

In a Warming World, Who Comes Out Ahead?

Shifting temperature
and rainfall could benefit
some areas.

By WILLIAM K. STEVENS

IN a finding fraught with sensitive political implications, some scientists say that if global warming takes its expected course, some parts of the world could come out winners, even while many others reap disaster.

A few regions, mainly in colder climes, may well benefit, according to computer models of climate change. The computer models merely simulate global climate change and are still being refined. They are therefore a rough guide to what may happen to various regions as the world warms, not an exact forecast.

For many other regions, including North

America, the computer models predict both pluses and minuses whose overall balance cannot yet be assessed. But for developing countries, scientists say, the general picture is negative: most are more vulnerable to climate change and less able to adapt to it than are the industrialized nations of the cooler latitudes.

The question of whether some countries might gain from global warming has been bubbling just beneath the surface of discussions about climate change.

Some politicians and environmentalists have been reluctant to confront the issue for fear it might disrupt efforts to forge an international agreement to head off global warming from gases being produced by human activity. Others, including some scientists, assert that while there might be some temporary winners, there will be none over the long run, especially if global warming is severe and if it occurs as rapidly as scientists predict. Not least, they say, the natural ecosystems that undergird

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In a Warming World, Winners and Losers Emerge

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A flood of environmental refugees may become a global problem.

overall economic advantage over the third world.

Countries that see themselves as undoubted losers include small island nations that fear a major rise in sea level and more frequent and severe tropical storms, both of which are expected to result from global warming. These nations have formed the Alliance of Small Island States to press their case for stringent controls on greenhouse gas emissions.

They are preparing to demand that the industrialized countries cut their own emissions and also help the island nations adapt to climate change, said Naresh Singh of Castries, St. Lucia, the executive director of the Caribbean Environmental Health Institute, an umbrella organization for 16 English-speaking Caribbean countries. Mr. Singh is a delegate to the Chantilly meeting.

If the level of the oceans rises by more than two feet by the year 2100, as climate experts predict, low-lying nations like the Maldives and some Pacific islands could be inundated. Other places at high risk include Bangladesh, Thailand, Indonesia, Egypt, coastal China, Louisiana and the southern coast of the North Sea, according to a recent assessment by the Intergovernmental Panel on Climate Change, a body set up by the United Nations to advise the treaty negotiators and their governments.

In general, populations most vulnerable to global warming "are in developing countries, in the lower income groups, residents of coastal lowlands and islands, populations in semi-arid grasslands and the urban poor in squatter settlements, slums and shantytowns, especially in megacities," says a report by the Intergovernmental Panel on Climate Change.

People living in third-world slums are judged more vulnerable because their existence, already precarious, could be made even more so by disrupted food supplies.

Developing countries are more vulnerable because they are more dependent on agriculture, forests and other natural resources for economic health, said Dr. Dennis Tirpak, director of the Environmental Protection Agency's global climate change division, a member of the American negotiating team at Chantilly.

Agriculture in much of the third world is especially susceptible to drought. Global warming is expected to intensify drought in wide areas, and also to cause severe damage to forests and grasslands. On top of this, many third world populations already live on the margins of subsistence, and lack the resources to cope with climatic disruption.

Apart from these broad outlines, the effects of warming appear mixed and quite complicated.

"In some places the climate will get better and in some it will get worse," said Dr. Michael H. Glantz of the National Center for Atmospheric Research in Boulder, Colo. But be-

yond that, he said, much remains unknown. Dr. Glantz, a social scientist, heads a group that studies the impact of climate change on societies and has been trying to encourage discussion and inquiry on winners and losers for some time. Last year he organized an international conference in Malta on assessing winners and losers.

The conference concluded, "There will be advantaged and disadvantaged countries, regions within countries, sectors and populations."

"The identity of those advantaged and disadvantaged will change over time," it said. "There are serious obstacles to their identification."

Dr. Tirpak explained: "It's not a case where you can simply pick a date and have one set of countries that will win forevermore and another that will lose. It is not a very easy thing to characterize."

The Intergovernmental Panel on Climate Change, nevertheless, has tentatively identified potential gainers and losers. The identification is based on results of mathematical simulations of how the earth's climate would behave under global warming, and is therefore uncertain.

"We should not take these studies literally, as a prognosis that every detail will just come as it is written now," Dr. Meyer-Abich said. But he said the general pattern "will not be changed very much" as more is learned.

Effects on Agriculture

The relative advantages and disadvantages are perhaps most tellingly reflected in the effects of warming on agriculture. This will occur in forms like shifting rainfall patterns, drier soil, increased evaporation of surface water, increased loss of water by

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Some of the areas threatened by sea-level rise.

Source: Intergovernmental Panel on Climate Change

The New York Times; Illustration by David Suter

Some poor countries are vulnerable to rising sea levels and spreading drought.

crops and reduced snowpacks in the mountains, resulting in lessened runoff in the spring.

But warming would also bring more rainfall to some areas and more warmth and longer growing seasons to regions that are now too cool for maximum agricultural production.

The following examples of possible gains and losses are not all-inclusive, but suggest the variety and range of changes expected:

Northern Europe would become a winner, according to the intergovernmental panel's analysis. Northern Scandinavia "stands to gain more from global warming than perhaps any other region of the world" because it would become warmer and wetter, the panel's report said. The grasslands that feed Iceland's sheep would become more than twice as productive as they are now.

Yields of grass and potatoes would increase in much of Ireland, Britain, the Low Countries and Denmark. A temperature increase of more than 2 degrees would improve the agricultural potential of much of the European part of the Soviet Union. But substantial decreases in productivity could occur in Southern Europe. A warming of 2 to 7 degrees would enable cultivated areas to creep 500 feet to 2,000 feet closer to the summit of the Alps. Northern Japan, including Hokkaido and the northern part of

Honshu, would enjoy increased yields of rice, corn and soybeans.

By contrast, drier soils would disrupt food production in regions like Northwest and West Africa, the horn of Africa, southern Africa, western Saudi Arabia, Southeast Asia, Mexico, Central America and parts of eastern Brazil.

Prospects for North America

For North America, the overall climate picture is mixed. Large parts of the northern United States and Canada would enjoy a pleasanter climate and attract more inhabitants, Dr. Meyer-Abich wrote in a recent review. In Europe, too, he said, these "privileged regions" would be extended farther to the north.

Agricultural production in the United States would also shift northward, according to a study by the Environmental Protection Agency, with Minnesota, Wisconsin and northern Michigan being gainers. But 10 to 50 percent of all agricultural acreage in the South might have to be abandoned. Production would probably decrease in the Corn Belt. Drier soil would cut yields of spring wheat in Canada, although there would be a small increase near the northern limit of current production. Yields of corn, barley, soybeans and hay would decline in all of Canada but northern Ontario.

A rise in sea level could inundate coastal wetlands, damaging or destroying spawning grounds that sustain commercial fisheries. Beachfront communities would have to invest billions of dollars in coastal protection, and some settled areas on the coast would probably be inundated.

Northern cities would be spared considerable expense in heating costs, snow removal and road main-

tenance. But air-conditioning bills would soar in the South and ski resorts could be in deep trouble.

In one sense, national borders are the wrong framework in which to consider global climate change.

"Looking at it on the nation-state level may not be appropriate," said Dan McGraw, a professor of international environmental law at the University of Colorado. "If significant climate change occurs, it's going to be a lot of individuals in the world who are disadvantaged. At one level, it doesn't matter so much which country they're in."

But when it comes to negotiating the treaties to moderate climate change, it is nations that do the negotiating. On that level, Mr. McGraw said, he has detected a reluctance to discuss winners and losers.

"Some folks feel that any discussion of the question will tend to polarize the possible participants in any sort of international solution," he said. The fear, he said, may be that "as countries start focusing on whether they are likely to be a winner or loser, that will influence whether they cooperate."

Temporary advantage aside, all nations are interdependent in the long run, note observers like William Nitze, a former State Department official who coordinated Government policy on global warming until last September. If the third world suffers, the industrialized countries suffer as well, he said, noting: "Developing countries are a tremendous market for us. We have a large stake in their long-term future prosperity."

Senator Al Gore, a Tennessee Democrat who favors strong action to combat global warming, contends that talk of winners and losers "is just another cop-out that people use for not dealing with this threat."

He cited the prospect of waves of "environmental refugees," fleeing ravaged third world economies or low-lying areas and causing "enormous destabilizing pressures" for industrialized countries.

Worldwide Refugee Problem

The number of refugees could amount to 100 million, said Dr. Michael Oppenheimer, a senior scientist and expert on global warming at the Environmental Defense Fund, a research and advocacy group. The pressure they may bring on the rest of the world "is enough in itself to make people who think they're going to be winners take notice and reassess," he said.

He concedes that if the world warms by only a degree or two over the next century, then "without question, some people could be labeled winners." But with an eight degree warming, the upper limit predicted by some computer simulations, "the world would be so different at those higher levels that it is very difficult to argue that any significant number of people will find it beneficial," he said. "There will be radical change, in other words."

Scientists predict that the rate of climatic change would be faster than at any other time in the last 10,000 years. "If it happened infinitely slowly," Dr. Oppenheimer said, "society could adjust. In a fast-changing world, there are no winners."