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If you haven't as yet read the signs, global warming will create famine and droughts. Steve Connor explains

JAMES Lovelock is convinced climate change is happening faster than anyone predicted and the consequences can be dire for the survival of civilisation in the 21st century because of the upheaval it will cause in terms of famine, drought and mass migration.

The inventor of the Gaia theory — which likens the earth to a living organism — this leading scientist has told the Royal Society in London that humans have in effect declared war on the planetary survival system, causing it to explode out of control. Man-made emissions of greenhouse gases are triggering a positive feedback in the climate in which temperature increases generate further temperature rises and the release of vast amounts of carbon dioxide from natural stores on land and in the oceans.

"I see our predicament as like that faced by any nation that is about to be invaded by a powerful enemy: now we are at war with the earth and, as in a blitzkrieg, events proceed faster than we can respond," he says. "We are in a strange position of living on a planet where climate and compositional change is now so rapid that it happens too fast for us to react to it."

Professor Lovelock's address spells out why he believes change is happening faster than many experts had predicted. "The positive feedback on heating from the melting of floating Arctic and Antarctic ice alone is causing an acceleration of system-driven heating whose total will soon be or already is greater than that from all of the CO₂ pollution that we have so far added." But he believes there is some hope that the natural, "negative" feedback cycles of the planet can be exploited to soak up carbon dioxide from the atmosphere.

Lovelock is not alone. Other scientists have also detected a dramatic decline in earth's ability to soak up man-made emissions of CO₂ and the corresponding acceleration in the rate of greenhouse gas increase in the atmosphere. That more carbon dioxide from human activities is lingering in the air rather than is being absorbed by the world's forests and oceans has alarmed them because they believe this signals a potentially dangerous turn of events for global climate. They fear that a much-anticipated "feedback" in global climate — when increases in carbon dioxide in the air trigger further increases in atmospheric concentrations of the gas — has already begun to occur decades before many predicted.

"We always said that these feedbacks would happen in the future, but what this study shows is that these feedbacks are happening right now," says Josep Canadell, executive director of the Global Climate Project in Canberra, and the lead author of the study.

About half of the CO₂ emissions resulting from human activities are absorbed by natural “sinks” on land and the oceans but the new study shows that the efficiency of these sinks has fallen significantly over the past half century. “What we are seeing is a decrease in the planet’s ability to absorb carbon emissions due to human activity. Fifty years ago, for every tonne of CO₂ emitted, 600 kg were removed by natural sinks. In 2006, only 550 kg were removed per tonne and that amount is falling,” says Dr Canadell.

The study has also found that the amount of CO₂ released into the air from human activities has accelerated in recent years not just because of the growth of the global economy but because, for the first time in a century, the efficiency with which fossil fuels are used has stagnated. The study, published in the journal *Proceedings of the National Academy of Sciences*, estimates that the inefficiency in the use of fossil fuels over the past six years has increased levels of atmospheric CO₂ by 17 per cent, while 18 per cent comes from the decline in the efficiency of natural sinks.

Corinne Lequere, a climate researcher at the British Antarctic Survey in Cambridge, says that stronger winds in the southern ocean, caused by global warming and the loss of the ozone layer, has resulted in more dissolved carbon dioxide in the deep sea being brought to the surface, and consequently less carbon dioxide being absorbed from the atmosphere.

“This is incredibly important. It is bad news because we can’t do much about these natural carbon sinks, but the good news is that we can increase the efficiency of fossil fuel use. I would say this is a wake-up call. Things are happening much faster than we expected,” says Lequere.

As if agreement, a landmark assessment by the UN of the state of the world’s environment paints the bleakest picture yet of earth’s well-being. The warning is stark: humanity’s future is at risk unless urgent action is taken. Over the past 20 years, almost every index of the planet’s health has worsened even as personal wealth in the richest countries has grown by a third. The report by the UN Environment Programme warns that the vital natural resources that support life on earth have suffered significantly since the first such report published in 1987. However, this gradual depletion of the world’s natural “capital” has coincided with unprecedented economic gains for developed nations, which, for many people, have masked the growing crisis.

Nearly 400 experts from around the world contributed to the report, which warns that humanity itself could be at risk if nothing is done to address the three major environmental problems of a growing human population — climate change and the mass extinction of animals and plants.

The report is the fruit of five years’ work by leading scientists and is the fourth in a series since the publication in 1987 of *Our Common Future* by an international commission into the state of the global environment chaired by former Norwegian Prime Minister Gro Harlem Brundtland. Achim Steiner, executive director of the Unep, says the objective of the latest report is not to present a “dark and gloomy scenario” but to make the case for an urgent call to action.

However, the dire state of almost every aspect of the planet’s well-being points to 20 years of missed opportunities.

Steiner says that it is illuminating how, over the past 20 years, the financial wealth of the planet has soared by around a third. “But at the same time it is sobering: much of the ‘natural’ capital upon which so much of human well-being and economic activity depends — water, land, the air and atmosphere, biodiversity and marine resources — continue their seemingly inexorable decline.”

Indeed, the political response to the growing emergency has been limited. “Without an accelerated effort to reform the way we collectively do business on planet earth, we will shortly be in trouble if indeed we are not already,” he says. “There have been enough wake-up calls. I sincerely hope this is the final one. The systematic destruction of the earth’s natural and nature-based resources has reached a point where the economic viability of economies is being challenged — and the bill we hand on to our children may prove impossible to pay.”

The fourth Unep report since the seminal 1987 report of the Brundtland Commission reveals a stark continuation in the environment’s decline. The environmental “footprint” of humanity has increased dramatically in 20 years, with a rising population and increased use of energy, land and other natural resources.

Unep’s Global Environment Outlook (GEO-4) states that the human demand on the planet now means we are living beyond our means. The present footprint is equivalent to 22 hectares per person, whereas the natural carrying capacity of the Earth is less than 16 hectares per person, the report says.

The world economy has at the same time boomed, with the global GDP per capita rising from about \$6,000 to just over \$8,000. But this increased wealth has been geared towards the developed world and has come at an enormous cost to the environment. Available freshwater stocks have declined dramatically since the 1980s. In west Asia for instance, from 1,700 cubic metres per person per year to 907 cubic metres today. By the middle of the century, this is likely to fall still further to 420 cubic metres per person per year. Over the past 20 years, the proportion of fish stocks in the world that have collapsed has doubled from 15 per cent to 30 per cent. At the same time the proportion of fish stocks that are deemed to be over-exploited has risen from 20 per cent to 40 per cent.

The intensity with which agricultural land is farmed has also increased, and with it the burden of soil erosion, water scarcity, nutrient depletion and pollution. In 1987, a hectare of cropland yielded 1.8 tons of produce, but due to intensification this had increased to 2.5 tons.

Energy consumption in developed nations has risen significantly. In Canada and the USA, for instance, the demand for energy has grown by 19 per cent since 1987. Concentrations of carbon dioxide are now about a third higher than they were 20 years ago.

Species of animals and plants are estimated to be going extinct at a rate that is about 100 times faster than the historical record, largely as a result of human activities. Biologists have now classified 30 per cent of amphibians, 23 per cent of mammals and 12 per cent of birds as threatened.

A growing human population, which is expected to reach nine billion by the mid-century, will place increasing pressure on land, water and biodiversity. Land will have to be more intensively farmed or more land will have to be cultivated. “Either way, biodiversity suffers,” the report says. Against a background of continued degradation of the land and oceans, of population increases and of species extinctions, lies the spectre of climate change — one of the biggest threats facing humanity in the 21st century. There is now “visible and unequivocal” evidence that global warming is causing further impacts on the global environment, the GEO-4 report says.

Mike Childs, Friends of the Earth campaigns director, says that the report makes it clear that we need concerted international political action to reduce greenhouse gas emissions and halt the loss of wildlife and ecosystems. “This report clearly demonstrates that we also need a step change in understanding that the steady degradation of the world’s environment threatens the well-being of everybody on the planet. Our response to this planetary emergency must be to harness humankind’s amazing ingenuity to make the next two decades a time of innovation and determination to create a fairer and greener world,” he says.

— The Independent, London.