An outlook clouded by worries over finance and training . . . Dr Mick Kelly, Dr Phil Jones, Dr Richard Warrick and Prof Tom Wigley, from the University of East Anglia

There by the grace of our friends overseas

Roger Highfield reports on a British climate research unit whose work on the Greenhouse Effect depends to a surprising extent on funding from abroad

WHICH TEAM of British scientists has been sought out by ıce Charles, Margaret tcher, the United Nations the American Governt for advice? The 18-ıg team at the Climatic arch Unit in the Univerof East Anglia, Norwich, arved out a world beating tation for research into of the most complex and ly understood of natural omena—the climate.

e unit's interests cover a span, investigating e best to site wind farms, volcanic eruptions ge the climate, analyses torical weather informaand assessing the ecoic impact of climate ge. But for the past le the unit has specialin studying the Green- Effect — the global ing caused by the burnfossil fuels — and its t on the world's changmate.

ough more money has hrown at the problem in ca, "we have proporly contributed more ur share to understand- problem and its impli-s," said Prof Tom , head of the research The unit's tools have computer models of r systems and analyses on global warming — measurements of air ature at ground level ch are provided by s around the globe and t sea covering much of an.

tists have warned for many years that the Greenhouse Effect may warm the planet. As we increase the burning of oil, coal and petrol, so more carbon dioxide traps infra-red heat that would otherwise escape into space.

Effects of global warming make alarming reading. Sea level rises could flood parts of East Anglia and require huge expenditure on sea defences. A report by Dr Mick Kelly and Ms Jacqueline Karas said the world could warm by another 1·5 degrees Celsius or more between the years 2030 and 2050. Southern England could warm to the temperature of south-west France, with vegetation zones moving several hundred kilometres north.

A warmer Britain could become a dust bowl: the typical "marching pace" for a spruce forest might be less than 20 km a century as seeds disperse, whereas global warming is already moving faster. Because it is difficult for species to adapt quickly to new conditions, some could become extinct, notably the conifer forests of northern Europe.

The work of the unit has only recently become visible to the public: it was not until the succession of warm years through the Eighties, coupled with a panic set off by drought in America last summer, that the Greenhouse Effect leapt out of the laboratory into the political arena and became a talking point for the public. Since then, world leaders, including Mrs Thatcher, have been united in their calls for international action to investigate the problem and look for solutions.

IN BRITAIN, the calls have not yet brought much increased scientific activity, let alone new policies to reduce the burden of gases in the air that we are imposing on future generations. Certainly for the unit, the brouhaha has not produced additional funding, said Dr Richard Warrick, who will be speaking on the subject at the British Association this week.

Astonishingly, British Government departments provided only four per cent of the unit's funding between 1986 and 1988, says its administrator, Dr Janice Darch. Through the research councils, it receives another six per cent. Against this, British industry contributed 45 per cent, but the rest came from the American Government (23 per cent), and the European Commission (17 per cent).

It is ironic that the unit, which specialises on the long-term view of climate change, is too dependent on a short-term outlook for the funding of projects — between one month and four years.

"Long-term research needs long-term support," Dr Warrick said. "With contract money one is constantly reacting to what others perceive as important, which may not be the critical issues such as understanding the science of the Greenhouse Effect."

However, Prof Wigley said that even if more funding could be found, he doubted if there was sufficient talent available to expand his staff. He said: "There is a lack of properly qualified individuals to tackle climate change and the Greenhouse Effect."

One of his concerns is that there appears to be no strong move to train more people in this area. Greater effort to study the effect is critical. Earlier this year, Prof Wigley told a Downing Street seminar attended by seven members of the Cabinet, including Mrs Thatcher, the rise in world temperature this century — about one half a degree Celsius — was faster than has happened in the past 120,000 years.

The main culprit for the global warming is carbon dioxide, released by the combustion of fossil fuels. Britain alone releases 160 million tonnes of carbon a year into the atmosphere. Restrictions on the release of chlorofluorocarbons to the atmosphere, intended to reduce damage to the ozone layer, may have the side benefit of reducing the growth of the Greenhouse Effect. But this will only delay the doubling of the effects of natural carbon dioxide by eight years, from 2019 to 2027.

THE CURRENT decade is certain to go down as the warmest since records began. According to the Climatic Research Unit's Dr Phil Jones, the six warmest years globally since reliable instrumental records began about 100 years ago have all been in the 1980s: in order, 1988, 1987, 1983, 1981, 1980 and 1986.

Global temperatures have risen by about half a degree Celsius since the beginning of the century. However, whether the current warming is due to the Greenhouse Effect, although very likely, remains open. No self-respecting meteorologist, climate modeller or weather watcher will actually say so. The whole point about weather, they say, is that it is changeable.

Dr Mick Kelly said it is impossible to blame the weather extremes of one year on the Greenhouse Effect alone. Although droughts in continental interiors are what one would expect from the Greenhouse Effect, no single event will herald the beginning of the greenhouse, Dr Warrick said.

His caution reflects the complexity of the greenhouse warming. Who, for instance, would have envisaged that efforts to improve the environment by reducing acid rain may be tightening the grip of the Greenhouse Effect?

According to Prof Wigley, up to half of the Greenhouse heating of the global climate during the 20th-century might have been offset by increased cloud albedo — reflectivity — caused by the emissions linked with acid rain. Sulphur dioxide ejected by power stations leads to more sulphate aerosol and cloud droplets. As a result, the reflectivity of clouds increases, cutting the warming effect of incoming solar radiation.

Such complex and intertwining effects must be investigated further; but can the world afford to wait for scientific proof?

ute to a supreme achievement — Bertrand Russell, philosopher

I seem to have been only like a boy playing on the seashore, finding a prettier shell than ordina