Big Picture

BRINGING CUTTING-EDGE SCIENCE INTO THE CLASSROO

HEALTH AND CLIMATE CHANGE

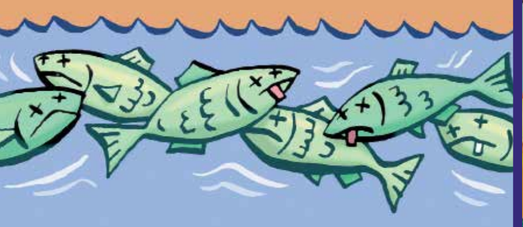
Carbon and climate:
Why climate change threatens us all

Carbon cycles through organic and inorganic stores over timescales ranging from hours to millions of years. Since the Industrial Revolution, humans have begun generating huge quantities of greenhouse gases, particularly carbon dioxide and methane, significantly affecting the carbon cycle. In particular, the build-up of greenhouse gases in the atmosphere is driving dramatic changes to the Earth's climate. These changes threaten to have serious, even catastrophic effects on human health and welfare.

AGRICULTURE AND AQUACULTURE

We can expect:
- Crop failure due to drought, flooding, salt water contamination
- Disrupted farming of fish, shellfish etc.
- Mass migration
- Urban overcrowding
- Conflict over water or food supplies

The impact will be:
- Famine, malnutrition, displacement
- Loss of livelihoods, hunger, displacement
- Mental trauma (e.g. anxiety, depression)
- Poor sanitation
- Injuries



FLOODS AND STORMS

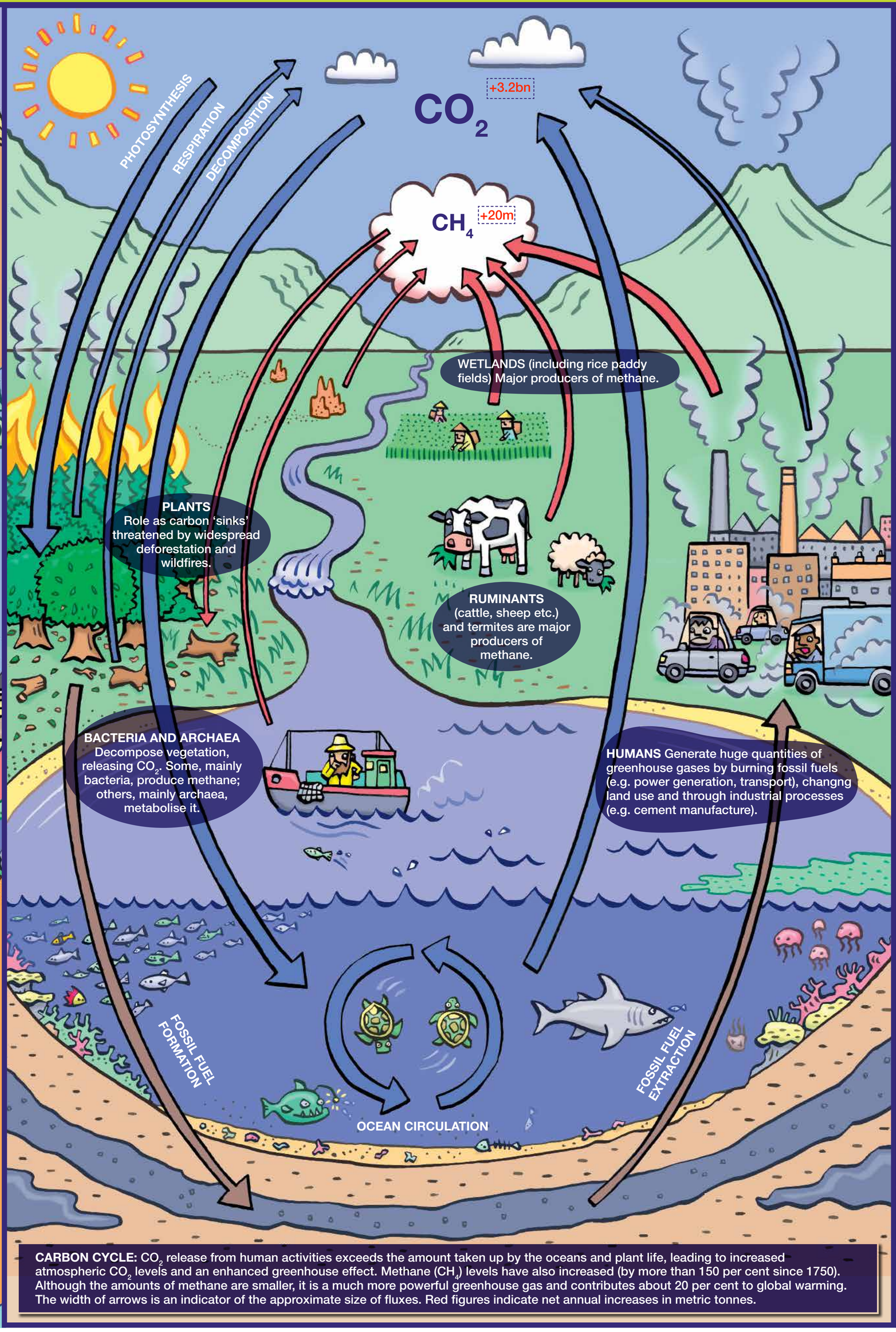
We can expect:
- Flooding, storm surges due to extreme weather
- Severe storms
- Contaminated water supplies

The impact will be:
- Drowning and injuries
- Damage to property and people
- More diarrhoeal disease, other water-borne infections

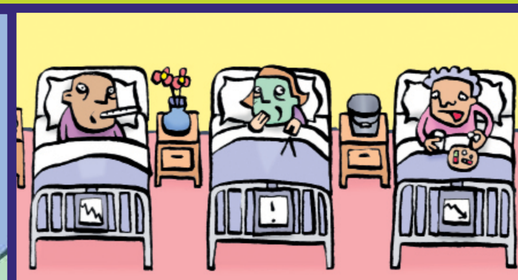
OCEANS AND ACIDIFICATION

We can expect:
- Sea level rise, caused by ice sheet melting and thermal expansion of seas
- Dissolved CO_2 lowers pH, acidifying oceans and weakening shells of marine organisms
- Collapse of coral communities and associated fisheries
- Toxic algal blooms

The impact will be:
- Coastal flooding, loss of land, settlements, infrastructure
- Massive ecosystem disruption, affecting fish stocks and coral
- Loss of protective barriers at coast, more flooding
- Poisoning; loss of fish stocks due to 'dead zones'



CARBON CYCLE: CO_2 release from human activities exceeds the amount taken up by the oceans and plant life, leading to increased atmospheric CO_2 levels and an enhanced greenhouse effect. Methane (CH_4) levels have also increased (by more than 150 per cent since 1750). Although the amounts of methane are smaller, it is a much more powerful greenhouse gas and contributes about 20 per cent to global warming. The width of arrows is an indicator of the approximate size of fluxes. Red figures indicate net annual increases in metric tonnes.



ECOSYSTEMS AND INFECTIONS

We can expect:
- Environmental changes promote spread of infectious diseases
- Ecosystem disruption changes distribution of disease-carrying organisms
- More interactions between non-immune people and pathogens

The impact will be:
- Epidemics of cholera and tropical diseases such as dengue and malaria
- Infections spread by rodents, mosquitoes etc. move to new areas
- Spread of malaria and other diseases in migrants

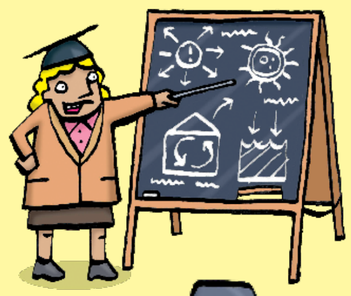
HEAT AND AIR QUALITY

We can expect:
- A hotter Earth
- Accelerated growth of microbes
- Worse pollen and air pollution, especially in cities
- More ground-level ozone

The impact will be:
- Worse heatwaves
- More food-borne disease, e.g. *Salmonella*
- More respiratory conditions such as asthma
- Respiratory and cardiovascular disease

Solutions…

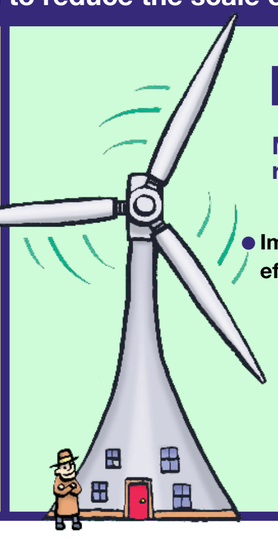
Although the situation is very serious, things can still be done – both to reduce the scale of climate change (mitigation) and to prepare for its impact (adaptation).



Adapt:

Adaptation: Prepare for consequences of climate change

- Increase disease surveillance
- Develop emergency response systems
- Develop public health plans linked to climate threats
- Introduce resilient crops
- Improve healthcare systems (particularly in developing countries)
- Improve design of infrastructure (e.g. houses, public buildings)
- Implement early-warning weather systems



Mitigate:

Mitigation: Stabilise and then reduce greenhouse gas levels

- Improve energy efficiency
- Switch to renewable energy sources
- Lower energy usage
- Capture and store carbon, chemically or biologically
- Preserve forests

Illustrations: Glen McBeth

Big Picture **is a free post-16 resource for teachers that explores issues around biology and medicine.**

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