

Climate change

# The long road from Kyoto

Environmentalists may remember 2003 as the year in which the Kyoto Protocol died. But even if the international community's first attempt at tackling climate change is in terminal decline, this isn't necessarily a defeat for the planet: it might force people to look more realistically at our ability to slow down — and adapt to — the changing climate.

The Kyoto Protocol, agreed in 1997, aims to reduce emissions of carbon dioxide and other greenhouse gases to 5% below 1990 levels by 2012. Although 120 nations are now on board, to come into effect, the treaty must be ratified by a group of countries that together accounted for at least 55% of the world's greenhouse-gas emissions in 1990. The United States, the single biggest emitter, pulled out of the agreement in 2001, leaving only Russia capable of breathing life into the protocol.

As *Nature* went to press, this looked very unlikely to happen. Russian President Vladimir Putin made half-hearted remarks about the treaty at the World Climate Change Conference in Moscow in September. And this month, at a meeting of parties to the Kyoto Protocol in Milan, high-level advisers to the Russian government said that the country would not ratify the protocol, at least in its current form, because it would stifle Russia's economic growth. In the slump that followed the collapse of communism, Russia's greenhouse-gas emissions fell after 1990, giving it a lot of unused 'allowable' emissions that could be sold as 'carbon credits' to other governments. But Russia's emissions, along with its economy, are now on the rise again. Without bankable unused emissions, and without US customers to buy these carbon credits, it looks ever more likely that Russia will say no to the treaty altogether.

"The common view here is that Kyoto doesn't live any more," says economist Henry Jacoby, who co-directs the Massachusetts Institute of Technology's Joint Program on the Science and Policy of Global Change. "It was a heroic effort, but it will simply not work the way it was conceived. It will be necessary to go back, rethink the various elements of the agreement, and start again."

The hope of many is that most of the individual commitments thrashed out during the Kyoto negotiations will live on even if the protocol dies, such as the voluntary commit-



J. RAEDLE/GETTY IMAGES

At the extreme: unusual weather conditions saw people struggling against Hurricane Isabel in Virginia (above) and wrestling with bush fires in California.



ments to emissions reductions undertaken by Britain and Germany.

But it remains unclear whether such initiatives will have a significant impact on our climate, which is already feeling the heat. This year, two papers in *Nature* showed that

global warming is having a noticeable effect on living systems. A meta-analysis of studies of more than 1,700 species showed that the geographic ranges of animals are shifting an average of 6.1 kilometres per decade towards the poles<sup>1</sup>. And climate change, in connection with other stresses such as habitat destruction, is threatening the survival of a wide range of species, from mammals to trees<sup>2</sup>.

Meanwhile, we have had a taste of the extreme weather conditions that the media have suggested represent what the future will be like under global warming. In Canada, winter rain brought on a deadly avalanche season. The European continent was hit by summer forest fires and a heatwave that, according to some estimates, claimed more than 30,000 lives. Floods hit southern Asia

and China, Hurricane Isabel lashed the United States, and late-season forest fires ravaged the west coast of North America.

It is impossible to say whether these phenomena were a result of global warming. But there is a growing realization that such weather events are becoming more likely. Scientists have found that the patterns of rainfall are changing — European summers are becoming drier, for example, but with more frequent heavy rainfalls and floods<sup>3</sup>.

How will we face up to the challenges posed by our changing climate in 2004? Earth-system modellers have started to focus on the capacity of smaller regions to adapt to the impacts of climate change. Indeed, regional efforts to combat and adapt to global warming may replace any single overarching scheme such as the Kyoto Protocol. "A homogeneous solution to climate protection is a broken dream," says Hans Joachim Schellnhuber, director of the Tyndall Centre for Climate Change Research in Norwich, UK. "One remaining hope is that it may be superseded by regional initiatives." ■

Quirin Schiermeier

1. Parmesan, C. & Yohe, G. *Nature* 421, 37–42 (2003).
2. Root, T. L. *et al.* *Nature* 421, 57–60 (2003).
3. Christensen, J. H. & Christensen, O. B. *Nature* 421, 805–806 (2003).

M. MEADOWS/AP