

It's the way you tell them

Tim Radford

In a democratic society, there is an obligation on scientists to explain their research. Unfortunately, there is no corresponding obligation on the taxpayers to listen. So scientists who believe their work is important have a further obligation to say so, clearly, and in as near to vernacular speech as possible. Such an approach was once loftily dismissed, at least in British universities, as "popularisation". All I can say is that being popular is a lot more enjoyable than being unpopular. Scientists and engineers prefer the cold language of technical fact and statistical probability, secured from accusations of error by protective caveats. This - like the language of lawyers that goes into the small print of contracts - is exactly the language the rest of the human race has difficulty listening to. So there is an immediate problem: of one group which apparently chooses not to be understood, addressing an audience that would on the whole prefer not to hear; the effectively mute, speaking to the selectively deaf.

However scientists and engineers concerned with natural disaster have compelling reasons for speaking clearly, vividly and in the vernacular: for them, simple words can and do, literally, save lives. There is no point in issuing judgements about potential catastrophe in academic language. The kind of language used in university common rooms and in scientific papers tends to suppress understanding, rather than promote it. For example: Moses did not challenge Pharaoh with a warning about the consequences of the continued detention of one particular subject ethnic population. And he certainly did not say that this non-release could provoke a demonstrable and conceivably unpopular ecological reaction that could result in some kind of algal manifestation in the main river

basin, with unforeseen outcomes for Nilotic flora and fauna, not excluding vital consumer services. Instead, in the words of the Authorised Version (1611) of the Bible, Moses "lifted up the rod and smote the waters that were in the river, in the sight of Pharaoh, and in the sight of his servants, and all the waters that were in the river were turned to blood. And the fish that was in the river died, and the river stank, and the Egyptians could not drink of the water of the river, and there was blood throughout all the land of Egypt."

It could hardly have been clearer. Even then, Pharaoh failed to take the hint, so that yet more awful consequences followed. And there should be a lesson in that, too: authorities usually need to hear warnings several times before they react, and even then, they may not react in time. In the course of the last 15 years, governments and authorities the world over have been warned loudly and repeatedly that global warming could be accompanied by a greater risk of severe weather-related events: floods, heatwaves, ice storms, typhoons and droughts. Notoriously, some nations have still to take these warnings seriously; at least seriously enough to subscribe to united global action. The warnings have not stopped. In a paper in the US journal *Science*, Britain's own chief scientist described global warming as potentially a greater threat worldwide than international terrorism. This year, in *Nature*, other scientists have warned that global warming could result in the loss of up to a million vulnerable plants and animals. These two bits of research did get a lot of play in newspapers, and in their different ways provoked unpromising reactions. But these were only two in a torrent of research papers. Here are three that preceded them. These three papers tell what should by now be a familiar story in a new way. One was a review article about the Commonwealth

and sea level rise, in a journal called *The Round Table*. The Commonwealth has 54 members, and the review starts from the premise that by mid century, it may have only 51 members: the Maldives and Tuvalu are already at risk of complete submersion. Most of Kiribati and The Bahamas are just four metres above sea level. Meanwhile by 2050, crop yields are expected to fall by up to 20% in Mozambique, Tanzania, Uganda, Namibia and Botswana. Sea level rise could hit up to 50 million people in Africa. Another 50 million will be affected along the coastlines of India, Pakistan and Bangladesh. Crop yields could decline by up to 40% in Pakistan. Yet a third 50 million are likely to find the sea lapping at their feet in Malaysia and the Indonesian archipelago. In all these places, malaria, schistosomiasis, leishmaniasis and dengue fever are also expected to increase.

So far, so clear. That is disaster in the making. Why is it happening? There is a clue in a paper in the Royal Society Proceedings B, by two marine scientists who compared humans with 31 non-human species in measures of biomass consumption, energy consumption and carbon dioxide production. In almost every case, humans consumed more of whatever there was to consume than other creatures - one exception was mackerel in the north-west Atlantic, where other fish and seabirds matched us - and this "more" wasn't just a bit more, or significantly more. Sometimes it was 100 times more, or 1,000 times "In this paper, we report tests of the hypothesis that the human species is ecologically normal," the authors say. And then comes the punchline. "We reject the hypothesis for almost all the cases we tested."

A glimpse of the scale of this human abnormality lies in our energy use. A researcher at the University of Utah last year worked out the true cost of a gallon

of gasoline. That is, how much foliage had to grow in the Carboniferous to produce the tiny fraction that might get trapped in swamps or fall to the riverbeds and somehow end up as oil that could be refined as petrol 250 million years later. His answer, published in *Climate Change*: one gallon of petrol equals 98 tons of foliage, or 196,000 lbs of fern and cycad and algae and conifer. He translated that into modern agriculture. "Can you imagine loading 40 acres worth of wheat - stalks, roots and all - into the tank of your car or SUV every 20 miles?" he asked.

I love all this stuff. Each report is a new way of telling a story that must be told again and again. There are other, older, bits of global accounting. One geologist has calculated that - in terms of clay for bricks, gravel for roads, limestone for pavements, gypsum for plaster, lime for cement and so on - roughly six tons of soil is shifted every year for every human being on Earth. That adds up to 36bn tons. Since the calculated flow of silt down the world's rivers is put at 24bn tons, that means that humanity is now the greatest earth-moving force on Earth. After hearing such figures you do begin to wonder what a sustainable world would look like, or a safe one? How do we get there?

The answer for all of us is, a bit at a time. Start anywhere. Just start. If all you can do is warn, or explain, keep on warning, or explaining, but do so in clear and urgent language.

And always remember that a start is not the same as progress. The International Decade for Natural Disaster Reduction was a success, in a way but the success was limited. The number of deaths per year in natural disasters had fallen by the end of the decade. But at the end of the decade there were more disasters each year than there had been at the beginning, affecting greater

numbers of people, at greater economic costs. This does not mean the decade was a failure. It simply means that each hour of the decade saw another 10,000 people on the planet, each about to make an ecological footprint of more than a hectare, most of them crowding into cities that could barely support them, and certainly could not house them securely. You know that, I know that. But do governments? And if not, why not?

That is the second great communication problem: governments have a way of not listening, or rather listening very selectively, usually to those people prepared to supply the messages that governments prefer to hear.

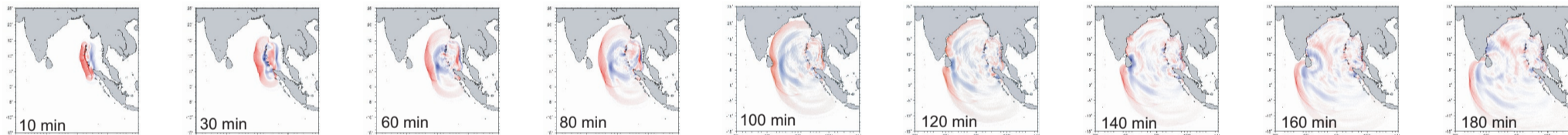
That is why I no longer think it is enough to get the story right; you must get the story read as well. Machiavelli pointed out several centuries ago that you cannot ever tell a prince, a tyrant, or an oligarch something that he does not wish to hear. In a democracy, you are free to tell a prime minister or a president what you believe to be the truth. But even that is not easy. I give you another memorable line from George W. Bush. When asked how he got his information he replied

"The best way to get the news is from objective sources. And the most objective sources I have are people on my staff."

Politicians listen to voters. In a democracy, when you address an issue, you really have to address everyone. That includes the people who cannot read, or if they can read, cannot afford to buy books. These most of all, because of course, these are the people most at risk from natural disaster. So it isn't just what you have to tell that matters, it's the way you tell them.

Tim Radford is Science Editor of *The Guardian*.

South Asia Tsunami, December 26 2004: Propagation through time



Data sources: International Coordination Group for the Tsunami Warning System in the Pacific, <http://ioc.unesco.org/tsu/>

More maps at http://www.grid.unep.ch/s_asia_tsunami/support/products/

Environmental management is risk reduction – UNEP's role in emergencies

As the environmental agency of the United Nations, UNEP assesses global environmental conditions and identifies potential environmental problems in order to propose ways to address the complex effects of environmental change on sustainable development.

Partnering with governments, private sector and local communities, science and interest groups as well as with other UN organizations, UNEP provides its environmental expertise to predict, and help in preventing and reducing the impacts of disasters as well as assist in determining environmental needs for recovery and rehabilitation.

Primary components in UNEP's efforts to ensure environmental security include:

- "Early Warning and Assessment" provides scientific and timely data on environmental change and develops vulnerability assessments, predictive information services as well as modern of preparedness strategies including Global Environment Outlook (GEO).
- The "Joint UNEP-OCHA Environmental Unit" provides environmental assessments of disasters and environmental response services.
- The "Awareness and Preparedness for Emergencies at Local Level" (APELL) programme works with the different actors involved in potential environmental emergencies related to industrial activities.
- "Transfer of Best Practices on Environmental Management and Technologies for Disaster Prevention and Response" strengthens the capabilities of countries in need.
- "Environmental Policy and Law Development" supports the use of effective legal tools, international agreements and strengthens national environmental authorities and their capacity to prevent and reduce environmental emergencies and their effects.

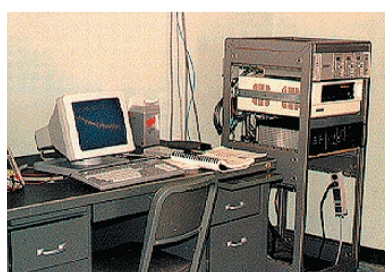
Building on its current strengths, UNEP will reinforce its efforts to ensure that in the future the importance of environmental aspects of emergencies is understood and that the imperatives of prevention and preparedness are fully recognised as critical to human and environmental security. In the concrete case of the recent tsunami tragedy in South Asia, UNEP established a South-Asia Disaster Task Force. Whilst the focus of the UN efforts is still to save lives, we must already look at how to minimise the underlying risks and plan for the recovery. Along with UN colleagues, UNEP is doing its utmost to help the countries affected and is working in close collaboration with OCHA and the respective UN country teams as well as the national environmental authorities to identify the urgent environmental needs, assist in mobilising environmental assistance and provide expertise to the environmental recovery activities.



HOPE – Hope Point, South Georgia Island



DGR1 – Domenigoni Valley Reservoir



GSC2 – Goldston, California

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