

Gathering storm

The human cost of climate change



Friends of the Earth
Les Amis de la Terre
Amigos de la Tierra

Gathering storm

The human cost of climate change

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Friends of the Earth International is a federation of autonomous environmental organisations from all over the world. Our members, in 61 countries, campaign on the most urgent environmental and social issues of our day.

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Face up to



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Summary

People will be exposed to unacceptable risks for as long as governments ignore the immediacy of the dangers posed by human-induced climate change. Negligence at the national level is mirrored by complacency at the international level with the failure of the world's historical polluters to reduce their carbon emissions.

In November 2000 the world's governments will meet at The Hague to finalise the Kyoto Protocol, the key environmental treaty to tackle climate change. Decisions taken at this summit, known as COP6 (the sixth Conference of Parties to the United Nations Framework Convention on Climate Change), will determine the ultimate environmental effectiveness of the Protocol.

There is growing evidence that human activities are affecting the Earth's climate and that climate change is the most significant global environmental issue facing the world today. In this report Friends of the Earth International demonstrates the urgency of action needed to halt climate change (Part 1).

While governments have been prevaricating in conference halls and meeting rooms, a trail of climate disasters has wreaked havoc with people's lives and livelihoods around the world. Although no individual weather event can be directly attributed to climate change, personal testimonies from survivors of Hurricane Mitch, the Mozambique floods and other events give a chilling insight of what may lie ahead for more of us in the future (Part 2). Tragically such events are often overlooked and quickly forgotten by those unaffected.

Though place and circumstance vary, the survivors' common refrain was that people did not have adequate warning to prepare - so the loss of life and livelihoods was all the greater. If we're not ready for the events of today, how are we to be ready for the events of tomorrow?

In the absence of deep cuts in greenhouse gas emissions, climate change threatens more frequent and extreme high-temperature events, droughts, floods, cyclones and storm surges with knock-on effects for ecosystems, fires, pest outbreaks, human health, our settlements and food security (Part 3). For many this could mean home-

lessness, missing relatives, crop failure, famine, disease or death. As today, it is the poorer countries which are likely to suffer most. Avoiding such an outcome will require deep cuts in emissions of greenhouse gases.

The tendency of governments to focus on the politics of a deal rather than making ambitious cuts in the use of fossil fuels means that a distance has been created from the horrors people have faced and will face. Part 4 looks at which countries are blocking action on climate change and proposes solutions for the way forward. Much deeper cuts in greenhouse gas emissions, based on an equitable sharing of the atmosphere, are needed if dangerous climate change is to be averted.

Global protection will only happen when all parties at the climate summit acknowledge the real risks of climate change and their own responsibilities in improving the situation through emissions reductions. Meanwhile governments are failing their people; millions of the world's poorest people are most at risk and citizens around the world are footing the bill.

Given that industrialised countries must make much deeper cuts in their greenhouse gas emissions of as much as 80-90% to keep climate change within acceptable limits while allowing developing countries space to develop, Friends of the Earth International calls on governments to ensure that decisions taken at the Hague:

- Ensure that the Kyoto Protocol results in real and permanent emissions reductions through the development of renewable energy sources and energy efficiency measures;
- Commit industrialised countries to achieving 80% of their Kyoto objective through emissions reductions at home;
- Enshrine principles of equity in the framework for emissions reductions in the next and future commitment periods based on an equal per capita approach and ecological limits.

The Hague meeting is a critical stage in international efforts to stop climate change escalating. Don't let world leaders water it down.

Part 1 - Setting the scene

"This is one of the biggest challenges the country and the world face over the course of the next century."

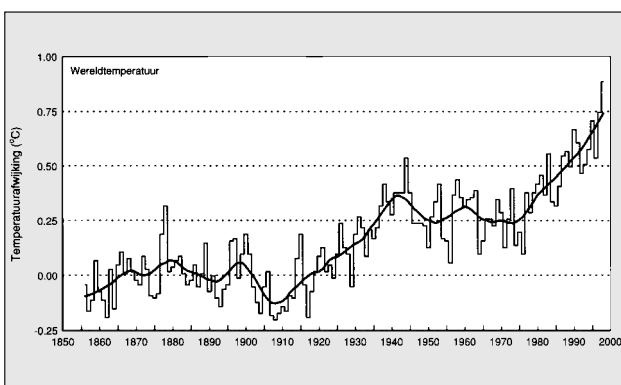
John Podesta, White House Chief of Staff [1].

Our climate is changing and will continue to change in the future. In 1996 the Inter-Governmental Panel on Climate Change (IPCC) - representing the international scientific consensus in the climate debate - concluded that *"the balance of evidence suggests a discernible human influence on the climate"*[2]. The extreme events which have characterised recent trends have all too often been a source of misery for many.

Unusual times

During the closing decades of the 20th century record breaking temperatures and a run of extreme weather events rang the alarm bells. Temperatures have risen about 0.6 °C since 1860 when records began[3]. Six of the warmest years globally occurred during the 1990s with 1998 being the warmest year on record [4]. 1999 was 'only' the fifth warmest year but is remarkable as it occurred despite the cooling influence of La Niña conditions in the Pacific [5].

The 1990s were not only the warmest decade of the century but also that of the millennium according to analyses of proxy indicators of climate (such as tree growth rings and geological records) [6]. 1998 is believed to have been the warmest year of the millennium and 601, the coldest year. The recent warming trend has been paralleled by a number of other disturbing environmental trends.



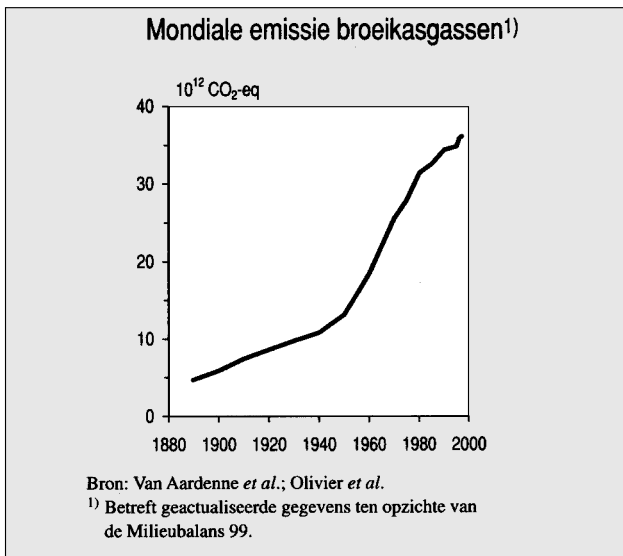
Disturbing Trends

- **Melt down:** Glaciers are melting and the Arctic Sea ice has thinned dramatically since the 1960s and 70s; nearly 40 percent in less than 30 years [7]. A recent NASA aerial survey indicates severe thinning of the Greenland ice sheet.
- **More El Niño events:** The behaviour of the El Niño/Southern Oscillation has undergone a distinct change since 1976, with more El Niños and few La Niñas [8]. Moreover, the 1982-1983 and 1997-1998 events were the strongest for over 100 years, while the longest was 1990-1995. Such behaviour is, as the IPCC remarks, 'unusual in the context of the last 120 years' [9].
- **Fire, frost and disease outbreaks:** In Canada, forest fires, insects and diseases affected twice as much forest area in the 1980s and 90s as in previous decades. In Calgary, the average frequency of large hailstorms increased from one every four years in the 1980s to two every year in the 1990s [10].
- **Changes in the natural world:** Earlier migration and egg-laying dates have been recorded for several bird species along with earlier budburst and flowering of plants [11].

The global warming trend over the last 100 years is, according to the IPCC, *"unlikely to be entirely natural in origin"* [12]. Emissions of so-called greenhouse gases are thought to be a key contributing factor to recent climate changes. The most important of these gases is carbon dioxide which is released when fossil fuels - coal, oil, gas - are burnt.

The significance of fossil fuel driven climate change has been subject to a disinformation campaign by the producers and users of the fuels. Many industrialists and their associations struggled hard to secure good returns on their investments by trying to convince scientists, the public and policy makers that

there is not a problem. All this has been to little avail in the face of mounting evidence of actual climate change. According to chief British and US Meteorologists, the evidence 'confirms that our climate is changing rapidly' [13].



Misery for many

The distressing effects of extreme weather events have been illustrated only too clearly by recent floods in China, Bangladesh, Europe, Venezuela and Mozambique, famine in Sudan, and Hurricane Mitch in Central America. Such events have killed thousands of people, displaced millions and caused massive financial losses [14].

We cannot say for certain that individual events like these are the direct result of human influence on the climate, but they do show how vulnerable we are to climate changes and highlight the inadequacy of existing coping strategies. Reflecting on actual recent events brings home the immediacy of climate change amid the understandable preoccupation with what lies ahead. Dramatic as such crude statistics are, they hardly begin to describe the devastating impact that individual weather events can have on the lives of the people affected - or indeed, the scale of the problem if governments do not act to limit future climate change.

International action to curb climate change

In 1997, in response to the threat of climate change, the world's governments agreed the Kyoto Protocol. This was the long awaited supplement to the UN Framework Convention on Climate Change (UNFCCC), which was

In just one year Aug 1999 - Aug 2000...

Aug 1999 - USA, NORTH AMERICA: Over 250 people die as a result of a heatwave gripping much of the north-east. Agricultural disaster areas are declared in 15 states with losses in West Virginia alone exceeding \$80 million.

Nov 1999 - India, ASIA: A cyclone devastates parts of eastern India, killing up to 10,000 people and washing entire villages into the Bay of Bengal.

Dec 1999 - Venezuela, SOUTH AMERICA: Up to 30,000 people die and 150,000 are made homeless as torrential floods, mudslides and overflowing rivers sweep through the country.

Dec 1999 - France, WESTERN EUROPE: Storms tear through France, kill 83 people and leave many without power for two months.

Feb 2000 - SOUTHERN AFRICA: floods drive more than 100, 000 people from their homes in Mozambique, Botswana and South Africa. Thousands are stranded on treetops in Mozambique and the risk of disease threatens a major public health crisis.

Apr 2000 - Ethiopia, AFRICA: Drought and forest fires devastate crops in Kenya and Ethiopia threatening the livelihoods of 8 million people.

Aug 2000 - India, ASIA: heavy flooding in north-eastern India makes at least 4.5 million people homeless, kills more than 400 and causes devastation to crops and infrastructure.

Aug 2000 - US, NORTH AMERICA: forest fires in the US set about 4.3 million acres (1.74 million hectares) ablaze. This makes the fire season to date one of the worst on record, with winds whipping flames as high as 80 feet (26 metres). Some of the fires are expected to burn until the autumn snow arrives.

adopted at the Earth Summit in Rio in 1992 and requires nations to protect the climate system.

Under the Kyoto protocol, industrialised nations are committed to reducing their overall emissions of greenhouse gases by 5.2 percent over the coming decade. But the Protocol is yet to enter into force and its agreed targets are only a first step to prevent dangerous climate change. While eighty-four countries have signed the Protocol, only 22 have ratified it and none of these are from the industrialised world [15]. Meanwhile, the target set by the UNFCCC of 1992 (to stabilise emissions on 1990 levels by the year 2000) has been missed by almost all major polluters.

In November 2000, governments will meet again for the sixth Conference of Parties to the UNFCCC (COP 6). Their task is to finalise the details of the Kyoto Protocol. It is vitally important that the decisions taken do not water down this key environmental agreement - unless we want extreme weather events to become the norm.

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Part 2 - Survivors speak out

“It didn’t seem like much at first ...” Julian Cisnero, a farmer from Chinandega, Nicaragua who lost his entire harvest.

What happens when a hurricane hits or storm waters flood? While these are not a new hazard to people in many parts of the world, their occurrence still makes it impossible to sustain crops and livelihoods. Many people have suffered great personal tragedy too, losing family, friends and their homes. Presented here are the stories of survivors and others affected by recent extremes - not just of the day of the event but also afterwards. Such stories give a penetrating insight into the scale of disruption that people could increasingly face as climate changes.

1 Central America: hurricane

NEWS FLASH: OCTOBER 1998. NICARAGUA

Hurricane Mitch roared through the Caribbean to Nicaragua at wind speeds of up to 290 kilometres per hour killing some 10,000 people in floods and mud slides. It was the first time in 100 years of observation that four Atlantic Hurricanes were raging at the same time. Nearly two years on, people are still suffering - from disease, homelessness and limited supplies of food [1].

Letter from Josefina Ulloa Velasquez, from Leon, Nicaragua - Hurricane Mitch survivor - November 15, 1998.

Friends, it is not easy to write since my words will narrate the pain of the tragedy of these 16 days past. From the first sound of the alarm on the night of the storms I could not sleep. At dawn I took my son Carlos Jose and cousins to Posoltega. Because all the roadways had been destroyed, and no transport could function, we had to walk, and on the way the first impact we really registered was the environmental destruction, the uprooted trees.

People had to form human chains to cross chasms where bridges had been swept away. When we arrived at the small community of La Virgen where my sister lives, we found her house buried under six meters of mud and

debris. Inside you could see how the mud had made its way over the beds and tables. We visited my brothers’ next and one was crying because it seemed everything had been destroyed, but by chance the path of the water had missed the homes of both my brothers.



Extreme rainfall during Hurricane Mitch caused huge mudslides in Nicaragua, Larry Towell

We found many bodies without heads, and severed limbs scattered. Cries for help could be heard emanating from the mud. People were still trapped where so many trees had fallen and we lacked the rope necessary to haul survivors out of the mud. One woman who was alive when we managed to pull her out of the mud died soon after.

Returning to my own village, I found similar horrors. Four thousand homes were destroyed and I found corpses hanging from the few trees that were left standing; on the ground being picked at by dogs; some burned and yet others semi-burned in abandoned efforts at cremation rendered impossible by the mud and water. The most terrible sight was two blocks from my uncle’s house, two women who had been giving birth at the time the flood hit were found dead. One child was only partially born, and the infant’s faces and chests had been

partially eaten by the dogs. We are still trying to incinerate and bury the corpses that remain.

Every day following the storm, we worked from 5am to midnight helping people who were so desperate that they sometimes fought over food. My defenses are low now and my nerves have been shattered by the horror of it all. I was so afraid when the storm hit that my body shook. Now conjunctivitis, micosi, (a type of fungal infection), and diarrhoea are setting in on people. In my family, eight people have been killed. And in my mother's family, 40 have been killed. Good friends, that is all I can write today. What can be said for my family?

Two years on, Josefina looks back on those days and tells what has become of the people she wrote about.

To this day, my sister's garden contains the buried remains of the bodies we found there. They had come in search of shelter and died there – we couldn't find their families. We felt impotent in the face of so much destruction. We tried for instance to give some words of hope to the bereaved, but it was difficult to know what to say to them.

Before the storm hit Nicaragua, in the few reports that were broadcast, the Government assured us that we were safe; that the storm would hit Honduras. So people were completely unprepared and suffered all the more because of it. I think that if people could have known that the storm was actually heading for them, they could have at least looked for shelter and brought their children in off the streets. Even after disaster struck, the President said that help wasn't necessary.

Today 350 families live in urban Santa Maria but because they are agrarians, they have no means to generate an income in an urban slum. Some women go to work in Minowa as domestic workers, but they've lost their autonomy and their identity. Many have since emigrated to places such as Costa Rica because conditions are so cramped here and they are living so closely with people they don't know.

Other tensions have developed since the storm too. People formed strong bonds to get through the ordeal and then faced homelessness, migration and separation. Regular social networks were broken and communities live at greater distances to one another. Combined with the pressure of unfamiliar and confined residential space, at times now this leads to conflict and even domestic violence. Prior to their relocation, each family had much more space to occupy, they grew their own

mangoes and oranges to sell at the local markets. This local economy no longer exists. They are called the 'dammificados' – the new label for the hapless survivors of Hurricane Mitch.

Every soul in the country was affected in one way or another. Now, whenever there is rain, people begin to shake with fear, they are in shock and many suffer psychosomatic problems, such as insomnia and headaches. Respiratory and renal infections, malaria and dengue fever are wrought by the appalling environmental conditions, poor nutrition and post-traumatic stress. I think people need counselling.

2 Africa: floods

NEWS FLASH: FEBRUARY 2000. MOZAMBIQUE

Five straight days of unseasonal downpours caused the worst flood in living memory in Mozambique [2, 3]. More than 100,000 people were forced to flee their homes and thousands were stranded in treetops. With rising floodwaters and a chronic shortage of clean drinking water, the risk of a malaria and cholera epidemic threatened a major public health crisis.

Interview with Gina Mamanoela, from Maputo, Mozambique - Debt relief worker - July 14, 2000.

When it started raining, we thought it was just normal rain and we didn't know how strong it was outside the town. We only realised this was a catastrophe when we saw it on television. Reports showed that the whole region was destroyed and many people were hurt, but it still seemed to be a distant threat. It was February when it started here in the town of Maputo where I live. It's low-lying, but not too low, which is why at first the floods didn't seem so bad. It wasn't until the evening that we saw the water coming. We knew we were in trouble then and people started to cry. Two of my aunts, who were visiting me at the time, were stranded at my house, distraught. For two whole months they couldn't get back to their children. Can you imagine being separated from your children in those conditions for two months?

Next morning, I found I couldn't leave the house and it stayed that way for many, many days. Now, in July, the way is passable, but still difficult to navigate and I've lost part of my house to the floods.

Help is not on the way because the Government focused its efforts only on the areas that were completely destroyed. In these areas they are starting to bring help,

but in other damaged areas such as mine, no help will come. This means that the water isn't clean and that on top of everything else, people are suffering with cholera and malaria.

Outside the town, 80 percent of people are farmers or, rather, were farmers. The bridges and roads were destroyed so connections between Maputo and central Mozambique no longer exist. Farmers that lived in these areas relied on agriculture for food and the roads and bridges to take excess produce to market. Now they can do neither of these things: so eating and working are both impossible. Instead they are living off tangerines and slowly starving. No help is on the way for these people either – because they don't own houses at all now so they aren't regarded as legitimate storm victims. People who lost their crops and livelihood don't seem to qualify for help. Those that can – the young ones - are fleeing to the city, but the older folks can't make the trip. City folks don't even want to drive into the country now because in their eyes the desperation has made it a dangerous place.

Members of my family living outside Maputo tell me they are dying - they can't survive on the local fruit that is the only edible thing still growing.

The worst thing about this is the impact on children. So many of them were separated from their parents during the floods and many have lost their parents, but don't understand their loss. Instead they keep asking 'when are mama and papa coming home?' For adults, when someone disappears in a flood you quietly know that you won't see them again, but for the children it's different. They don't know if their parents are merely in another part of the country, on their way home. The doubt always lingers with the children.

3 Central Europe: heatwave and fires

NEWS FLASH: JULY 2000. CENTRAL EUROPE

High temperatures claimed 40 lives in mainland Greece, Bulgaria, Kosovo, Italy and southern France [4]. Romania was badly affected. Around 800 Dutch tourists were evacuated by government when enormous fires, spurned on by the heat-wave blazed out of control on the Greek island of Samos, engaging 25,000 fire fighters. Fires were reported in Southern Croatia and the South of France where two lives were claimed in July.

Interview with Lavinia Andrei, from Rumania - NGO Coordinator - July 12, 2000.

You know something is awry when a two month heat-wave is broken by the showering of hail stones the size of golf balls, as it was in the north of Romania some days ago. Animals and people were injured and property damaged, but for the rest of the country, the rains have failed and the heat wave persists with devastating impact. Survival means successful crops for 35 percent of the working population of Romania. For them, agriculture is the only source of income. None could afford to insure their crops against failure and that's why, after this drought, their livelihoods have been completely destroyed. The animals are dying while the people become the poorest of the poor.

4 Western Europe: freak gales

NEWS FLASH: DECEMBER 1999. WESTERN EUROPE

Winter storms hit Western Europe hard as the 20th century closed. Freak gales ripped through northern and southwest France, killed 83 people, toppled electricity pylons and knocked out up to a quarter of the country's power network. Thousands of people were left without electricity over the Christmas days and millennium celebrations. In France alone, the gales destroyed about 300 million trees and caused an estimated 10 billion Euro worth of damage. In Germany, the storms killed at least 17 people [5].



Manfred Uselmann

Interview with Walter Trefs, from the Black Forest, Germany - retired forester - August 14, 2000.

I was at home when the gale force winds reached 180km per hour. My house is very sheltered, so I did not realise at first what was going on. I went up to the roof to fix a loose tile - I probably should not have done that, as I could have been blown off. While I was on the roof I looked over to the forest and I saw the trees bending over like crazy. And then I heard a crash. I heard the forest collapsing. That sound - it was scary.

I thought that people might be trapped, so I set off in my car, with my chainsaw. I did not get very far. Incredible, only half an hour or so of gale force winds had done this. There were people on the street, about 15, further away, and they were all trapped, surrounded by big fallen trees. But I could not rescue them alone. I fetched some neighbours and together it took us about 2 hours to get through. The elderly people that had been trapped were in shock and there was also a person in a wheelchair. One car had been completely crashed by a tree. The people were lucky they got out... This rescue operation really made it clear to me that this was not a normal storm. This one completely flattened the forest. When I saw it I could not believe it. Not just old trees had been hit, but also the young ones. There was literally no tree standing where the centre of the storm had been. When I saw what the storm had done to houses in the village I thought of the hurricane pictures that you see on TV, from the USA. There were roofs lying 30-40m away from the houses they used to sit on.

The weather is changing and the forest shows it to us. We should listen. There are ticks now up here, where it used to be too cold for them. I can see the changes, I know this forest so well. What makes me desperate is that after the clearing up was done, everyone forgets. It is just business as usual. But it is not. There will be more storms, and more damage.

Everyone is affected, already now, by the massive amounts of wood on the market. The prices have halved since the storm, so everyone is affected, not just those whose houses were damaged. In the 1980s the forest showed us that we were releasing too many pollutants. It died of

acid rain and we took action. We woke up. The forest and the storms are now giving us the same signals. But it seems all people want to do is go back to their everyday routines.

'We are already in the middle of climate change. Extreme weather conditions have increased drastically. The gale Lothar gives us an idea what we might have to expect in the future' Klaus Töpfer, head of UNEP
Frankfurter Rundschau, Dec 29, 1999.

5 Asia: floods

NEWS FLASH: OCTOBER 1999. INDIA

On October 29 windspeeds of 250-260 km per hour drove sea levels to rise up to eight meters, flooding the Indian state of Orissa. Most living things were swept away and for the survivors, little remained by way of food with the cattle all perished, food crops destroyed and salt pounded into the barren fields [6].

Interview with Pravin Nair, a Delhi resident who went to Orissa to help clean up after the storms - July, 2000.
Eight months ago it was - a terrible storm in the state of Orissa. It was one of the worst catastrophes in the area for 600 years and people had not been warned. There was no system to warn people of the approaching danger. Instead, the Meteorological office told people that the storms would only hit Bangladesh. It was absolutely heartbreaking.



Cyclone hits the Indian state of Orissa, Henk Braam.

It is in this area that we have taken up the work of reconstruction. Fourteen districts were very badly affected by the wind and waves. Over 10,000 people were washed away and agriculture was totally destroyed in these areas. For the first seven to ten days no relief arrived. With no power, no telephones, the Government virtually collapsed and could not deliver much by way of help.

They had lost their homes, crops and cattle. By the time I arrived, the area had been cleared to a certain extent and so it seemed to me that the worst aspect of it is the repercussions - the fact that people have no way for a livelihood. Salt water has ruined the land - people lost their seeds and just....everything. Terrible disease, no clean water to drink, malaria escalated and cholera broke out. All the children's books were washed away and their exams were upon them so we started by providing books.

The land will one day recover, but it will take a long time.

6 Asia: forest fires

NEWS FLASH: JUNE 2000. INDONESIA

In early June spot fires broke out in the forests until as many as 120 spot fires were raging in Sumatra and Kalimantan. Smoke from the fires and high levels of pollution caused large scale respiratory problems for local people. Food production was severely affected by the changes to the micro-climate. Fires occur naturally in these regions particularly in the drought periods, but their incidence is made greater by large-scale land clearance for plantations.

Interview with Anung Karyadi, from Jakarta, Indonesia - Environmental campaigner - July, 2000.

People find it harder to get around because poor visibility is a serious danger. On top of causing illness and death, the immobility limits people's ability to earn an income to feed themselves. Two days ago I heard that the real impacts now are on the transportation. Now it takes at least eight hours to get between two towns when it would normally take four.

We anticipate that things will get worse as they did after the biggest forest fires in 1997 placed an enormous burden on the economy. Echoes of the impacts of those fires are visible still and are still spreading.

All this is happening because plantation owners clear

the land with fire before planting. The micro-climate has changed in Indonesia and this helps the fires to get out of control.

7 Canada: ice storm

NEWS FLASH: January 1998: CANADA

Canada experienced its worst ice storm in memory. More than a million Canadians were without power as emergency crews struggled to repair the damage caused by a massive ice storm. The storm subsequent power cuts were blamed for 16 deaths in eastern Ontario and southern Quebec [7].

Interview with Ariane Connor, from Montreal, Canada - Student - August 14, 2000

I knew something was very wrong when 12 hours later the electricity still had not gone back on. In the middle of winter it is rarely out of order more than three hours.

By the Tuesday/Wednesday I was starting to get an idea of how grave the situation was. I live next to Mont Bruno - and the forest. We started hearing the scream of crashing trees in the mountain and on our properties. Since I had no TV or radio, the only news I got was from friends at work I would call in Montreal. I had no clue that the situation was so widespread otherwise.

By the time we went out into civilisation to buy candles, kerosene etc. - the shelves were EMPTY. Everyone was buying all the wood, generators, candles, batteries, kerosene that they could get their hands on. There was nothing left anywhere. Even the large warehouse stores were empty.

The worse thing was the cold. I do not mind the dark; but the cold gets to you after 48 hours. And hearing the trees crash. We feared that the trees were about to crash down on the house, or that the roof would cave in from the weight of the ice. By the time we cleared the roof (with axes, picks, etc) there was easily 4 feet of ice.

Many homes were without electricity for close to 8 weeks. In a Canadian winter, this is no treat. The army was called in to patrol our abandoned suburb. It was very strange: you would drive around and there were no lights, no circulation, roads were blocked everywhere due to the fallen trees and debris. Some people froze to death, there were accidents related to people trying to heat their homes without the adequate equipment (camping stoves, etc).

Hundred of electrical towers literally crumbled. Hydro-Quebec's main line came down and so did its back-up line. Electricians from all over North America came to help. All of Montreal was blacked out; police and fire trucks patrolled the streets.

I think that the only long-term effect is the fear that it will happen again. We now know that it is possible. I did not return to my home for two whole months. In the following years, insurance rates went up for everything.

The weather is getting crazier and crazier. I have noticed that people are realising it more and more. My guess: global warming. Maybe this was just a freak occurrence? I have no idea, I am not a scientist. But people are worried about it recurring.

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Part 3 - A Climate of Change

“It is no longer a question of whether the earth’s climate will change but rather when, where and by how much [1].” Robert T. Watson, Chairman of the United Nations Inter-Governmental Panel on Climate Change.

The appalling experiences described by the survivors of recent weather events could become more common if we fail to take action to cut emissions of greenhouse gases. Indeed, changes in climate and sea level will be most immediately felt through more frequent and severe extreme events, such as heatwaves, floods, cyclones and storm surges.

Such events, overlain on a more gradual change in environmental conditions, would have serious knock-on effects for ecosystems, fires, pest outbreaks, human health, our settlements and food security [2]. While many uncertainties remain over precisely how we might be affected, two things are clear. First, no one is immune to the possible consequences of climate change. And second, while some people may benefit or be able to adapt (at a cost), millions of others could face hardship or even death as a result of our pollution of the atmosphere with greenhouse gases.

A warmer world

Over the last decade, scientists have become increasingly confident that if we do not curb emissions of greenhouse gases, the world’s climate will change and sea levels will rise.

According to the IPCC, if current trends persist, global mean surface air temperature could rise by 1-3.5 °C by 2100 relative to 1990 levels [3]. This would represent a greater average rate of warming than any seen in the past 10,000 years. As the world warms, average sea level is also expected to rise - by between 15 cm and 95 cm by 2100 relative to 1990 - due to thermal expansion of the oceans and melting of glaciers and ice-sheets.

The IPCC observes that even *‘small changes in the mean climate or climate variability can produce relatively large changes in the frequency of extreme events’* [4].

Particularly disturbing is the suggestion in some studies

that El Niño events - a major source of climatic disruptions around the world - may become more intense and/or more frequent [5, 6, 7]. Moreover, there is a risk of *‘surprises’* - sudden shifts in climate - due to irregularities in the response of the climate system.

Regionally, the extent and character of climate change will vary markedly from place to place. In general, climate models show the greatest warming at the poles and greatest changes in precipitation in the tropics. Similarly, regional sea level changes will depend in part on land movements (including those due to over-extraction of groundwater) and ocean currents.

Beyond this, it is difficult to say exactly how climate will change locally as models do not represent climate change well on this scale and local factors such as deforestation and urbanisation will have a significant impact. Even so, climate models remain the best tool we’ve got for forecasting the future. Indeed, it would be a fool who ignored the insights of the best information we have to date.

The world picture

The impacts of climate change will vary markedly from place to place depending not just on the magnitude of the predicted changes, but also on the sensitivity of local systems to change and people’s ability to adapt. A 1998 report on regional vulnerability to climate change together with more recent sophisticated modelling studies present a disturbing vision of the world in years to come [8, 9, 10].

The most recent study focuses on the world in 2080 if we do nothing to mitigate our emissions of greenhouse gases [11]. Based on output from one computer model, global temperatures are projected to rise by 3 °C above 1990 levels by this date while sea levels are calculated to increase by 40 cm - that is, close to the IPCC’s best estimate of potential changes.

Water Resources

Climate change is predicted to have major impacts on regional water resources bringing drought to some areas, floods to others and changes in the timings of wet and dry seasons. Large changes are predicted for river runoff with decreases in Australia, India, southern Africa, most of South America and Europe and the Middle East. Increases in runoff are anticipated across North America, Asia, particularly central Asia and central eastern Africa. In areas where runoff declines, water quality may also deteriorate due to increased concentrations of pollution.

The biggest concern, however, is water availability. At present, 1.7 billion people - or nearly one-third - of the world's population live in countries suffering water stress (defined as using more than 20 percent of their annual renewable resources). As climate changes, both the number and distribution of people experiencing water stress will change.

Between 2.3 and 3.2 billion people could experience a deterioration in conditions of at least 10 percent by 2050 - a figure that rises to between 3 and 3.6 billion by 2080. Areas experiencing increased water stress may include North Africa, the Middle East and the Indian subcontinent. Areas that may experience an improvement in water stress levels include China and the United States.

The expense required to improve water management systems could be prohibitive for poorer nations where access to clean, safe water is already at a premium. Even wealthier countries may find it difficult to justify the expense of improvements or they simply may not have the time to implement the changes required to avert serious consequences.

Rising seas

Rising sea levels due to climate change will put millions of people in coastal areas at increased risk of flooding and coastal erosion.

Currently, an estimated 10 million people a year are at risk of flooding from storm surges. This could have risen to 94 million by 2080, with the bulk of the increase (about 70 percent) being accounted for by climate change. Even these startling figures could be overly conservative as they assume levels of flood protection evolve with increasing GDP.

Typical effects of varying levels of sea level rise [12]

Sea level rise (cm) above 1990 levels

100	----- 70 million people and 70 countries below the 100-year storm surge level, 85% Male, Maldives inundated
90	----- 65% Marshall Islands and Kiribati inundated
80	----- 6% Belize inundated, 2% of land in Senegal lost
70	----- 1 400 km² of land in Japan below high tide level,
60	----- 3 million people vulnerable 10% of land in Bangladesh and 3% in the Netherlands lost
50	----- Most beaches in Alexandria, Egypt, eroded
40	----- 20-40% USA wetlands eroded or inundated
30	----- 18 million additional people experience yearly storm surges
20	-----

The majority of people affected (60 percent) would be along coasts in southern Asia from Pakistan, through India, Sri Lanka and Bangladesh to Burma. A further 20 percent is accounted for in South East Asia (Thailand, Vietnam, Indonesia and the Philippines). In addition, substantial numbers will be affected in eastern Africa (South Africa to Sudan, including Madagascar, the Mediterranean from Turkey to Algeria and western Africa (Morocco to Namibia). More than 90 percent of the number of people flooded each year would live in these five regions.

In developed countries, the primary cost of storm surges is likely to be economic due to the high concentration of cities and industrial infrastructure in coastal zones. Warning systems and insurance may insulate people to a degree, but individuals may still face the trauma of having their homes flooded. In developing countries the cost is as likely to be measured in lives as in dollars.

Small island states, together with low-lying deltas in developing countries, are particularly vulnerable to sea level rise. In the absence of adaptation measures, tens of millions of people in Bangladesh alone could become environmental refugees if sea level rises by one metre (this is the high end of the IPCC's estimate for 2100).

While adaptation is possible for most areas, it would require long-term planning and incur substantial costs. This may be viable for wealthy countries where the cost is a tiny percentage of GDP and for those, like the Netherlands, which have established methods for controlling floods. However, for others the cost of protective measures could amount to several percentage points or more of their hard-won GDP each year. For many small island states adaptation costs would be prohibitive, amounting to 34 percent of GDP in the case of the Maldives [13].

Food Security

Food security in the future will depend not only on what happens to crop yields as climate changes but also on people's ability to adapt and, critically, on whether they have the means to cover any local shortfall.

In general the agriculture over much of the developed world is expected to benefit from climate change, while the developing world, with the exception of China, will lose out [14]. Crop yields in mid- to high latitude countries such as the European Union, Canada, Japan and China are anticipated to improve slightly over the next 80 years. However, over the same period, crop yields are expected to decrease in low latitude countries such as Africa, the Middle East and particularly India.

During spells of drought or flooding, some regions, particularly the most vulnerable ones, may face much more serious conditions than indicated above. This is because the models used to look at impacts on crop yields ignore the impact of climatic extremes and the possible spread of pests and diseases and assume, amongst other things, optimal management regimes.

The extent to which farmers would be able to adapt will vary from region to region. Farming systems in industrialised countries such as America and Australia tend to be highly adaptable although short-term losses can be incurred during extremes. Subsistence farmers and pastoral peoples - who make up the bulk of the population in areas such as sub-Saharan Africa, south, east and Southeast Asia, tropical areas of Latin America and some

Pacific island nations - are particularly vulnerable. Indeed, it seems highly unlikely that greater productivity elsewhere will solve these countries' food security problems.

Currently, 800 million people are malnourished despite an adequate supply of food globally. Existing food shortages locally are not due to lack of food globally, but poverty, inadequate infrastructure and other social, economic and political factors which constrain people's ability to cover any shortfall. By the 2080s, the number at risk of hunger could rise by an additional 80 million people due to climate change. Africa, in particular, will feel the brunt of marked reductions in food production and increases in the risk of hunger with an extra 55 - 70 million people at risk.

Human health

Climate change could do much to offset the considerable gains in human health over recent years. Direct impacts include increased loss of life and illness due to heat stress in warmer areas and fewer cold related deaths in colder ones. Respiratory and allergic disorders may rise due to increases in some air pollutants, pollens and mould spores as well as fires [15]. Extreme weather events will bring death, injury, psychological effects and spread diseases - such as cholera - associated with contaminated water supplies.



An English/Malaysian poster warns people to check tiger mosquitos breeding places because they carry dengue fever. The Wellcome trust.

Climate change will also affect the incidence of diseases spread by insects, ticks and rodents. Of particular significance will be changes in the potential for transmission of vector-borne infectious diseases such as malaria, dengue fever, yellow fever, schistosomiasis, Lyme disease and viral encephalitis.

Of the infectious diseases, the prospects for malaria are the most worrying. Currently, 2,400 million people are at risk from malaria and about one million people die each year from the disease [16]. While the numbers affected by malaria are likely to rise in future through population growth, climate change will add to the problem. By 2080, a further 290 million people could be at risk of contracting *falciparum* - the most dangerous form of malaria - through climate change. The greatest increases are likely to be in China and central Asia. Parts of the eastern USA, China, Europe and central Asia could also experience an extension to the transmission season of up to five months.

The actual health impact of climate change in particular regions will hinge critically on the availability of appropriate health services. While well-resourced nations may well be able to minimise the suffering involved, people in poorer countries with inadequate health provision could be at increased risk. The most vulnerable would be those living in remote rural areas and the urban poor.

Regional outlook

If anything, the impact of the full onslaught of the multiple stresses that may be induced by climate change is clearer on the regional level. Climate change impacts will vary dramatically around the world depending on local vulnerability. Vulnerability hinges not only on the climate change itself, but also on the sensitivity of the systems involved and people's ability to adapt. It also takes some account of existing trends and in particular the fact that climate change in many areas will occur against a backdrop of continuing poverty and debt, population growth, land degradation and so forth.

A major study by the IPCC of regional vulnerability shows that while in general the wealthier countries have the infrastructure to cope, regions such as Africa - which have contributed the least to the problem - will suffer far more [17]. What is also apparent is that within individual regions, the urban elites are likely to fare better than the urban poor or the many living in remote rural areas.

Africa

'Africa is the continent most vulnerable to the risks of projected changes because widespread poverty limits adaptation capabilities... global efforts will be necessary to tackle the potential health effects.' [18]

Changes in climate could add to existing pressures arising from biodiversity loss, resource depletion and land degradation, further aggravating problems of food security and conflict. The scope for adaptation is probably at its most limited in this region due to the wide prevalence of poverty, weak institutions and poor infrastructure.

The biggest threat to African people is likely to come from extreme events, which may increase the frequency of floods, droughts and storm surges. People living in marginal areas may be forced to migrate to already over-stretched urban centres.

Water stress is likely to increase with all the consequent problems for human well being. More droughts taken together with other factors (such as poverty and conflict) could seriously increase the risk of malnutrition and hunger particularly in southern Africa. The sub-tropics may, however, benefit from increased horticultural production at higher altitudes.

The coastal nations of west and central Africa (e.g., Senegal, Gambia, Sierra Leone, Nigeria, Cameroon, Gabon, Angola) will suffer the effects of erosion due to sea level rise together with the associated risk of inundation and extreme storm events. Similarly, the east coast may suffer as erosion reduces the protective effects of coral. The agriculturally productive, northern part of the Nile delta may be lost through flooding and erosion with loss of agricultural land and urban areas.

Socio-economic impacts could be severe in densely populated coastal areas and reductions in hydropower would adversely affect industrial production. The economy of many countries could be put under further pressure by losses in agricultural productivity - agriculture currently contributes 55 percent of total African exports.

A warmer climate may open up new areas for malaria and lead to increases in yellow and dengue fevers as well as other diseases. As well as causing illness and death these changes will have far-reaching economic consequences.

Polar regions: Arctic and Antarctica

'...communities will face profound changes that impact on traditional lifestyles'[19].

This region comprises the areas within the Arctic Circle and those within the Antarctic Convergence. As a result of climate change land ice and sea ice will melt.

Substantial loss of sea ice is expected in the Arctic which may even melt thoroughly every summer by 2050 [20].

Arctic indigenous peoples following a traditional lifestyle, in particular, will encounter major challenges in adapting to the new environment with its altered landscape, changes in drainage patterns and ecological changes. A small northward extension of farming may be possible but fish production could drop.

The icy land interior of the Antarctic is less likely to change over the next 100 years and the temperature rise envisaged is unlikely to have any great human impact as few people live there.

Asia (Middle East and arid Asia)

'Water shortage, already a problem in many countries ... may be exacerbated by climate change' [21].

This region ranges from Turkey in the West to Kazakhstan in the east, from Yemen in the south to Kazakhstan in the north. Water resources, livestock and grasslands are likely to be most vulnerable to climate change.

Climate change may exacerbate existing water scarcity problems in many countries, adding to international tensions over resources. River flows of some rivers would initially increase because of glacial melt leading to increased risk of flash floods. Ultimately this pattern would reverse as the glaciers disappear.

Water shortages and land degradation may threaten food security in some areas. Beyond this, little is currently known of how agricultural production may be affected, except that wheat yields in Kazakhstan and Pakistan may decline.

Changes in both water availability and food supply could adversely affect people's health, as could an increasing incidence of vector borne diseases and heat stress. There are a variety of adaptation strategies which could be employed, although the capacity of many countries (particularly those in economic transition) to implement them is questionable.

Asia (temperate Asia)

'The major impacts are projected to be large shifts of the boreal forests, the disappearance of significant portions of mountain glaciers, and water supply shortages' [22].

Temperate Asia includes countries between 18 °N and the Arctic Circle e.g., Japan, Korea, Mongolia, most of China and Russian Siberia. Overall a decrease in water supply is likely. Beyond this, little is known above how climate may change due to major uncertainties over the prospects for the monsoon and El Niño. Agriculture may be positively or negatively affected, although crop production is expected to increase in northern Siberia and decrease in the southwest.

Rising sea levels would aggravate existing problems in subsiding delta areas and saltwater intrusion would become a greater problem. A 1m sea level rise would threaten certain important coastal areas including the Japanese coastal zone, on which half of Japan's industrial production is located including the cities of Tokyo, Osaka, Nagoya.

Heat stress, mortality and illness are projected to more than double by 2050 and risk areas for vector borne diseases could expand. Increases in non-vector-borne diseases such as cholera, salmonella may also occur. The scope for adaptation varies markedly across the region with countries like North Korea being most vulnerable.

Asia (tropical Asia)

'Low income rural populations that depend on traditional agricultural systems or on marginal lands are particularly vulnerable' [23].

This region covers South and South East Asia. Higher temperatures and changes in precipitation are expected to result in glacial melt in the Himalayas and increased danger from flooding in the short term, but reduced river flows could add to existing problems with water stress in the dry season.

Crop yields could change significantly with possible reductions in rice, wheat and sorghum yields. Low-income rural populations dependent on traditional agricultural systems or marginal lands are particularly vulnerable to the impact of climate change on crop production.

Coastal areas especially at risk from sea level rise include: the delta regions of Bangladesh; Myanmar; Vietnam

and Thailand; and the low-lying areas of Indonesia, the Philippines and Malaysia. Socio-economic impacts would be particularly acute in major cities, tourist resorts and agricultural and fishing areas.

The incidence of vector-borne diseases such as malaria and dengue fever is expected to increase as is the occurrence of water borne and water related infectious diseases.

Australasia

'Changes in food production elsewhere ... would have major economic impacts on the region' [24].

This region covers Australia, New Zealand, and their outlying islands. Much of the region has scarce water resources. In Australia, any reduction in water availability is likely to increase competition between uses. Low-lying islands are also vulnerable to reductions in freshwater supplies. More frequent high-rainfall events may help to a degree but could increase flooding, landslides, and erosion.

The outlook for agriculture is mixed. Conditions for crops in New Zealand and, in the short term at least, Australia could improve. However, gains may be offset by possible increases in fires and insect plagues. Aboriginal land management strategies are likely to be fairly resilient to climate change.

Parts of the region's coasts and coastal settlements and infrastructure are at risk of flooding and erosion as sea level rises. Particularly vulnerable are the indigenous coastal and island communities of the Torres Strait and of New Zealand's island territories.

Economically, Australia is particularly sensitive to fluctuations in world food prices while bleaching of tropical coral reefs (including the Great Barrier reef) would impact tourism. Financial losses could also be incurred in the forestry sector as a result of fires or extreme events.

Significant health impacts could arise due to increases in heat stress, dengue and water or sewage-related diseases. The potential for adaptation exists throughout much of the region, but not without economic cost.

Europe

'Even though capabilities for adaptation in managed systems in many places in Europe are relatively well established, significant impacts of climate change still should be anticipated' [25].

The Europe region covers the area of the continent west of the Urals and part of the Caspian Sea. In Europe, the greatest impacts are likely to be on agriculture and other water-dependent activities. The outlook for agriculture is mixed with possible increases in winter crops in many areas, but reductions in summer crops in western and southern Europe. Particularly vulnerable are low-income countries, such as Croatia and Turkey [26].

Populations in the floodplains of western Europe could face an increased risk of flooding, while water-shortages could increase in southern Europe. Reductions in runoff would also add to existing pollution problems in rivers. The progressive disappearance of Alpine glacier mass would affect water supplies, shipping and hydropower, while reductions in snow-season in the Alps and elsewhere would negatively affect the ski industry.

Urbanisation of many coastal areas limits the scope for adaptation to sea level rise. Most at risk are: the Dutch, German, Ukrainian and Russian coastlines; some Mediterranean deltas and Baltic coastal zones. Existing problems of intrusion of salt water in the Netherlands and elsewhere could also be aggravated as sea level rises.

Heat related deaths are expected to increase with rising temperatures along with the incidence of vector borne diseases. Viral encephalitis already occurs in parts of western Europe and Scandinavia, while Leishmaniasis could spread from the rural Mediterranean into eastern Mediterranean and the incidence of Lyme disease is also sensitive to temperature [27].

Latin America

'Increasing environmental deterioration ... would aggravate socio-economic and health problems, encourage migration of rural and coastal populations and deepen national and international conflicts' [28].

All continental countries from Mexico to Chile and Argentina and their adjacent seas are covered by this region. Changes in water availability would affect hydro-power generation and grain and livestock production, particularly in Costa Rica, Panama and the Andes Piedmont as well as parts of Chile and western

Argentina. Such impacts could lead to conflicts between users, regions and countries in the region.

Loss of coastal land and salt-water intrusion due to sea level rise could occur in low-lying coasts and estuaries in Central America, Venezuela, Argentina and Uruguay.

Decreases in crop production are also projected for several major crops in Mexico and Central American countries, Brazil, Chile, Argentina and Uruguay, compounding the already serious problem of malnutrition for some Latin Americans. Extreme events - floods, droughts, frost, storms - are likely to damage agricultural production, including valuable export crops such as bananas in Central America. The livelihoods of indigenous communities will be threatened if productivity of traditional crops is reduced.

Particularly vulnerable groups include those living in shantytowns in areas around large cities, especially where those settlements are established in flood-prone areas or on unstable hillsides. Vector-borne diseases are predicted to extend southward and to higher altitudes, adding to the existing chronic problems of malnutrition and disease experienced by some populations.

Existing economic difficulties, together with social and economic problems (such as inequitable land distribution) are likely to make adaptation difficult.

North America

'North America (is) moderately to highly sensitive to climate change, and the range of estimated effects often includes the potential for substantial damages' [29].

This region covers Canada and the United States south of the Arctic circle. Heavy rainfall and severe flooding interspersed by prolonged dry periods and/or drought are predicted. Water resources would be affected by projected increases in runoff in winter and spring and water shortages in summer, with the Great Plains and prairie regions being particularly vulnerable. Declines in river flows could also cause water quality to decline.

Although on a continental scale the vulnerability of crop production is thought to be low, losses will occur at local and regional levels. Climate change may have positive effects on some warm season crops but crop yields could go down in the eastern, south-eastern and corn belt regions. More frequent and larger forest fires are predicted.

A 50 cm rise in sea level from climate change could inundate 8,500 to 19,000 km² of dry land, with highly developed estuarine beaches being among the worst affected. Risks to property and human health could increase as a result of increased exposure to wildfire, landslides, and extreme weather events. Similarly, the numbers affected by heat stress could change, as might the incidence of viral encephalitis [30].

The occurrence of simultaneous stresses would make adaptation difficult even in this well-resourced and technologically advanced region and the likely response of different sub-regions is likely to vary markedly.

Small Island States

'The small island states are extremely vulnerable to global climate change and global sea level rise. In some cases, migration and resettlement...might have to be considered' [31].

Low-lying island states and atolls in the Caribbean, the Indian Ocean, the Pacific Ocean and the Mediterranean are particularly vulnerable to the impacts of sea level rise, including: the Bahamas, the Maldives, Kiribati, the Marshall Islands, Malta and Cyprus. These small island states could lose significant land area with sea level rise from 50 cm to 1m. Many islands with higher elevations could also be seriously affected as their settlements and infrastructure are generally concentrated in the coastal zone.

As climate changes and sea level rises, islands could experience increased freshwater shortages due to saline intrusion and/or changes in precipitation patterns. Health problems such as heat-stress, cholera, dengue fever and malaria would stress the already over-extended health systems of most small island nations. As the stresses mount and the land shrinks, so income from tourism - a major earner for many islands - is likely to fall.

The high cost of coastal protection relative to the island economies means that ultimately, the only option for many people will be to leave their homeland and experience the trauma of being a refugee.

Making a difference

From the above, it is apparent that nobody is immune from climate change and that adaptation, even where possible, could be expensive. Given this and the difficul-

ty of planning in an atmosphere of uncertainty, the best insurance is to avoid dangerous climate change. Actions taken now to reduce greenhouse gas emissions has the power to affect the extent and timing of future climate change and its impacts.

The ultimate objective of the UN FCCC requires stabilisation of greenhouse gases in the atmosphere 'to prevent dangerous anthropogenic interference with the climate system' and that this occurs 'within a time frame sufficient ... to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner'. From the above, current patterns of emissions would have a devastating impact on the lives and livelihoods of millions of people across the world and doing nothing is not an option.

Unfortunately, regardless of what measures we take, we are already committed to future climate change for decades to come due to the long life-time of many greenhouse gases in the atmosphere and time lags in the response of the atmosphere-ocean systems. Moreover, sea levels could continue to rise for a century or more.

What then will it take to keep climate change within tolerable bounds?

Containing future climate change will require stabilising atmospheric concentrations of greenhouse gases. A recent report examined the implications of stabilisation of atmospheric concentrations of carbon dioxide at 750 or 550 parts per million (ppm) [32]. As a result of measures to this effect, climate changes could be delayed by 50 to 100 years. In either case, this would buy more time for adaptation.

Even so, impacts under both scenarios are severe. The 750ppm scenario includes significant losses of tropical forests in Latin America and increased water stress in some countries in Europe and the Middle East. Stabilisation at 550 ppm avoids these impacts.

Compared with an unmitigated emissions scenario, the 550 ppm stabilisation scenario would:

- postpone a 20°C rise in global temperature above present levels from 2050 to 2100
- delay a 40 cm rise in sea level by 2080 for 25 years
- reduce the number of people experiencing increased water stress in 2080 by two-thirds to one billion, benefiting, in particular, Pakistan and Sudan
- reduce regions experiencing lower cereal yields - Africa and India would still be badly affected but parts

of Latin America would be better off

- cut the annual number of people flooded in 2080 by 80 percent to 19 million
- lessen the numbers of people at risk of malaria in 2080 by 40% to 175 million

While this illustrates the improved future prospects that can be achieved by stabilising carbon dioxide concentrations at 550 ppm, millions of people could still experience severe disruptions to their lives. Indeed the risks are still greater than suggested here as projections are based on a best-estimate of future climate change and take no account of the potential for surprises. With this in mind, and taking a precautionary approach, we need to stabilise atmospheric concentrations at closer to 450 ppm [33].

What will it take to stabilise atmospheric concentrations of greenhouse gases at a tolerable level? According to the IPCC, stabilising concentrations of carbon dioxide alone would require cuts in global emissions of 60-70 percent [34]. The precise timing would depend on the control strategy adopted, but stabilisation at 450 ppm or 550 ppm could require cuts of this magnitude to be achieved as early as 2050 [35, 36]. International commitments to-date fall far short of this and until upgraded, the lives and livelihoods of millions around the world remain at risk.

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Part 4 - Time for action

“The best predictions available indicate potentially severe economic and social dislocation for present and future generations, which will worsen international tensions and increase risk of conflicts among and within nations. It is imperative to act now” [1].

Statement from the world’s governments meeting in Toronto June 1988 at the International Conference on the Changing Atmosphere: Implications for Global Security.

As this report shows no one is immune to the impacts of climate change - though some people can expect to face far greater difficulties than others. The signing of the UN Framework Convention on Climate Change (UNFCCC) at the Earth Summit in 1992 seemed a great step forward in international efforts to tackle climate change. But 8 years later, there is little sign of the commitment and action required to cut emissions to the levels required to avert dangerous climate change.

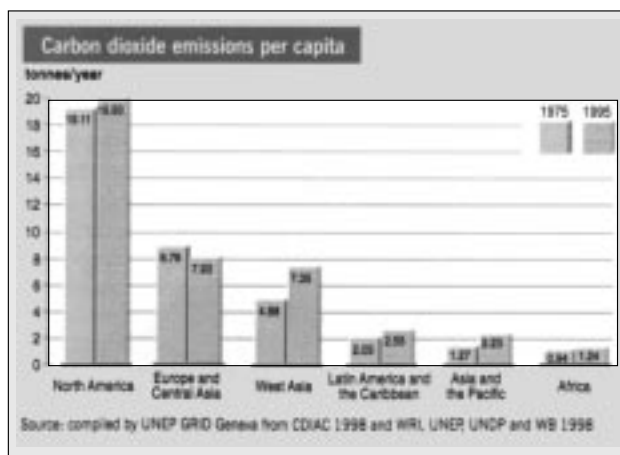
The intervening years have been distinguished by attempts by the arch polluters to weasel out of any form of meaningful commitment and out of the actions required to implement them and by their blatant hypocrisy in terms of their own funding practices. What is needed is for countries to once and for all recognise their responsibilities and commit to a fair share of the cuts required to avert dangerous climate change.

A lack of commitment

Developed countries are overwhelmingly responsible, historically and currently, for the great majority of greenhouse gas emissions. Industrialised countries generate over 62 times more carbon dioxide pollution per person than the least developed countries[2]. The world’s top three emitters, for example, the US, Australia and Canada generate 5.99, 5.14 and 4.67 tonnes of carbon (tC) per person. Compare this to India, 0.31tC; Bangladesh, 0.05tC; and Ethiopia, 0.03tC [3]. Recognising this - and the fact that the greatest priority for developing countries is the alleviation of poverty - the UNFCCC requires the industrialised world to make the first moves on cutting emissions.

Yet signs of real action to cut emissions remain woefully weak among the world’s heaviest polluters. Greenhouse gas emissions in the OECD countries rose have risen by 4% between 1990 and 1996 (OECD, 1999), despite the fact that most of these countries pledged to return their greenhouse gas emissions to 1990 levels by the year 2000 [4]. Governments are failing to meet their commitment to stabilise at 1990 levels let alone begin making the cuts in emissions as agreed under the Kyoto Protocol. Worrying indeed given that the Intergovernmental Panel on Climate Change (IPCC) has indicated that world-wide cuts in carbon dioxide of at least 60-70% percent are necessary to guarantee no further increase in atmospheric concentrations [5].

Many EU countries are set to miss their Kyoto targets altogether. Among the European nations, only the UK and Germany are even coming close while the rest have actually increased their emissions [6]. The Netherlands committed to a 6 percent emissions cut but has instead increased emissions by 17 percent.



Elsewhere, the same curious absence of efforts for self-preservation is revealed in the fact that greenhouse gas emissions in Australia have also risen. Australia agreed to limit growth in greenhouse gas emissions to eight percent above 1990 levels by 2010. Instead, by 1998, emissions were up 16.9 percent on 1990 levels [7]. Defending this position, the Environment Minister, explained that the rise in greenhouse gas emissions from

stationary sources is due to Australia's strong economic growth. This is short-termism at its worst as it ignores the future cost to the economy of climate change.

Meanwhile US Ambassador Mark Hambley claims that the United States is taking the fight against climate change seriously and is committed to an equitable global solution [8]. However, the US, the world's top emitter of greenhouse gases says its ratification depends on the 'meaningful participation of developing countries'.

Despite being the world's leading greenhouse gas emitter, the US has tried to shift responsibility, with some claiming that the Kyoto Protocol "...is blatantly unfair because it exempts developing nations from making any commitment to reduce their emissions of greenhouse gases. As a result, nations like China, India, Mexico and Brazil, [...] will be given a free pass while the United States is forced to struggle with the Kyoto treaty's stringent mandates" [9]. Not only is the US position in direct conflict with the spirit of the Climate Convention there seems little possibility of the US meeting its targets - unless they start taking their commitments seriously now.

Fair shares

Equity and responsibility are at the heart of the UN Climate Convention, which says *'The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities'*.

Friends of the Earth International argues for the 'equity' principle to be the guiding principle in determining national commitments under the Convention. In particular, Friends of the Earth advocate that targets should be derived on the basis that everybody has a right to an equal share of the available capacity of the atmosphere. This means countries have an equal per capita share of whatever level of greenhouse gas emissions it is deemed safe to emit while keeping climate change within tolerable bounds.

The present situation is not equitable. A per capita approach requires Annex 1 countries (industrialised countries, primarily responsible for human-induced greenhouse gas emissions) to ultimately reduce their emissions by 80-90 percent [10]. On current understanding of what may constitute a dangerous climate change, this would have to be achieved by 2050. Such reduc-

tions both reflect the particular responsibility of industrialised countries to cut their emissions while also allowing some room for manoeuvring amongst developing countries.

Friends of the Earth believes that such 'fair share' targets are achievable and should be the long-term aim of the UNFCCC.

Funding hypocrisy

Working at cross-purposes to the objectives of the Kyoto Protocol to cut greenhouse gases are the public funds spent by developed countries (working through institutions, such as the World Bank and Export Credit Agencies) on fossil fuel intensive projects at home and abroad. In the United States US\$ 216 billion were dedicated to fossil fuel intensive projects in developing countries in the five years to 1999 [11], much of which was channelled through publicly-financed institutions.

Public funds are being used to wreck the environment while the fossil fuel industry continues to enjoy access to the US\$ 30 billion per year in direct subsidies in addition to the public funds that are run through development agencies and other indirect national subsidies. In the EU the figure is similar [12].

In this way, Americans and Europeans are being taxed to wreck the climate on the one hand, and then being told they'll have to pay to clean it up on the other. The by-product is that key developing countries are financially encouraged to "keep feeding from the fossil fuel trough despite US State Department and Senate claims that they need to participate "meaningfully" in the climate agreements [13].

Until effort is made to reduce the amount of fossil fuels burnt, and policy makers put real work into enabling the development of renewable energy sources, the threat of future climate change will continue to grow.

The way forward

The time has never been better for investing in sustainable development with a view to minimising the growing problem of climate change. Few countries have anything to lose by this. Many of the measures required to cut emissions of greenhouse gases (for example, improved energy efficiency and good quality public transport) are consistent with the needs of sustainable development.

Even more to the point is that money spent now could advert serious costs later. By its own estimates, the US will be a major loser in worst-case climate change scenarios. Miami, Washington DC, New York and Boston look set to be affected and New York city with its long coastlines and connecting tunnels would be particularly hard hit by rising sea levels [14].

Complacency on the part of wealthier countries could prove to be the most expensive and painful option. *"The cost of weather related disasters in the year 1998 alone exceeded the costs of all such disasters during the 1980s"*[15]. Economic inequality is likely to increase because of climate change, a situation which is not only inhumane but, also very expensive.

Friends of the Earth International believes that the financial burden of preventative and adaptive measures must be taken by the historical polluters - exactly the countries which are working so hard to water down the Protocol. These costs should not be absorbed by aid or foreign assistance and preventative and adaptive measures must be pursued with respect of the right of low-income countries to develop the infrastructure, economies and stability in line with what they need for sustainable development.

Given that industrialised countries must make much deeper cuts in their greenhouse gas emissions of as much as 80-90% to keep climate change within acceptable limits while allowing developing countries space to develop, Friends of the Earth International calls on governments to ensure that decisions taken at the Hague:

- Ensure that the Kyoto Protocol results in real and permanent emissions reductions through the development of renewable energy sources and energy efficiency measures;
- Commit industrialised countries to achieving 80% of their Kyoto objective through emissions reductions at home;
- Enshrine principles of equity in the framework for emissions reductions in the next and future commitment periods based on an equal per capita approach and ecological limits.

All governments need to acknowledge the risks of climate change - and accept their responsibility for climate change.

The Hague meeting is a critical stage in international efforts to stop climate change escalating. Don't let world leaders water it down.

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<http://listproc.mbnet.mb.ca:8080/guest/archives/>

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