

# Climate Change: scientific and faith perspectives

*10<sup>th</sup> IEF Annual Conference  
jointly organized with BASED  
Balliol College, Oxford, UK*

*Arthur Lyon Dahl Ph.D.  
International Environment Forum (IEF)  
<http://www.bcca.org/ief>*

*15 September 2006*

International Environment Forum



What's wrong with global warming?



Blackpool 2050?

There will be winners and losers



Summer in the New Forest 2050?

## Climate Change

Scientific perspective

*A rapid overview:*

- *global warming*
- *climate change*
- *driving forces*
- *consequences*

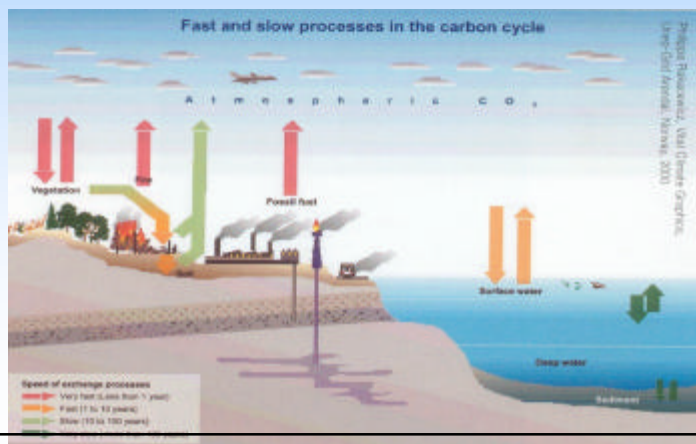
# The Biosphere



- Delicately balanced – atmospheric conditions for life created by life
- Early plants removed carbon dioxide and added oxygen, making animal life possible
- Dead plants were buried and their hydrocarbons fossilized as coal, oil and gas
- The complex systems and feedback mechanisms of the biosphere are poorly understood

## The Carbon Cycle

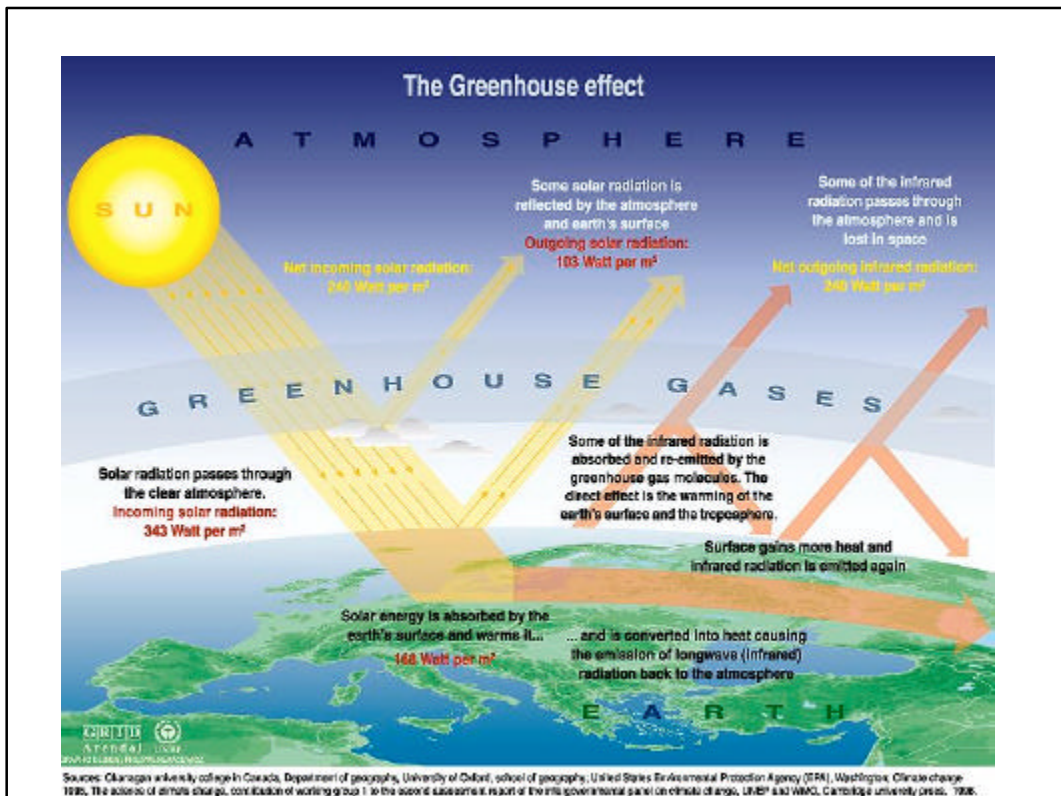
- Carbon flows through carbon dioxide, organic matter, limestone (from shells), fossil fuels (storing ancient carbon)





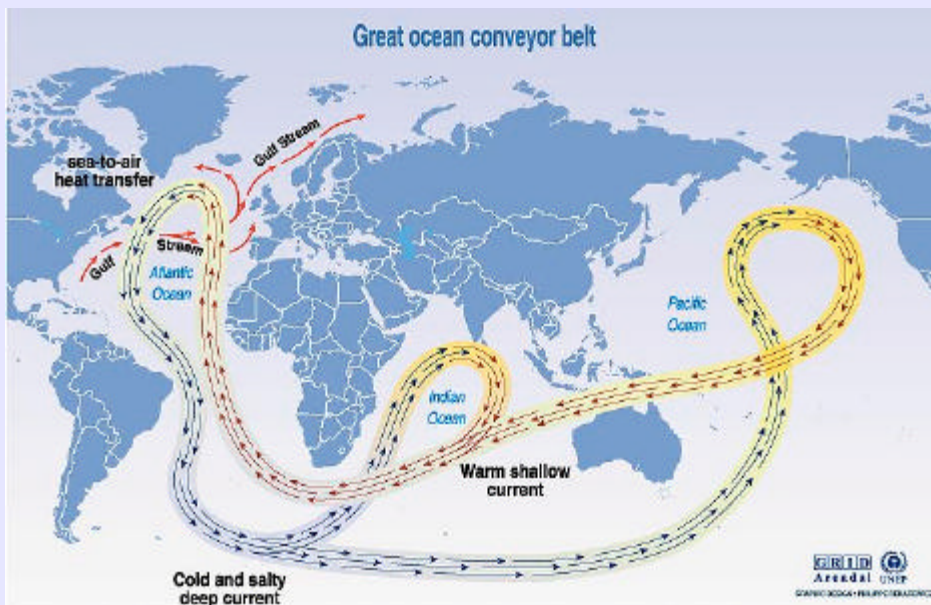
# The Greenhouse Effect

- The atmosphere maintains a temperature comfortable for life through the greenhouse effect
- Principal greenhouse gases that trap heat in the atmosphere are carbon dioxide, methane, nitrous oxide, etc.
- The atmospheric lifetime of  $\text{CO}_2$  is variable, methane 12 years and  $\text{N}_2\text{O}$  120 years, producing long time lags between cause and effect.

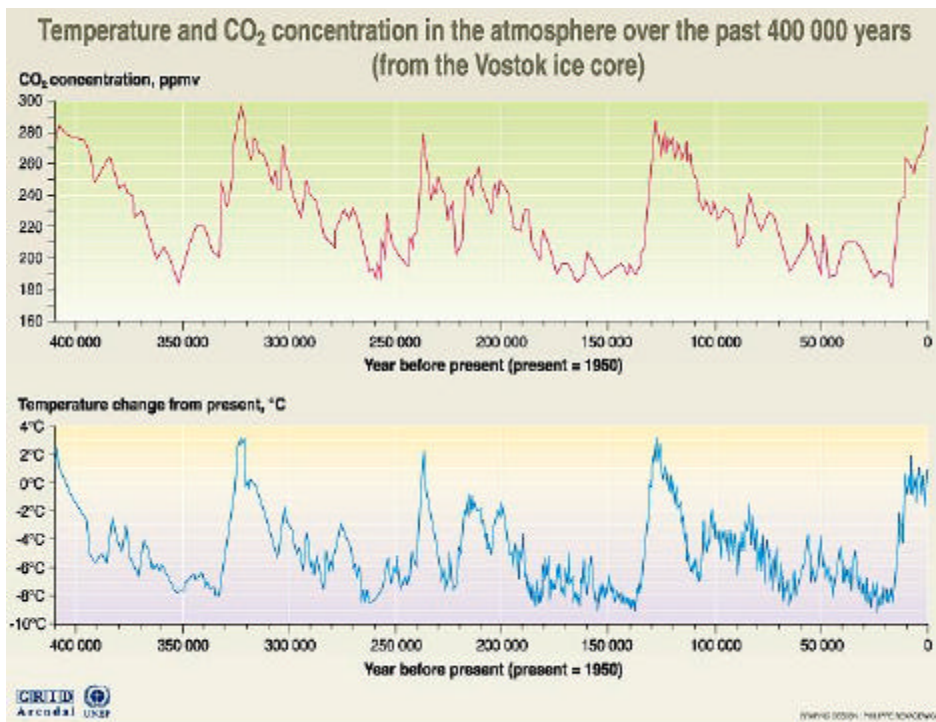


# Climate Change

- The climate has changed in past geological epochs, with both ice ages and much warmer periods, due in part to the changing position of the continents and the Earth's orientation
- The linked ocean-atmosphere system redistributes heat around the world
- A deep Atlantic current, driven by winter freezing in the Arctic, flows to the Antarctic, drawing the warm Gulf Stream to northern Europe



Source: Rowland, 1991, in Climate change 1996, impacts, adaptations and mitigation of climate change: scientific technical analyses, contribution of working group II to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press University, 1996.



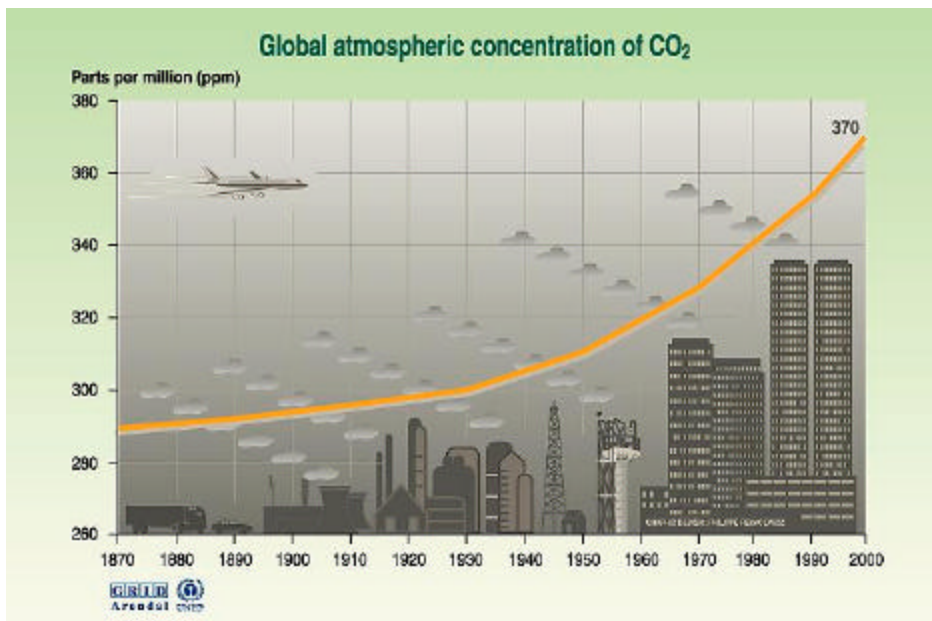
Source: J.P. Petit, J. Jouzel, et al. Climate and atmospheric history of the past 400 000 years from the Vostok ice core in Antarctica, *Nature* 399 (3, June), pp 429-436, 1999.

## Burning fossil fuels releases CO<sub>2</sub> into the atmosphere

- Fuel oil produces 2.9 tonnes of CO<sub>2</sub> from burning 1 tonne of oil equivalent (toe)
- Natural gas produces 2.1 tonnes CO<sub>2</sub> per toe
- Coal produces 3.8 tonnes CO<sub>2</sub> per toe
- Other significant modern sources of CO<sub>2</sub> are deforestation and loss of humus from degraded soils

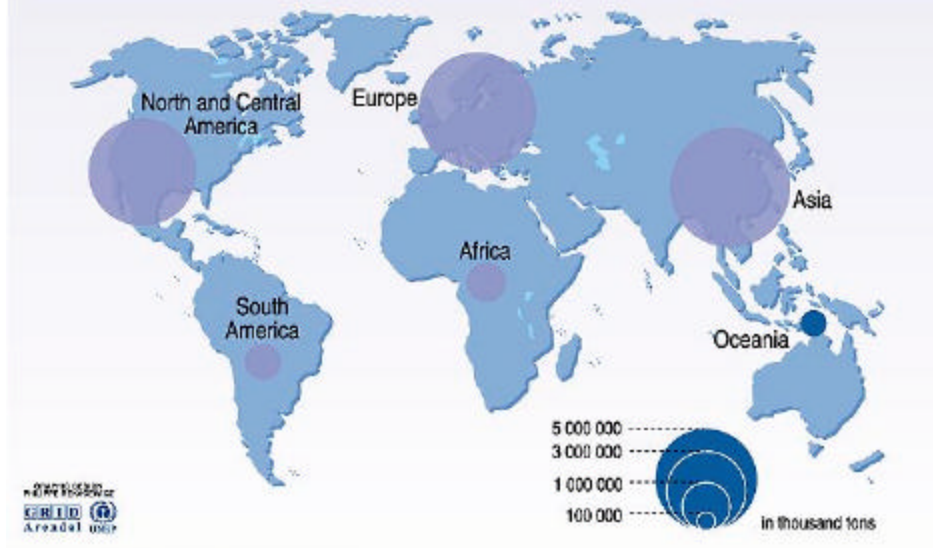
# Greenhouse gases and climate change

- The CO<sub>2</sub> level in the atmosphere is rising rapidly as we burn fossil fuels
- More heat in the atmosphere and oceans changes air circulation and climate
- Effects will be highly variable around the world, and are not easily predictable
- Various computer models of the global climate are used to predict the effect of rising greenhouse gas levels on the climate
- The Intergovernmental Panel on Climate Change confirms a significant human climate impact





## CO<sub>2</sub> emissions from industrial processes

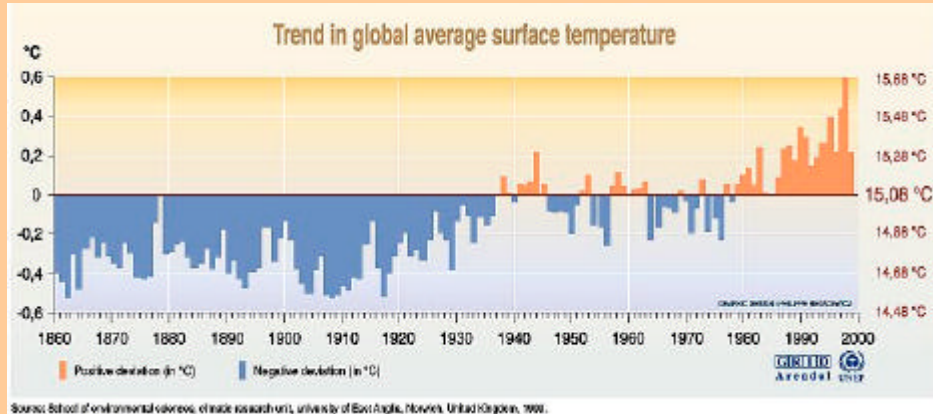


## CO<sub>2</sub> emissions from land use change





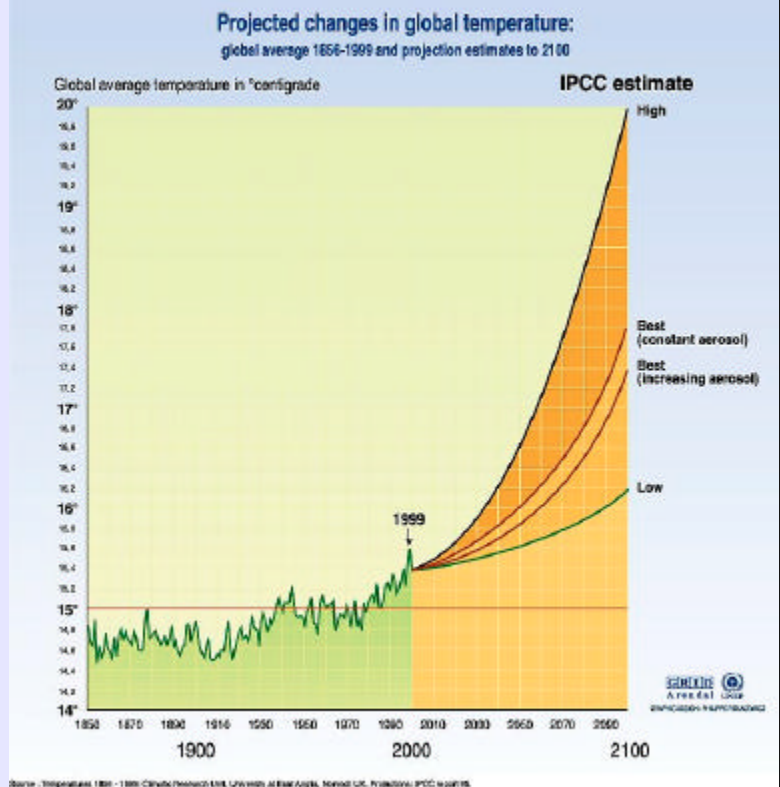
# Is the climate really changing?



## Climate Change Science

- No science is perfect, and there are always different interpretations of the available data
- Powerful interests have tried to discredit climate change science despite the overwhelming consensus of climate scientists on the human impact on global warming
- The counter-arguments have been disproved one after the other

What the  
models  
say

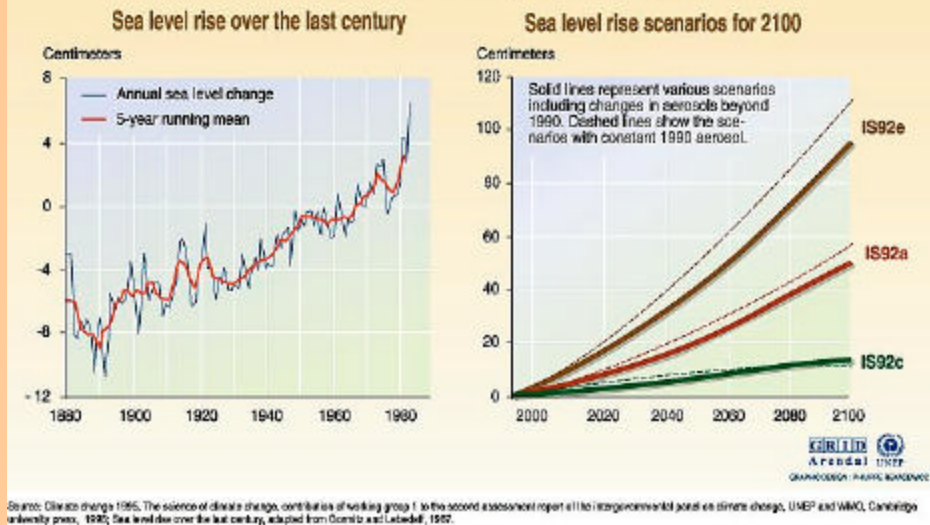


## Signs of Climate Change

- Many species are changing their latitudinal and altitudinal distributions in response to rising temperatures
- Coral reefs have suffered bleaching and mortality from unusually high temperatures
- The number of category 5 cyclones (hurricanes) has increased in all oceans over the last 30 years
- There have been several record warm years in the last decade

# Sea level rise

## Sea level rise due to global warming



One effect of global warming is rising sea level due to thermal expansion of water and melting ice caps.

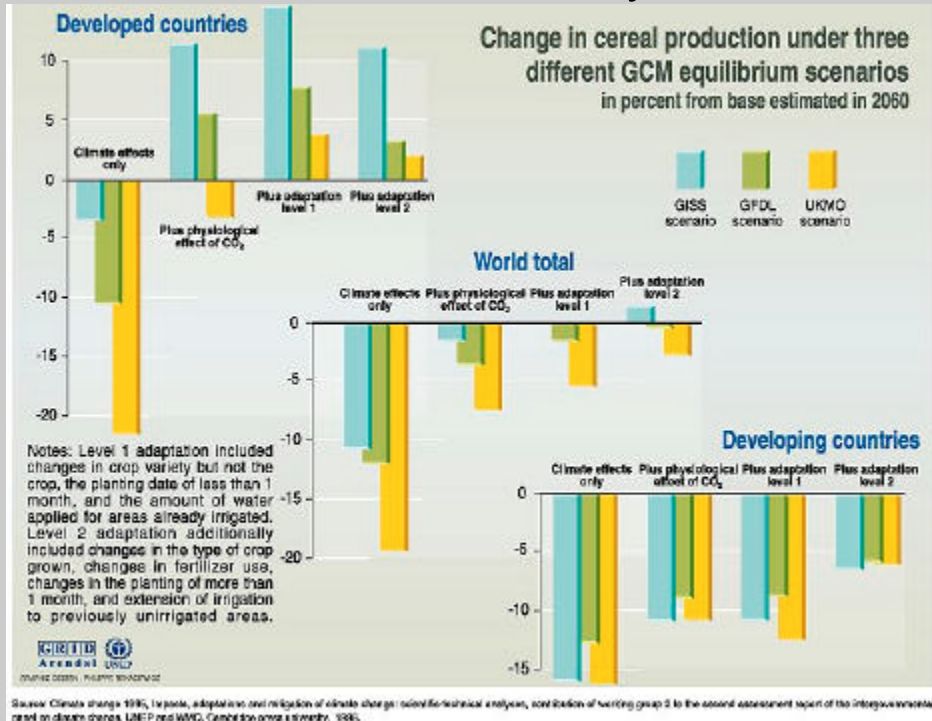
## Climate change will bring great environmental changes

(Aral Sea, from UNEP, GEO 3)

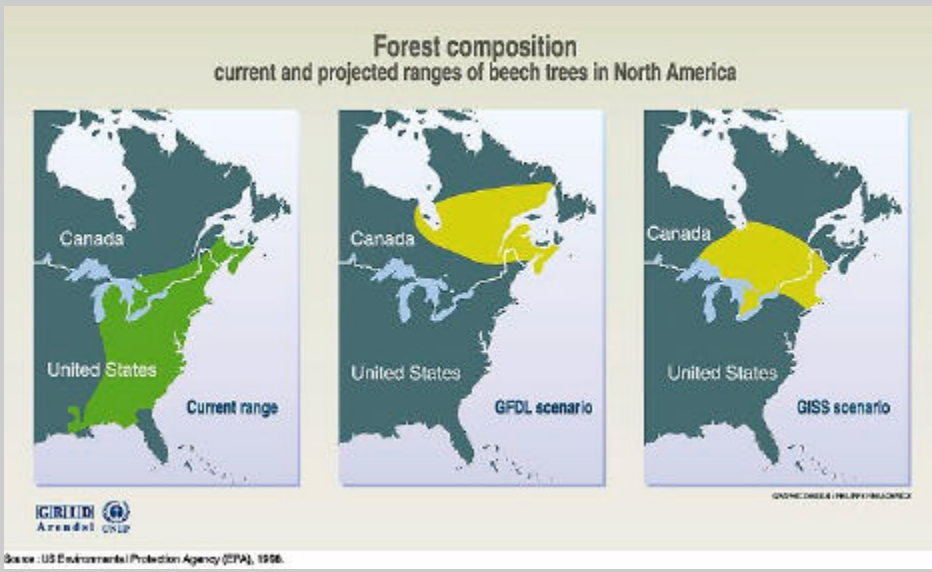
- Food insecurity
- Water shortages
- Terrorism, refugees
- Natural, economic and social disasters
- Loss of biodiversity



# Food Insecurity



# Biodiversity Impacts

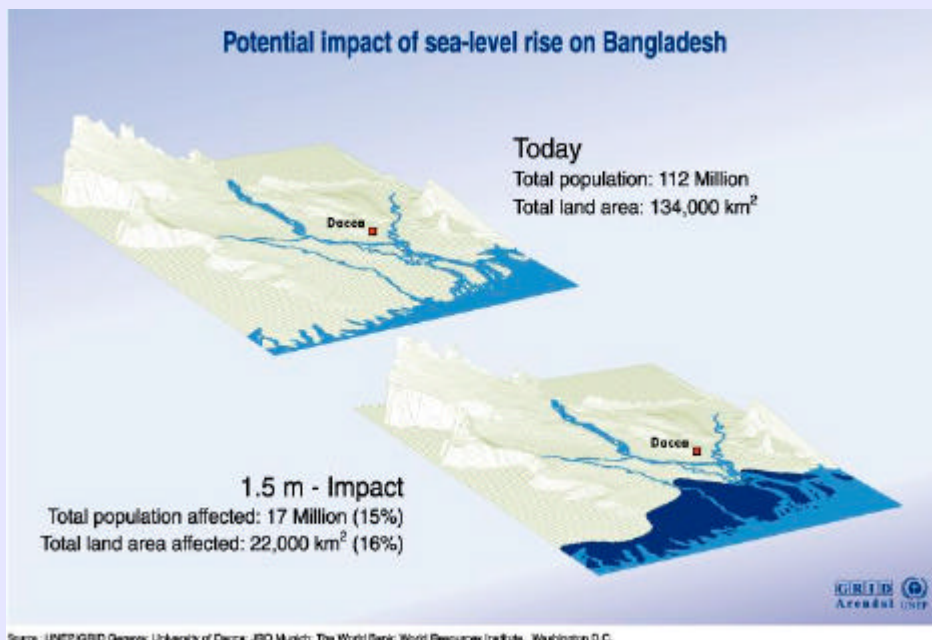




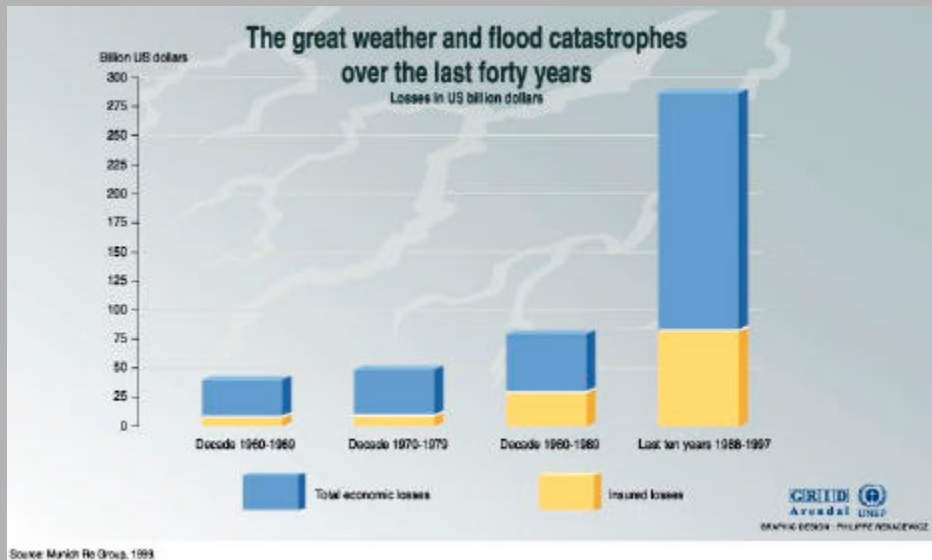
# Human Impacts of Climate Change

- An increase in extreme weather events: floods, droughts, cyclones
- Less winter snowfall, melting glaciers, water shortages
- Changing conditions for agriculture and forestry, shifting fish stocks
- Sea level rise, flooding low-lying areas and islands
- Millions of environmental refugees
- High costs of mitigation and adaptation
- Greatest impact on the poor

## Rising sea levels will create millions of refugees



## Economic impact of natural disasters linked to global warming



## And the cost is still rising

- ***The reinsurance industry estimated that disasters related to climate change could cost \$130 billion annually within 10 years***
- ***Economic damages from weather-related disasters hit an unprecedented \$204 billion in 2005, nearly doubling the previous record of \$112 billion set in 1998 and reflecting the high number of disasters affecting built-up areas. Three of the 10 strongest hurricanes ever recorded occurred in 2005.***

## The latest evidence suggests that the worst predictions may be realized

- The Gulf Stream has recently slowed by 30%
- Half of the permafrost in the Arctic is expected to melt by 2050 and 90% before 2100, releasing methane
- Major parts of the Arctic Ocean were ice-free in 2005 for the first time
- Greenland glaciers have doubled their rate of flow in the last three years
- The rate of sea level rise has doubled over the last 150 years to 2 mm per year, and melting of the West Antarctic ice sheet is now adding another 4 mm per year and Greenland 0.6 mm per year

We may be approaching a tipping point where runaway climate change would be catastrophic



If the Gulf Stream slows or stops

*Northern Europe may cool significantly, limiting agriculture and raising energy consumption*

## Global warming is driven by our addiction to cheap energy

- Our industrial economy was built on cheap energy, mostly from fossil fuels
- Transportation, communications, trade, agriculture, heating/cooling, consumer lifestyle all depend on energy
- Energy demand is rising rapidly and the supply is shrinking
- Global warming is just one more reason to address the energy challenge urgently
- Adaptation will be extremely expensive

## Controlling greenhouse gases?

- UN Framework Convention on Climate Change (Rio, 1992) call for controls
- Kyoto Protocol on reduction of greenhouse gases – return emissions to 1990 levels by 2012
- CO<sub>2</sub> emissions rose 4.5% in 2004 to 27.5 b tonnes, 26% higher than 1990
- China and India have doubled CO<sub>2</sub> production since 1990, US +20%, Australia +40%
- US released 5.8, China 4.5, Europe 3.3, India 1.1 billion tonnes of CO<sub>2</sub> in 2004



## Fossil energy use is still growing

- World oil use is growing 1.1%/year, Latin America 2.8%, India 5.4%, China 7.5%
- From 2001-2020, world oil consumption will rise 56%, with OPEC production doubling, but non-OPEC production has already peaked
- Oil provides 40% of world's primary energy
- Two thirds of future energy demand will come from developing countries where 1.6 billion people have no electricity.
- Energy demand and global warming are on a collision course

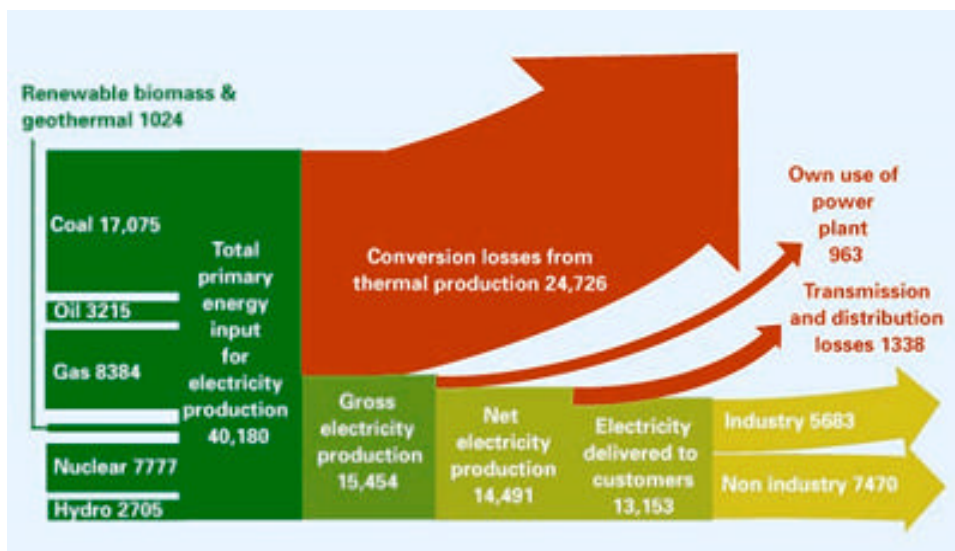
## The end of the fossil fuel era

- At *present* consumption rates, reserves of oil will last 40 years, gas 67 years and coal 164 years
- Geologists estimate recoverable oil reserve 2000 Bb, past production 980 Bb, known reserves 827 Bb, yet to find 153 Bb, so half already consumed
- Production peaks and starts to decline at half of recoverable resource, ca. 2008-2012, after which production will fall at about 2.7% per year, dropping 75% in 30 years
- Heavy oil/tar reserves (600Bb) equal only 22 years current consumption
- Even without global warming, we must change energy sources and consumption patterns

## Coal also has a significant impact on global warming

- Major coal producing/ consuming countries: US, Australia, Japan, South Korea, India, China, formed Asia-Pacific Partnership on Clean Development and Climate, July 2005
- They have 45% of world population, consume 45% of world energy, produce 52% of CO<sub>2</sub>, with both expected to double by 2025
- Agreement to develop/share clean/efficient technologies, especially carbon sequestration, to reduce greenhouse gas emissions and to provide secure energy supplies
- China plans 560 new coal-fired power plants, India 213
- 25% of global CO<sub>2</sub> emissions come from coal-fired power stations

Where does our electric energy come from?  
Total Electricity Generation Worldwide (TWh)



(source: International Energy Agency 2002)

World Alliance for Decentralized Energy (WADE) <http://www.localpower.org>

## Our dependence on fossil fuels

- . Road transport, shipping, aviation
- . Chemical feedstocks, plastics, synthetics
- . Energy/raw materials for industrial production
- . Agricultural fertilizers
- . Mechanized agriculture
- . Electricity generation
- . Heating and cooling, lighting
- . Town planning, suburban lifestyle
- . Global trade, food distribution

Tourism, a major global industry, is highly sensitive to energy costs



The business community is worried

## ***Carbon Disclosure Project***

***The Carbon Disclosure Project, representing a group of 225 investors with \$31 trillion of assets under management, i.e more than 50% of the world's invested assets, has invited 2,100 companies worldwide to disclose investment-relevant information concerning their greenhouse gas emissions.***

See: <http://www.cdproject.net>

## **Global Warming, Energy and Population**

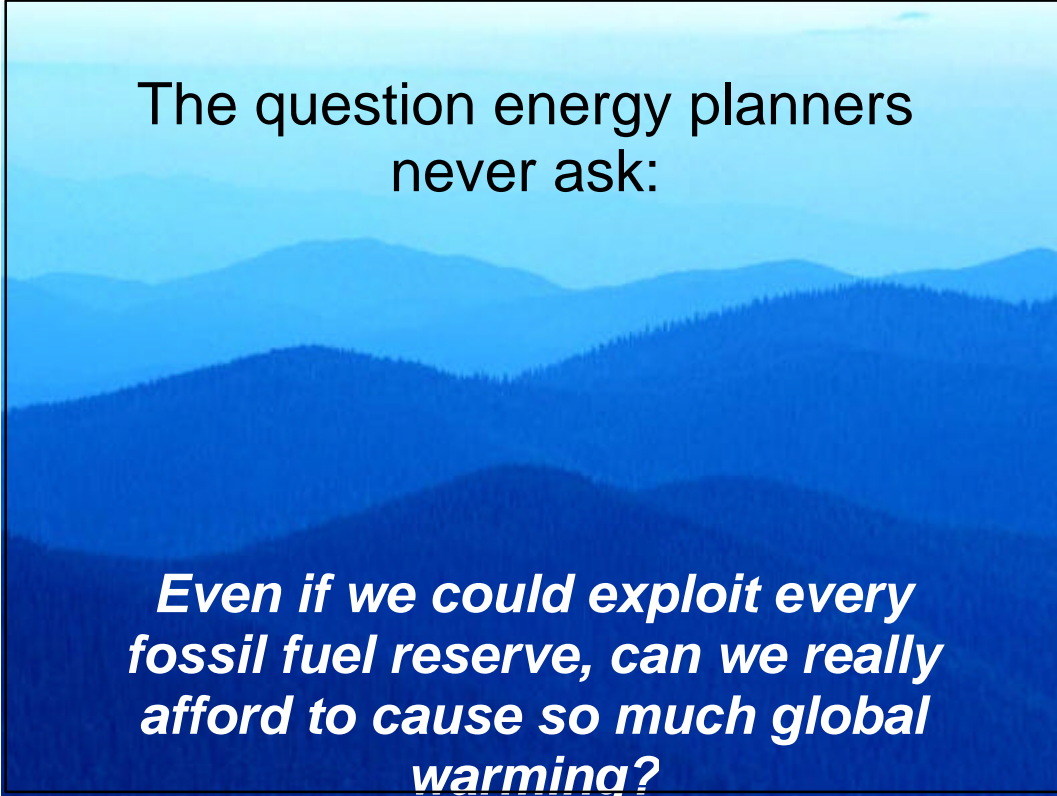
***80% of global energy comes from fossil fuels, which we must stop burning to reduce global warming***

***The world population has expanded sixfold, exactly in parallel with oil production***

***Can the world maintain such a population without the cheap energy from fossil fuels?***

***What will happen if it cannot?***





The question energy planners  
never ask:

***Even if we could exploit every  
fossil fuel reserve, can we really  
afford to cause so much global  
warming?***

## The Nuclear Option?

- Uranium reserves are expected to be exhausted in 40 years
- Research costs and development highly subsidized, including by military uses
- High energy input in construction and fuel fabrication, not carbon free
- Risks of accidents uninsurable
- Decommissioning costs not included
- UK unable to privatize its nuclear industry
- High waste disposal costs are imposed on future generations
- No safe long-term disposal yet found
- Fusion *still* "40 years" off

## Barriers to change

***“... the biggest obstacles to the take up of technologies such as renewable sources of energy and "clean coal" lie in vested interests, cultural barriers to change and simple lack of awareness.”***

*- Avoiding Dangerous Climate Change, UK Meteorological Office*

*from <http://www.unepfi.org/ebulletin>*

How do we go back to life  
without fossil fuels?



***Or can we rethink civilization  
in a new and better way?***

# Climate Change

## *Faith perspective*

***The failure of materialism  
The need for unity  
Ethical principles for sustainability***

International Environment Forum



## The failure of present institutions to address global warming adequately

- No politician will sacrifice short-term economic welfare, even while agreeing that sustainability is essential in the long term
- Deep social divisions within societies and between countries prevent united action in the common interest
- Global warming is just one symptom of the fundamental imbalances in our world
- Our present economic system is incapable of addressing global long-term issues

## Global warming underlines the failure of our economic system

- Economic thinking is challenged by the environmental crisis (including global warming)
- **The belief that there is no limit to nature's capacity to fulfil any demand made on it is false**
- A culture which attaches absolute value to expansion, to acquisition, and to the satisfaction of people's wants must recognise that such goals are not, by themselves, realistic guides to policy
- Economic decision-making tools cannot deal with the fact that **most of the major challenges are global**

(based on *The Prosperity of Humankind*, Bahá'í International Community, 1995)

## Climate change is a consequence of the dominant self-centred materialism of society

- *The early twentieth century materialistic interpretation of reality became the dominant world faith in the direction of society*
- *Humanity thought it had solved through rational experimentation and discourse all of the issues related to human governance and development*
- *Dogmatic materialism captured all significant centres of power and information at the global level, ensuring that no competing voices could challenge projects of world wide economic exploitation*



## The social and environmental failure of economic development

- Not even the most idealistic motives can correct materialism's fundamental flaws
- Since World War II, development has been our largest collective undertaking, with a humanitarian motivation matched by enormous material and technological investment
- While it brought impressive benefits, it failed to narrow the gap between the small segment modern society and the vast populations of the poor
- The gap has widen into an abyss

*(Baha'i International Community, One Common Faith, 2005)*

## Consumer culture emits greenhouse gases

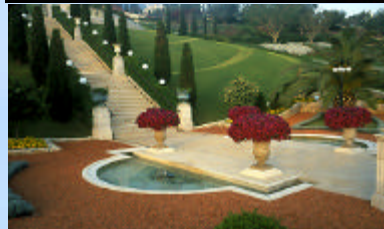
- Materialism's gospel of human betterment produced today's consumer culture pursuing ephemeral goals
- For the small minority of people who can afford them, the benefits it offers are immediate, and the rationale unapologetic
- The breakdown of traditional morality has led to the triumph of animal impulse, as instinctive and blind as appetite
- Selfishness becomes a prized commercial resource; falsehood reinvents itself as public information; greed, lust, indolence, pride - even violence - acquire not merely broad acceptance but social and economic value
- Yet material comforts and acquisitions have been drained of meaning (based on Baha'i International Community, One Common Faith, 2005)
- This self-centred hedonistic culture of the rich now spread around the world refuses to acknowledge its primary responsibility for global warming. The illness is spiritual

# Religion and the challenges of today

- *Progressive globalizing of human experience*
- *Loss of faith in the certainties of materialism as its negative impacts become apparent*
- *Lack of faith in traditional religion and failure to find guidance there for living with modernity*
- *Still longing to understand the purpose of existence*
- *Now there is a sudden resurgence of religion, based on a groundswell of anxiety and discontent with spiritual emptiness.*
- *Desperate people without hope are easily attracted to radical, intolerant, fanatical movements.*
- *The world is in the grip of a war of civilizations based on irreconcilable religious antipathies*
- *This situation paralyses our ability to address global challenges such as climate change*

## We can choose

- Business as usual in a materialistic society ignoring the future
- Retreating to a fortress world of old values
- Making a transition to sustainability with science and religion in harmony



## Unity - the essential prerequisite for action

***The bedrock of a strategy that can engage the world's population in assuming responsibility for its collective destiny must be the consciousness of the oneness of humankind. Deceptively simple in popular discourse, the concept that humanity constitutes a single people presents fundamental challenges to the way that most of the institutions of contemporary society carry out their functions. Whether in the form of the adversarial structure of civil government, the advocacy principle informing most of civil law, a glorification of the struggle between classes and other social groups, or the competitive spirit dominating so much of modern life, conflict is accepted as the mainspring of human interaction. It represents yet another expression in social organisation of the materialistic interpretation of life that has progressively consolidated itself over the past two centuries....***

*(The Prosperity of Humankind, Bahá'í International Community, Office of Public Information, Haifa)*

## Unity essential to remove barriers to collaboration on global warming

***Only so fundamental a reorientation can protect them, too, from the age-old demons of ethnic and religious strife. Only through the dawning consciousness that they constitute a single people will the inhabitants of the planet be enabled to turn away from the patterns of conflict that have dominated social organisation in the past and begin to learn the ways of collaboration and conciliation. "The well-being of mankind," Bahá'u'lláh writes, "its peace and security, are unattainable unless and until its unity is firmly established."***

*(The Prosperity of Humankind, Bahá'í International Community, Office of Public Information, Haifa)*

# Global warming is incompatible with SUSTAINABLE DEVELOPMENT

*The concept of sustainable development was defined and put on the international agenda by a World Commission created by the United Nations and chaired by Norwegian Prime Minister Gro Harlem Brundtland. (World Commission on Environment and Development (Brundtland Commission) 1987: Our Common Future).*

**“Development that meets the needs of the present generation without compromising the ability of future generations to meet their needs”**

UN Commission on Environment and Development 1987

The nations of the world have repeatedly accepted this as a goal and priority.

## Sustainability – an ethical concept

- We are trustees, or stewards, of the planet's vast resources and biological diversity
- We must learn to make use of the earth's natural resources, both renewable and non-renewable, in a manner that ensures sustainability and equity into the distant reaches of time.
- This requires full consideration of the potential environmental consequences of all development activities
- We must temper our actions with moderation and humility
- The true value of nature cannot be expressed in economic terms
- This requires a deep understanding of the natural world and its role in humanity's collective development both material and spiritual
- Sustainable environmental management is not a discretionary commitment we can weigh against other competing interests
- It is a fundamental responsibility that must be shouldered, a pre-requisite for spiritual development as well as our physical survival.

## **Sustainability requires rethinking economics**

- The present economic system is unsustainable and not meeting human needs
- 50 years of economic development, despite some progress, has failed to meet its objectives
- The global economic system lacks global governance
- It is not the mechanisms of economics that are at fault, but its values



## **Economics for people**

**Economics has ignored the broader context of humanity's social and spiritual existence, resulting in:**

- **Corrosive materialism in the world's more economically advantaged regions (and global warming)**
- **Persistent conditions of deprivation among the masses of the world's peoples**

**Economics should serve people's needs; societies should not be expected to reformulate themselves to fit economic models.**

**The ultimate function of economic systems should be to equip the peoples and institutions of the world with the means to achieve the real purpose of development: that is, the cultivation of the limitless potentialities latent in human consciousness.**

*(adapted from Bahá'í International Community. *Valuing Spirituality in Development*, 1998)*



## Values for the economic system

- .Society needs new value-based economic models**
- .The aim should be a dynamic, just and thriving social order**
- .Strongly altruistic and cooperative in nature**
- .Providing meaningful employment**
- .Helping to eradicate poverty in the world.**
- .Able to accept responsibility for and address global warming**

(adapted from Bahá'í International Community, *Valuing Spirituality in Development*, 1998)

## The Golden Rule

- Do unto others as you would have others do unto you.
- Does a minority of high energy consumers have the right to cause such damage to others and to future generations?
- Many faith-based groups are drawing increasing attention to the ethical implications of excessive consumerism and one of its impacts, global warming

# JUSTICE AND EQUITY

**It is unjust to sacrifice the well-being of the generality of humankind -- and even of the planet itself -- to the advantages which technological breakthroughs can make available to privileged minorities.**

**Only development programmes that are perceived as meeting their needs and as being just and equitable in objective can hope to engage the commitment of the masses of humanity, upon whom implementation depends.**

(adapted from Baha'i International Community, *Prosperity of Humankind*)

## Solidarity

The poor are most vulnerable to climate change and least able to protect themselves.

We should consider every human being as a trust of the whole.

The goal of wealth creation should be to make everyone wealthy.

Voluntary giving is more meaningful and effective than forced redistribution.

## Cooperation and Reciprocity

Cooperation and reciprocity are essential properties of all natural and human systems, increasing in more highly evolved and complex systems. They will be necessary to find solutions to global warming



## Trustworthiness

Trust is the basis for all economic and social interaction

Public opinion surveys show little trust in politicians and business, key actors in this area

Re-establishing trust will have to be part of the solution to global warming



## Moderation in Material Civilization

**The civilization, so often vaunted by the learned exponents of arts and sciences, will, if allowed to overleap the bounds of moderation, bring great evil upon men.... The day is approaching when its flame will devour the cities...**

Bahá'u'lláh (1817-1892)

Global warming is a perfect illustration of this

## Contentment – moderate lifestyles

All faiths have taught the spiritual value of a simple life and detachment from material things:

**...be content with little, and be freed from all inordinate desire.**

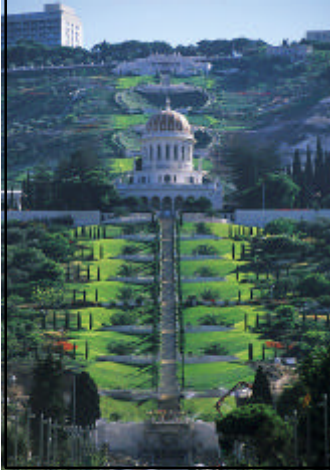
(Bahá'u'lláh)

What does this imply for the consumer society and its energy consumption?





Climate change is an issue on which all religions can find common ground



## Values for a sustainable society

- Justice
- Solidarity
- Altruism
- Respect
- Trust
- Moderation
- Service





## Religion can

Strengthen the ethical framework for action on climate change

Educate about values and global responsibility

Create motivation for change

Encourage the necessary sacrifices



Global warming and the resulting climate change challenge our generation in fundamental ways. Science alone cannot solve the problem

*Thank you*