

Population and the Environment: What is the Link?

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The message of this presentation:

- Essential ecosystems are being degraded and destroyed
- Population growth remains a serious problem
- Solutions exist but our lifestyles and economy must change

Millennium Ecosystem Assessment

- 1,300 experts in 95 countries examined the effects of ecosystem change on human health and well-being
- The conclusion was that humans have changed ecosystems more rapidly and extensively over the past 50 years than during any other period, primarily to meet increasing demands for food, fresh water, timber, fiber, and fuel

Forests are Dwindling

- Global forest cover has declined by 50% since pre-agricultural times
- Increasing use of forest products for paper, lumber and fuel is accelerating the process
- Since the beginning of the 20th century 22% of forest cover has been lost

The current status of food security

- The FAO estimates there were 923 million chronically hungry people in 2007, 90% live in developing countries, 75-112 million higher than in 2006
- Worldwide 17% of people are hungry but in 15 countries in Africa, 35% are
- 1 in 3 children younger than 5 in developing countries suffer stunting





Fisheries are Collapsing

- One billion people are dependent on fish for protein
- 75% of global fisheries have been over-fished or fished at their biological limit

Cropland is Shrinking Due to Soil Erosion and Desertification



- **Crop yields are threatened by rising temperatures and inadequate water supply**
- **Human activity has transformed an estimated 10% of the Earth's surface from forest or rangeland into desert**

Cropland is Shrinking Due to Soil Erosion and Desertification (Continued)

- The productive capacity of 25% of all agricultural lands- an area equal to the size of India and China combined- has already been degraded
- Conversion of grains to biodiesel and ethanol drives up price of grain and limits amounts available for export and human consumption



Water shortage is a growing problem

- By 2025, 3/4 of people will face some degree of water scarcity
- Overuse is depleting aquifers in countries with half the world's people and the largest grain producers- China, India and the US
- Impending loss of aquifer water threatens production of grain supplies for 175 million Indians and 120 million Chinese
- Melting glaciers in India, China and South America threaten irrigation as does decreased snow melt in Iran, Afghanistan, Central Asia and Western US

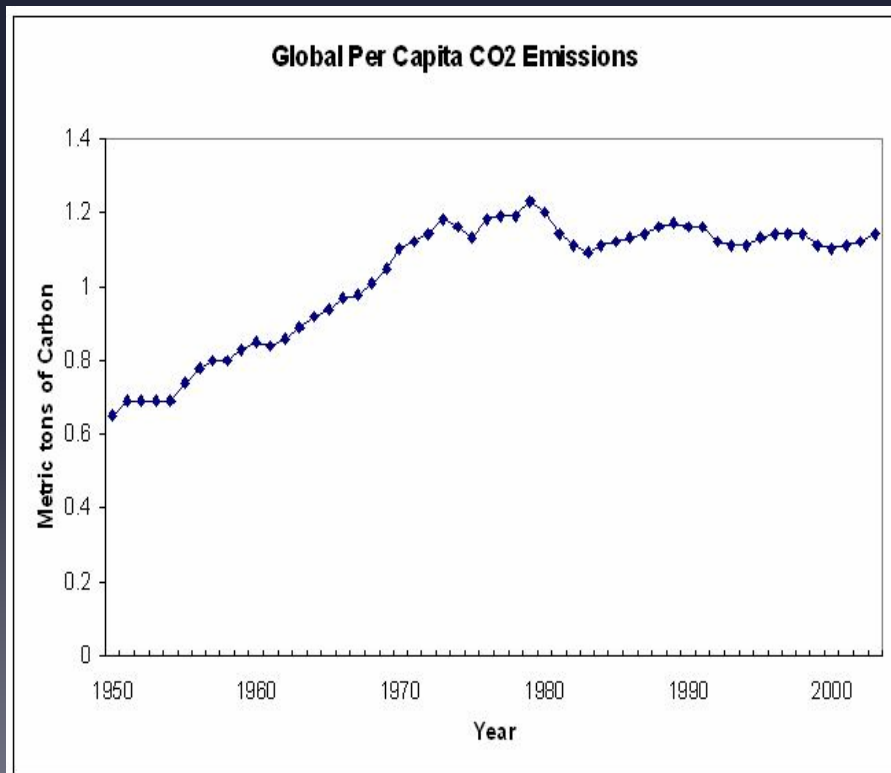
Climate Change is a major threat to food security

- Past record temperatures may become the norm by 2100
- 1° Celsius increase in norms will likely cause a 2.5-16% decrease in crop yield
- More destructive storms will damage crops and destroy topsoil
- A 10 meter rise in sea level could displace more than 600 million people and flood large areas of cropland and rice growing floodplains

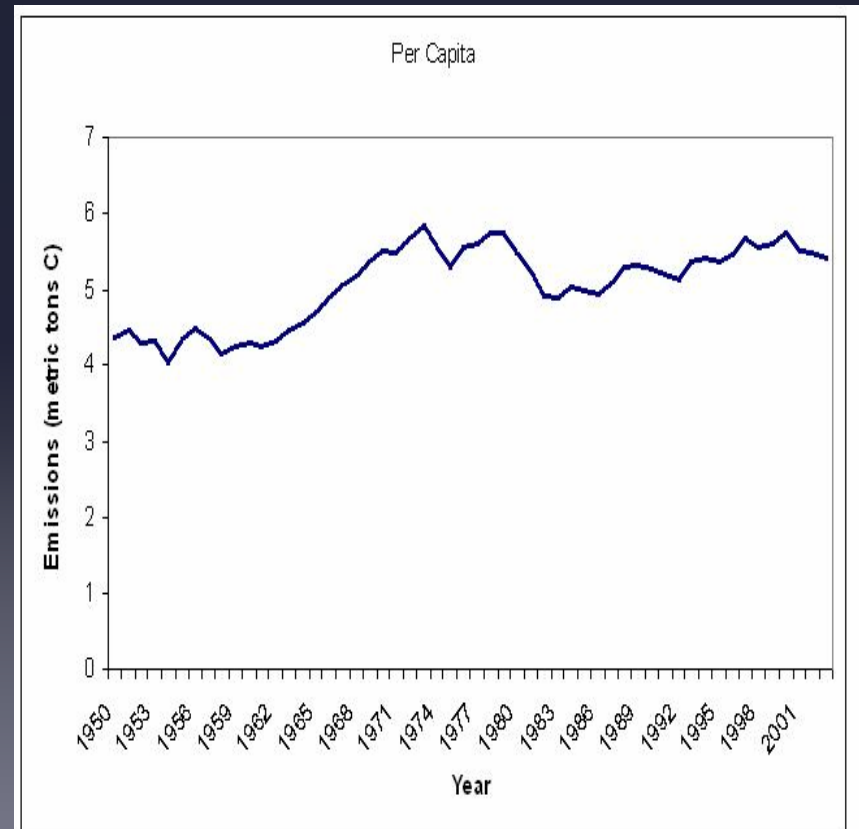


Per capita CO₂ emissions (Global and U.S.) have changed very little since 1970

Global

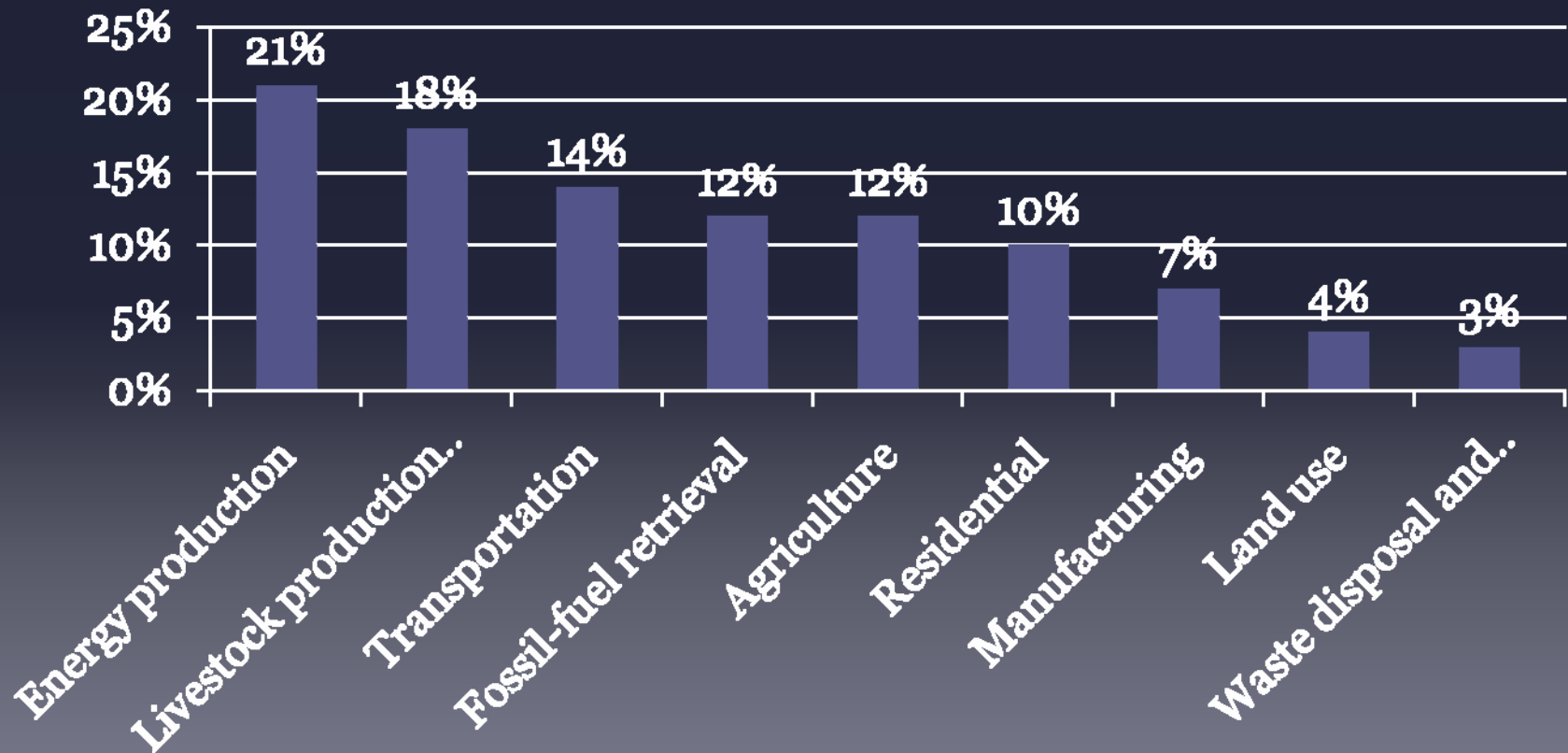


United States



Source of figures: Carbon Dioxide Information Analysis Center (CDIAC)
Slide courtesy of F. Meyerson

Sources of Greenhouse Gases



Source: U.N. FAO, 2006

Impact of humans on the environment relates to:

- Population size
- Per capita consumption
- Environmental impact of technology used to produce what is consumed

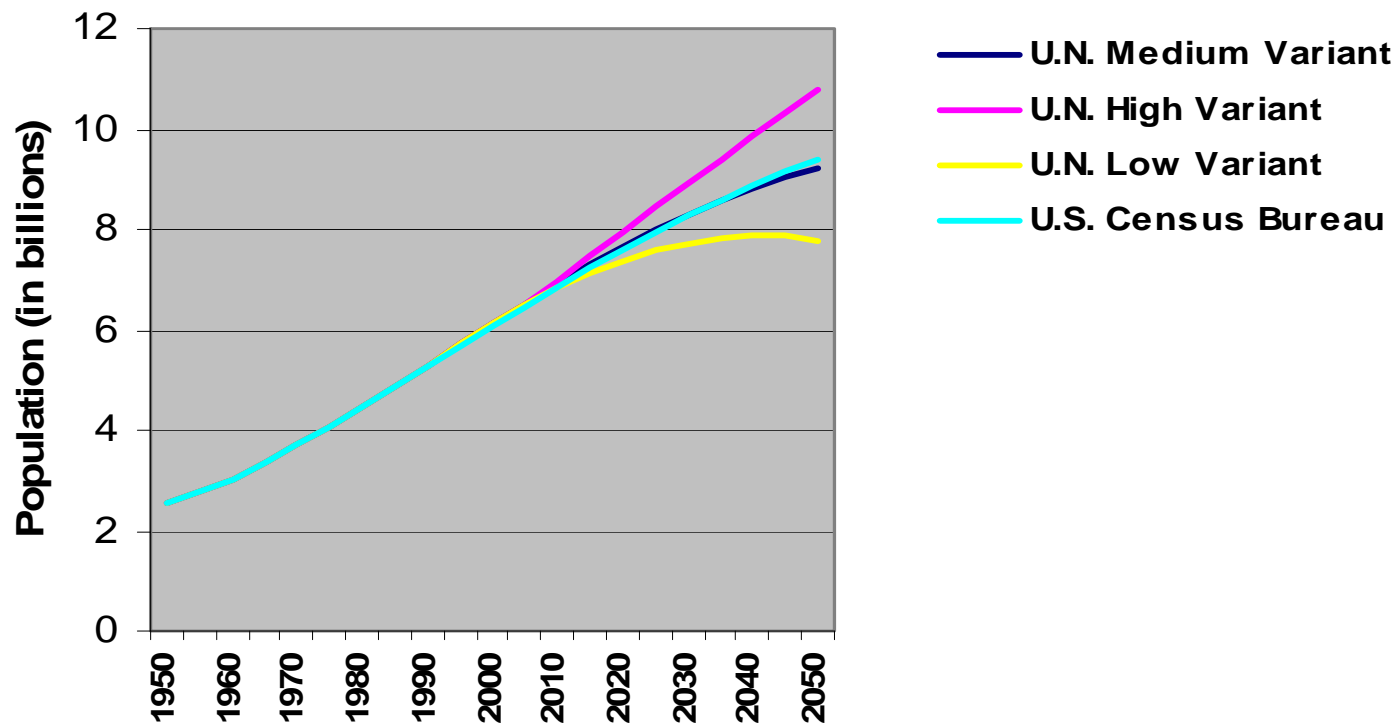
We must address all three

Growth rates have declined, but growth of numbers remains high

Year	Average Births Per Woman	Annual Population Growth (millions)
1950 (World)	5.3	48
2007 (World)	2.7	79
2007 (U.S.)	2.1	2.9

99% of projected growth will be in developing countries.

Global Population 1950-2050 (historical and projected)



Data and projections sources: U.N. Population Division 2006, U.S. Bureau of the Census 2006

Projected Population Growth 2007- 2050 in Regions and Countries

Region or Country (with 75% of 2050 population)	2007 Population (millions)	2050 Population (millions)	Percent Change
Africa	944	1,953	107%
India	1,132	1,747	54%
China	1,318	1,437	9%
Latin America/Caribbean	569	784	38%
USA	302	420	39%
Indonesia	232	297	28%
Pakistan	169	295	75%
World	6,625	9,294	40%

Continued...

- A population explosion of livestock especially in Africa, the Middle East and China is accelerating the conversion of grassland to desert

	1950	2006	2050
African Population (millions)	238	926	1,953
African Livestock (millions)	273	738	???

Population growth will increase demands on already inadequate crop and range lands

- Grain production per person peaked in 1984 at 342 kg, in 2006 it was 302 kg

Population growth and grain land per person

Year	Population (billion)	Hectares/ person
1950	2.6	0.23
2008	6.7	0.10
2050	9.2 (UN med projection)	0.073
2050	11.0 (constant fertility)	0.061

Lack of access to and use of family planning is an important cause of population growth

	World	U.S. (2001)
	Annual numbers in millions	
Pregnancies	210	6.4
Unintended Pregnancies	80	3.1
Abortions	42	1.3
Unplanned Births	34	1.4
Population Growth	79	2.7

Assuming \$15 billion/year is needed for family planning in developing countries and 1/3 should come from donors, then \$5 billion/year is needed

- Current commitments fall short

Projected 2008 Government Population Assistance		
Assistance Category	Percent	\$ in millions
General Contributions	6.4	589
Family Planning	3.5	322
Reproductive Health	8.0	736
Basic Research	1.6	147
STI/HIV/AIDS	80.5	7,406
TOTAL	100.0	9,200

It should be noted that funds in the “general contributions” and “reproductive health” categories could provide some support for family planning. The recent large increase in U.S. funding of HIV/AIDS programs will probably increase the total in this category in 2009.

Stabilizing climate will be essential

- **We have much of the needed technology**
 - **To move from a petroleum to an electric economy powered mainly by wind, photovoltaic and other renewable sources such as hydro, geothermal, biomass**
 - **To improve public transportation including high speed electric trains, bicycle and pedestrian friendly streets and plug-in hybrid cars**
 - **To raise the energy efficiency of appliances, lighting, heating of homes and buildings**
 - **To recycle materials**
- **We can minimize the consumption of meat**



Features of a new economy to restore natural systems

- Replant forests and limit their use for paper and fuel, and sequester carbon
- Conserve and rebuild soil- through plantings, limiting overgrazing and better farming practices
- Restore fisheries- by limiting catches, establishing marine reserves and protecting reefs and wetlands
- Preserving water resources through better irrigation practices, reduction of groundwater use and composting toilet- 2.6 billion people now lack sanitation facilities

Conclusion

- If we fail to strengthen family planning by 2050, developing countries could grow from 5.6 to 9.8 billion people
- If we fail to reform our economic system, life-supporting ecosystems will continue to sustain irreversible damage
- The consequences will be disastrous for human welfare

Conclusion (Continued)

- We can avert disaster
 - Family Planning works and we know how to provide it at low cost
 - We have much of the knowledge and technology needed to preserve the environment
 - The key missing elements are political will and lifestyle choices