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Mark Lynas has seen the results of man-made climate change across five continents. Only urgent action can now prevent a catastrophe, he argues

Hardly anyone realises it, but the debate about climate change is over. Scientists around the world have now amassed an unassailable body of evidence to support the conclusion that a warming of our planet - caused principally by greenhouse gas emissions from burning fossil fuel - is under way.

The dwindling band of climate "sceptics", a rag-tag bunch of oil and coal industry frontmen, retired professors and semi-deranged obsessives, is now on the defensive. Although names such as Fred Singer, Philip Stott and Björn Lomborg still appear from time to time in the popular press here and in the United States, their views are notable by their absence from the expert literature.

Meanwhile the world as we once knew it is beginning to unravel. The signs are everywhere, even in Britain. Horse chestnut, oak and ash trees are coming into leaf more than a week earlier than two decades ago. The growing season now lasts almost all year round: in 2000 there were just 39 official days of winter.

Destructive winter floods are part of this warming trend, while in lowland England snow has become a thing of the past. Where I live in Oxford, six out of the past ten winters have been completely snowless - something that happened only twice during the whole 30-year period between 1960 and 1990. The rate of warming has now become so rapid that it is equivalent to your garden moving south by 20 metres every single day.

In other parts of the world, the signs of global warming are more dramatic. Over the past three years, researching a book on the subject, I have witnessed major climate-driven changes across five continents, changes that are leaving millions homeless, destitute and in danger.

In Alaska I spent a week in the Eskimo village of Shishmaref, on the state's remote western coast, just 70 miles from the eastern coast of Russia. While the midnight sun shone outside, I listened as the village elder, Clifford Weyiouanna, told me how the sea, which used to freeze in October, was now ice-free until Christmas. And even when the sea ice does eventually form, he explained, it is so thin that it is dangerous to walk and hunt on. The changing seasons are also affecting the animals: seals and walruses - still crucial elements of the Eskimo diet - are migrating earlier and are almost impossible to catch. The whole village caught only one walrus last year, after covering

thousands of miles by boat.

Shishmaref lives in perpetual fear. The cliffs on which the 600-strong community sits are thawing, and during the last big storm 50 feet of ground was lost overnight. People battled 90mph winds to save their houses from the crashing waves.

I stood on the shoreline a year ago with Robert Iyatunguk, the co-ordinator of the Shishmaref Erosion Coalition, looking up at a house left hanging over the cliff top. "The wind is getting stronger, the water is getting higher, and it's noticeable to everybody in town," he told me. "It just kind of scares you inside your body and makes you wonder exactly when the big one is going to hit." In July 2002 the residents voted to abandon the site altogether - a narrow barrier island that has been continuously occupied by Eskimos for centuries - and move elsewhere.

In Fairbanks, Alaska's main town in the interior, everyone talks about warming. The manager of the hostel where I stayed, a keen hunter, told me how ducks had been swimming on the river in December (it's supposed to freeze over in autumn), how bears had become so confused they didn't know whether to hibernate or stay awake, and that winter temperatures, which used to plummet to 40 degrees below zero, now barely touched 25 below.

All around the town, roads are buckling and houses sagging as the permafrost underneath them thaws. In one house, the occupants, a cleaning lady and her daughter, showed me that to walk across the kitchen meant going uphill (the house was tilting sideways) and how shelves had to be rebalanced with bits of wood to stop everything falling off. Other dwellings have been abandoned. New ones are built on adjustable stilts.

Scientists have long predicted that global warming will lead in some places to intense flooding and drought. When I visited China in April last year, the country's northern provinces were in the grip of the worst drought in more than a century. Entire lakes had dried up, and in many places sand dunes were advancing across the farmers' fields.

One lakeside village in Gansu Province, just off the old Silk Road, was abandoned after the waters dried up - apart from one woman, who lives amid the ruins with a few chickens and a cow for company. "Of course I'm lonely!" she cried in answer to my rather insensitive question. "Can you imagine how boring this life is? I can't move; I can do nothing. I have no relatives, no friends and no money." She was tormented by memories of how it had once been, when neighbours had chatted and swapped stories

late into the evenings, before the place became a ghost town.

Minutes after I had left, a dust storm blew in. These storms are getting more frequent, and even Beijing is now hit repeatedly every spring. During an earlier visit to a remote village in eastern Inner Mongolia, not far from the ruins of Kubla Khan's fabled Xanadu, I experienced an even stronger storm. Day was turned into night as a blizzard of sand and dust scoured the mud-brick buildings. I covered inside one house with a Mongolian peasant family, sharing rice wine and listening to tales of how the grass had once grown waist-high on the surrounding plains. Now the land is little more than arid desert, thanks to persistent drought and overgrazing. The storm raged for hours. When it eased in the late afternoon and the sun appeared again, the village cockerels crowed, thinking that morning had come early.

The drought in north-west China is partly caused by shrinking run-off from nearby mountains, which because of the rising temperatures are now capped with less snow and ice than before. Glacier shrinkage is a phenomenon repeated across the world's mountain ranges, and I also saw it at first hand in Peru, standing dizzy with altitude sickness in the high Andes 5,200 metres above the capital, Lima, where one of the main water-supplying glaciers has shrunk by more than a kilometre during the past century.

A senior manager of Lima's water authority told me later how melting ice is now a critical threat to future freshwater supplies: this city of seven million is the world's second-largest desert metropolis after Cairo, and the mountains supply all its water through coastal rivers that pour down from the ice fields far above. It is the snows that keep the rivers running all year round - once the glaciers are gone, the rivers will flow only in the wet season. The same problem afflicts the Indian subcontinent: overwhelmingly dependent on the mighty Ganges, Indus and Brahmaputra rivers that flow from the Himalayas, hundreds of millions of people will suffer water shortages as their source glaciers decline over the coming century.

Unless alternative water supplies can be secured, Lima will be left depopulated, its people scattered as environmental refugees. This is a category already familiar to the residents of Tuvalu, a group of nine coral atolls in the middle of the Pacific. Tuvalu, together with Kiribati, the Maldives and many other island nations, has made its plight well known to the world community, and an evacuation plan - shifting 75 people each year to New Zealand - is already under way.

I saw at first hand how the islands are already affected by the rising sea level, paddling in knee-deep floodwaters during last year's spring tides, which submerged much of Funafuti and almost surrounded the airstrip. Later that same evening the country's first post-independence prime minister, Toaripi Lauti, told me of his shock at finding his own crop of pulaka (a root vegetable like taro, grown in sunken pits) dying from saltwater intrusion. He recalled how everyone had awoken one morning a few years previously to find that one of the islets on the atoll's rim had disappeared from the horizon, washed over by the waves, its coconut trees smashed and destroyed by the rising sea.

However severe these unfolding climate-change impacts seem, they are - like the canary in the coal mine - just the first whispers of the holocaust that lies ahead if nothing is done to reduce greenhouse gas emissions. Scientists meeting under the banner of the UN-sponsored Intergovernmental Panel on Climate Change (IPCC) have predicted a warming during this century alone of up to six degrees Celsius, which would take the earth into dangerous uncharted waters. A few weeks ago, scientists at the UK's Hadley Centre reported that the warming might be even greater because of the complexities of the carbon cycle.

The IPCC's worst-case forecast of six degrees could prove almost unimaginably catastrophic. It took only six degrees of warming to spark the end-Permian mass extinction 251 million years ago, the worst crisis ever to hit life on earth (expertly chronicled by Michael Benton in *When Life Nearly Died*) which led to the deaths of 95 per cent of all species alive at the time.

If humanity is to avoid a similar fate, global greenhouse gas emissions need to be brought down to between 60 and 80 per cent below current levels - precisely the reverse of emissions forecasts recently produced by the International Energy Agency. A good start would be the ratification and speedy implementation of the Kyoto Protocol, which should be superseded after the following decade by the "contraction and convergence" model proposed by the Global Commons Institute in London (www.gci.org.uk), allocating equal per-person emissions rights among all the world's nations.

In the meantime, a network of campaigning groups is currently mobilising under the banner of "No new oil", demanding an end to the exploration and development of new fossil fuel reserves, on the basis that current reserves alone include enough oil, coal and gas utterly to destabilise the world's climate. Searching for more is just as illogical as it is wasteful.

Avoiding dangerous climate change and other large-scale environmental crises will need to become the key organising principle around which societies evolve. All the signs are that few in power realise this - least of all the current US administration, which has committed itself to a policy of wanton destructiveness, with control and exploitation of oil supplies a central theme.

We must abandon the old mindset that demands an oil-based economy, not just because it sparks wars and terrorism, but because the future of life on earth depends on leaving it behind.

Mark Lynas's book High Tide: news from a warming world will be published by Flamingo in March 2004. marklynas@zetnet.co.uk

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