

GEOGRAPHY 1000

Introduction to Physical Geography

INTEGRATED CONCEPTS:

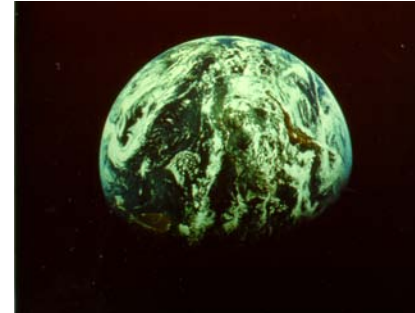
HUMAN – ENVIRONMENTAL CHANGE

Derek R. Peddle

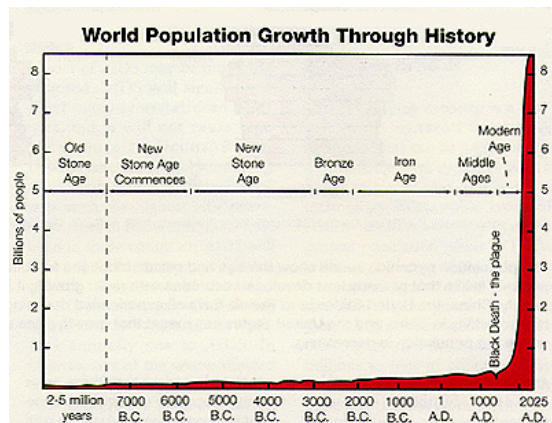
D.R. Peddle-Geog.1000

1

What do you think is the most
urgent, long term issue on Earth
right now ? ...



2



3

Global Issues in Geography

- Geography is the study of people and places on the earth's surface.
- We study not only the place, but our (human) impact on the place.
- Our relationship to the environment is changing.

4

Global Issues and Geography

- We have become more specialised through time
- Still... science of the “Big Picture”.
- Modern geography is being asked to address many of these larger issues
 - Physical, technological
 - Human, cultural, social
 - * Environment * ~ Linkages.

5

What are the Issues ?

- Global issues are often presented in politically motivated contexts.
- Science responds to societal demands/interests.
- Fear is seen as a motivator

6

ENVIRONMENTAL ISSUES

- * Air/Water Quality and Quantity
- * Energy
- * Climate Change
- * Pollution & Hazardous Waste
- * Land Use and Degradation
- * Recycling
- * Toxics & Pesticides
- * Wildlife
- Resources & Sustainability
- Many more ...

7

Global Issues & Attitudes

- Emotional response.
 - “Environmental movement” becomes more popular.
 - 1987 - Bruntland Report “Our Common Future”
 - World Commission on Environment and Development
 - “Sustainable development seeks to meet the needs of the present, without compromising the ability to meet future needs.”
 - environmental protection
 - economic growth
 - social equity.
- Sound familiar ?.... Relationship to now ?**
 * So... 2+ decades later: progress ?



Time Magazine 1989...

8

Positive view of Change.

- Global issues facing human populations are not new.
- Humans are not “unnatural” (including settlement i.e. - cities), yet our affect is profound and global in scope...
- Real issue is not the Earth - but our relationship to it.
- Civilizations have risen and fallen in the past and will in the future
 - *Uniformitarianism* applied to civilization?

9

Human Civilization and Geography

- Success of intensive agriculture leads to food surplus.... Yet hunger is widespread.
- Significant parts of society do not devote time to food production.
- Division of labour (food producers / everyone else).
- Time to do other things (science, industry, war, recreation).
- Distribution of wealth, food.
 - local/global -> ***Imbalance***. Problem.

10

Climate / Food... Energy...

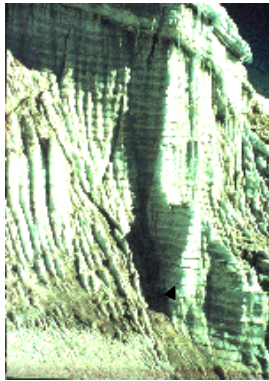
- Interesting development - Price of flour, bread, pasta:
 - 2002: Increased significantly...
 - Drought, marginal quality; poor yields
 - ~ marketplace: Economics of supply:demand. Price: ^\$
- 2008-2011 - large price increases. 2 main reasons:
 - ?:
 - More drought...
 - Biofuels. Large shift to corn, canola → Less wheat
- April 2011: CORN
 - US reserves: lowest in 15 years
 - 40% of corn → ethanol production
 - Price of corn: doubled.
- Food Production vs. Energy
 - Utilisation / Decisions / Wealth....

11

Dependencies...

- Think of how dependent we are on technology and infrastructure:
 - Flick a switch --> Light. Start-up computer etc.
 - Grocery stores - Food.
 - The water tap.
 - Basic needs.... Yet we rely on others at many levels.
 - Emergency preparedness...
 - Economy... Within last 3 years: Boom → Bust.
 - housing, stock markets
 - rapid...
- Advanced ? Or behind ? ~*self-sufficiency*?

12

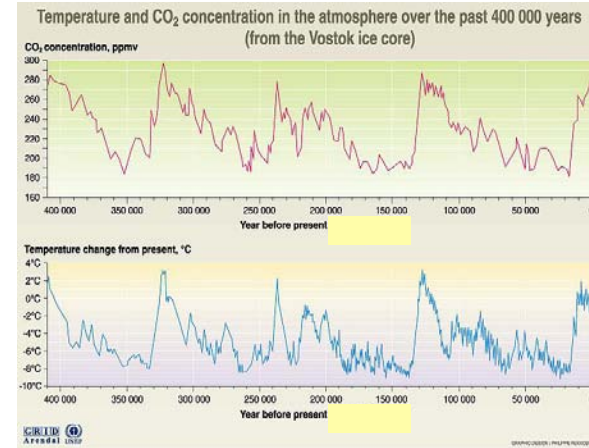


ICE CORES are climate records



Yearly ice layers from snowfall

Photo: L.G. Thompson

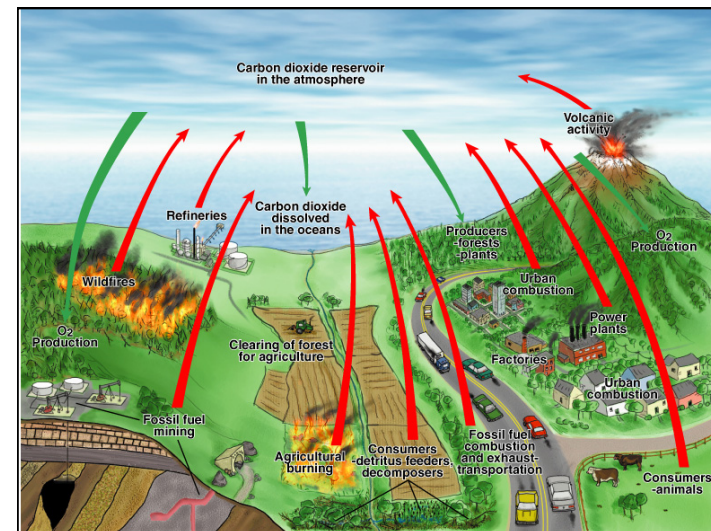


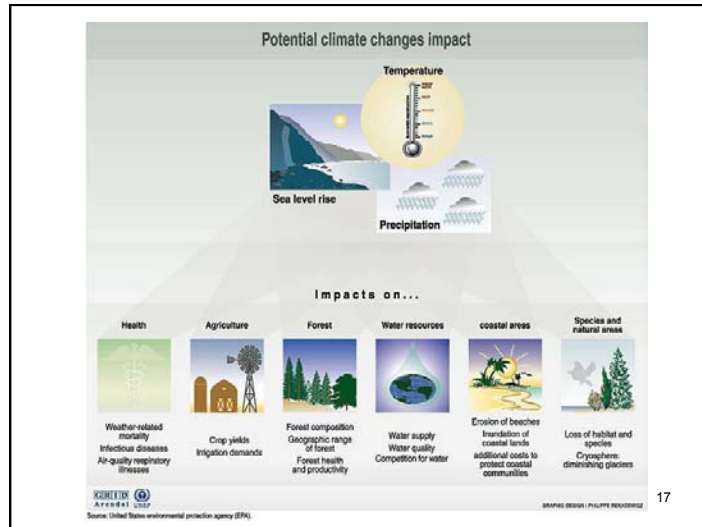
Positive correlation: CO₂ and temperature 14

All components in a system count



15





17

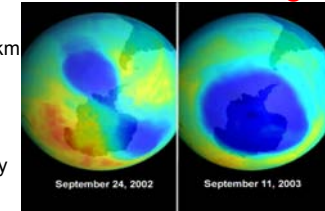
Ozone (O₃) is an odorless, colourless gas

Good Ozone.

In the upper atmosphere: 15-50km above the Earth's surface

→ Shields us from the sun's harmful UV rays.

→ Destroying this component by air pollution causes "hole in the ozone layer."



Bad Ozone.

In the lower atmosphere, ozone is formed when air pollutants react chemically in the presence of sunlight.

→ smog



Mexico City

18

Montreal Protocol on Substances That Deplete the Ozone Layer - 1987

CFCs - Chlorofluorocarbons

Widespread change in refrigeration, propellants and cleaning solvents.

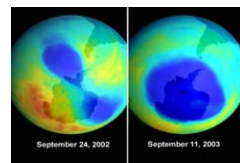
191 nations

"Perhaps the single most successful international agreement to date..."

Kofi Annan: UN Secretary-General (97-2007)

Replaced with:
Hydrochlorofluorocarbons (HCFCs).
Hydrofluorocarbons (HFCs)

But... still powerful greenhouse gases...



19

What is global change?

- Global = worldwide / overall impact.
- Global climate change
- Increase in average world temperature
 - Natural
 - Anthropogenic (due to people)
- Many varied regional effects
 - Also: climate, not daily weather...

20

What is causing climate change

- Carbon dioxide, water vapor, methane
- Naturally occurring, but increases further with human activity
- Rising CO₂ since Industrial Revolution [~200 yrs]
- Production of fossil fuels
- United Nations
 - United Nations Framework Convention on Climate Change (UNFCCC)
 - Kyoto Japan - December 1997: Kyoto Protocol
 - Many conventions since then – Updates / Focus.
- Human effect: High confidence (IPCC)
 - Intergovernmental Panel on Climate Change
 - <http://www.ipcc.ch/>
 - 2007: Nobel Peace Prize
 - (more on this later...)

21

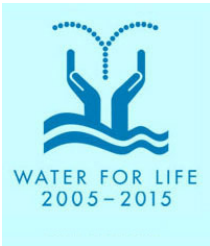
Greenhouse effect (G.E.)

- Natural warming effect
- Keeps Earth habitable
 - Greenhouse effect is a good thing!
 - **But** out of balance / too much: a bad thing.
- Greenhouse gases (GHGs)
 - Let in short wavelength energy
 - Trap long wavelengths
- KEY: Enhanced G.E. / more GHGs
 - Additional warming - problem.

22

UN international decade for action Water for Life, 2005-2015

Commenced on World Water Day 22 March 05



April 8, 2005: United Nations (UN) Announcement:
University of Lethbridge named the Canadian Centre for this UN initiative

<http://www.un.org/waterforlifedecade/>

23

UN RESOLUTIONS FOR THE “WATER FOR LIFE” DECADE

Water is critical for SUSTAINABLE DEVELOPMENT:

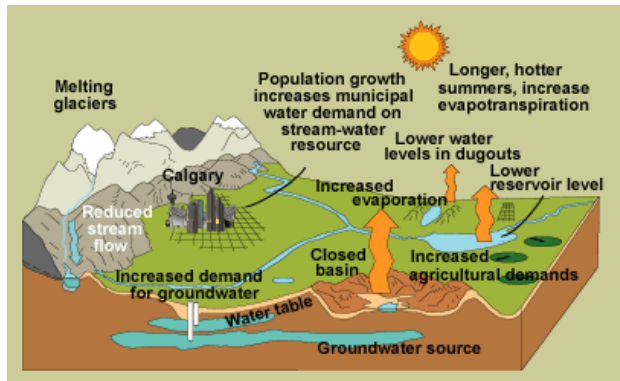
- **environmental integrity**
- **eradication of poverty and hunger**
- **human health and well-being**

GOALS FOR THE DECADE:

- Greater **focus** on water-related issues at all levels
- **Implementation of water-related programs/projects**; ensure participation and involvement of women in water-development
- **Cooperation at all levels**, in order to **achieve internationally agreed water-related goals** contained in (inter)national reports

24

Southern Alberta water budget: climate change impacts



25% of the glacier area in the southern Rockies lost in last 100 yrs

Luckman (1997)

If local yearly temperature increased by 1.4°C all glaciers in the Rockies south of 56°N will perish
Shea et al. (2004)

Canadian Arctic ice caps have been thinning and receding, in some places by almost 50%

Abdalati et al. (2004), Braun et al. (2004), Burgess & Sharp (2003)



27

Swiss Glacier in retreat

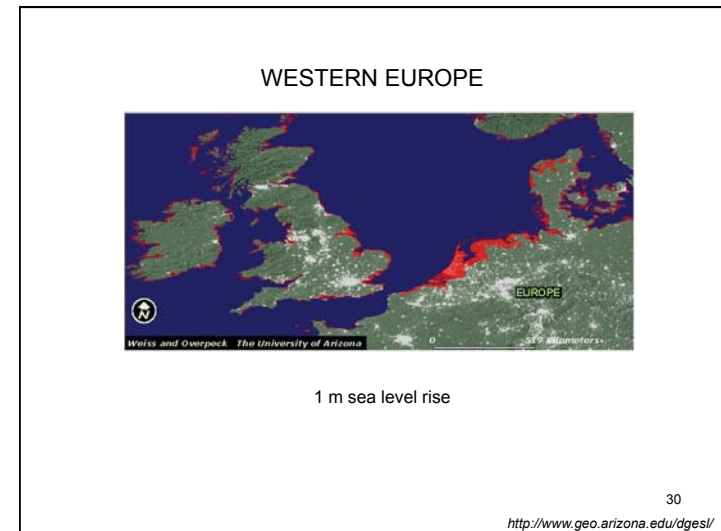
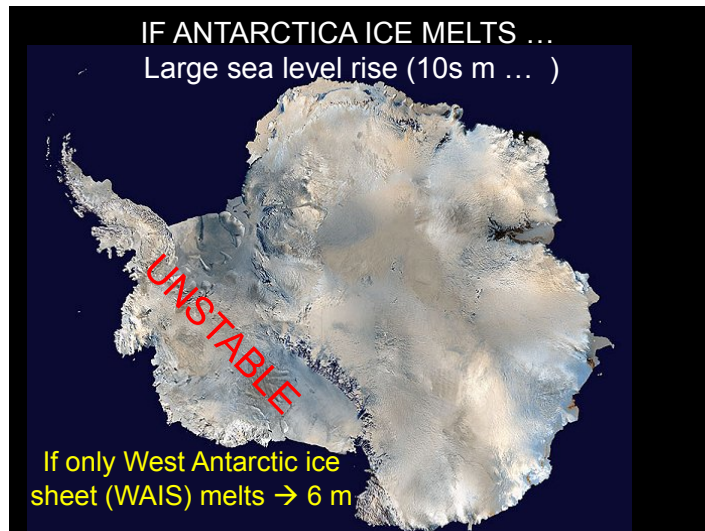


1985



2004

28



What is IPCC?

Intergovernmental Panel in Climate Change (UN Organisation)

- assess scientific, technical and socio-economic information relevant for understanding risk of human-induced climate change.
- based on scientific/technical literature.
-

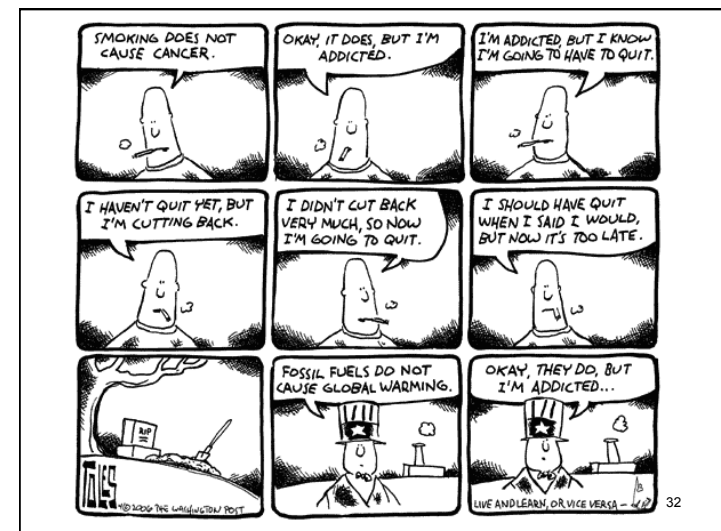
3 Working Groups (WG):

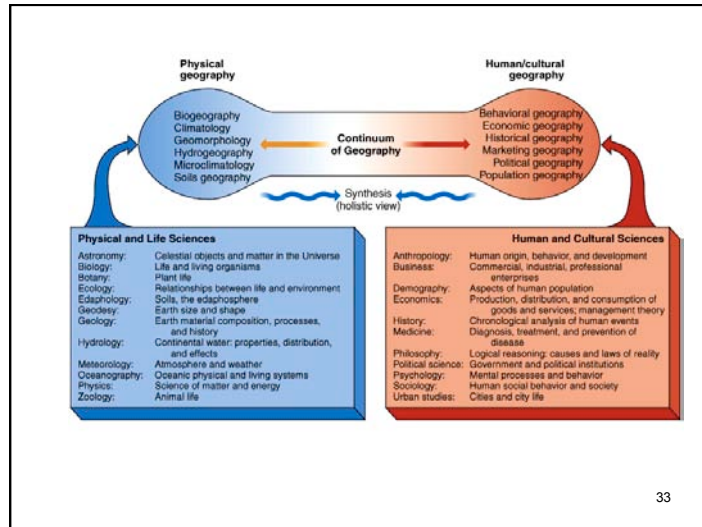
- WG I:** The Physical Science Basis
- WG II:** Impacts, Adaptation and Vulnerability.
- WG III:** Mitigation of Climate Change

+ Synthesis Report

<http://www.ipcc.ch/>

31





33

"Solutions" to climate change (warming)...

- **Mitigation:** reduce effects
 - Carbon taxes
 - Emissions trading
 - Energy efficiency, alternative fuels
- **Adaptation:** adapt to effects
 - Seawalls, irrigation, etc.
 - Cause ? who pays?

34

Politics of climate change

- Fossil-fuel producers:
 - USA, Saudi Arabia, Australia, Canada etc.
 - USA has 4% of population, 36% of CO₂ emissions.
- Europe: has set binding targets.
- Developing countries: want to grow/develop...
- Economic pressures: global / national.
- How to reconcile competing goals ?
International...

35

If interested in Remote Sensing....

Canadian Remote Sensing Society

- Student memberships
- **NEW !: CRSS Lethbridge Chapter**
 - Social events
 - Networking / Career opportunities
 - Science talks
 - Partnerships
- National Organization – Conferences/ Events/Opportunities across Canada
- International partnerships
- *Canadian Journal of Remote Sensing (CJRS)* – Free to all CRSS members.
- More Info @: www.CRSS-SCT.ca (→ "About" > "Member Benefits")
- Monique Bernier (Québec): CRSS-SCT National President
- Anne Smith (Agric. Canada - Lethbridge): Vice-President
- D. Peddle: Past-President / Associate Editor: *CJRS*
- Chris Hopkinson (U.Lethbridge Geog): Member, CRSS Executive

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36



www.CRSS-SCT.ca

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