

ervation Foundation refers to developments which benefit people as well as the environment as 'Symbiotic Technologies', and it believes that these sorts of ideas should be encouraged wherever possible. They are, however, much the same as any other in having to stand alone in the market place on the twin merits of their price and consumer satisfaction. Their ecological superiority may or may not be a relevant selling-point.

To get this message across, the Conservation Foundation teamed up with the National Westminster Bank and produced its 'Guide for Environmental Entrepreneurs'. The guide outlines many of the common pitfalls and aims to make environmental entrepreneurs think about their projects in *commercial terms* as soon as possible. It is available free from the Foundation at Fairholt House, 2 Pont Street,

London SW1X 9EL, England, UK—telephone 01-235-1743. Meanwhile the Ford Conservation Awards have shown that such people needing guidance are by no means unique to the UK—organizations in other countries may well find a demand for either their own guide or for copies of the Foundation's with an insertion giving specific local information and orientation. Who knows what vital new *Symbiotic Technology* might succeed with the right encouragement at the right time!

STEPHEN ROBINSON
*The Conservation Foundation,
 Fairholt House, 2 Pont Street
 London SW1X 9EL
 England, UK.*

The Recent Bangladesh Flood Disaster Was *Not* Caused by Deforestation Alone

It is my intention to bring a greater degree of rationality into the discussion of the causes of the recent flood disaster in Bangladesh, so that in future more appropriate remedies may be administered. To do this I must slay, or at least grievously wound, a 'sacred cow' syndrome held by a great many people. This syndrome was succinctly expressed in several article headlines in various newspapers recently. Thus one which I have at hand is a release from Knight-Ridder Service by Marc Kaufman and exclaims: 'Bangladesh Flood Disaster Blamed on Deforestation.' This widely-held belief is expressed later in the article as follows: 'By almost all accounts, the main environmental problem is the widespread and growing deforestation of the Indian and Nepalese mountains to the north of Bangladesh, a country that is little more than an overpopulated delta region.'

A flood of this magnitude is caused by too much rain falling in too short a period, or prolonged rain falling on land that is already saturated with water. The extent of the damage is caused by too-great human occupancy of the floodplain of the Ganges and Brahmaputra Rivers. This occupancy is increasing each year, with more and more non-absorbing surface being added by urban infrastructure, thus aggravating the problem of rapid runoff. Moreover the increase in roads, bridges, and riverside buildings, all add to the problem of river channels handling flood-flows.

This part of Bangladesh, as is indicated in the above-cited article, is an overpopulated delta. Deltas are the product of river-flow and deposition of sediments, and are naturally prone to flooding owing to channel changes. Solutions involve: restricting occupancy of the most seriously flood-prone areas, structurally improving buildings to make them less subject to damage, and flood warning and evacuation programmes. Floodwater storage reservoirs further upstream might also help, though they will *not eliminate* floods. All of these remedies are in-country, but are terribly expensive and difficult. It is much easier to point the finger of responsibility at other people especially when they live high in the mountain watersheds, which in this case means largely in other countries.

It is true that some kinds of deforestation (but not all) in the remote mountains may make a contribution to the flood situation. But this is usually very small when dealing with major meteorological events such as summer monsoons. These monsoon rains would produce (and historically have produced) floods even if the entirety of river basins were in forest cover wherever trees will grow. The

problem is that when the soil is saturated from previous rain, practically all of the ensuing rain will produce stream- and river-flow.

It is clear, of course, that removing the forest, and replacing it with an abusive, soil-compacting grazing or cropping use, will reduce the ability of the soil to accept and store water. However, forest removal and conversion of the land into terraced agriculture (the beautiful, benign, rice-paddy terraces are also 'deforested'), does not aggravate flooding appreciably. Well-managed grazing land, though deforested, is also not a major contributor to floods. Unfortunately, some of the agriculture and grazing that has replaced forests in the mountain country is abusive, and results in more-and-more-rapid runoff of water. However, the soils here are generally not deep, and therefore cannot store much water even in their natural state. Also, the increased runoff from these remote mountain-watershed lands is small, even in a major storm or monsoon situation, compared with the water accumulated from all natural sources in major basins such as those of the Ganges and Brahmaputra. It is moreover to be remembered that, usually, rain will be falling not only high in the Himalaya, but also in Bangladesh, where it will fall directly on large river surfaces, on cities, and on all the associated non-absorbing surfaces.

It is true that sediment in the river channels reduces the ability of the rivers to accommodate a given water-flow. This sediment comes from riverbank erosion, riverbed erosion, and erosion from the land. There is unquestionably more soil erosion where the lands are steep than in the lower parts of the rivers. Forest removal and inappropriate use of the land will accelerate surface erosion and may even increase the incidence of shallow landslides.

The displaced material eventually finds its way into the stream- and river-channels and adds to the local problems. However, this contribution tends to be dwarfed by the natural sources of river sediment. The Himalaya is an area of mountain building and general movement due to earthquakes, which results in great instability and the occurrence of an incredible number and size of natural landslides.* Added to this are glacial-lake outbursts which can be disastrous in producing a wall of water and moving vast amounts of sediment down into lower stream areas. Poor-

* See, for example, 'Geo-forestry of Landslide-affected Areas in a Part of Central Himalaya', by Drs A.K. Tiwari, J.S. Mehta, O.P. Goel & Professor J.S. Singh, *Environmental Conservation*, 13(4), pp. 299-309, 11 figs. 1986.—Ed.

ly-located and poorly-maintained mountain roads in these already 'unstable' situations have added to the problem.

It is for these reasons that I have trouble in accepting that this major disaster was caused by deforestation. Other statements have appeared on other occasions to the effect that over 400 million people in the South Asia lowlands are being held hostage by 46 million peasant farmers in the uplands. Such accusations are not only inaccurate but also harmful, because in finding a scapegoat, people have found a reason for not doing anything about their own contribution to the problem. There are many eminently valid and

desirable reasons for stopping conversion of mountain forests into abusive agriculture, but blaming logging and peasant farming for these floods in lower Bangladesh is not one of them.

LAWRENCE S. HAMILTON, *Research Associate
Environment & Policy Institute
East-West Center
1777 East-West Road
Honolulu
Hawaii 96848
USA.*

'The United States' Nuclear Defense Industry' Updated

Shortly before 'The United States' Nuclear Defense Industry' went to press*, there was a flurry of public outrage in the United States which led to defence-plant closings around the country. It is unfortunate that these situations seem to end inevitably in human tragedy at least on the economic scale.

During 1988, the US Department of Energy was forced to close four major defence facilities which were involved in nuclear weapons' production efforts. In February the outdated N reactor at Hanford, Washington, was shut down due to safety and management problems; in August the Savannah River plant in South Carolina was closed after a long history of mismanagement and equipment failures; in early October the Rocky Flats plant at Golden, Colorado, was shut down following the exposure of three workers to radioactivity; and the Feed Materials Production Center at Fernald, Ohio, was closed also in early October following a strike by workers demanding higher wages and safer working conditions (Budiansky & Cook, 1988; Noble, 1988).

In an apparent effort to avoid expensive litigation, the US Department of Energy acknowledged that 'the Government knew full well that the normal operation of the Fernald plant would result in emissions of uranium and other substances' (Noble, 1988 p. 1). Revelations that, over the last several decades, government officials had been aware that 'thousands of tons of radioactive uranium waste' were being released into ground-water and into the atmosphere, came to light as a result of a recent US Supreme Court decision (Boyle *versus* United Technologies, June 1988) which protected government contractors from prosecution for death or injuries resulting from faulty equipment (Noble, 1988 p. 1).

* Now published on pp. 264-6 of our Autumn issue.—Ed.

In addition to the dangers associated with stationary defence industry facilities, during the last 12 years there have been no fewer than 178 accidents involving Department of Energy trucks transporting nuclear materials among the various facilities (Resnikoff, 1988).

What does the future hold for the United States' nuclear defence industry? In March 1988, public hearings were held in Idaho regarding a Department of Energy proposal to construct a Special Plutonium Isotope Separation plant at the Idaho National Engineering Laboratory near Idaho Falls. This plant would represent the first of a new generation of nuclear weapons' production facilities, signifying a US commitment to at least another 30 years of nuclear weapons' production (Paul, 1988).

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ROLAND J. LAMARINE, *Assistant Professor
Department of Health and Community Services
California State University
Chico
California 95929-0505
USA.*

Trieste Resolution on, and Network Proposal for, Increasing the Flow of Scientific Literature to Third-world Institutions

Resolution

Recognizing the fundamental importance of science and technology to social, economic, and cultural, development and to the well-being of the Earth, and that the availability of scientific information is essential to any scientific and technological activity, the participants in the *Workshop on Increasing the Flow of Scientific Literature to Third-world Institutions*, meeting today [2 November 1988] in Trieste, Italy, emphasize that it is crucial to ensure that in each developing country at least one library, accessible to all scientists working in that country, be kept up-to-date through the acquisition of relevant journals and books in

science and technology, [and hence strongly endorse the following]:

NETWORK PROPOSAL

In order to enhance the flow of books, journals, and related materials, on science and technology to Third-world Institutions, the participants at the Trieste Workshop agree to establish a cooperative information NETWORK ON SCIENTIFIC AND TECHNOLOGICAL LITERATURE FOR DEVELOPING COUNTRIES (ST-LITNET).

The establishment of the Network will permit the effective exchange of information among organizations now separately providing these materials.