

Rajendra Pachauri

*Interview with Dr. Rajendra Pachauri,
Delhi, 31 October 2002*

Among the thousands of scientists who have studied the onset of global warming, there is one—the chief of the 191-nation Intergovernmental Panel on Climate Change (IPCC)—who ought to be in a better position to speak definitively on this subject than any other.

Unfortunately, the IPCC chief is not only an authority but a lightning rod for one of the planet's most politically volatile debates. When the IPCC issued its landmark year-2000 report projecting higher temperature increases than previously expected—and confirming the roles of the oil, coal, and automotive industries in exacerbating these increases—the U.S. government was not pleased. In 2001, under heavy political pressure from the Bush administration, IPCC chairman **Robert Watson** was forced out of his job. He was replaced by **Rajendra Pachauri**.

For this issue, Worldwatch senior researcher Janet Sawin interviewed both Watson and Pachauri on humanity's prospects for both mitigating and adapting to oncoming climate change.

Robert Watson

*Interviews with Dr. Robert Watson,
World Bank, 9 and 19 December 2002*

World Watch: Which questions about climate change do you think are the most important to address in the coming years?

Rajendra Pachauri: There's a whole range of questions that are important, and you can't see them in isolation. You really need to understand the extent and nature of climate change to begin with. And that [requires] a very strong research underpinning. Then you need to look at what the impacts of those changes are going to be, and clearly those impacts vary from place to place, from ecosystem to ecosystem.

Therefore, what we need is much more focused and reliable research on a localized basis, and much more research on the specific impacts that each part of the world is likely to suffer. So, in general, I think what we really need to do is to come down from the aggregate to the particular. We are hoping that, by the time the Fourth Assessment Report takes shape, probably sometime in 2004 or 2005, we will have research output giving us this kind of detail at a regional level.

WW: How do you expect the next report, under your chairmanship, to differ from the previous one?

RP: First of all, one hopes that the science itself is advancing.

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World Watch: With the Kyoto Protocol on the verge of entering into force, what are the implications of the United States not being a party to the treaty?

Robert Watson: First let me say that it's good news that Canada has ratified. However, the Kyoto Protocol won't enter into force unless the Russian Federation also ratifies. Even without the United States, ratification is a significant first step. But to stabilize the atmospheric concentration of greenhouse gases will require significant steps beyond the Kyoto Protocol.

A real question is whether the United States, by not ratifying, is losing a business opportunity. The political leaders of the United Kingdom, Tony Blair and John Prescott, believe the Kyoto Protocol represents an important opportunity to restructure the U.K. energy industry and industry in general, and to advance new technologies as a means of economic revival. Under the European Union "bubble," the U.K. has a legal commitment to reduce its emissions by 12.5 percent relative to 1990 levels. But the country has set an internal goal of 20 percent reduction [by 2012].

Also, there are probably 20 to 50 large multi-national

ing, so to that extent we hope we can go beyond the Third Assessment Report. The Third Report, in my view, is an excellent document, and I'd like to pay tribute to Bob Watson for having led this effort with so much academic rigor and vitality.

But, in the next report, I would like to see some greater emphasis on a few things. First, we should try to bring about much greater integration between the various elements. There should also be some greater level of consistency between the work of the different IPCC working groups. There are several cross-cutting themes—"uncertainties" is one of them—which we need to incorporate into the work of all three working groups. So I hope we can do a lot more to incorporate these cross-cutting themes in the next report. And finally, we need to go, to the extent possible, into much greater detail in looking at the socio-economic impacts. We've done that in the Third Report, but we need to do much more in the next one.

WW: What are some of the "uncertainties"?

RP: If you look at, let's say, the extent of temperature change, or changes in precipitation that are likely to take place, we really have not been able [as we have progressed] to come up with estimates wherein the extent of uncer-

tainty is reduced. Now we have created much better models and have much more sophisticated computers, so one hopes that these models will help us to reduce the uncertainties of the predictions that we come up with.

Even in assessing the impacts of climate change, it's not easy for us to reduce the level of uncertainty in the projections that we make. And the same is true of mitigation. After all, how technologies will evolve, and how rapidly these technologies will get disseminated, [will be affected by] a whole range of variables that we really don't have a perfect handle on.

So the theme of uncertainties runs through everything we are doing. And I think if we bring some degree of consistency to how we address uncertainties in each element of the next assessment, and look into how they are linked together, we'll be a little wiser.

WW: When you mention scientific uncertainties about impacts, are you talking about climate feedback effects such as increased water vapor and clouds?

RP: Absolutely. We are dealing with such complex systems, where we really don't know all the feedback effects. We don't know, in some cases, even the causal linkages. So all of that has to be addressed by the research that's being done.

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companies that have taken on commitments equal to or exceeding the Kyoto targets. Many have already achieved the targets that they set for themselves by 2010—all while making a profit. They found that there are real opportunities to use energy more efficiently, and the Kyoto Protocol provides an incentive to produce new technologies that are more climate-friendly.

WW: The Bush Administration pulled out of the Kyoto Protocol in early 2001, saying emissions cuts would hurt the U.S. economy. How legitimate are these concerns?

RW: That depends on how the United States cuts its emissions. If the U.S. were to make all of its CO₂ emissions cuts domestically, the IPCC estimates that the cost would be somewhere between 0.42 and 1.96 percent of GDP—a very wide range. If the U.S. utilized international trading [of carbon credits] with Russia, it could halve the costs to between 0.24 to 0.91 percent [of GDP]. It could further reduce the costs by using the Clean Development Mechanism—trading with developing countries—and by using carbon sequestration activities—crediting carbon absorbed by forests, agriculture, and pastoral lands. It could further reduce costs by addressing all greenhouse gases—methane,

nitrous oxide, etc. The cost [then] would be substantially less than the range of 0.24 to 0.91 percent of GDP.

So, would ratifying the Kyoto Protocol cripple the U.S. economy? If the U.S. reduced all greenhouse gases, not just CO₂ from energy production, and used biological sinks and the full range of trading systems, then the estimated costs are in the order of 5 to 15 cents a gallon of gasoline. Given the fluctuation in the price of gasoline over the past few years, that 15 cents is a relatively small levy to safeguard the climate system of the Earth. We also have to recognize there are global costs of *inaction*—in the agriculture sector, the water sector, sea level rise, displaced human settlements, and loss of biodiversity, as well as in adverse impacts on human health.

WW: Do you believe current U.S. climate policy is consistent with U.S. obligations under the UN Framework Convention on Climate Change (which became U.S. law in 1992)?

RW: No. The United States should be either ratifying the Kyoto Protocol or taking domestic actions that would be broadly consistent with the Protocol. As the world's only superpower, we should be trying to do everything we can to move toward lower CO₂ emissions.

WW: Do you believe that people around the world are already experiencing extreme weather events—such as flooding, droughts, and storms—as a result of human-induced global warming?

RP: I really can't say that on any scientific basis, but if you go purely by the recent record, the fact that 1998 was the warmest year in recorded history is something to worry about. Also the fact that droughts have become more prevalent. And the World Meteorological Organization has assessed that in the last 10 years the number of extreme events, the way they define them, has actually doubled. Now, if that's the case, then you clearly arrive at least at a tentative conclusion that there is a relationship between climate change and some of these extreme events. I'm not too sure we can say this with perfect or reasonable scientific certainty. But I hope that in the Fourth Assessment Report we can address this question also.

WW: There is growing pressure to undertake cost-benefit analyses of proposed actions to reduce the threats of climate change. Can this be seen as an effort to stall the process of working to avert climate change?

WW: What new research do you think is most needed, and what should be the IPCC's focus for the next assessment?

RW: We need a balanced program covering the whole spectrum of climate issues: Is the Earth's climate changing and why; how is it projected to change; what are the impacts of this change and possible options for adaptation. And what actions can be taken to mitigate greenhouse gas emissions.

Within Working Group I, which assesses what we know about the climate system, what's most important is to narrow the range of uncertainty around the climate sensitivity factor. With a doubling of carbon dioxide, we said for the last 20 years that the temperature of the Earth would increase between 1.5 and 4.5 degrees Celsius.* We need to reduce that range.

Second, we've got to improve our ability to project changes in climate at the regional level.

And third, [we need] a better understanding of the carbon cycle. There is a debate regarding how much carbon is naturally absorbed by the world's terrestrial systems and, in particular, how much is being absorbed in the United States. And that is both a scientific and a political issue.

WW: If you had to set research priorities for Working Group II, what would those be?

* Revised upward in 2001 to between 1.4 and 5.8 degrees Celsius—an even wider range.

RP: We have to look at this first in human terms, and we have to look at it in bio-physical terms. I will illustrate this by giving an example: I was talking with a very well-known economist, and I was telling him about the threat to the Maldivian Islands from sea-level rise. And his question was: What's the population of the Maldivian Islands? And I said: As far as I know, it's maybe 400,000. And he said: How much would it cost to resettle these people?

Now you see, if you start measuring the impacts and mitigation possibilities in these terms you are really creating a huge distortion, which goes against the very basic principles of human civilization. So I really think in every case we need to look at the impacts in a total, wide, and holistic manner. Unless we do that we just get hung up on narrow, ill-defined, and I would say distorted costs and benefits that could justify almost anything you want. And I hope that in the Fourth Assessment Report we can look at some of the social issues; that we can look at the anthropologic issues; and certainly we need to look at the economic issues. But they shouldn't be done in a narrow and restrictive manner.

WW: Most of the cost of the impacts of climate change

RW: An improved understanding of how climate change will affect water-resource management, agriculture, and human health in developing countries. And how natural ecological systems will respond. For example, we need to know more about how coral reefs and forested ecosystems will react to a change in climate [in general], as well as to changes in climate variability and to the expected increase in extreme events.

Projecting changes in extreme events is a key challenge. When we look at how to improve regional-scale projections, the crucial issue isn't how the mean values of temperature or precipitation will change, it is how climate variability and extremes will change. Most ecological and socio-economic systems are more sensitive to changes in extreme events than to small changes in mean values.

WW: How can we plan to adapt to such changes?

RW: In a lot of countries, the first challenge is not going to be how to adapt to the climate of the future, it's going to be about reducing vulnerability of sectors to today's climate variability. It is to see whether countries can make themselves more resilient. These actions will allow countries to become less vulnerable to future climate change.

WW: And what about mitigation—heading off climate change by reducing global emissions? What should the IPCC focus on here?

RW: We need to analyze a wide range of technologies, both

will fall on people in the South, while the costs of averting climate change will fall primarily on the North. How do you balance those costs and benefits?

RP: There's a huge equity issue, as far as climate change is concerned. We have to recognize that quite apart from the extent of impacts, the vulnerability of societies in the South is extremely high because there are communities that don't have any physical infrastructure, that don't have any kind of institutional mechanism which might save them whenever they suffer privation or hardship, and that live through this day after day, with or without climate change.

Now, with climate change it's only going to become worse. In several cases it will represent the last straw on the camel's back. So there is a major equity issue: Who is causing the problem, who has caused this problem, and who is suffering the ill effects of this problem? On a global basis we really can't ignore these issues because if you are looking at the impacts of climate change then you necessarily have to take into account the impacts on those

in energy production and in energy use. It's also critical to understand how to get these new technologies into the marketplace. How do we get rid of the fossil fuel subsidies, so that new technologies have a level playing field? How do we internalize the social costs of fossil fuel technologies? For example, if we took into account all of the social costs of fossil fuels, which cause not only global warming but also local and regional air pollution, it would make other energy supply technologies much more competitive.

We also have to do a better job on the economics, understanding both the costs of inaction—of damage caused by climate change—and the costs of mitigation, because numbers have been thrown all over the place either to justify action or to justify inaction. We have to recognize that some of the costs of climate change don't play out in the market. We could be losing biodiversity, or losing some of the goods and services provided by ecosystems, that don't have market value.

WW: Both the IPCC and the U.S. government are talking about the need for cost-benefit analysis, and the emphasis seems to be on mitigation efforts. What are your thoughts regarding such a process?

RW: We need to look at the costs and the benefits both of action and of inaction. It's not a question of do we mitigate the threat of climate change or do we adapt. Even with strong mitigation around the world, there's still going to be significant climate change, and therefore there will be changes in ecological and socioeconomic systems. We must recognize that simple cost-benefit analysis is probably not

who are least equipped to handle these things.

WW: The latest round of climate negotiations [October–November 2002 in Delhi, India] saw more discussion of adapting to climate change than past meetings. What should be the role of adaptation relative to mitigating and reducing the threat?

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Illustrations by Kevin C. Chadwick

going to be adequate. There are some impacts where it is hard to determine the economic value. For example, how do you place a value on human life?

[We need] in-depth discussion of how to view the costs and benefits of adaptation and mitigation options using a wide range of discount rates. Performing a global average of costs and benefits is absolutely pointless. A global cost-benefit analysis might show agriculture to be unaffected by climate change. However, analyzing the impact of climate change on agriculture by country or region would show that in Africa, parts of Asia, and even southern Europe, there would be costs associated with climate change—whereas in North America and parts of northern Europe, there would be benefits. So, the impacts of climate change need to be analyzed by region and by sector.

WW: The Bush administration has talked about climate

RP: Well, I think the emphasis on adaptation at this particular meeting is a deliberate one, and I think the Indian government has had a fair amount of input in creating that increased emphasis. Whatever we do today, we are committed to a certain level of climate change, and we can't really wait until the year 2050 or 2060 [to] start doing things that make a major difference in the level of climate change that's taking place. In the short term, we have no choice but to adapt. There is a resource question, there's a technology question, there are institutional questions—all of these should be part of the negotiations.

So I think that's precisely why the current negotiations are paying [some] attention to these issues. And I hope that we will do much more in the future, because there are communities that will need help at the international level, the national level, and certainly at the local level, and the global community should be party to that. Otherwise these communities could see their socioeconomic conditions significantly worsen.

WW: You don't see an increased emphasis on adaptation

uncertainties and the need to base policies on sound science. In your view, how sound is the state of climate science right now and what level of certainty do we need to achieve before moving forward?

RW: We know enough today to start to take actions to reduce greenhouse gas emissions. There is no doubt that the Earth's climate is warming, and that most of the warming is due to human activity. And without actions to reduce greenhouse gas emissions, future changes in climate are inevitable. Nearly every government in the world has decided that some form of action is needed.

Is additional research needed? Yes, we can definitely improve our science base—both in the natural sciences and social sciences. But uncertainty in knowledge is not a reason for inaction. The precautionary principle argues that uncertainty could actually be the reason *for* action.

WW: Is there a role for scientists to play in recommending policies and technologies?

RW: This is a difficult question. I believe that national and international assessments should not recommend policy action. They should evaluate the implications of different actions or inactions. And that's what the IPCC did—IPCC did not say, "Thou shalt do . . .," but said, "These are the implications of doing this or doing that." I believe an assessment should be policy relevant and policy neutral.

WW: Does that mean scientists shouldn't express opinions

taking away from mitigation?

RP: No. I don't think that world can afford to wait, as far as mitigation measures are concerned. We need to pursue those very vigorously. I think we need both mitigation and adaptation. But you may find that the actors involved in mitigation are different from those who will be involved in adaptation. There are countries that should really go flat out in terms of mitigation measures, and of course they should also assume some responsibility for adaptation by those who are deprived and are suffering the results of climate change. But for those who are involved in adaptation, particularly in the poorer countries, there's only so much you can expect them to contribute to mitigation. I think their priorities are survival and being able to cope with the kinds of stresses that are being imposed on them by climate change. They necessarily have to focus on adaptation.

WW: To what extent do you believe it is possible to adapt to climate change?

on climate politics?

RW: Individual scientists are members of society. Therefore, as an individual member of society, any scientist who has a strong view on whether there should or should not be action on climate has a perfect right—you could even say a duty—to talk to Congress, to talk to the administration, and to talk to the public through the media. However, when scientists speak out, they should recognize that science and technology are only part of the debate. There are a number of social issues. Climate change may present large labor issues, for example. Scientists need to realize that science and technology are only part of the decision-making process. They can and should speak out—while recognizing they don't have expertise across the full suite of issues.

WW: Two scientists wrote in a *Science* article last year that in order to avoid dangerous climate change we need to stabilize carbon dioxide in the atmosphere at 450 parts per million (ppm) and we must begin to reduce global emissions before 2020 or we forgo that option. We're not on track to do this. At what level do you think we need to stabilize to avoid dangerous climate change?

RW: I always argued, as chair of IPCC, that the IPCC should not try to define "dangerous".... If we are trying to protect the average person or sector in the world, we could possibly tolerate a higher level of emissions. To protect the most vulnerable sectors or people, we would want to stabilize at a very low level of carbon dioxide—at 450 ppm or

RP: In some cases, if you ask me, we've probably gone beyond the state of adaptation. Where ecosystems are threatened and social systems have been strained, you might actually have disruption in human existence. Take the case of sub-Saharan Africa. There are places where it's going to be very, very difficult for people to construct any kind of social system that gives them sustenance. They'll probably have to move to other locations. But the large majority of people can still do something about adapting to climate change. That's precisely why we need more global and regional initiatives.

WW: What are the greatest challenges that lie ahead for the global community in dealing with climate change?

RP: I think the biggest challenge, first, is to understand the danger. The *extent* of climate change. I am afraid there are still people, and several in positions of responsibility, who just don't understand what climate change is all

even less. Because the most vulnerable—the disenfranchised in Africa, those living in low-lying island states like Tuvalu or in low-lying deltaic areas like Bangladesh—will be adversely affected even by small changes in temperature and sea level.

The same approach is true for ecological systems. If we want to protect the most sensitive ecosystems in the world—probably coral reefs—we would come up with a different answer than if we wanted to protect the “average” ecological system. There is no single definition of “dangerous.”

WW: At what level do you think greenhouse gas concentrations must be stabilized?

RW: The biggest problem with any particular stabilization level is the uncertainty in knowing what the impact on climate will be. If we are unlucky, the value of the climate sensitivity is high (i.e., a doubling of CO₂ would result in a temperature increase of 4.5 degrees Celsius), whereas if we are lucky, the value of the climate sensitivity is low (doubling produces a rise of only 1.5 degrees). Stabilizing at 450 ppm with a climate sensitivity of 4.5 degrees is the same as stabilizing at about 750 or 1,000 ppm with a low climate sensitivity factor.

If we take a precautionary, prudent approach, we should assume the worst—that is, a high climate sensitivity, where even at 450 ppm of carbon dioxide there will still be a significant change in climate. Most European countries would probably argue that stabilization at 450 ppm is a reasonable goal. And that's pretty consistent with what most NGOs would argue.

about. I think that awareness is absolutely essential as a first step to the kind of action that's required.

The other challenge is to be able to restructure our institutions, our way of thinking, our policies—to integrate climate change into development, into growth, and other policy measures that are being pursued. So the first step is to understand what climate change is, and the second is to build that into policy-making as we see it today.

WW: What, at this point, gives you the most hope for the future?

RP: The fact that you see a lot of initiatives being undertaken by individuals and by organizations. And the rate at which awareness is spreading. As this awareness spreads, particularly in democracies, I think that decisionmakers will have to act, even if they are not in tune with what needs to be done today. I believe that this will include every country.

However, the other greenhouse gases have already changed. So even if we stabilize CO₂ at 450 ppm, we would probably be close to the CO₂ equivalent of 550 ppm. We also have to be pragmatic. To stabilize at 450 ppm, global emissions would have to peak by 2010, and they're not going to. The only hope of stabilizing at 450 ppm would be major international action to reduce emissions from all countries as soon as possible.

WW: You've summarized your views on some contentious issues, including the precautionary principle, the role of scientists, and U.S. policy. What is it about your positions that most irked the Bush Administration?

RW: My position was simply a statement of the findings of the IPCC. Clearly the U.S. government—and it's not just the administration, there are many in Congress—believe that there are too many uncertainties to proceed. The message of the IPCC—that the Earth's climate is changing, that most of the changes to date are due to human activities, that significant future changes are projected, that most of the effects of climate change will be negative rather than positive, and that developing countries and poor people in developing countries are most affected—is not the message, for whatever reason, that the Bush administration wanted to hear.

The IPCC also stated that there is a wide range of technologies and policies that can be used to address the climate change issue in a reasonable, cost-effective manner. This clearly was not a message that they wanted to hear. And for whatever reason, they decided there needed to be a change in leadership of the IPCC.