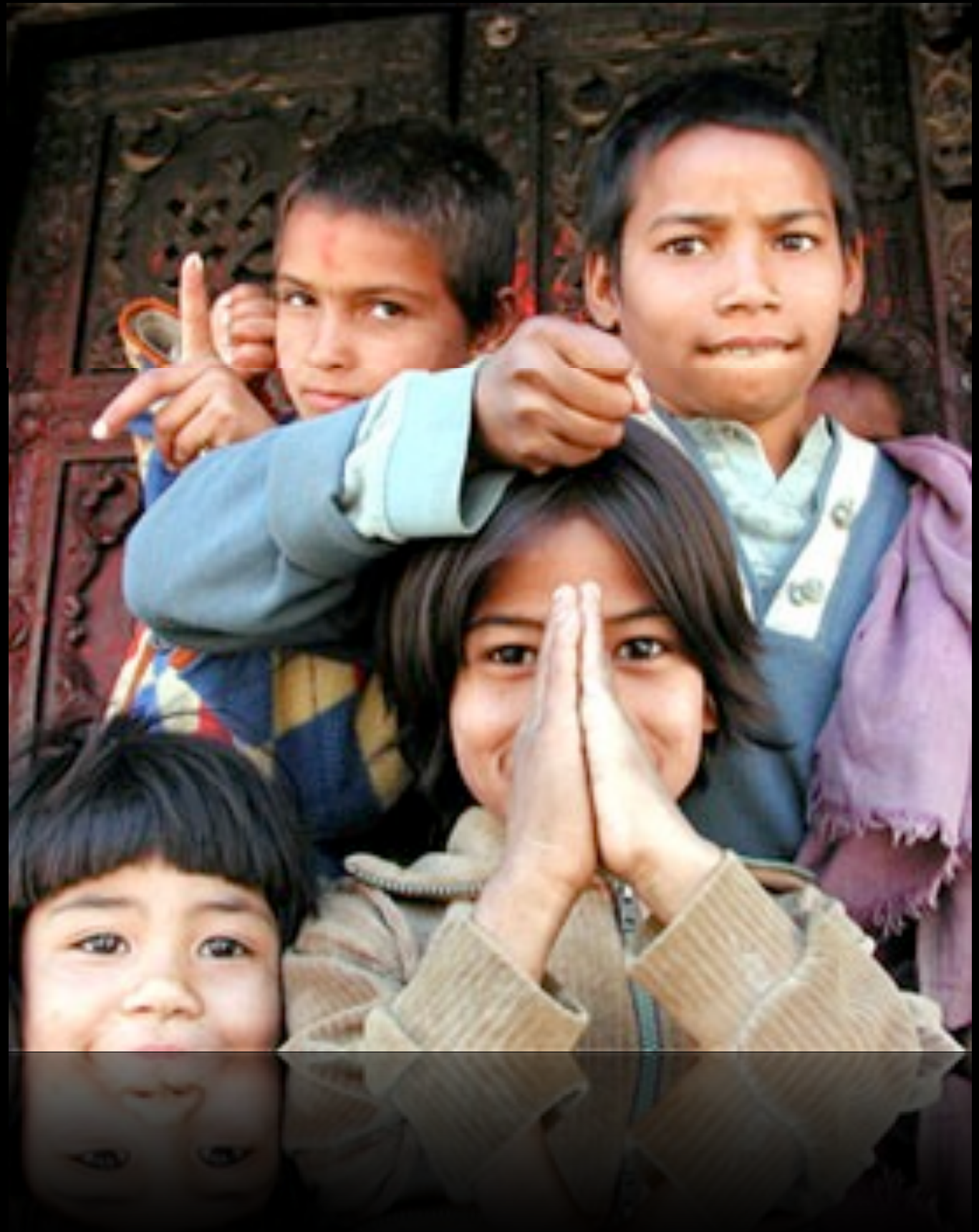
2006

Thursday, August 6, 2009

2

This presentation looks at why organizations like CARE are increasingly concerned about climate change and how development-oriented NGOs can adapt their programming in response. "Climate" typically refers to weather conditions averaged across 30 years (a period recommended by the World Meteorological Organization). Dissimilarities are always found when two 30-year periods are compared. Therefore, the intended meaning of "climate change" can be confusing. The United Nations Framework Convention on Climate Change (UNFCCC) addresses this problem by defining climate change only as that which is induced by human activities (e.g. industrial processes, fossil fuel combustion and land use changes such as deforestation)

People in the
poor, vulnerable
communities
where we work
tell us their
climate is
changing



Thursday, August 6, 2009

3

People in the poor communities with which CARE works speak with increasing fervor and fear about their changing climate and its implications.

CARE staff report changing climatic conditions affecting:

- 📌 Food security
- 📌 The availability of water
- 📌 Health
- 📌 The productivity & essential viability of natural resource-based livelihoods
- 📌 The range of poor people's livelihood opportunities and
- 📌 The frequency & intensity of natural resource conflicts.

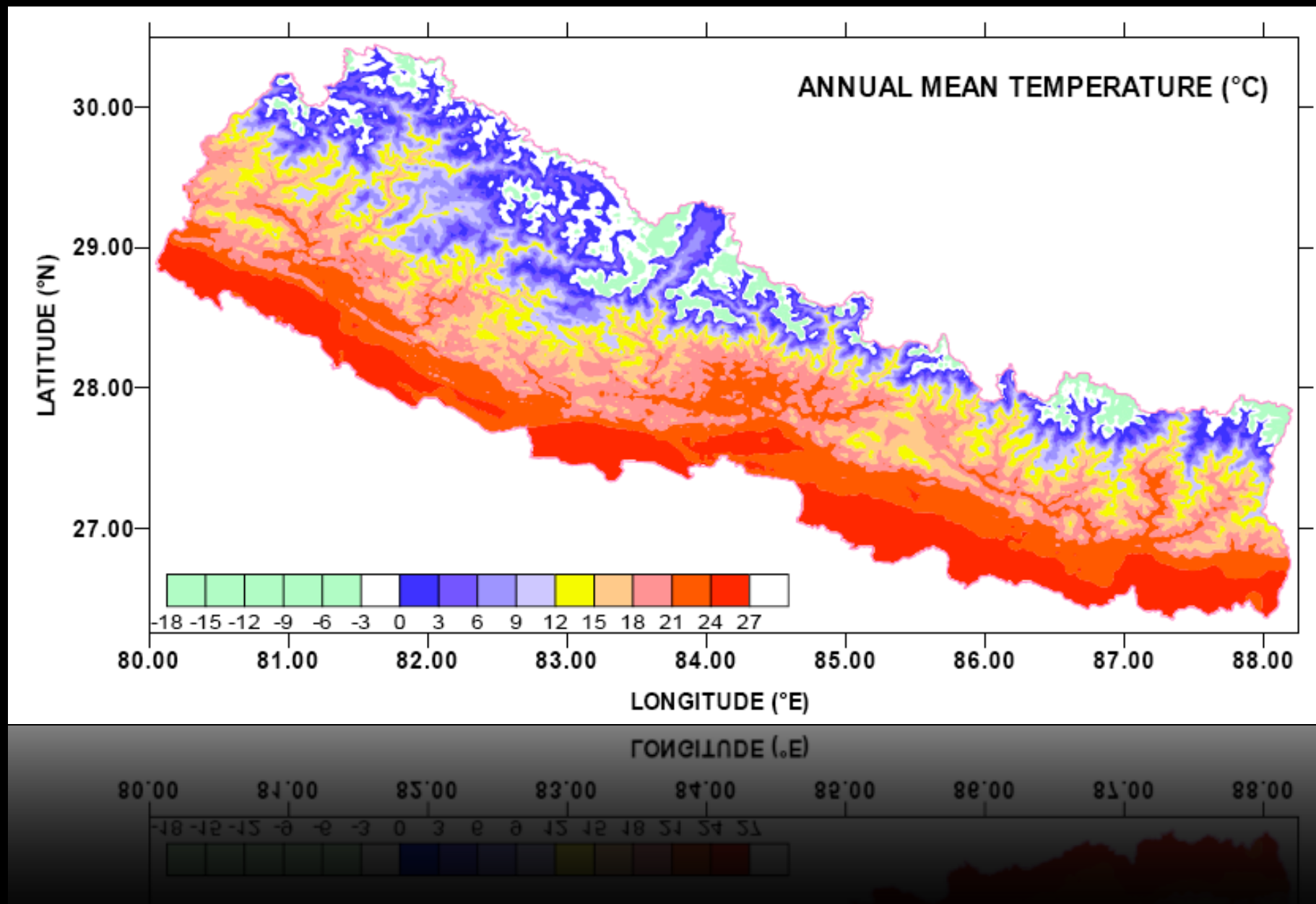


Climate change projections for Nepal



Nat'l avg. temperatures

- From 1981-1998, national average temperatures rose 0.06°C per year/0.41°C per decade (at <580ppm CO₂)
- Temperatures have already risen faster in Nepal than the global average, and this trend is likely to continue

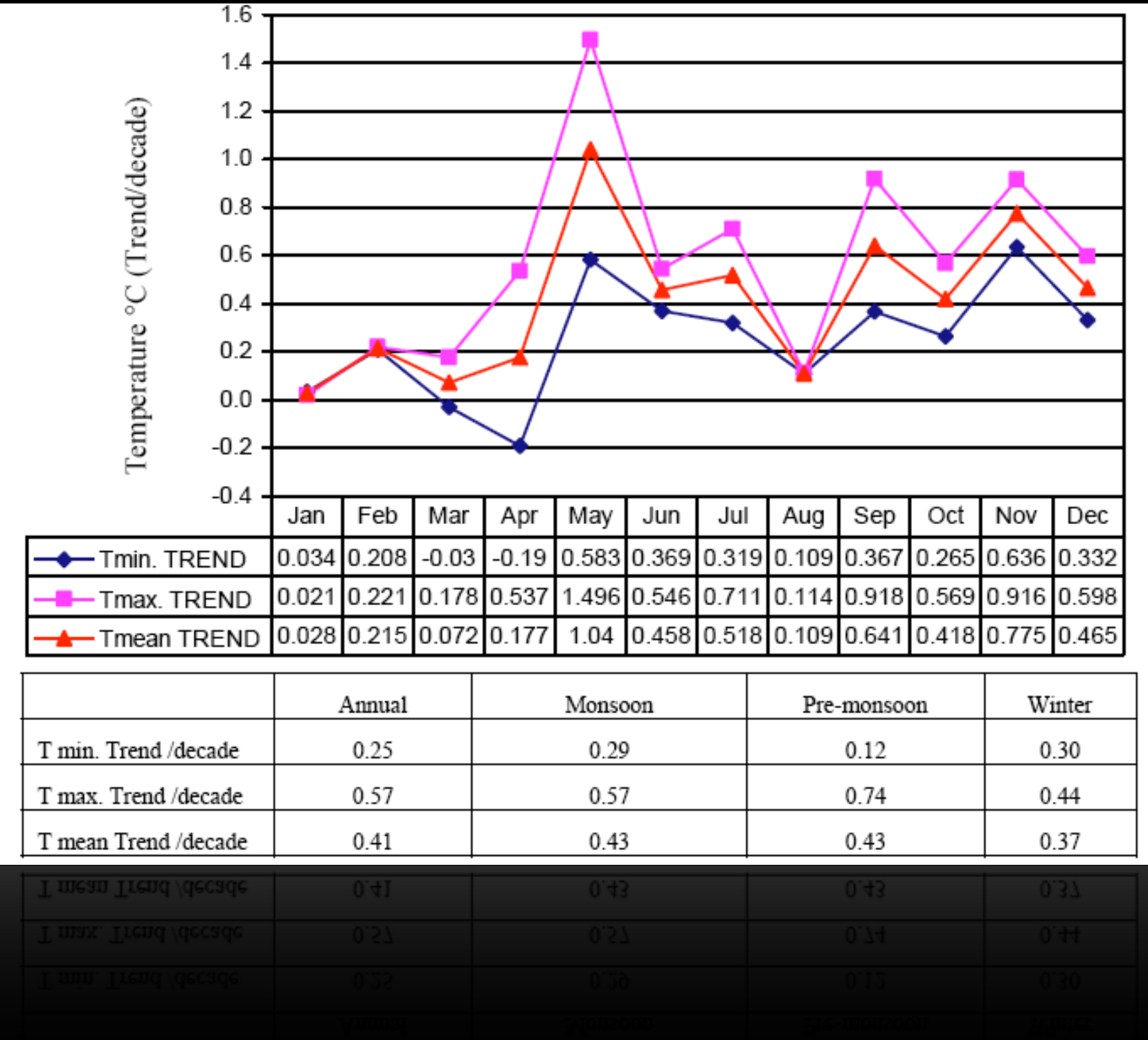


Worldwide average surface temperatures have increased by an estimated 0.8°C (1.4°F) between 1900 and 2005. The past decade was the hottest of the past 150 years and perhaps the last millennium. The hottest 22 years on record have occurred since 1980, and 2005 was the hottest of all. The nearly universal consensus amongst scientists is that this warming trend has been triggered by the emission of carbon dioxide and other greenhouse gases by human activities (e.g. industrial processes, fossil fuel combustion and land use changes such as deforestation). Moderate projections of future warming suggest a global increase of 1.4°C (2.5°F) to 5.8°C (10.4°F) by 2100.

Reliable and relatively comprehensive climate records exist for Central America. They indicate that the region follows the global trend of recently rising temperatures. Whilst the global average surface temperature had only risen by 0.6° C (±0.2° C) during the 20th century, temperatures in Meso-America had risen by more than 1.0° C. In the case of El Salvador, temperature rose a staggering 1.2° C between 1961-1990 at an average rate of 0.04°C *per annum*

Seasonal variability

- 📍 **May** temperatures rose 1.04°C
- 📍 **January** temperatures rose 0.028°C

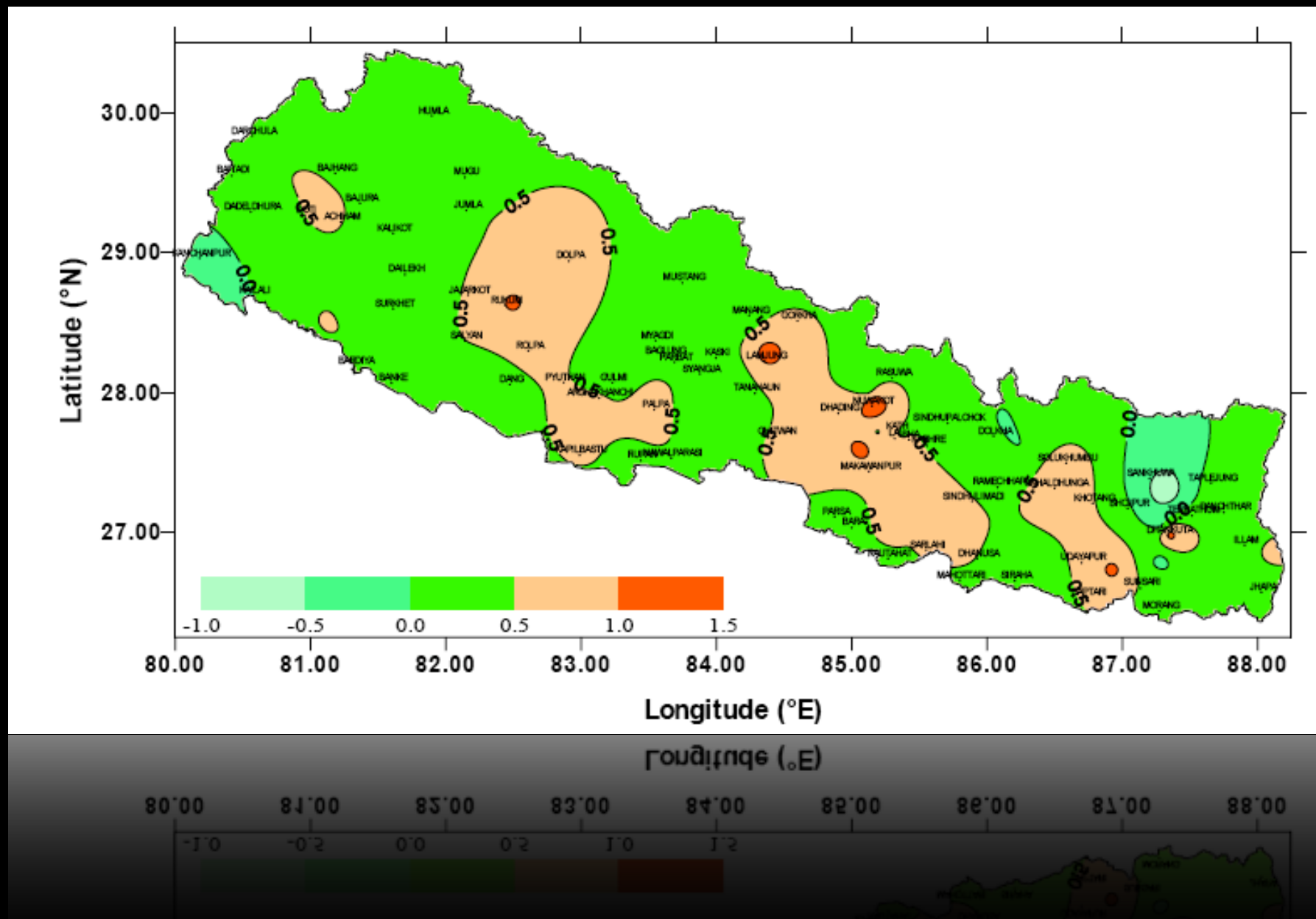


Worldwide average surface temperatures have increased by an estimated 0.8°C (1.4°F) between 1900 and 2005. The past decade was the hottest of the past 150 years and perhaps the last millennium. The hottest 22 years on record have occurred since 1980, and 2005 was the hottest of all. The nearly universal consensus amongst scientists is that this warming trend has been triggered by the emission of carbon dioxide and other greenhouse gasses by human activities (e.g. industrial processes, fossil fuel combustion and land use changes such as deforestation). Moderate projections of future warming suggest a global increase of 1.4°C (2.5°F) to 5.8°C (10.4°F) by 2100.

Reliable and relatively comprehensive climate records exist for Central America. They indicate that the region follows the global trend of recently rising temperatures. Whilst the global average surface temperature had only risen by 0.6° C (±0.2° C) during the 20th century, temperatures in Meso-America had risen by more than 1.0° C. In the case of El Salvador, temperature rose a staggering 1.2° C between 1961-1990 at an average rate of 0.04°C *per annum*

Spatial variability

- Far western Terai and parts of the eastern region have actually become cooler in the last 20 years...
- ...But most of the country has become significantly warmer
- Temperatures have risen fastest at higher altitudes



Range of temperature change projections for 2050...

Model	Pre-monsoon	Monsoon	Post-monsoon	Winter	Annual
CCCM	+2.0 to +4.0	+1.4 to +4.4	+3.7 to +4.7	+2.4to +5.4	+2.3 to +4.3
GFD3	+2.8 to +3.5	+1.8 to +3.3	+2.7 to +3.7	+3.2 to +3.8	+2.9 to +3.3
RCM	+ 1.0 to +15	+0.5 to +13.3	+1.0 to +12.5	+2.0 to +10.5	+1.0 to +12.4
RCM	+ 1.0 to +12	+0.2 to +13.3	+1.0 to +13.2	+3.0 to +10.2	+1.0 to +13.4

... presuming 2xCO₂

+4.3°C



Thursday, August 6, 2009

Worldwide average surface temperatures have increased by an estimated 0.8°C (1.4°F) between 1900 and 2005. The past decade was the hottest of the past 150 years and perhaps the last millennium. The hottest 22 years on record have occurred since 1980, and 2005 was the hottest of all. The nearly universal consensus amongst scientists is that this warming trend has been triggered by the emission of carbon dioxide and other greenhouse gasses by human activities (e.g. industrial processes, fossil fuel combustion and land use changes such as deforestation). Moderate projections of future warming suggest a global increase of 1.4°C (2.5°F) to 5.8°C (10.4°F) by 2100.

Reliable and relatively comprehensive climate records exist for Central America. They indicate that the region follows the global trend of recently rising temperatures. Whilst the global average surface temperature had only risen by 0.6° C (±0.2° C) during the 20th century, temperatures in Meso-America had risen by more than 1.0° C. In the case of El Salvador, temperature rose a staggering 1.2° C between 1961-1990 at an average rate of 0.04°C *per annum*

Projected seasonal and spatial variability



Seasonal: greatest temperature increase will be during the winter season and lowest during the monsoon season



Geographic: greater warming in northern areas



Altitudinal: greater warming at higher altitudes

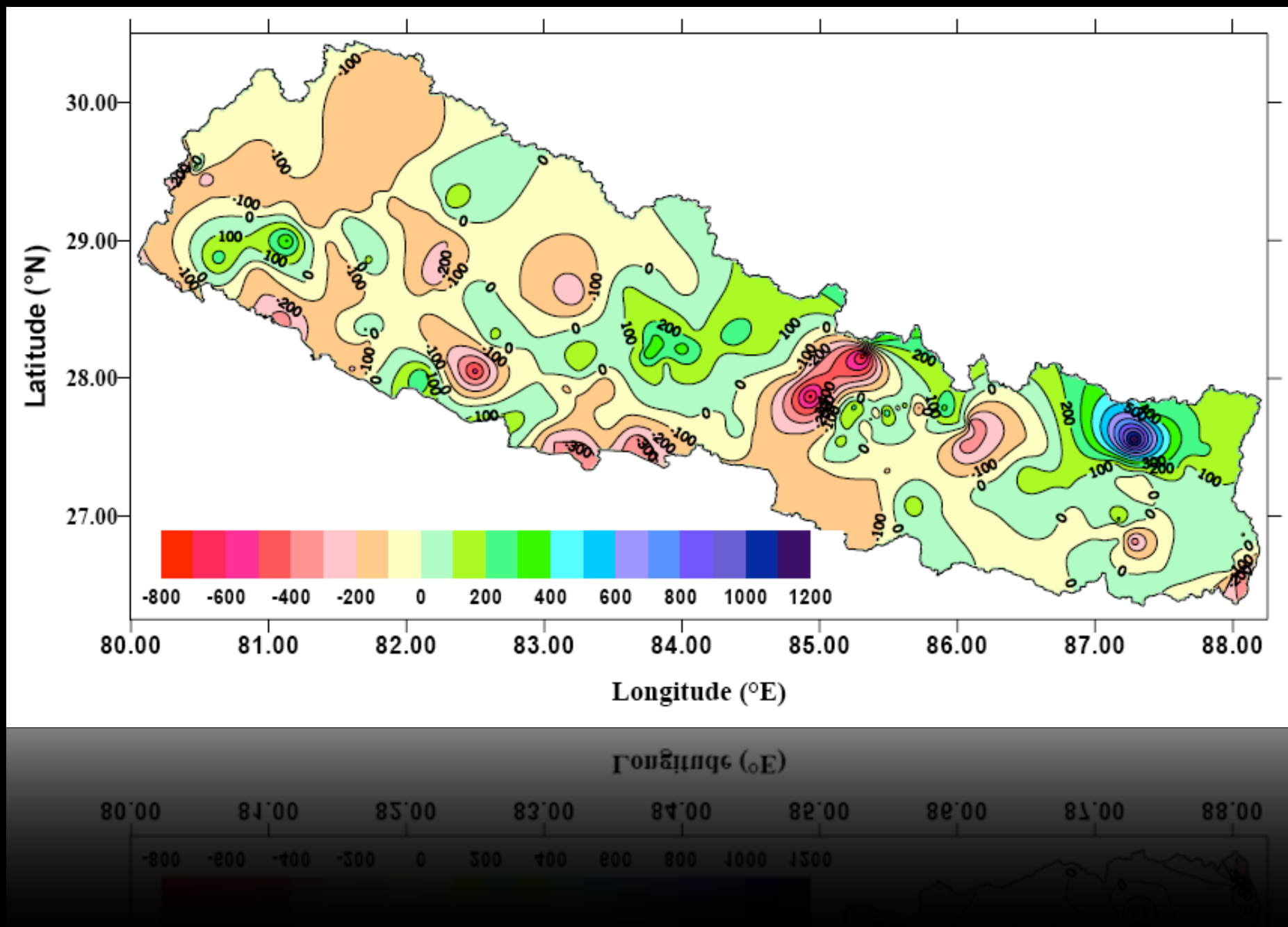
Worldwide average surface temperatures have increased by an estimated 0.8°C (1.4°F) between 1900 and 2005. The past decade was the hottest of the past 150 years and perhaps the last millennium. The hottest 22 years on record have occurred since 1980, and 2005 was the hottest of all. The nearly universal consensus amongst scientists is that this warming trend has been triggered by the emission of carbon dioxide and other greenhouse gases by human activities (e.g. industrial processes, fossil fuel combustion and land use changes such as deforestation). Moderate projections of future warming suggest a global increase of 1.4°C (2.5°F) to 5.8°C (10.4°F) by 2100.

Reliable and relatively comprehensive climate records exist for Central America. They indicate that the region follows the global trend of recently rising temperatures. Whilst the global average surface temperature had only risen by 0.6° C ($\pm 0.2^\circ$ C) during the 20th century, temperatures in Meso-America had risen by more than 1.0° C. In the case of El Salvador, temperature rose a staggering 1.2° C between 1961-1990 at an average rate of 0.04°C *per annum*

Nat'l. avg. rainfall



During the 1981-1998 baseline period, rainfall decreased at a national annual average rate of 9.8 mm per decade



Thursday, August 6, 2009

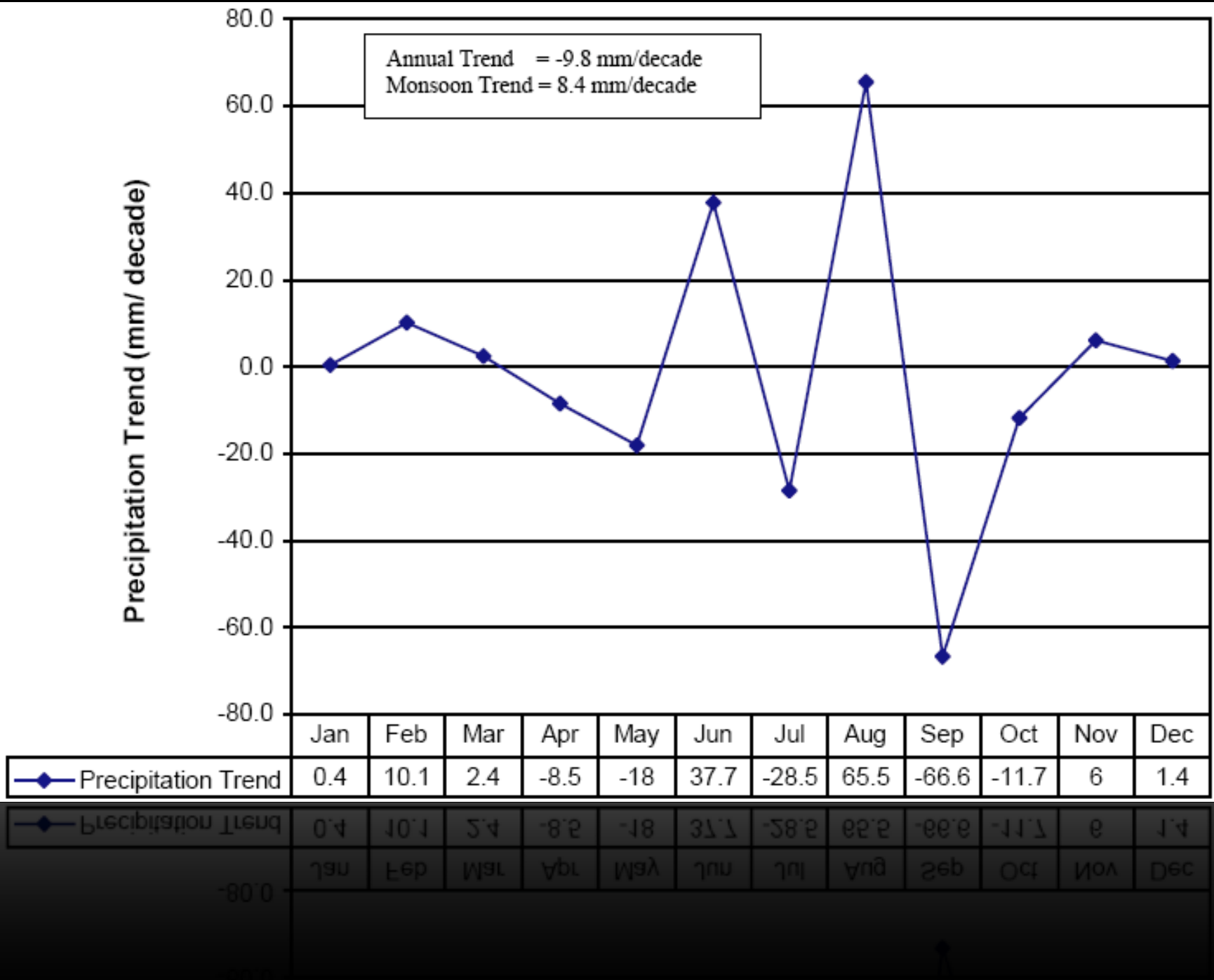
11

Though different climate change models have long projected reasonably consistent increases in temperature for Central America, they have tended to draw varied conclusions about precipitation. The plethora of models, scenarios and constant updates to each make it extremely difficult to get a straight answer to the question, 'how will climate change affect rainfall in Central America?' However, several messages come through loud and clear.

Seasonal variability

August rainfall has increased by 65.5%

September rainfall has decreased by 66.6%



Thursday, August 6, 2009

Worldwide average surface temperatures have increased by an estimated 0.8°C (1.4°F) between 1900 and 2005. The past decade was the hottest of the past 150 years and perhaps the last millennium. The hottest 22 years on record have occurred since 1980, and 2005 was the hottest of all. The nearly universal consensus amongst scientists is that this warming trend has been triggered by the emission of carbon dioxide and other greenhouse gasses by human activities (e.g. industrial processes, fossil fuel combustion and land use changes such as deforestation). Moderate projections of future warming suggest a global increase of 1.4°C (2.5°F) to 5.8°C (10.4°F) by 2100.

Reliable and relatively comprehensive climate records exist for Central America. They indicate that the region follows the global trend of recently rising temperatures. Whilst the global average surface temperature had only risen by 0.6° C (±0.2° C) during the 20th century, temperatures in Meso-America had risen by more than 1.0° C. In the case of El Salvador, temperature rose a staggering 1.2° C between 1961-1990 at an average rate of 0.04°C *per annum*

Spatial variability

- 📍 Declined in most of the Terai belt and western Nepal (with a maximum of 300 mm per decade in the central Terai belt)
- 📍 Declined by more than 700 mm per decade in parts of central Nepal
- 📍 Increased in the hills and mountains of west Nepal, as well as in the northern belt of eastern Nepal (with a maximum gain of 1100 mm per decade)



Worldwide average surface temperatures have increased by an estimated 0.8°C (1.4°F) between 1900 and 2005. The past decade was the hottest of the past 150 years and perhaps the last millennium. The hottest 22 years on record have occurred since 1980, and 2005 was the hottest of all. The nearly universal consensus amongst scientists is that this warming trend has been triggered by the emission of carbon dioxide and other greenhouse gases by human activities (e.g. industrial processes, fossil fuel combustion and land use changes such as deforestation). Moderate projections of future warming suggest a global increase of 1.4°C (2.5°F) to 5.8°C (10.4°F) by 2100.

Reliable and relatively comprehensive climate records exist for Central America. They indicate that the region follows the global trend of recently rising temperatures. Whilst the global average surface temperature had only risen by 0.6° C ($\pm 0.2^\circ$ C) during the 20th century, temperatures in Meso-America had risen by more than 1.0° C. In the case of El Salvador, temperature rose a staggering 1.2° C between 1961-1990 at an average rate of 0.04°C *per annum*

Range of precipitation change projections for 2050...

Model	Pre-monsoon	Monsoon	Post-monsoon	Winter	Annual
CCCM	-70 to +20	-100 to +1600	+25 to +72	-200 to -18	-400 to +1600
GFD3	0 to +60	+100 to +900	+2 to +14	+24 to +59	+150 to +1050
RCM	0 to +900	-1500 to +2000	-100 to 100	-25 to +200	-1000 to +3000
KCM	0 to +200	-1200 to +5000	-100 to 100	-52 to +500	-1000 to +3000
GFD3	0 to +20	+100 to +200	+5 to +14	+54 to +22	+120 to +1020

... presuming 2xCO₂



Worldwide average surface temperatures have increased by an estimated 0.8°C (1.4°F) between 1900 and 2005. The past decade was the hottest of the past 150 years and perhaps the last millennium. The hottest 22 years on record have occurred since 1980, and 2005 was the hottest of all. The nearly universal consensus amongst scientists is that this warming trend has been triggered by the emission of carbon dioxide and other greenhouse gasses by human activities (e.g. industrial processes, fossil fuel combustion and land use changes such as deforestation). Moderate projections of future warming suggest a global increase of 1.4°C (2.5°F) to 5.8°C (10.4°F) by 2100.

Reliable and relatively comprehensive climate records exist for Central America. They indicate that the region follows the global trend of recently rising temperatures. Whilst the global average surface temperature had only risen by 0.6° C (±0.2° C) during the 20th century, temperatures in Meso-America had risen by more than 1.0° C. In the case of El Salvador, temperature rose a staggering 1.2° C between 1961-1990 at an average rate of 0.04°C *per annum*

Extreme weather

- 📌 80% of precipitation in Nepal falls during the monsoon season
- 📌 This pattern of wet versus dry seasons will be exacerbated by climate change and most likely culminate in more extreme rains (both in terms of intensity and duration).
- 📌 Higher temperatures, increased rates of evapo-transpiration and decreased winter precipitation may bring about more droughts

These types of events may pose the greatest climate change threat to Nepal.



Other forms of extreme weather



Hot winds



Heat waves



Cold waves



Hailstones and
uncharacteristic
snowfalls

Of all the ways in which climate change will affect Central America, the greatest threat lies in the increasing frequency and severity of extreme weather events (e.g. hurricanes) and conditions (e.g. the El Niño phenomena). They already have the capacity to overwhelm local coping strategies and exhaust international aid. It is frightening to imagine a future in which they strike more often and more forcefully than today. It is certain that the *intensity* of hurricanes and tropical storms will increase as a result of climate change. This conclusion is based on the laws of physics: warmer water means there is more heat energy for hurricanes to transform into wind. Meanwhile, higher air temperatures mean more evaporation. This leads to heavier precipitation. The implications of climate change for the *frequency* of extreme weather events has been less clear. Atlantic hurricane activity has been increasing since 1995. Many scientists have argued that this may be due to the Atlantic Multi-decadal Oscillation (AMO), which is a 60-80 year natural cycle in sea surface temperatures (see Figure 11). However, in June 2006, the first compressive study of worldwide sea surface temperatures showed that climate change – and definitely *not* the AMO – is driving the upsurge in hurricane activity.

Snow and glacier melt

Global warming is causing most glaciers around the world to shrink.

It may quickly cause many small glaciers to disappear.

📌 1°C rise in temperature will yield a 20% reduction in glaciated area above 5000 metres

📌 2°C will cause losses of 40%

📌 3°C will cause losses of 58%

📌 4°C will cause losses of 70%



Consequences for poverty in Nepal

...with an emphasis on CO
priority programme areas



Thursday, August 6, 2009

18

As we learn from people in the communities with which we work, staff and scientists, it is becoming increasingly clear that climate change is an “underlying cause of poverty” in that it triggers or worsens a wide range of immediate and intermediate causes of poverty. Poor people are particularly vulnerable to climate change because poverty:

- Is often linked to a higher reliance on natural resources. This makes poor people more sensitive to changes affecting the environment *and* can lead to degradation of natural resources – thus creating a vicious circle of increasing vulnerability to climate change
- Constrains people’s adaptive options/capacity.

Health

Climate change is:

Expanding the range, frequency and severity of **diseases**.



Reducing the **nutritional value** of crops

Reducing the variety and availability of **medicinal plants**.

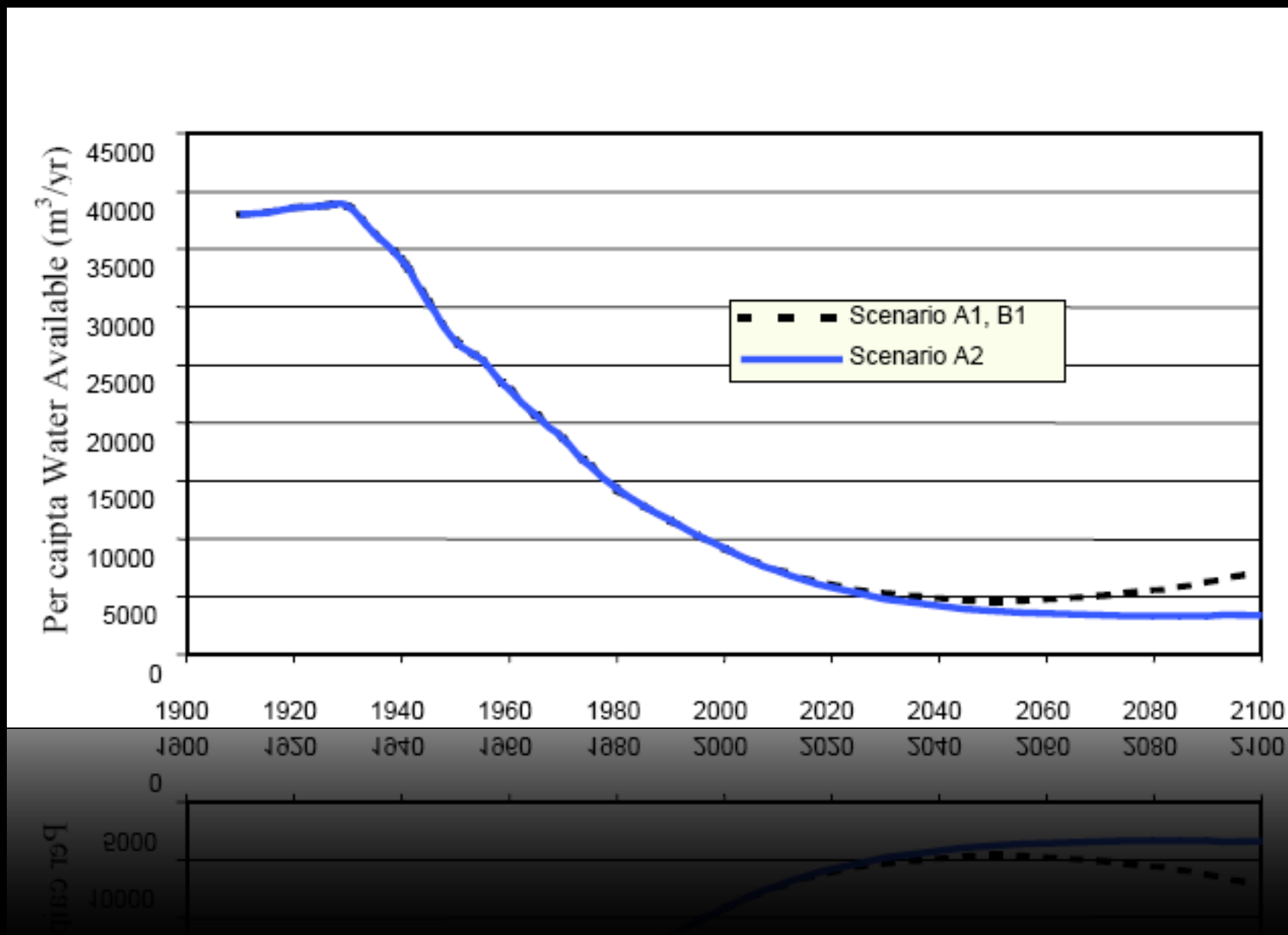


Along with the direct destruction of crops, disease robs people of physical capital and key productive assets (e.g. cattle).

Poor people are *especially* reliant on local biodiversity to fight disease. When climate change reduces the variety and availability of medicinal plants, poor people are either forced to buy it or go without a cure.

Water

- 📌 Dry season water flow is just 12% of monsoon season flow. This figure will continue dropping.
- 📌 Demand projected to increase 7 fold in the next 25 years



Thursday, August 6, 2009

20

Regardless of climate change, stress on water resources is set to increase throughout Central America because of rising demand from growing populations and expanding economic activity. This may be exacerbated by increasingly frequent and intense extreme weather (i.e. storms, floods and droughts), as well as a general decline in precipitation. The Intergovernmental Panel for Climate Change (1997) projects that about 70 per cent of the population in Mexico and Central America will live in areas with low water supply by 2025. Diminishing water supplies are likely to have further socio-economic repercussions. For example:

- Changes in water supply may lead to power shortages due to reduced rainfall in hydropower regions
- The cost of realising the UN Millennium Development Goals is likely to rise as poor access to water impacts negatively on health and livelihood productivity

“Water scarcity is ... eminent unless the water resources are properly managed as the high demand of water for consumptive use as well as for hydropower occurs in dry season” (Government of Nepal, Initial National Communication to the UNFCCC).

This has implications for both rural and urban production, as well as domestic burdens.



Regardless of climate change, stress on water resources is set to increase throughout Central America because of rising demand from growing populations and expanding economic activity. This may be exacerbated by increasingly frequent and intense extreme weather (i.e. storms, floods and droughts), as well as a general decline in precipitation. The Intergovernmental Panel for Climate Change (1997) projects that about 70 per cent of the population in Mexico and Central America will live in areas with low water supply by 2025. Diminishing water supplies are likely to have further socio-economic repercussions. For example:

- Changes in water supply may lead to power shortages due to reduced rainfall in hydropower regions
- The cost of realising the UN Millennium Development Goals is likely to rise as poor access to water impacts negatively on health and livelihood productivity

Food & economic security

Climate change threatens to reduce agricultural productivity and reduce livelihood opportunities by:

- 📌 Temporarily flooding arable land
- 📌 Degrading arable land and destroying other productive assets
- 📌 Increasing the frequency and intensity of plant, animal and human disease
- 📌 Increasing the rate of evapo-transpiration/useable soil moisture
- 📌 Decreasing the availability of water for irrigating winter crops
- 📌 Directly reducing the yields of cereal crops (10% per 1° C rise above optimal crop temperatures of 34-37° C)



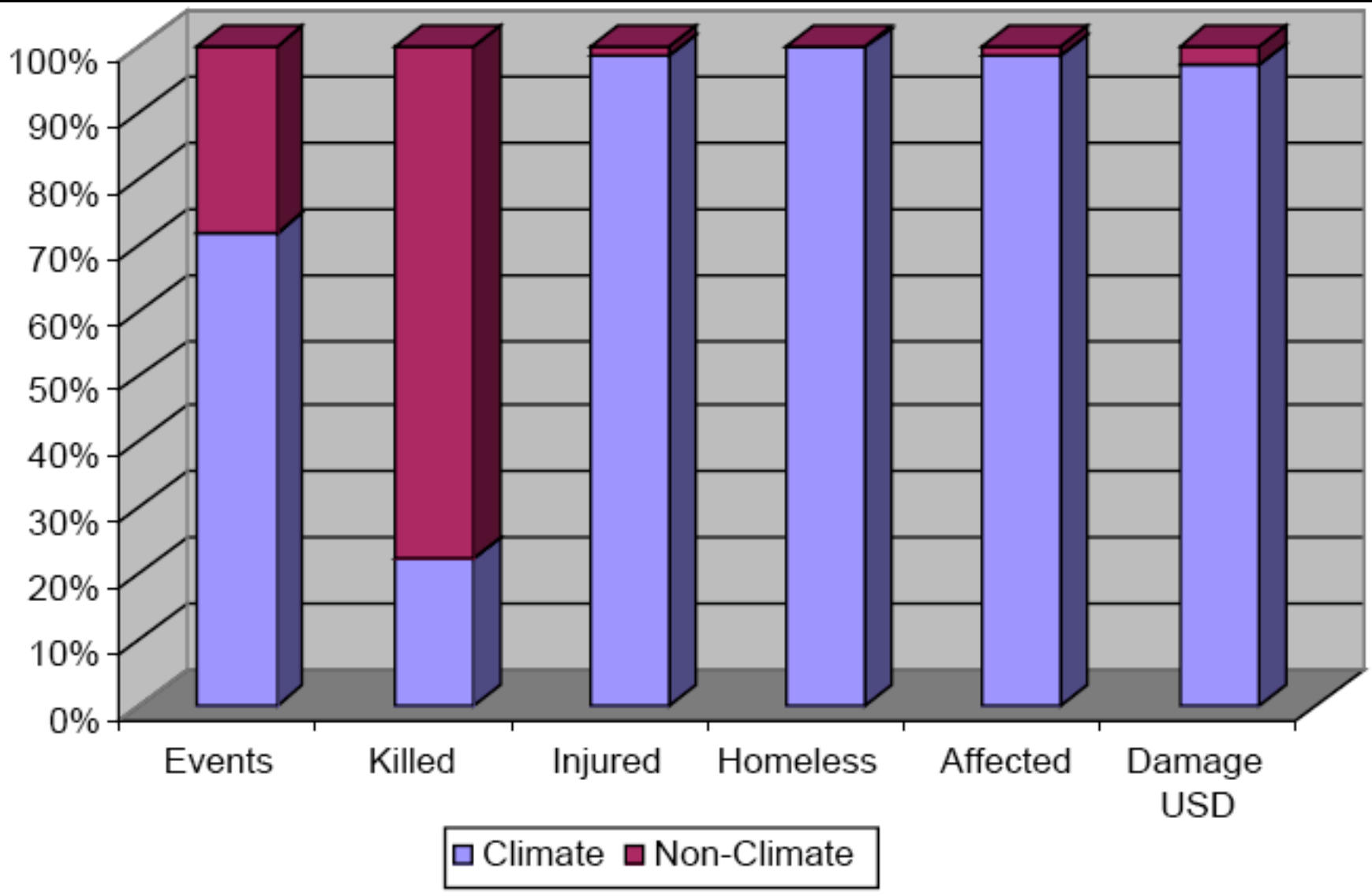
Thursday, August 6, 2009

22

Climate change will affect food security by reducing livelihood productivity and opportunities. Erratic weather will undermine rain-fed agricultural systems; heat stress on crops will reduce yields; increases in carbon dioxide concentrations will decrease the protein content of vegetation (with implications for both human and livestock health and productivity); rising rates of evapo-transpiration will increase pressure on water supplies (especially in areas where river runoff is reduced and shallow wells become unreliable); rates of disease will rise for humans, plants and livestock; salt water incursions will contaminate water supplies and damage ecosystems; sea-level rise will claim land in low-lying, populated coastal areas; environmental services will decline (e.g. water and biodiversity); and higher ocean temperatures, salinity and acidity will devastate marine organisms and fisheries.

A study covering the Central American region as a whole has predicted that, despite probable improvements in technology and the mixed-benefits of 'CO₂ fertilization,' these two dynamics may substantially reduce the production of basic grains. But the greatest cause for concern is how incremental changes in temperature and rainfall will combine with the affects of extreme weather events and conditions. Imagine, for instance, these declines in basic grains added to the impact of a hurricane. Mitch demonstrated the power of such storms to decimate food supplies – especially that of the poorest households. Indeed, in Honduras, this single event destroyed 58 percent of the total maize harvest. This included 40 per cent of crops belonging to families in the very poorest socio-economic quintile and 25-30 per cent of crops belonging to families in higher quintiles. Furthermore, Mitch robbed many small farmers of their crop stores through flooding and landslides. Or, imagine incremental declines in the production of basic grains combined with more frequent and powerful ENSOs.

Natural disasters in LDCs, 1900-2002



Climate Non-Climate

Climate Non-Climate

USD

Events

Killed

Injured

Homeless

Affected

Damage

0%

10%

20%

30%

40%

50%

60%

70%

80%

90%

100%

Humanitarian disasters

Increasingly frequent and intense storms, droughts and floods threaten to:

- 📌 Degrade the natural resource base people depend upon for their livelihoods
- 📌 Destroy economic and food security
- 📌 Destroy Nepal's water, health, transport and education infrastructure
- 📌 Increase health risks



Thursday, August 6, 2009

24

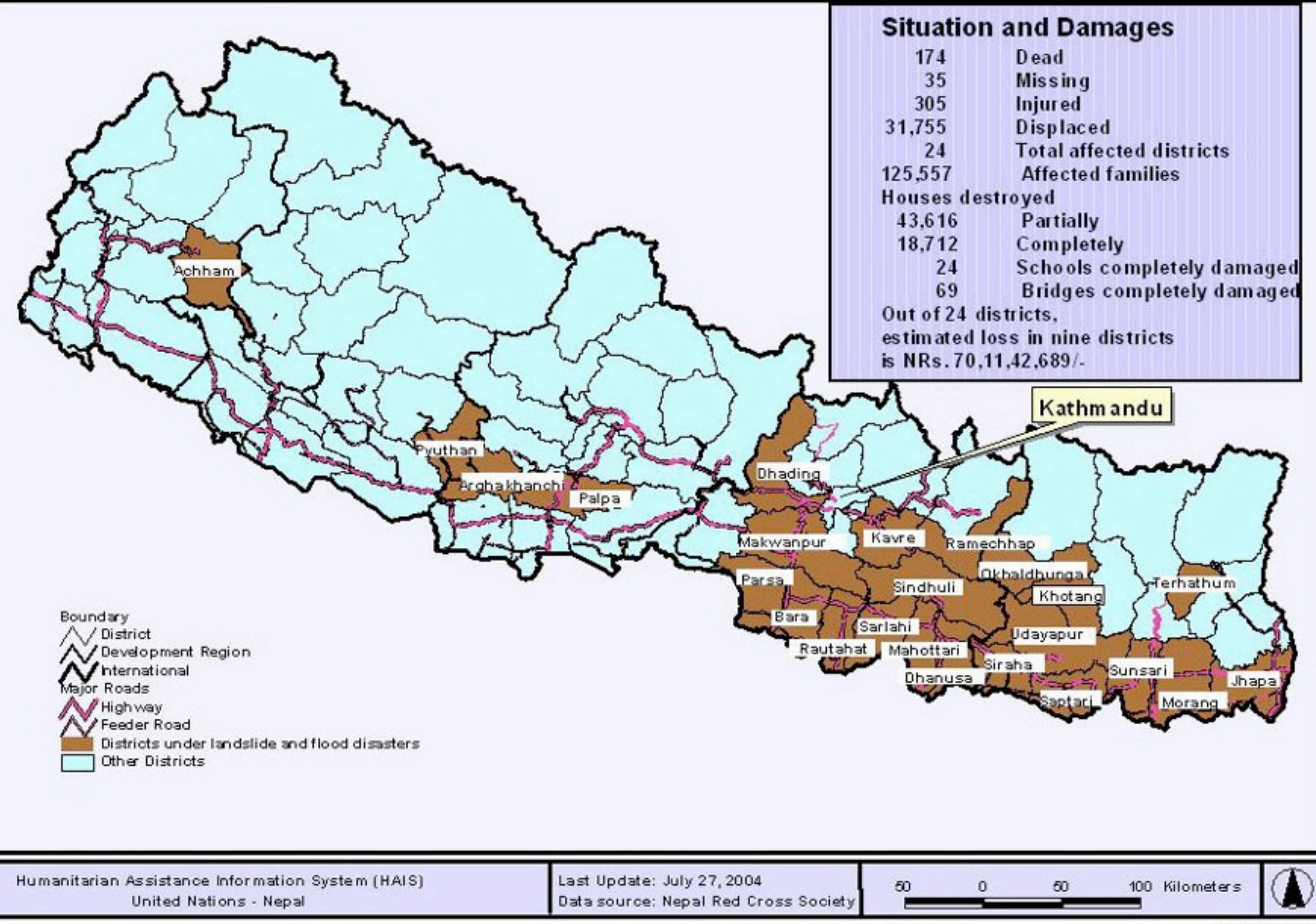
Climate change is projected to cause an *additional* 50 million environmental refugees worldwide by 2010 and 150 million by 2050. Freshwater scarcity is already leading to changes in human settlement patterns across Central America. As noted in the quote at left, the drying out of the countryside and choking-off of rural livelihoods is accelerating urban migration. Cities within the region cannot keep pace. Services are being overwhelmed and crime – along with civil unrest – frequently rise in response to widespread dissatisfaction and desperation. The poorest households, which migrate with few assets, often find themselves moving from one bad situation to another in peri-urban encampments prone to disasters. Following Hurricane Mitch, the exodus from Central America (especially Honduras) reached epic proportions. Mexican border authorities apprehended roughly 5,800 illegal immigrants from Central America in December 1997. This figure represents a nearly 50 per cent increase and is overwhelmingly attributed to the impact of extreme weather. Guatemala, similarly overwhelmed by the influx of migrants from the south.

The adverse effects of climate change are likely to be felt disproportionately by women. However, as vulnerability to climate change depends on control of financial, physical, natural, human and social capital, and because women typically have less access to and control over these resources than men, they are likely to have lower adaptive capacities.

Research into the consequences of extreme weather events for women has found that:

- Women's economic insecurity increases more than men's
- They take longer to recover from economic loss than men
- Gender barriers provide an obstacle to involvement in reconstruction work
- Natural disasters often lead to a sustained increase in the workload of women (e.g. due to male migration, reduced access to resources, more time spent travelling to collect water and search for fuelwood).

NEPAL LANDSLIDE AND FLOOD DISASTERS JULY 04 - 26, 2004



Climate change is projected to cause an *additional* 50 million environmental refugees worldwide by 2010 and 150 million by 2050. Freshwater scarcity is already leading to changes in human settlement patterns across Central America. As noted in the quote at left, the drying out of the countryside and choking-off of rural livelihoods is accelerating urban migration. Cities within the region cannot keep pace. Services are being overwhelmed and crime – along with civil unrest – frequently rise in response to widespread dissatisfaction and desperation. The poorest households, which migrate with few assets, often find themselves moving from one bad situation to another in peri-urban encampments prone to disasters. Following Hurricane Mitch, the exodus from Central America (especially Honduras) reached epic proportions. Mexican border authorities apprehended roughly 5,800 illegal immigrants from Central America in December 1997. This figure represents a nearly 50 per cent increase and is overwhelming attributed to the impact of extreme weather. Guatemala, similarly overwhelmed by the influx of migrants from the south.

The adverse effects of climate change are likely to be felt disproportionately by women. However, as vulnerability to climate change depends on control of financial, physical, natural, human and social capital, and because women typically have less access to and control over these resources than men, they are likely to have lower adaptive capacities.

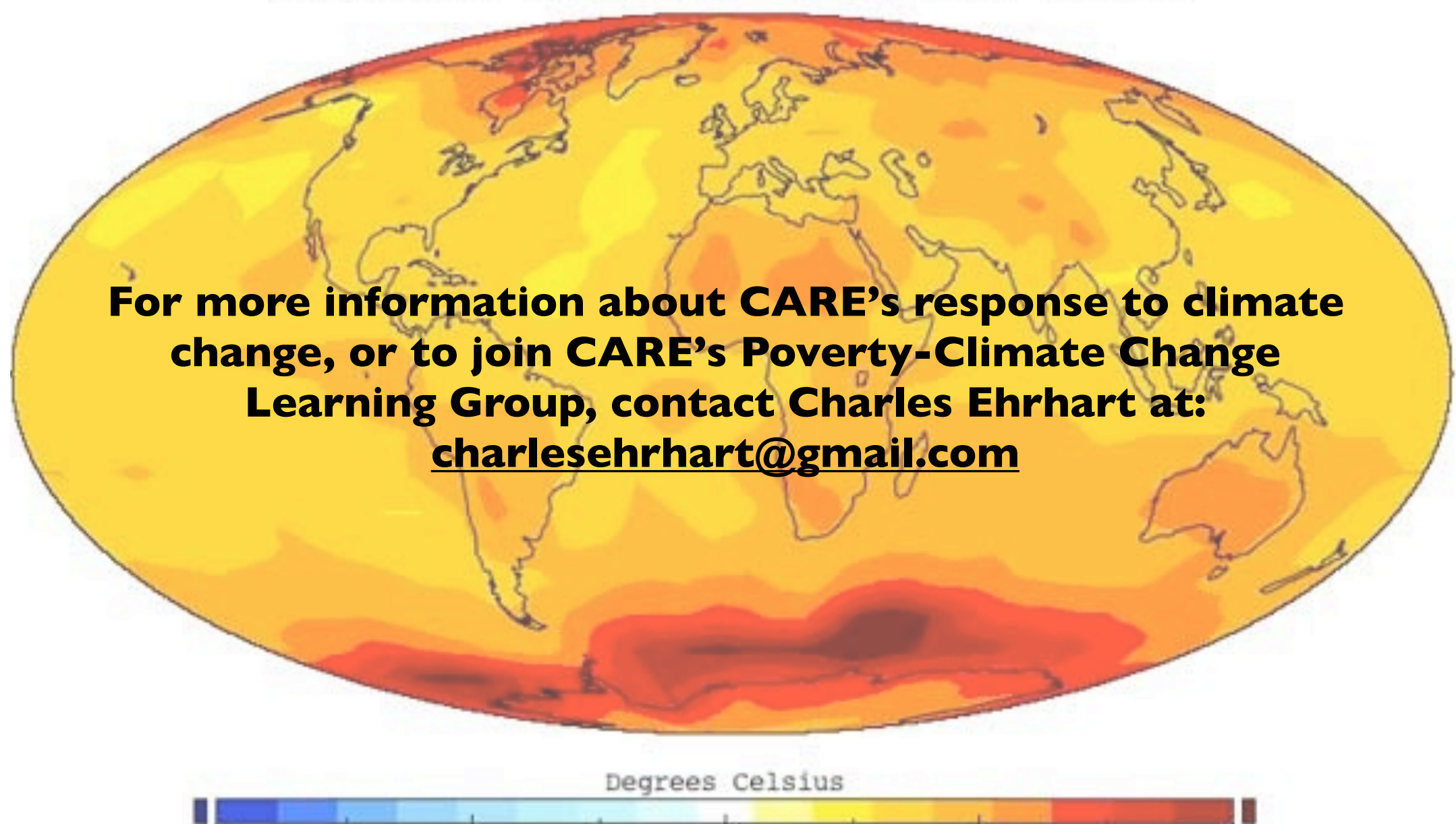
- Research into the consequences of extreme weather events for women has found that:
- Women's economic insecurity increases more than men's
 - They take longer to recover from economic loss than men
 - Gender barriers provide an obstacle to involvement in reconstruction work
 - Natural disasters often lead to a sustained increase in the workload of women (e.g. due to male migration, reduced access to resources, more time spent travelling to collect water and search for fuelwood).

Women and natural disasters:

Research into the consequences of extreme weather events for women has found that:

- 📌 Women's economic insecurity increases more than men's
- 📌 They take longer to recover from economic loss than men
- 📌 Gender barriers provide an obstacle to involvement in reconstruction work
- 📌 Natural disasters often lead to a sustained increase in the workload of women (e.g. due to male migration, reduced access to resources, more time spent travelling to collect water and search for fuelwood).





“Dealing with climate change is an imperative for today, not an option for tomorrow”

- U.K. Foreign Secretary, Ms. Margaret Beckett

