

The Ecologist

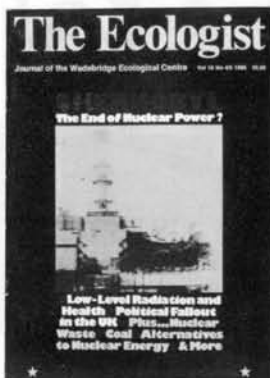
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***"If the world's
PCBs continue to
enter the oceans,
the extinction of
marine mammals
is inevitable."***



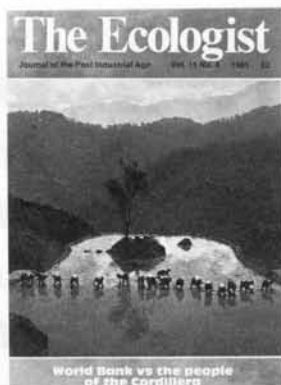


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Transported via the atmosphere, PCBs are now ubiquitous, high levels having been discovered in even the remotest regions of northern Canada. Already several species have been affected as the chemicals make their way up the food chain with fatal results. If PCBs continue to enter the oceans in any quantities, the extinction of marine mammals is certain. To avert catastrophe, PCB manufacturers should buy back their products and supervise their safe disposal.

Peter Bunyard

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The destruction of the world's forests, the death of the seas, the increase in droughts and floods, the spread of deserts, all point to a major disruption of the Gaian mechanisms that make life on earth tolerable for humans. The cause is undoubtedly our way of life: but how will Gaia respond?

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International agreements permit whaling for "scientific" purposes — a loophole that has been fully exploited by the Japanese, whose whaling fleet recently set sail to kill some 800 whales in the name of science. In fact, the whales are being slaughtered to satisfy the demand for whale meat in Japan's gourmet restaurants.

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Many of the social and economic problems besetting our society have their roots in the lack of control which ordinary citizens have over their everyday lives. Such control is only possible when power is exercised by the local community.

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Modern meteorological models are notoriously unreliable when it comes to predicting the annual monsoon in south-east Asia. Tribal peoples, by contrast, have developed their own "science" of prediction, which relies on observing the behaviour of plants and animals. It is remarkably accurate.

Manel Tampoe

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Three out of four of Sri Lanka's major development projects in the last decade have involved massive construction schemes. To provide the requisite building materials, the south-west coast of the island has been systematically "mined" for its coral and sand. Widespread coastal erosion has been the inevitable consequence, with the result that the coastline can no longer withstand even a mild monsoon without sustaining considerable damage.

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Cover: Humpback whale (picture Francois Gohier/Ardea). Cover Lay-out: John McIntyre.

The Salmonella Epidemic

"*Salmonella enteritidis* infection is epidemic in the UK." "An extensive nationwide outbreak of infection by *Salmonella enteritidis* type 4 has clearly been taking place in Britain over the past 2 years." "There seems to be little doubt that infection by *Salmonella enteritidis*, type 4 in particular, albeit subclinical, is currently a problem among many broiler and layer flocks in Britain." "All surveillance indicators suggest that an epidemic of unprecedented proportions is occurring. Between 1981 and 1986 the number of strains received for serotyping by the Public Health Laboratory Service Division of Enteric Pathogens has increased by 66 per cent."

The above statements (taken from editorials in such specialist journals as *The British Medical Journal*, *The Lancet*, and *Epidemiology and Infection* and from an official government warning) all proceeded by several months the row over Edwina Currie's recent and much-publicised comments on salmonella in eggs. Nor should that surprise us, for one of the first lessons to emerge from the current egg scandal is that if Mrs Currie was forced to resign from her post as junior minister for Health, it was not because she was *wrong* to warn on the scale of salmonella infection in eggs and poultry, but because she had been *right*.

Indeed, in evidence to a House of Commons' Select Committee, the government's own chief medical officer, Sir Donald Acheson, has subsequently acknowledged that the increase in reported cases of *salmonella enteritidis* has now technically reached epidemic proportions. Between 1982 and 1987 the incidence of *Salmonella enteritidis* infection reported in people in England and Wales increased 6 fold from 1101 to 6858 cases, of which 80 per cent were of phage-type (PT) 4. In 1988 the tally of *Salmonella enteritidis* infections in England and Wales rose to over 12,000. A similar increase has been observed in Scotland, where, *Salmonella enteritidis* has become the commonest serotype. The USA is experiencing the same problem with eggs and egg-based products.

If Mrs Currie erred, then, it was by going mute when clarification and amplification of her original statement were needed. At a crucial moment, an outspoken Minister of Health lost her voice; the parliamentary opposition fumbled their opportunities by reviling her; and her colleagues in the government ditched her. Concern over a critically important issue has thus been addled. That concern goes beyond food poisoning caused by bacteria, viruses and parasites to the whole issue of how we produce food today and who polices that production.

Vested Interests

The immediate target of Mrs Currie's warnings was the egg industry. But, in taking on the egg producers, Mrs Currie could not avoid becoming embroiled in a fight with the Ministry of Agriculture Fisheries and Food (MAFF) — and, ultimately, with the National Farmer's Union, whose power within Whitehall is legendary. Indeed, it is a brave (or foolhardy) politician who takes on what Paul Johnson, the *Daily Mail* columnist and doyenne of the New Right, has described as "the most powerful pressure group in the country and the only one to which conservative government's bow the knee." In the recent affray, whilst the Department of Health held its ground with its warnings over

eggs, MAFF still claimed its sacrifice. Mrs Currie was forced to resign, the purveyors of suspect foods — rather than the victims of the diseases they pass on — received compensation from the Government, and an MP with farming interests moved into the vacant place at the Department of Health.

The power of the farmers' lobby is not new. Ever since the creation of the Ministry of Food during the First World War, when Lloyd George perceived "the food problem as one of our most important concerns", the interests of the farming industry have been promoted over those of the consumer. A memo after the war, when the fate of the Ministry was in the balance, observes: "During the past war, the Board of Agriculture tended to be on the side of the farmer when his interests clashed with those of the consumer. This attitude on the part of the Board or Ministry of Agriculture — while natural and possibly correct — makes the separate existence of a Ministry of Food imperative."

Imperative or not, a Ministry of Food has yet to be reestablished. Meanwhile, the hand-in-glove relationship between MAFF and the farming industry, and the disdain for consumer interests, continues — and could not be better illustrated than the recent revelations that MAFF inspectors recently permitted six farms known to be contaminated with salmonella to continue production, despite the known risks to public health.

Edwina Currie's warnings thus raise the very same questions that the above memo attempted to address all those years ago. Why indeed should the farming industry have its own Ministry — any more than all the others dealt with by the Department of Trade? Food and health issues should properly be the concern of a Ministry of Food and a strengthened Department of Health and Environment Ministry, overlorded by a national, rather than a factional, interest. Mrs Currie was simply asserting that the Department of Health's prime concern is *health* — and not belated and inadequate cures for *ill* health.

Under pressure from the public (and amid press comment that Mrs Thatcher was herself sufficiently bridled by the lapdog image of MAFF to consider shutting down the ministry altogether), MAFF has tardily responded to criticisms with a set of codes and guidelines, described by John McGreggor, the Minister, as "one of the most comprehensive programmes for dealing with salmonella in any country in the world." The number of inspections will be doubled and in future contaminated poultry units will, in theory, be closed. But the guidelines lack statutory force (although the Ministry is considering statutory controls). Moreover, the Ministry has in the past proved notoriously reluctant to prosecute farmers. It would seem, therefore, that once again the watchdog will have no teeth.

Those who look towards the industry itself to put its house in order should reflect on an editorial in *The Lancet* last September. It noted that the industry was not losing output from the birds because of the infection: "It is not of economic importance to the industry and nothing is done about it". The editorial concluded, "Until the poultry industry, the MAFF, and the DHSS are willing to co-operate to tackle the real underlying cause of the epidemic, the public will have to put up with their chickens overcooked and their boiled eggs rock hard."

For their part, vets, "knowing that there has been a salmonella problem for years," have taken a complacent attitude. The line adopted by the *Veterinary Record*, for example, is that Salmo-

nella, like the poor, will always be with us. An article in the *British Veterinary Journal* last year warned the industry of "ill-informed scare reports", referring to a drop of nearly 30 per cent in consumption of broilers in a matter of a few weeks after publication of such articles in "the popular press and media". However, another British vet, urging the industry to "clean up its act", commented in December: "The industry, like a patient with VD, kept quiet, because it didn't want people to know."

Cheap Food, Adulterated Food.

But even if strict legal and technical controls, backed by heavy fines and prison sentences, were to be enforced, the problem of salmonella would not disappear. The reason is clear: salmonella poisoning (and there were an estimated 3 million cases last year) is a *direct* and *inevitable* consequence of modern industrial food production.

There are over 2,000 serotypes of the salmonellas, the range having been extended as extensive farming and the resulting crowding and stresses have increased the spread among live-stock, especially poultry, pigs, cattle and calves. Salmonellas can live in most animals and insects. Feeds, the components of which might include meal made from fish, bones and feathers, and which contain dried blood, sundry offals and tallow from the slaughterhouses and rendering plants, and even (it now emerges) 'human effluent', are frequent sources of infection and reinfection. A consignment of fish meal from, say, South America into Rotterdam may be parcelled out and thus spread its salmonella into several countries.

The calf trade, where animals are under appalling stress, has also become a notorious breeding ground for infection, the animals succumbing to scours (diarrhoea), dehydration and respiratory complaints.

As salmonellas account for many of the day-to-day diseases found in intensive units, farmers and dealers have obtained therapeutic antibiotics from vets in such large amounts that the germs have acquired resistance, some to 8 or more drugs. The pharmaceutical industry has promoted such sales; indeed, farmers have found difficulty in buying unmedicated calf feed. The abuse of drugs as surrogates for good husbandry has reached its nemesis in outbreaks of salmonellas in people, some of whom, their treatment compromised by the resilience the bugs have acquired, have died.

Nor are Salmonellas the most commonly reported cause of acute diarrhoea in the UK; that distinction applies to campylobacters, which cause illness like salmonellosis and sometimes mimic appendicitis. In 1982 the campylobacters were responsible for 12,822 reports of food poisoning in England and Wales. In 1987, the toll had risen to over 27,000 and it is still rising. Like salmonellas, campylobacters are associated mainly with the handling, preparation and consumption of fresh poultry. There are plenty more of these zoonoses associated with the production of meat, milk and eggs, some of the diseases (such as listeriosis and toxoplasmosis) being intrinsically more insidious and dangerous than the salmonellas.

The inclusion of slaughterhouse wastes and tallow and of poultry litter and DPM (dried poultry manure) in animal feeds is an obscenity that has shocked the public. Not only does it turn typical herbivores into carnivores or even cannibals, it also ensures that the residues of drugs will be passed on and that bacterial and other infections will also be transmitted, especially as rats and mice, domestic animals, and wild and feral birds have

access to the material. Sterilisation is now required, but may prove inadequate or the product may be subsequently recontaminated in the factory or in transit. Such possibilities can be illustrated by the suggestion that *Salmonella ealing* entered baby food because a milk-drying factory was also taking delivery of raw milk for pasteurisation. Swill for pigs has been notorious as a vehicle of viral infection and inadequately heat-treated offals from slaughtered sheep are being blamed for the transmission, through feedstuffs, of such diseases as BSE (bovine spongiform encephalopathy) in cattle, dogs, cats, farmed mink and in animals in "wild life" parks, as well as in human consumers of such materials. Bovine infections frequently spread to poultry. About 60 per cent of poultry carcasses on sale carry salmonella. The trade claims that the best suppliers manage to reduce this incidence to 20 per cent. This is still 20 per cent too much.

Workers in the industry are also at risk from a host of bacterial, viral, fungal and parasitic infections. These zoonoses assume greater significance as the population of immunocompromised patients increases. Post-infective diseases are being recognised more and more; reactive arthritic complaints may ensue upon zoonotic infections — such complications certainly beset pigs infected with salmonellas and similar bugs. Butchers waste are a well recognised entity emphasising a likely connection with handling meat. Some of the zoonoses endanger pregnant women and their foetuses — particularly listeriosis and toxoplasmosis.

The Myth of Cheap Food

Despite the current concern over the health risks of salmonella, and the revulsion expressed by most consumers at the idea of chickens being fed their own excrement, the public commonly excuses intensive livestock farming as the price we have to pay for cheap food. In fact, such farming is neither cheap nor, when measured by criteria other than labour costs, particularly productive. As Sir Richard Body has repeatedly pointed out, the subsidies received by conventional farming grossly distort its real competitiveness: indeed, it is estimated that, if the subsidies were removed, the price we pay for our food at the supermarket counter would rise by at least a quarter. In effect, the main justification for supporting the gruesome and evil system of production that lies at the roots of the salmonella epidemic is nothing short of a myth.

What then should be our response to the crisis? Official "solutions" rely heavily on legal and technological fixes. Dubious feeds, it is suggested, should be fumigated with chemicals (such as formaldehyde) or treated with acids; hatchery eggs could be dipped in antibiotic solution; resort could be had to irradiation of feedstuffs and food (at present disallowed in the UK); or 'competitive exclusion' by use of probiotics might be tried. In West Germany, vaccines against salmonella have been developed to add to the existing armoury of chemical and biological agents needed by the modern poultry industry.

Yet, such "solutions" can only serve to postpone the inevitable day of reckoning, for they leave unresolved the need for fundamental reforms in the way we produce and process our food. In that respect, Edwina Currie has ducked a golden opportunity — but that is no reason for the rest of us to do the same.

Alan Long

Francisco Mendes Filho

1944-1988

On the night of December 22, 1988, Francisco (Chico) Mendes Filho, leader of the Brazilian rubber tappers movement and an internationally-respected defender of the tropical rainforest and its inhabitants, was shot dead at his home in Xapuri, Acre state, northwest Brazil. His three police bodyguards, assigned to him after recent death threats, failed to apprehend the gunmen. He leaves behind a widow and two children.

Prime suspect for the murder is wealthy farmer Darli Alves da Silva, who is believed to have escaped to Bolivia with his brother after ordering a son to hand himself over to the police. Alves already had an extradition warrant served against him by Parana state where he is wanted in connection for another murder, yet the police in Acre failed to arrest him. He had apparently let it be known that he would only be taken after killing Chico Mendez. According to a recent Amnesty International report, more than 1000 rural workers and trade unionists have been murdered since 1980, but only three per cent of the killers jailed.

Mendez, the recipient of one of the 1987 United Nations Environment Programme awards to the world's 500 top ecologists, led the Acre-based 'Alliance of forest peoples', uniting the region's rubber tappers and Indian peoples against the destruction of the rainforests on which they depend for their survival. The ecologically sustainable life-styles of the rubber tappers (*seringueiros*) and Indians are the antithesis of the officially-encouraged short-term greed of the wealthy landowners.

Led by Mendez, the tappers developed a form of passive

resistance, known as the *empate*, defending the rainforest with their lives by forming human chains against both the ranchers' chainsaws and the armed police who serve their interests. Mendez lobbied for collective land-use, and for government-owned 'extractive reserves' where tappers can extract latex, brazil nuts and medicinal essences. Twelve reserves are now being created in 5 Brazilian states covering over 5 million acres of rainforest.

In 1987, Mendez visited the United States where he lobbied congressional staff and officials of the Inter-American Development Bank over the funding of the extension of the BR 364 Trans-Amazonian highway from Porto Velho in Rondônia, to Rio Branco, the capital of Acre. Shortly after his visit, the IDB suspended \$65 million worth of loans for the project until environment protection measures were implemented. The asphalted highway had brought in its wake a rush of speculators and ranchers along with their armed henchmen who forced an estimated 10,000 tapper families across the border into Bolivia, and an equivalent number into the slums of Rio Branco.

Unfortunately, such are the conditions in this new Wild West that Mendez' success in fighting for the future of the rainforest led to his own death. He was well aware of the risks that he was taking, yet he ignored approaches from Brazilian government officials urging him to take up less political activities. His murder provides a bitter testimony to his tenacity and courage in the face of powerful and ruthless opposition and his effectiveness in raising national and international awareness of the crimes against man and nature being freely committed in a supposed democracy, the western world's seventh major economic power and the most unequal society on earth.

The Ecologist deeply mourns the death of Chico Mendez, but we hope that the widespread international coverage which it has been given will put pressure on the Brazilian authorities to halt the policies that are destroying the rainforest and to bring to an end the murderous campaign being waged against the rubber tappers and indigenous peoples of Amazonia. If so the death of this brave man will not have been totally in vain. We would ask readers to send telexes, telegrams or letters to the following addresses to insist on an immediate investigation of the case by an independent body and to demand that those responsible be brought to justice.

Patrick McCully

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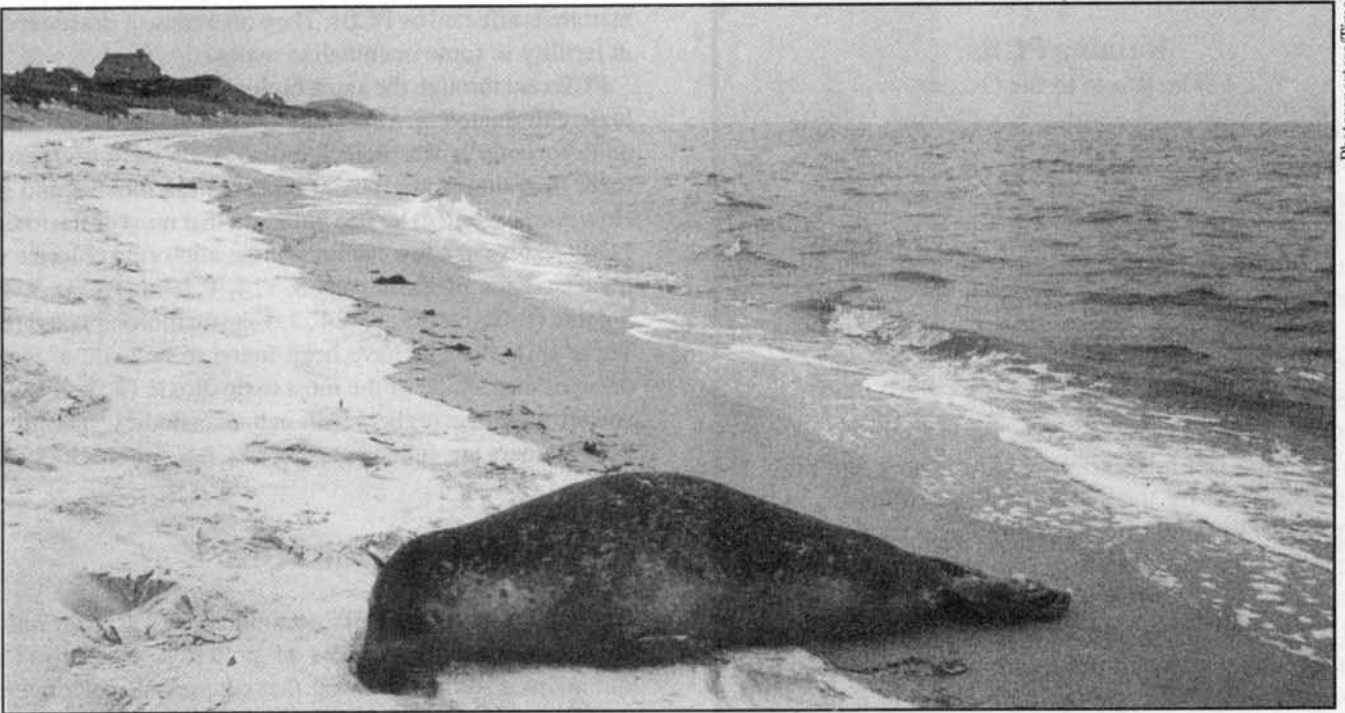
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SICK SEAS: 1988 saw a mass epidemic of seal disease in the North Sea. Pollution has drastically weakened their immune system and there are real fears for the future survival of the species.

Extinction: The PCB Threat to Marine Mammals

by
Joseph E. Cummins

Within the decade, most of PCBs now in use will wear out in both industrial and developing countries. Few Third World countries have the funds or the political will to ensure their proper disposal. Yet if the PCBs held in the Third World alone were released into the general environment, the extinction of marine mammals would be inevitable. To avoid disaster, PCB manufacturers should "buy back" their products and pay for their safe disposal.

Recent studies have detected a very alarming trend in the accumulation of polychlorinated biphenyls (PCBs) in the waters of the oceans and their biomagnification to elevated levels in the tissues of such marine mammals as whales, dolphins and seals. The levels of PCBs found in the marine mammals are orders of magnitude greater than the levels found in terrestrial birds and mammals, including humans. In addition, it has been observed that the genetic make-up of marine mammals predisposes them to reproductive failure when exposed to even moderate levels of PCBs.

There are about 1.2 million tonnes of PCBs in the world. Of that total, 31 per cent has been released to the environment (roughly 20 per cent is in the open ocean and 11 per cent in soil and terrestrial sediment). Sixty-five per cent of the world's PCBs are still in use, or in storage or deposited into landfills. If those PCBs are permitted to leak into the marine environment, then the extinction of marine mammals is inevitable. Although PCB releases into the environment are limited in most western coun-

tries, in developing countries such releases (particularly from phased out electrical equipment) are not well controlled. If the released PCBs entered the seas, they would probably prove sufficient to cause the extinction of a wide range of marine mammals, if not all.

The international community must find a way to prevent those PCBs at present stocked on land or deposited in landfills from entering the ocean. In developing countries it is a foregone conclusion that PCBs will escape into the environment unless the cost of preventing this escape is born by an external body. The most appropriate solution is for the PCB manufacturers to "buy back" their products from developing countries. The consequence of failing to control PCB releases to the oceans will be the extinction of marine mammals and the chemical fouling of the ocean fisheries, rendering them unsuitable for use by humans.

PCBs and their Effects

Commercial PCB preparations were first manufactured in 1929. Production peaked between the late 1950s and the early 1970s,

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Raining PCBs: The Route to the Oceans

PCBs enter the oceans through two main routes: by deposition from the atmosphere and through the drainage of rivers. The best available evidence indicates that about 2 per cent of the PCBs currently entering the oceans do so via rivers, while 98 per cent enter via the atmosphere.

The pervasiveness (and thus the potential impact) of PCBs is clearly brought home by the discovery that rainfall in isolated northern regions of Saskatchewan, Ontario and New Brunswick has been found to contain up to 17 parts per trillion PCBs. The maximum level of PCBs permitted by the Government of Ontario in discharges into the environment is *just one part per trillion*. It is impossible, however, to put an injunction on rainfall..

Recently, it has become clear that even the most isolated regions of the high arctic are being contaminated by PCBs, principally through atmospheric deposition. Biomagnification through the food chain is a particular threat to polar bears, which rely on seal blubber for a major part of their diet. Levels of PCBs in the adipose tissue of polar bears increased fourfold between the years 1969 and 1984. If current PCB inputs continue, the bears will exceed the 50 ppm limit designating them as 'toxic wastes' about the year 2005.

but decreased sharply thereafter upon discovery of the widespread environmental contamination they were causing. PCBs were used in electrical equipment because they were very stable and because they were good insulators. PCBs were also used in hydraulic equipment in factories and in metal finishing. Environmental PCB pollution has been most frequently associated with the manufacture of such electrical equipment as transformers and capacitors, and with automobile manufacture. Most of the PCBs produced are still in use, primarily in older electrical equipment.

Pure PCBs form oils that are heavier than water. They are not very easily dissolved in water, but they are easily dissolved in fat or organic liquids. PCBs are very stable in the environment and suffer very little biodegradation. PCBs migrate through the environment via surface waters (normally in association with microscopic soil particles) and via the air.

PCBs are injurious to living beings. They accumulate in fatty tissue and readily pass through the lipid portions of the membranes of cells. It is well documented that PCBs both initiate and promote cancers (in Ontario, PCB-associated cancers of occupational origin are compensated); in addition, they cause birth defects in humans and animals; reduce immune defences and induce hypertension and stroke. Children of mothers who ate fish from the Great Lakes mildly polluted with PCBs (at or below legal standards) have been found to suffer significant learning and behavioural defects. Large human populations in Japan and in Taiwan were exposed to elevated PCBs by ingesting contaminated rice oil. These human exposures clearly established the toxic manifestations of PCBs.

PCBs — a category which includes 209 distinct molecules — can drastically reduce certain bird populations by causing egg shells to grow thin and fragile. They have a hormone-like effect that interferes with calcium accumulation in egg shells. The same mechanism explains the bone defects observed in newborn

mammals affected by PCBs. They also cause a drastic reduction in fertility in some mammalian males.

PCBs act through the same biological systems as do the more toxic chlorinated dioxins and chlorinated dibenzofurans. Until quite recently it was believed that PCBs were uniformly less toxic than their more potent relatives the dioxins and furans. However, current evidence indicates that most of the toxicity of PCBs resides in a few isomers of the non-ortho chlorine substituted coplanar PCBs, namely 3, 3', 4, 4', tetra (T_4CB), 3, 3', 4, 4', 5-penta (P_5CB) and 3, 3', 4, 4', 5, 5'-hexachlorobiphenyl (H_6CB). These PCB isomers have been found to be toxic to within an order of magnitude of the most toxic dioxin (2, 3, 7, 8-TCDD) and are present at higher levels in human bodies.¹ The most toxic PCB isomers are called "coplanar PCBs" for brevity's sake.

Marine Mammals and PCBs

Until quite recently, PCB accumulation was believed to be greatest nearest the sources of pollution. Recently Tanabe² summarised studies showing that cetaceans (including striped dolphins, melon-headed whales and Dalls porpoises) were found to contain higher levels of PCBs than terrestrial mammals and birds *inspite of living in the pristine oceans, far from land-based PCB pollution*. Very high PCB levels were observed in killer whales from the deep ocean — 410 parts per million (ppm) in blubber, for example — and in blue-white dolphins off the coast of Europe (833 ppm). The levels observed far exceed the level (50 ppm) that normally require goods to be labelled and handled in toxic waste containers. Marine mammals may thus, on average, exceed the levels requiring that they be classified as toxic wastes.

In addition to this excessive accumulation of PCBs, marine mammals have a genetically predetermined sensitivity to reproductive impairment by PCBs. The hormone-like action of PCBs causes reproductive impairment in seals (pinnipeds) according to Reijnders,³ and in porpoises (cetaceans) according to Subramanian *et. al.*⁴ According to Tanabe,⁵ the induction of reproductive abnormalities by PCBs is related to genetic influences that reduce the capacity for inducing drug metabolizing enzymes when animals ingest phenobarbital and/or methylcolanthrene. Other organisms, such as mink, which are hypersensitive to PCB-induced reproductive failure also have smaller capacities for inducing drug metabolizing enzymes. Interestingly, about one in ten humans of European origin are genetically similar to mink and marine mammals as regards the capacity for inducing drug metabolizing enzymes, while the remainder have much greater capacities. The inference is that one in ten humans of European origin are probably sensitive to PCB-induced reproductive impairment.

In conclusion, marine mammals are accumulating elevated levels of PCBs and the animals are genetically sensitive to PCB-induced reproductive impairment. There is a very real concern that such animals are facing extinction.

Worse to Come?

There are about 1.2 million tonnes of PCBs in the world. According to Tanabe,⁶ 65 per cent of that tonnage is either in use in electrical equipment, or stored on land or deposited in landfills. Eleven per cent is present in the soil and sediment of terrestrial or coastal regions, and 20 per cent is in the ocean, the

"Marine mammals are genetically sensitive to PCB-induced reproductive impairment. There is a very real concern that such animals are facing extinction."

remainder having been degraded or incinerated.

For the most part, the richer countries have secure control over the 'landlocked' PCBs. The poorer, developing countries (holding about 15 per cent of total world stock of PCBs), however, are unlikely to control the pollutant, and, should the PCBs held by them ever enter the oceans, they would be sufficient to cause the extinction of most marine mammals.

Where PCBs are trapped in sediments and soil, the pollution is localized in 'hot spots' which can be identified and contained. The PCBs in the oceans, by contrast, cannot be contained. Similarly, much of the global PCB burden is now being redistributed by airborne transport. Swackhamer and Hites,⁷ for example, observed elevated levels of PCBs in an isolated lake on a large island in Lake Superior which had never experienced extensive anthropogenic activity. In that instance, the PCB transport was airborne and elevated levels were observed in game fish as a result of biomagnification. Indeed, PCBs have penetrated throughout the global environment and now pollute the waters and animals at both poles. However, the northern hemisphere is more polluted than the southern.

The mid-latitudes of the northern hemisphere are far more polluted with PCBs than is the remainder of the world. This distribution is related to the localization of industry. If the further environmental release of PCBs into the environment is prevented, PCB levels should (at least in theory) decline due to dilution and dispersal. However, dilution provides little relief as marine mammals biomagnify PCBs by factors as great as ten million times.

Biomagnification and the surface microlayer

Aquatic contaminants of low water solubility associate with floating particles concentrated at the sea surface. The upper 50 micrometers of water contains pollutants concentrated from atmospheric deposition, terrestrial runoff and sewage disposal. Pollution levels in this surface microlayer exceed those observed at lower levels by orders of magnitude; moreover, water samples from the upper microlayer have induced developmental abnormalities and genetic damage in test animals.^{8,9} Pollutants in the surface microlayer tend to pass into the food chain because photosynthetic organisms seek the surface and fish and mammals feed at that layer. Ultimately, in some areas, it may be necessary to 'skim' the oceans' surface to remove dangerous pollutants.

A Scenario for Disaster.

Within the present decade, the majority of electrical equipment containing PCBs will wear out in both industrial and developing countries. If the 15 per cent of world PCBs at present in use, in storage or simply dumped in developing countries were released into the general environment, the extinction of marine mammals

would be inevitable. Developing countries, lacking foreign exchange and suffering formidable debt burdens are unlikely to provide funds for environmental protection. Developing countries would undoubtedly be grateful to obtain exchange credits in exchange for their PCBs which could be safely destroyed for the world's benefit. PCB manufacturers should be persuaded to buy back their dangerous products from developing countries. The World Bank should play an important role in ensuring exchange credits for PCBs held by debtors and in convincing the PCBs producers to purchase back their deadly products.

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"Sixty-five per cent of the worlds PCBs are still in use, or in storage or deposited into landfills. If those PCBs are permitted to leak into the marine environment, then the extinction of marine mammals is inevitable."



D. Roger/Unesco/Ambio

The detritus of industrial civilisation now litters all the corners of the Earth. But whilst the survival of industrial man is threatened by over-consumption, Gaia will undoubtedly continue to prosper.

Gaia: The Implications for Industrialised Societies

by
Peter Bunyard

The Gaia Hypothesis has brought home to us that life on the planet is part of a unified system — the ecosphere—which, if sufficiently deranged, must inevitably transform into a new state of being. Whilst Gaia itself will undoubtedly survive, the same cannot be said with any confidence of our own species, for we are undermining the very Gaian mechanisms that make life tolerable for larger mammals. Indeed, entire ecosystems are now disintegrating as the result of the changes that mankind has wrought since the Second World War.

Throughout its 4.5 billion year history, the Earth has been subjected to all manner of physical trauma, including violent Kraka-toa-like volcanic explosions and asteroids such as that which left a crater 1200 metres across and 180 metres deep in the Arizona desert. The evidence suggests that life began as early as 3.9 billion years ago, and once begun it retained its grip, not only surviving cataclysmic changes but probably benefiting from them by bursting out in a myriad of new forms to take advantage of novel niches and habitats. As Lovelock and Watson's Daisy World models indicate, Gaia would seem to have been remarkably resilient, always ready to bring in fresh recruits with new biological ideas to help it in the task of creating stability when the old order of organisms had outlived its purpose.

As human beings with a perfectly natural interest in the survival of our children

and grandchildren, we may like the idea of Gaia surviving through thick and thin, but in the end our major concern is that the Earth should remain a pleasant, habitable planet for us. One preoccupying conclusion from Lovelock's planetary models is that Gaia can tolerate and accommodate substantial perturbations — up to certain, as yet unknown, levels. Should those tolerance levels be exceeded, the entire regulatory system may flip abruptly to another level, for instance in which surface temperatures become much higher. Bacteria, with their wide range of metabolic capabilities and their remarkable propensity to share in each other's genetic make-up, may well adapt to a hotter planet,¹ but would we and those organisms like trees, insects, grass and mammals with which we are familiar and consider to be truly part of the world we live in?

None of us can now dispute that our

industrial activities, particularly in the post World War II era, have caused substantial changes to the environment. Our pollutants in the atmosphere, waterways and soil have pushed many recycling, cleansing mechanisms to the limit, overwhelming buffering capacity as in the soils of Southern Sweden, or, in some areas, actually causing trees to become covered in an algal slime.² The millions of motor vehicles on the roads, feedlots, monoculture farming with its heavy inputs in terms of fossil fuel energy and imported chemicals, the wave of tree-felling, particularly in the Tropics, all are evidence of mankind's obsession in bringing the entire wealth of the planet into its domain. We are in the throes of trying to create a new Earth, with Nature, as we know it, banished to a few sanctuaries, conceived more as museum pieces than as essential components in the intricate dynamic of planetary regulation.

We may feel that our modern industrial activities are but a logical step in the process of our development from neolithic agriculture to the present, that our discoveries and applications of technology are inevitable, given our inquisitiveness and ingenuity, and that in the end, having discovered how the world works, we will put our knowledge to rational use and make a better world.

However, the more likely outcome is that the momentum built into our industrialised consumer society, with its mania for growth, will prevent fundamental and vitally necessary action. Indeed, the present approach is to strive for 'business as usual' and to look for ingenious technical fixes to prevent excessive environmental damage, like for instance catalytic converters and lean-burn engines in motor vehicles, or elaborate devices for scrubbing smoke stacks. Our hope, then, is that the application of regulations and their transnational harmonisation will work well enough to control the pollution caused by our devices. Yet our notions of pollution control and what the environment can accept are based on simplistic linear thinking, whereby if one has gone too far one way a simple retraction will take one effectively the other. Again it is an example of our total immersion in mechanistic thinking and our failure to comprehend fully the fluidity and self-driven dynamics of the Earth's Gaian system. Furthermore, although technology has made many of the machines we use far more energy efficient, or less polluting, the spread of industrialization and consumerism, both within industrialised countries and in less developed parts of the world, has intrinsically taken up the slack granted us through the improved efficiencies now built into machines.

Overall our actions tend to be cosmetic at best. In fact, as part of a dominating, all-pervasive, technology-obsessed culture, we in the West have been led to believe that true progress lies in the application of scientific discovery and that all other cultures are basically backward, even though they may have their attractive features. The remarkable, self-evident successes of the scientific approach have been their own ambassador and few other cultures have been able to withstand the forceful power of our own, especially given its connection to profit and finance. In that respect, the world is becoming unidimensional, à la Marcuse, and we should ask, like Siegfried Giedion in his masterful book *The Eternal Present*, whether "the one-way street of

"As human beings with a perfectly natural interest in the survival of our children and grandchildren, we may like the idea of Gaia surviving through thick and thin, but in the end our major concern is that the Earth should remain a pleasant, habitable planet for us."

logic is taking us into the slum of materialism."³

Gaia and Traditional Cultures

But it is incorrect automatically to assume that our activities *per se* run counter to Gaia. Looking back to the multitude of traditional cultures, or if we are lucky enough to find them, to those still extant, we can find many instances of a collaboration with Nature that enhances richness and diversity. Nothing could be more striking in that respect than the differences between the traditional practices of living off the land among South American peoples and those imposed since the Spanish Conquest some 400 to 500 years ago.

For instance the Quechua and Aymara Indians of the Andean Altiplano developed over the millennia what David Guillet has called "the management of risk". The climatic conditions at such high altitudes made growing crops extremely difficult at the best of times and, should the frosts be harder or the rainfall less than the average, crops might well fail, especially if they were all of the same variety or, indeed, species. To counter the risk of failure, the Altiplano Indians used a two-

fold strategy. One was to grow different crops in any one region, always using a great variety of any one cultivar; the second was to grow crops at different altitudes, using the upper slopes for hardy species, such as the chenopodia quinoa and canihua, for potatoes as well as for the legume taro, and the

lower slopes for various beans and maize. The arid, cold Puna, high up in the mountains, was used for raising camelids, such as llamas and alpacas, and for deriving water for irrigation. In essence the peasants traditionally employed diversification as well as stratification in their agricultural activities.⁴

Such a strategy for risk management would not have been feasible if the social and cultural system of the Andean campesinos followed the same pattern as that now prevailing in the Western world, based as it is on individual/family land ownership and on an overriding concern with the production of cash crops for the market economy. As Guillet points out, in the Central Andes the peasants had access to land at different altitudes, moving between the zones as the growing seasons and harvesting dictated.

Remarkably, traditional farming practices among the Quechua and Aymara Indians of Peru and Bolivia survived the Spanish Conquest and domination through the *latifundia* system, at least until World War II. Thus work was organised through both households and what have been called 'suprahouseholds' in which relatives through marriage were brought into the system basically to share in the



Industrial emissions spewed into the environment are radically changing the chemistry of the atmosphere. Gaia's response could be a "climatic flip" with unknown consequences ..

labour and then, presumably, in its rewards. Through such relationships entire communities became involved, thus ensuring that the infrastructure of terraces and irrigation systems was adequately maintained and that land was distributed through usufruct.

Agrarian reform, based as it has been on understandable social pressures to break up the large estates and the exploitation of peasant labour, has not necessarily been a force for good in the Central Andes. For one thing, governments have reacted to such political realities by making land available elsewhere, for instance in the tropical lowlands, where agriculture is rarely suitable, at least in the long term. The destruction of tropical forest has been one foreseeable and tragic result. Meanwhile in the Altiplano itself, land reform and the pursuit of the market economy have begun to destroy irrevocably the traditional communal farming practices that at least ensured survival for all. The land is now falling into private hands and the survival strategies of diversification and zoning are now being replaced by an emphasis on cash crops for the market. Excessive pressure, through overgrazing for instance, is being put on the environment, and the precarious ecological balance created through millennia of wise

practice is collapsing.

Throughout the Americas, and the same applies to any region of the world, we can find evidence of remarkable adaptations of different peoples to their environments. Whether we consider the Eskimos, the Prairie Indians of North America, or the peoples of Central and South America, we find a host of different cultures and adaptations to the environments in which those peoples found themselves. The now extinct Sinu people of northern Colombia, for instance, converted the cienaga swamplands to the west of the Rio Magdalena into an extensive, highly productive canal system that was similar in a number of respects to the water/garden 'chanampas' system developed by the Aztecs and their predecessors around what today has become sprawling, highly polluted Mexico City.⁵ Through such canals, the Sinu Indians controlled the seasonal inundations that occurred throughout the rainy season, thus keeping the cienagas filled and well stocked with fish, while simultaneously trapping sediment that could be used for intensive crop growing in the areas between canals. An appraisal carried out by scientists in Colombia indicates that at least 2000 square kilometres were made fertile that way and suitable for highly productive cultivation.⁶

The carrying capacity of the region, in terms of the number of people it can now support, is now no greater than 70 to the square kilometre, whereas an evaluation of the numbers that were and could be supported by the Sinu system indicates a 15-fold greater population density — some 1000 inhabitants per square kilometre. The forests have now been chopped down to make way primarily for cattle, and the swamps, those wonderfully productive ecological systems, are increasingly being drained and dried out. The tens of thousands of people who depend on the cienagas and the river systems to provide them with essential protein from fish are being inexorably deprived of the little livelihood they once had. Ironically, the current obsession with hydro-electricity, planned for the Rio Sinu, together with flood control, is the antithesis of traditional practices where the rainy season was seen as essential for replenishing the canals.

Fallen Man

The destruction of community, the desperate search for land, the need to enter the market economy, have all combined in the process of environmental degradation in

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The proceedings of the *Second Annual Camelford Symposium on Gaia and Its Implications for Evolutionary Theory* (to be held on 2-4th November 1988) will be available by the autumn of 1989.

the developing world. There we see in front of our eyes the brutal consequences of environmental destruction; erosion, desertification, salinisation, flooding, gross pollution with agrochemicals.

In effect, we have replaced intrinsically productive and sustaining systems with our own westernised model of progress and development, introducing alien elements into an ecosystem without first evaluating what that particular environment had to offer. In this, the world's indigenous peoples have shown themselves to be vastly superior; indeed when we look at the sum of our present-day industrial activities, we can only conclude that our so-called 'scientific viewpoint' has been environmentally crass. Furthermore, with the profit motive playing such a conspicuous part in development, there has been a tendency wilfully to misconstrue the capacity of the environment to assimilate and cope with wastes. The tradition in Britain, for instance, has been to espouse an 'out of sight, out of mind' approach, as if the environment as a whole had an infinite capacity for absorbing and neutralising wastes.

To a great extent, the piecemeal approach to industrial wastes and the setting of compromise standards, which depend for the most part on some rule of thumb notion as to what the environment can take while not jeopardising industry's profits, has to a great extent been mirrored by the activities of the environmental movement. With some justification, environmentalists have gone for obvious targets such as vehicle emissions, power plant pollution, the aerosol link and the ozone layer, off-shore incineration of toxic wastes, dumping at sea, nuclear power and such bestialities as modern whaling. But with rare exception, environmental groups have avoided looking at the whole industrial enterprise. They may be rocking the boat, but certainly not enough to sink it.

Our Impact on Gaia

The Gaia hypothesis will undoubtedly have the effect of changing radically the views and actions of environmental groups, transforming them into movements that embrace ecology in the fullest, most general sense of the word. Now we have a hypothesis that enables us to understand far better than before why acid rain is a particular problem of the post World War II era rather than of the late 19th century. Now, through the work of Lovelock, Watson, Whitfield, Heinrat and others, we can

glimpse the extraordinary network of interactions that tie the activities of industrial society to sulphur-bearing rain emanating from the seas. We have come indeed to appreciate that sulphur and nitrous oxide (NO_x) emissions from power plants and motor vehicles are just one source of pollution that, mixed with a *pot pourri* of atmospheric chemicals from both natural and anthropogenic sources, is causing a fundamental transformation of the oxidation pathways.

Carbon Dioxide and The Greenhouse Effect

As far as changes to the environment are concerned, Lovelock realised from the Gaia Hypothesis that of all the Earth's systems, the atmosphere would be among the most sensitive to change and equally, assuming the hypothesis to be correct, that it would be the system upon which the biota would have to act reasonably quickly to counteract perturbations, whether the cause was external to the Earth, such as asteroidal impact, or a biota-generated phenomenon, such as the release of free oxygen into the atmosphere several aeons ago. In fact, temperature regulation of the Earth's surface by the biota was always one of the most significant features of the Gaia Hypothesis and an aspect that distinguished it wholly from other theories of the biosphere, as discussed by Jacques Grinevald.⁷ As part of that regulation, given that the Sun has increased in luminosity by between 30 and 40 per cent since the Earth came into being as a planet, the greenhouse gas carbon dioxide (CO_2) has had to be dumped, most of it finishing up as limestone like the White Cliffs of Dover, and taking the concentration of CO_2 down some thousandfold to 0.03 per cent today.

Given the importance of climate to human affairs, for instance for agriculture, for flood control and even for such mundane matters as to where to spend one's holiday, it is perhaps significant that one of the areas of greatest concern today is whether or not the emission of greenhouse gases through anthropogenic activities has caused, is causing or will cause fundamental climatic change.

The Gaia Hypothesis indicates that an increase in the concentration of greenhouse gases in the atmosphere must cause climatic change by altering the amount of heat that remains trapped at the Earth's surface; equally, for the hypothesis to be valid, it must be shown that the sum of all biotic activities on Earth will counter,

through cybernetic regulation, any such temperature rise. The question then arises as to what kind of time-scale we are talking about. Geologically speaking there is abundant evidence that surface temperature has been controlled within narrowly defined limits, which includes the transition from warm periods to ice-ages. Indeed, one of the results coming from the various attempts at climate modelling is how small a change is needed in the concentration of the greenhouse gases to bring about climatic change.

In that respect the levels of CO_2 in the atmosphere have now risen to some 345 parts per million (ppm) from about 260 ppm prior to the Industrial Revolution. By the year 2000, the levels of CO_2 are expected to rise to about 370 ppm and continue their rise upwards to approximately 600 ppm sometime in the middle of the next century, when they will have effectively doubled from what is now taken as base. Thus, at the present time, CO_2 levels are increasing at about 1.5 ppm (volume) per year, hence 0.5 per cent per year. To put that change in perspective, we have to appreciate that at their peak, carbon dioxide levels will comprise just 0.06 per cent of the atmospheric gases.

There is considerable debate over the precise quantities of carbon dioxide being generated by anthropogenic activities. The general consensus is that fossil fuel burning is bringing about the production of some 5 billion tonnes of the gas each year, with land use changes, and in particular deforestation, adding between 1 and 4 billion tonnes on top of that. Where land use changes involve the clearing of one type of vegetation, for instance trees, to make way for highly productive crops, then the difference in CO_2 emission and uptake through photosynthetic activity may be relatively small. In that respect today's exploitation of temperate and boreal forests may not be contributing significantly to the rising levels of CO_2 in the atmosphere. The same, however, is not true of tropical forests, which, particularly when cleared through burning, are adding significantly to the rise in levels of the gas. Nevertheless, controversy over the extent of such destruction of tropical forests is intense. For instance, a report prepared for the UN Food and Agriculture Organisation (FAO) and the United Nations Environment Programme (UNEP) in the early 1980s suggested that some 7 million hectares each year of primary rainforest were being destroyed worldwide, which included some 1.5 million hectares per year of the Brazilian Amazon.⁸

"The dying of the forests, the spread of deserts, the death of the Baltic seals, the cycles of droughts and floods are all indications of perturbations. Such perturbations may have underlying natural causes but their accentuation to the point of catastrophe is surely our own doing."

However, the rate of destruction has certainly accelerated since then, and some observers, with the aid of satellite image scanning, are coming up with figures of 20 million hectares and more of the Brazilian Amazon going up in flames each year. On the basis that between 150 and 300 tonnes of carbon are released as CO₂ per hectare through burning, then the destruction in Brazil alone would be responsible for between 3 billion tonnes and 6 billion tonnes of carbon each year. The latter amount would therefore be approximately as much as that estimated as released from fossil fuel burning and that is not even taking the remainder of the tropical countries into account.

Even without taking Brazil into account, as much as 2 to 3 billion tonnes of carbon could be released from tropical forest elsewhere. It would therefore seem, that with Brazil's ferocious onslaught on the Amazon, the emission of CO₂ from the destruction of tropical forests throughout the world may exceed by a considerable margin that from fossil fuels.⁹

Ironically, for those who uphold dams as being ecologically clean (insofar as they do not involve the burning of fossil fuels and their noxious emissions), W.J. Junk and his colleagues have estimated that the flooding of tropical forests in the relatively low-lying parts of the Amazon, such as at the 250 MW Balbina dam close to Manaus, for generating hydroelectricity will, if the trees are left to decay, lead to as much CO₂ being emitted from their decomposition as would be released from an equivalent sized thermal power plant operating on fossil fuels for some 100 years.¹⁰

The Brazilian Amazon is just one region of tropical forest that is being destroyed in the world. Altogether, as much as 4 billion tonnes of carbon could be released annually from such destruction and therefore



The drought which hit the US in the Summer of 1988 led many scientists to conclude that the Greenhouse Effect is already a reality.

nearly equivalent to the amount from fossil fuels.¹¹

Despite the sophistication of today's computers, global climate models are relatively crude when dealing with the real world and no-one is really sure what the overall effect will be of increased greenhouse gases. Nevertheless, there is general agreement among climatologists that the Earth's surface has warmed up by 0.7°C since the mid-nineteenth century, an amount that is certainly consistent with model predictions of the warming-up effects of the greenhouse gases that have been emitted since then and which are still resident in the atmosphere.

The seas are a major sink for CO₂, both through simple absorption of the gas into water and through the photosynthetic activity of the marine biota. Changes in the biomass of algal plankton will undoubtedly affect the rates of uptake of CO₂ but not in ways that can match today's anthropogenic emissions. For instance, M. Stuiver estimated in 1978 that between 1850 and 1950, some 180 billion tonnes of carbon of anthropogenic origin found their way into the atmosphere, which, had it remained there, would have been equivalent to an increase of 26 per cent to the total 700 billion tonnes of 'natural' atmospheric carbon. Isotopic studies indicate that only 2 per cent of that carbon is still to be found in the atmosphere and that therefore an effective sink has been in operation — just as one would expect from the Gaia hypothesis. The indications are that, by 1950, some 64 per cent of the excess carbon had found its way into the first 300 metres of

the oceans and 24 per cent had been taken deeper into the bathyal and abyssal zones.¹²

It would seem that the Earth is coping remarkably quickly with the excess CO₂ being generated by our industrial activities, and if we could stop immediately, abandoning our profligate consumption of fossil fuels and our rampant deforestation, not many years would have to pass before the levels of that one greenhouse gas were back to 'normal'. Yet, to date we have not effectively reduced our anthropogenic emissions of CO₂ and the trend would appear to be inexorably upward. Indeed, our emissions of CO₂ are swamping the natural cycling mechanisms, so that according to Ramade as much as 40 to 60 per cent of the CO₂ produced by the combustion of fossil fuels during the decade 1959 to 1969 has remained in the atmosphere, with the rest going into the oceans.

Other Greenhouse Gases: Methane

Carbon dioxide is by no means the only greenhouse gas that is being emitted through our industrial and agricultural activities. Methane concentrations in the atmosphere, having remained apparently stable for thousands of years, have been increasing substantially since the beginning of the industrial revolution. Pre-industrial concentrations have been estimated as some 700 parts per billion (by volume), whereas in 1985 they were more than double that at 1650 ppb with a current

rate of increase that is close to one per cent per year.¹³

As Jim Lovelock has pointed out, methane plays a crucial role in the balances of gases such as oxygen in the atmosphere, and since methane is generated by living organisms — anaerobic methanogenic bacteria — here we are seeing a typical, and crucial, Gaian mechanism at work. These bacteria derive their energy and nutrition from carbonaceous material and therefore form a small, although significant, part of the processes whereby carbon dioxide is returned to the atmosphere. Photosynthesis, whether by cyanobacteria, algae (such as those comprising marine plankton), or by higher plants, requires that the concentration of CO₂ be at a certain volume in the atmosphere. Indeed, for life on Earth, it is now a race between the levels of CO₂ having to be reduced to lower levels to maintain surface temperatures within viable limits and the cut-off point for photosynthesis. As we now know, the so-called C-4 plants, with their different photosynthetic biochemical pathway, are at an advantage over the C-3 plants at low CO₂ concentrations.

At present, about 100 million tonnes of carbon are buried each year, equivalent to

the release of 133 million tonnes of free oxygen gas into the air. Not that the oxygen content is increasing, as we know full well, having remained at its present levels for some 700 million years; there are in fact plenty of sinks for mopping up excess oxygen, such as volcanic materials or reduced materials in the soil. Broad estimates indicate that as much as 97.5 per cent of the products of photosynthesis are consumed by oxygen-breathing consumers, leaving just 2.5 per cent for anaerobes such as methanogenic bacteria. According to Lovelock, the amount of carbon buried each year until the current period has been remarkably steady throughout the history of life on Earth. One must therefore assume that in the Archean, anoxic organisms (such as the methanogens) consumed most of the products of photosynthesis, but that as free oxygen built up in the environment the place of such organisms was taken over by respiring consumers such as ourselves. Lovelock's conclusion is that the methanogenic organisms, being anaerobic, have had to retreat into murky places away from the highly toxic effects of free oxygen. They now reside in such places as swamps, paddy fields, and the intestines of higher organisms.

Cattle, Rice and Atmospheric Methane

Why have methane levels been increasing and what do such rises mean? Again it would appear that mankind has had a hand in such rises. The spate of forest clearing has greatly encouraged the termite population, and although there are considerable differences in the estimates of the contribution that these social insects make to global methane, it is nonetheless significant. Cattle provide another excellent refuge for methanogenic anaerobes, and the eradication of tropical forest to make way for cattle is certainly compounding the contribution from termites. Between 1966 and 1983, for instance, well in excess of 100,000 square kilometres were cleared in the Brazilian Amazon Basin for cattle ranching, such multinational companies as Volkswagen benefiting outrageously from the easy terms offered by the Brazilian government for enormous swathes of land.¹⁴ We are now seeing that amount of forest and more going from the Brazilian Amazon alone in just one year — an extremely disturbing prospect.

The devastation of tropical forest in Central America for cattle raising has been

THE EARTH REPORT

MONITORING THE BATTLE FOR OUR ENVIRONMENT

GENERAL EDITORS: EDWARD GOLDSMITH AND NICHOLAS HILDYARD

Dispassionately written, factual and concise, this book is far more horrifying than any supernatural shocker, documenting as it does the all-too-real, relentless destruction of the earth's natural environment. The issues it raises are of immediate, urgent concern, not only to politicians, campaigners and students but every citizen of the planet.

Opening the book are six major essays by eminent writers about such topics as acid rain and forest decline . . . the politics of food aid . . . nuclear power after Chernobyl . . . and the purity of our drinking water. Backing these is a magnificent A-Z directory of reports on everything from additives to zero population growth. This meticulously-researched, up-to-date encyclopaedia includes the brand names and properties of toxic chemicals, the sites of major ecological disasters, such as Bhopal and Three Mile Island, species and habitats of wildlife and plants threatened with extinction, and the effects of intensive farming, damming and deforestation, etc.

Amid the alarmingly widespread, seemingly unending environmental and ecological damage, a few hopeful signs are noted, such as the growing trend towards recycling, new initiatives in reforestation, and the recent Ramsar convention to protect the world's vanishing wetlands. The book also includes useful maps, tables and diagrams, plus a directory of organisations concerned with the environment, and an over-view of events that affected the health of the planet—for better or worse—during the last year.

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proportionately equally great. Meanwhile, through World Bank and European aid, the cattle population has increased greatly throughout Africa and is now being extended further through the EEC-funded tsetse fly eradication programme, which, according to FAO plans, is to stretch right across the African Savannah, as if the world were suffering a gross shortage of beef.

The annual growth rate in the world cattle population in the decade between 1970 and 1980 was approximately one per cent per year and the indications are that such growth has been continuing. The area down to rice paddy, another ideal habitat for methanogenic bacteria, has also been increasing significantly, at around 0.7 per cent per year according to FAO figures. Leaks of methane into the atmosphere from coal mining and natural gas production have been increasing at about 2.2 per cent per year over the past decade.

Overall, methane releases into the atmosphere per year have been estimated by Paul Crutzen as amounting to 380 million tonnes divided up as follows: domestic ruminants 80 million tonnes; biomass burning 45-60; natural gas leaks 33; coal mining 34; rice paddies 120; and natural wetlands 70-50 million tonnes.

The annual growth rate in methane of around 1.2 per cent suggests an annual growth of 4.6 million tonnes and therefore just 1.6 per cent of the total anthropogenic source. However, the 2.9 million tonnes of methane arising from the growth in rice

"CFCs are powerful greenhouse gases, molecule per molecule, being at least 10,000 times more effective than CO₂."

paddy production, in cattle ranching and in fossil fuel extraction does not tally fully with the increase in methane in the atmosphere and indicates that some 1.7 million tonnes need to be accounted for. Here, Crutzen suggests that changes in atmospheric chemistry are at play and they closely involve methane.

In the earth's atmosphere, methane is a consumer of oxygen through interacting with ozone and with the hydroxyl radical, itself a product of ozone and water interacting photolytically. Thus laboratory experiments indicate that for each methane molecule oxidised as many as 3.5 hydroxyl radicals are consumed as well as 1.7 ozone molecules. Under such circumstances the levels of both these potent oxidisers will tend to fall drastically once methane levels begin increasing. Crutzen is concerned that the 1.7 million tonnes of methane that cannot be accounted for in the totalling of anthropogenic emissions is the result of the fall in the concentration of both ozone and hydroxyl. If Crutzen is correct then the situation may well deteriorate further.

But there is another angle to the story. Such build-up of methane may well be occurring over tropical areas through forest destruction followed by rice paddy and cattle ranching. On the other hand, where levels of NO_x, in particular nitric oxide (NO), are raised, the chemistry of methane breakdown takes a totally different course and one in which both hydroxyl and ozone concentrations are likely to increase. Nitric oxide above certain concentrations, as is indeed the case over heavily industrialised areas with their dense traffic and high concentration of power plants, smelters and cement factories, catalyses the production of half a hydroxyl radical and 3.7 ozone molecules. Undoubtedly the increased oxidative powers of the atmosphere over industrial regions of the planet through the interaction of increasing levels of hydrocarbons, such as methane and nitrogen oxides, are accelerating the oxidation and deposition of acid oxides, such as sulphur oxides as well as nitrogen oxides, leading to acidification of lakes, rivers, and soils where the buffering capacity is poor.

Meanwhile methane is a greenhouse gas

which, per molecule, is some ten times more powerful than carbon dioxide. On the other hand its concentration in the atmosphere is some 500 times less compared with carbon dioxide and therefore its increase, at just over double the rate of CO₂, is leading to a greenhouse effect that is some 20 times less. The methane increase therefore accounts for some 5 per cent of the putative warming of the Earth's surface at the present time.

Nitrous Oxide

Nitrous oxide, which is generated particularly through biomass burning, fertiliser use and the combustion of fossil fuels is slowly increasing in the atmosphere, having gone up some 20 parts per billion over the past 150 years. Nevertheless, it too is a strong greenhouse gas and moreover it has a residence time in the lower atmosphere of some 170 years, compared to approximately 10 years for both carbon dioxide and methane. When oxidised to nitric oxide and present in sufficiently high concentrations in the lower atmosphere, nitrous oxide contributes to the increase in tropospheric ozone.

Ozone

Ozone generated at the surface of the Earth through the catalytic processes, involving the oxidation of hydrocarbons in the presence of NO_x, remains in the lower atmosphere for a few weeks. Levels of surface ozone have been rising at approximately 0.25 per cent per year in global terms, but locally the rise in the levels has been considerably higher. According to Paul Crutzen, for instance, ozone concentrations in West Germany increased by some 60 per cent between 1967 and 1980. Not only is ozone a greenhouse gas but, close to the Earth's surface, it is highly toxic to living organisms. Moreover, being a powerful oxidant in the presence of light, it can bring about chemical changes in a number of other atmospheric pollutants, helping therefore to create a cocktail of toxic by-products that may indeed be responsible for causing the die-back of trees and 'waldsterben' over many parts of the northern hemisphere.

Stratospheric ozone is generated from oxygen in the presence of light. Equally, light breaks the ozone molecule down and, in the presence of water vapour, the electronically excited oxygen atom will form the powerful oxidant — hydroxyl. Strato-

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spheric ozone is important for life insofar as it screens out much of the ultraviolet B radiation that penetrates the atmosphere from outer space. However, ozone decomposes readily in the presence of light and chlorine atoms and one of the great concerns over the past decade has been the potential interaction of the chlorinated chlorofluorocarbons (CFCs) with stratospheric ozone. That such fears may already be realised comes from recent studies indicating that ozone is rapidly becoming depleted from the stratosphere above Antarctica. It appears that during certain months of the year, the ozone levels over Antarctica are dropping by as much as 40 per cent compared with levels before the 1960s. Moreover, the ozone hole appears to be getting larger and spreading to lower latitudes.

Chlorofluorocarbons

Each of the main CFCs, CFC-11 and CFC-12, have been increasing at a rate of around 7 per cent per year in the atmosphere, one reason being their relatively long residence times of between 80 and 120 years respectively. At present, their global concentrations are comparatively low, at some 0.2 and 0.3 parts per billion. Lovelock was initially sceptical that at such low concentrations the CFCs could be responsible to a measurable extent for destroying the ozone layer. He now concedes that ozone depletion is taking place in the upper atmosphere and that it is conceivable that the CFCs are involved. On the other hand, he was one of the first to point out that the CFCs were powerful greenhouse gases, molecule per molecule, being at least 10,000 times more effective than CO₂. At their present concentrations in the atmosphere, the CFCs would contribute some 15 per cent to the greenhouse effect of CO₂.

Both methane and nitrous oxide independently are effective in destroying ozone and it could be argued that the disappearance of ozone over Antarctica is the result of interaction between the various atmospheric pollutants that have been generated through man's industrial activities. One mechanism has been suggested which, ironically, results from the greenhouse effect, but from the other side of the coin. Indeed, the greenhouse effect results in the Earth's surface trapping more heat at the expense of the upper stratosphere which, for the energy balance to be maintained, must become colder. The suggestion is, therefore, that the air some 20 to 25 kilometres above Antarctica has become

colder, resulting during the dark winter months in the accumulation of ice crystals within which are trapped a cocktail of pollutants such as methane, nitrous oxide, the CFCs and other substances. At the beginning of the Antarctic summer, when the sun shines, these crystals melt and, through photo-oxidation, form a host of new chemicals, some of which are extremely effective at causing the destruction of ozone.

In 1986, Wolfgang Seiler proposed a similar mechanism for the killing of the trees in the Black Forest which appeared to be particularly vulnerable just above the inversion layer, at around 500 metres. While all below may be blanketed in fog, the hills above the boundary layer may be bathed in brilliant sunshine, coincidentally at the same altitude as the plume transporting pollutants from tall factory stacks. At those altitudes, particularly during the winter months, the temperature is likely to fall well below zero. As a result, Seiler suggested, all kinds of substances, including photooxidation products, could become trapped in the ice that formed on the needles. Those compounds could well be toxic and in sufficiently high concentrations to cause damage. Alternatively toxic compounds could be generated as a result of interactions with naturally produced substances such as terpenes and isoprenes released from the needles.¹⁵

The Consequences of Climatic Change

Global climate models suggest that a doubling of the CO₂ content of the atmosphere could lead to a global warming of between 1.5°C and 5.5°C. Such a doubling is expected by the middle of the next century; if we then add in the contribution from the other greenhouse gases, methane, the CFCs, nitrous oxide and ozone, the effective doubling time for CO₂ is likely to be brought forward by 20 years to 2030 — just 40 years away. The models, supported by evidence of the climatic history of the Earth, indicate that the warming up, given as a global average, will not be uniform but of much greater intensity at higher latitudes, with the equatorial regions, at least in terms of surface temperature levels, remaining much as they are at present. We are therefore talking of dramatic temperature changes in temperate regions, especially if the higher prediction proves to be correct. It should also be remembered that throughout the past 12,000 years, the average surface temperature of the planet has

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risen by no more than 3°C to 4°C.¹⁶

One effect of a generalised warming-up will be to increase the temperature of the oceans. Just such a warming-up will lead to as much as a one metre rise in sea level before any ice-cap melting has taken place, and the effect of such rises is likely to be devastating for any low-lying areas close to the sea, as for instance along the Eastern seaboard of the United States (let alone the Netherlands), and many capital cities of the world, including London. Furthermore, salt water will intrude farther inland, jeopardising fresh water supplies in coastal regions.

A warmer climate will lead to significant, although unpredictable, changes in weather patterns and in the kind of vegetation that can be supported. Some models anticipate the virtual loss of boreal climates and the expansion of tropical and warm temperate climates, the net result being an increase in grasslands and deserts, with a sharp decline in the area under forests. Such models have not taken man's activities on vegetation types into account. Agriculture would be fundamentally affected, not least through changes in rainfall pattern, but equally important because the rising CO₂ levels would enhance the growth of C-3 plants at the expense of C-4 plants. Since C-4 plants provide us with many essential crops for both human and livestock consumption, for instance maize, sorghum and sugar cane, and the C-3 plants many of the competing weeds, we may well find increased CO₂ levels jeopardising conventional monoculture food-crop systems.

Are the high winds that struck Britain in the winter of 1987 an indication that the climate has already begun to destabilise? And what about the droughts which afflicted the United States during the summer of 1988, or the heavy rains and flooding of the Sudan, Bangladesh and parts of South America? What about hurricane Gilbert? Circumstances never remain precisely the same and it is a manifestly difficult task to pin any one feature of climate down to a recognisable perturbation, whether it be of natural origin, such as a major volcanic event, or man-caused. Nevertheless, we have sufficient knowledge of the effects of deforestation to come to the conclusion that the flooding of Sudan and the upsurge in the waters of the Nile, or indeed the flooding of Bangladesh, are not simply the result of climate changes, but are also a direct consequence of the deforestation that has been going on over the past few decades.



Bruck/Ambio

Forest death in the Black Forest of West Germany. Acid rain is just one example of Gaian mechanisms being overwhelmed by man's activities.

Deforestation and Climate

There has been considerable confusion as to precisely what happens to rainfall and run-off after deforestation. It has been noted, for instance, that the total quantities of water carried by rivers during the course of the year may not be significantly less after deforestation than before. However, as various researchers have found, the rains, when they come, tend to be far stronger. H. C. Pereira, for instance, measured rainfall in a region of tropical Africa where rainforest was transformed into tea plantations encompassing just 700 hectares. He discovered that high intensity rainfall went up four times compared to still forested regions. Equally, Snow, who studied the climatic effects of substituting tropical forest for subsistence agriculture in Panama, found that average annual run-off in the region prior to deforestation and after did not change significantly. On the other hand, the intensity of rainfall and its intermittence increased once the forest had gone. A principal cause for the seasonal increase in surface run-off was found to be soil compaction and the actual proportion of rain reaching the soil.

Substantial differences have been found between the soil's capacity to absorb water when the forest is intact and when it has been cleared. H. Schubart investigated the changes to soil after deforestation in a region close to Manaus in the Brazilian Amazon. He discovered a 10-fold drop-off in water absorption in a 5-year old pasture compared to the soil still covered in forest. That loss in ability to retain water by the soil, primarily through compaction, is compounded by the increase in rain actually reaching the soil. Luiz Molion of the Brazilian Space Research Institute was able to show, again close to Manaus, that 17 per cent of annual precipitation over the forest is intercepted by the canopy and never reaches the ground. Evapotranspiration is significantly diminished after tropical forest has been removed. Indeed, evapotranspiration may fall by as much as 50 per cent and precipitation by 20 per cent, lending considerable credence to the measurements of Eneas Salati, Molion and others that over an extensive area such as the Amazon Basin a considerable proportion of rainfall is derived from the continual recycling of evapotranspired water.¹⁷

This efficient recycling of water over the tropical forest is a component of Gaia, even though in global terms it may appear small. Indeed, whereas over temperate zones local evapotranspiration contributes no more than 10 per cent to local precipitation over the course of a year, over the intact forest of the Amazon the proportion may be as high as 50 per cent and that of a much higher average precipitation, amounting to some 2500 millimetres per year. That process of evapotranspiration is like a sweating mechanism, keeping that area of the Earth far cooler than it would be if they were as dry as a desert. Between 50 and 75 per cent of the solar energy reaching the Earth's surface is used in evapotranspiration and the remainder in heating the air. Thus the humidity under the canopy is 87 per cent compared to less than 50 per cent just 50 metres away out in a clearing. And soil temperatures are at least 5°C hotter out in the open compared to those covered by forest.

The vapour generated over the forest condenses to form clouds which, with their high albedo (reflectivity), will prevent solar radiation from reaching the ground and will thus also serve to keep the surface in tropical regions cooler. Meanwhile some of that vapour will be carried aloft in the Walker-Hadley circulation of air across the Equator and get transported to higher latitudes, where, after condensing and precipitation, it will release its latent

heat. Although there is considerable contention over the role of the tropical forest in providing heat through evapotranspiration for regions in the sub-tropics and beyond, nevertheless some heat is transported in that way and may serve as one component in averaging out the temperatures over the entire planet. The other important mechanism in this process of heat-transport is that of ocean currents.¹⁸

Salati estimates that of 12 trillion (10^{12}) cubic metres of rain that fall over the Amazon Basin each year, 6.5 trillion cubic metres are derived from evapotranspiration. Daniel Hillel,¹⁹ responding on behalf of the World Bank to my article in *The Ecologist* (Vol. 17, Nos 4/5 1987) on the potential climatic consequences of deforesting the Amazon, is somewhat dismissive of concern that the loss of primary forest will lead to environmentally damaging reductions in either rainfall or evapotranspiration. For instance, he does not appear to find a fall in precipitation of up to 20 per cent to be a dramatic reduction and one that will perturb unduly the system's viability. If we assume that the reduction in evapotranspiration is 50 per cent, as indicated by Molion, then a simple calculation shows that such a reduction over the entire Amazon Basin would be equivalent to a reduction in latent heat of approximately 240 terawatts ($1 \text{ TW} = 10^{12} \text{ watts}$). The entire human population at present consumes energy at the rate of 10 terawatts and electricity at 2 terawatts. Therefore that simple reduction — hardly dramatic according to Hillel — would be equivalent to 24 times the rate of world energy consumption and 100 times its electricity consumption.

We know full well that the tropical forest is one of the most extraordinary contemporary manifestations of Gaia. There, diversity enables a highly efficient energy flow through the system with the net result that essential nutrients can be rapidly recycled and kept within the biomass. All components of the system act in harmony, even intra-specific competition which itself must help determine diversity and optimise the use of available energy and nutrients.

The climax, primary tropical forest is a relatively delicate structure, having been greatly reduced in extent during the last ice age. Vast regions of the Amazon Basin, for instance, turned into Savannah, with the truly forested areas remaining isolated in what today have been termed 'biological refuges'. When conditions improved for the forest, slowly but surely it was able to recolonise, this very process contributing

to the multiplicity of variation and diversity. The difference between a 'drying-out' of the region and its receiving adequate rain to sustain it may not have been so great. Can we assume that the fall-off in precipitation once the forest has been destroyed will not engender a generalised deterioration in the condition of the remaining forest, particularly in the Amazon Basin, where the moisture essentially circulates from East to West in what is known as the Walker Cell circulation? Hillel, for instance, is optimistic with regard to the forest's regenerative powers, basically arguing that vegetation soon returns. Of course it will if the area of forest destroyed does not exceed that necessary for seed distribution and the soil has not been too heavily compacted. Otherwise, as Salati and other Brazilian scientists have pointed out, the recovery of the rich original ecosystem may be painstakingly slow — a 1000 years or more.

We would indeed be foolhardy to imagine that a brutal simplification of the tropical ecosystem as brought about through a wide-reaching forest clearance would leave no noticeable mark on Gaia. The Gaia Hypothesis predicts that *stability* is at its greatest when *species diversity* is high and we are already aware that deforestation in the tropics has many fundamental consequences, such as soil deterioration and gully erosion, that go beyond changes in cloud formation and energy transfers. Undoubtedly one of the more worrying aspects of forest loss from tropical areas, particularly those growing on weathered soils such as in the *terra firme* regions of the Amazon Basin, is the immediate loss of most of the nutrients that otherwise have been so effectively recycled by and within the biomass, particularly through the tightly bound symbiotic relationships between the root mat of the trees and mycorrhizae. Once gone we can never hope to replace the intricate complex interactions that underlie the forest's undoubted success as an integrated ecosystem. Moreover, the question also arises whether we can, with our modern scientific approach, improve significantly — if at all — on the strategies of survival within the tropical forest developed and tested over millennia by the world's forest dwellers.

Acid Rain and Gaian Mechanisms

In many of our modern activities, we are on a collision course with Gaia. One of the essential attributes of Gaia is that its multi-

plicity of parts — the biota — have evolved recycling systems that keep nutrients in circulation, between, for instance, the seas and the land. Our industrialised activities are interfering directly with those recycling pathways, very often speeding them up so that they swamp the processes that normally control them. The acid rain phenomenon is just such an example. As Lovelock showed more than a decade ago, marine organisms such as the algal coccolithophorids generate sulphur in volatile form — dimethylsulphide — which, when oxidised to sulphur dioxide, primarily through the action of the hydroxyl radical, returns to the land. Lovelock and his colleagues have since elaborated the process further by pointing out that the self-same sulphur dioxide provides condensation nuclei for the formation of rain-bearing clouds over the oceans.

We have affected such a recycling process in two fundamental ways. First, we have increased substantially the flow of nutrients from the land to the sea, particularly in those areas over the continental shelves where such sulphur-generating planktonic algae are to be found. And secondly, we have altered the processes of photo-oxidation in the atmosphere, through emissions from smoke stacks, from vehicle exhausts, from intensive livestock raising and from land-use changes such as deforestation. The net result of all these activities is to have brought about a substantial increase in the rate and quantities of acid, both of sulphurous and nitrogenous origin, that are deposited. The consequences, as we have begun to realise, are a swamping of soil buffering mechanisms and the making available of toxic ions such as aluminium and cadmium.

Entire ecosystems are now disintegrating as the result of the changes that have been taking place since the Second World War. Thousands of square kilometres of lakes in Scandinavia are now devoid of fish. Meanwhile soils that were considered relatively robust and insensitive to acidification are showing catastrophic declines in pH — sometimes by as much as one unit — with the result that at least half the base cations, among them calcium, magnesium and potassium, have been lost from the soil and replaced by hydrogen and aluminium.²⁰

The extent of the changes taking place has taken many scientists by surprise, although it would hardly have done so had they taken the fine-tuned recycling mechanisms of Gaia into account. For instance, the levels of sulphur fall-out in relatively



S. Franklin/Newsweek

Deforestation in Ethiopia has caused massive flooding in Sudan. If the Greenhouse Effect is not controlled, many low-lying areas of the globe will be permanently under water.

pollution-free areas, such as in the more northerly parts of Canada, amount to less than 10 kilograms per hectare per year. The average levels in open country in south Sweden are as high as 24 kilograms per hectare per year, and therefore sufficient to cause damage to soil and surface waters. In Sweden at least 18,000 out of 20,000 lakes are now acidified to the point where they are incapable of supporting fish.

Meanwhile the precipitation of nitrogenous compounds from the atmosphere has increased by a factor of between 20 and 60 over certain regions compared with 'clean' areas. Thus, over 'clean' parts of the United States and Scandinavia, the deposition rate for nitrogen compounds such as ammonium and nitrate is less than 1 kg/ha/year. Over parts of south Sweden as much as 20 kg/ha/year are deposited and at the edge of some forests as much as 60 kg/ha/year. According to Bengt Nihlgård, the ammonium concentration in bulk precipitation has increased by 2 per cent per year and nitrate by 4 per cent per year since the 1950s. Compared to the natural biological fixation rate, the deposition of nitrogen may be from 10 to 100 times greater. No wonder natural mechanisms for nitrogen use are being swamped.

Much of the ammonium deposited derives from fertiliser, as much as 10 per cent of that used evaporating into the atmosphere before precipitation. In the Netherlands, where as much as 580 kg of nitrogen per hectare are applied to farmland each year, the quantities volatilising and falling out are considerable. Indeed figures exceeding 60 kg of nitrogen per hectare per year, three-quarters of it ammonium, have

been measured in throughfall and stem flow in deciduous forests. Up to 90 per cent of nitrates and nitrogen oxides in the atmosphere are now of anthropogenic origin.

Ammonium uptake in the plant through the roots leads to the release of hydrogen ions and hence to the gradual acidification of the soil. In fact, when ammonium concentrations in the soil are high, magnesium uptake is impaired, leading to chlorosis and necrosis of leaves. Analyses of frost-damaged young spruce trees in south Sweden indicated excess nitrogen in the needles, half of which was found to be non-protein. The most affected trees had a nitrogen content of 3 per cent in their needles, compared to normal levels of 1.3 to 1.8 per cent. Levels higher than 1.8 to 2.0 per cent are associated with reduced resistance to frost. Excess nitrogen makes trees vulnerable to fungal diseases as well as attacks by insects, supporting Chaboussou's trophobiosis theory in which unbalanced nutrition leads to excess amino acids in plant cells. In some parts of south Sweden, spruce have been found covered in a greyish blue algal slime, suggesting a kind of terrestrial eutrophication.²¹

Man and Gaia

The dismal truth is that ecosystems are in disarray wherever we care to look. The Gaia Hypothesis has brought it home to us that life on the planet is part of a unified system - the ecosphere - which if sufficiently deranged must inevitably transform into a new state of being. If we accept

the notion of Gaia, then we must accept that life on Earth, through the process of evolution, has worked towards optimising conditions and bringing about the regulation of physical phenomena so that such processes in turn will better support life. We, as one species, are now threatening that state and inevitably are threatening our own survival. The dying of the forests, the spread of deserts, the death of the Baltic seals, the cycles of droughts and floods are all indications of perturbations. Such perturbations may have underlying natural causes but their accentuation to the point of catastrophe is surely our own doing.

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Whaling: The Slaughter Continues

by
Sam Hall

Despite a worldwide ban on commercial whaling, the Japanese fleet sailed for the Antarctic in November to slaughter 800 whales in the name of 'science'. Sam Hall looks at the politics and history of whaling and argues that Japanese 'research' is a thinly-veiled excuse to provide whale meat for the country's gourmet restaurants.

When Japanese whalers began to harpoon minke whales in the Southern Ocean just after Christmas, they did so in the knowledge that most other nations condemn the flag of science under which they sail as a sham. They are in violation of international agreements and in defiance of the directives of the International Whaling Commission. Clearly contemptuous of economic sanctions that have been applied against them, they will also be slaughtering one of the last breeds of whale still existing in reasonable numbers.

This does not appear to concern the Japanese any more than it disconcerted whalers from a score of nations in the past. In their heyday, whalers killed and processed 66,000 whales a year, depleting Antarctic stocks to such an extent that today the southern population of 100-ton blue whales is estimated to be less than one per cent of its original level. That of humpbacks is down to no more than three per cent. The number of finwhales has been reduced to 20 per cent, and sei and sperm whales are similarly threatened.

The shortage of stocks inevitably forced up the price of whalemeat in Japan. Years ago, it was a staple diet, eaten by more than half the Japanese public. In 1962, the Japanese consumed 226,000 tons of it. Last year, according to the Japanese Whaling Association (JWA), consumption was down to 25,000 tons. Now, it is estimated that only one or two per cent of the populace can afford whale meat — those

wealthy enough to be able to eat at high-class gourmet restaurants, where it is regarded as a delicacy roughly equivalent to venison.

Figures supplied by the JWA show that in six years wholesale prices have risen dramatically. In 1982, a prime section of red meat cost between 500 and 800 yen (\$1.85-\$3) per pound. Today, the price fluctuates between 30,000 and 40,000 yen (\$112-\$150) per pound, depending on the cut. Chicken, by comparison, costs a mere 1,000 yen (\$3.75) per pound. Despite the almost prohibitive cost, one restaurant in Osaka claims to serve whale meat to an average 30 customers a night.

In order to satisfy this demand and keep their dying industry alive, Japanese whalers have turned their attention to the relatively small, but more common minke whales, which on average measure 25 feet and weigh six tons. Antarctic waters support about 400,000 of them. Scientists have divided these stocks into six principal areas and in Area Number IV, the preferred hunting grounds of the Japanese fleet, many scientists believe the minke population has already declined by approximately 50 per cent.

Scientific Whaling

Altogether, more than 11,000 whales of various species have been killed since the International Whaling Commission (IWC) imposed its five-year moratorium on commercial whaling in 1985. Apart from aboriginal whaling on a strict quota basis, as permitted in Alaska, the principal reason for this slaughter is an article in the IWC convention that permits whales to be killed for 'scientific purposes'.

"The original intention was to encour-

age research which would contribute to the effective management of whale stocks," explains Kieran Mulvaney, director of the Whale Conservation Society. "If we are to conserve whale stocks, we need them alive. We need to find out their numbers, where they are, how long the female takes to gestate, how long a calf stays with its mother and so on. To do that, we need to be able to study whales in the same area for several consecutive years. But they are not likely to return to the same area if, as soon as we see them, we kill them."

The Japanese took a different view. They saw scientific research as a loophole, an ideal opportunity enabling them to circumvent the ban and resume commercial whaling under a different name. The Japanese Joint Whaling Company was quickly renamed the 'Cetacean Research Institute'. Whaling ships were suddenly described as 'research vessels'. Last year, the Japanese delegation to the IWC proposed a scientific programme to study the age, sex and death rates of whales, and in pursuit of that objective announced their intention to kill 825 minke whales.

"It is quite clear that the Japanese wanted to prove their contention that stocks of minke whales are still sufficient to permit a resumption of commercial whaling when the IWC ban expires in 1990," Mulvaney believes. "The proposal was typical of their attitude towards conservation. Ten years ago, after virtually all the blue, fin and sei whales in the Antarctic had been slaughtered, they claimed that minke whales would breed like rabbits in order to eat the plankton that would otherwise have been eaten by the whales they had killed. In fact, in some areas we have now seen the minke population halved."

The IWC Scientific Committee, the Worldwide Fund for Nature (WWF) and

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MAJOR WORLD BANK PROJECTS

Their impact on
People, Society
and the Environment

by *Graham Searle*

This study was commissioned by the International Institute for Environment and Development (IIED) to serve as a background document for a proposed meeting between the World Bank and its principal critics.

Searle looks carefully at the probable human, social and ecological consequences of three World Bank projects, the **Narmada River Development Project** in India, the **Polonoroeste Project** in Brazil and the **Indonesian Transmigration Programme**, which were to be discussed at the meeting.

The material on which the study is based was largely obtained from the World Bank itself and the study was conducted with the full co-operation of the Bank's project staff.

Unfortunately, the meeting, originally scheduled for June 1986, was postponed to October 1986 and eventually cancelled while the IIED decided against publishing the study.

The Wadebridge Ecological Centre, however, decided that this document must be published because of its value to those concerned about the role played by the World Bank in determining the present course of Third World development. This has been made possible by a generous grant from the Rowntree Social Services Trust, to whom all thanks are due.

Maps, tables and diagrams as well as references to the World Bank documents used to compile the study are included.

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other conservation organisations were equally sceptical. After considerable lobbying, and diplomatic pressure from the Japanese, IWC member countries roundly condemned the Japanese programme, as well as similar ones put forward by Iceland and South Korea. The IWC noted that the intended methods of sampling were inconclusive and that the information gained would be of no help to the effective management of whale stocks.

"The South Koreans have so far respected the decision, but Iceland, which had already killed 80 fin whales before the vote was taken, negotiated a special deal with the United States, which has the power to levy economic sanctions," asserts Tessa Robertson, Conservation Officer at WWF. "The deal allowed the Icelanders to take 20 sei whales, and was apparently worked out after the Icelandic government threatened to halt essential building work at the American NATO base at Keflavik."

Sanctions

With no authority to impose penalties, the IWC relies on the goodwill, and honesty, of its member nations. Conservationists believe US economic sanctions can play a crucial role in the enforcement of IWC decisions, and were dismayed when the Japanese, obviously encouraged by the US-Iceland deal, rethought their Antarctic science programme and announced a new plan which involved killing 50 sperm whales and 300 minke whales per year.

At a specially convened meeting of the IWC Scientific Committee, the new proposal received the support only of the Icelanders and the Japanese themselves. Twenty other nations, led by Britain, pleaded with the Japanese government to withhold its permit for the proposed expedition. Meanwhile, the World Wildlife Fund and other conservation organisations took legal action against the US government to force it to apply economic sanctions against Japan.

By now, though, the Japanese whalers had sailed, in violation of a 1985 agreement with the United States under which Japan had agreed to stop all whaling activities by 1988, on condition that the Americans did not apply sanctions against them. President Reagan had adhered to his side of the bargain, but was now left with no alternative. In February 1988, economic sanctions were applied.

Unless the sanctions are applied force-

fully, however, the economic effect on Japan is likely to be minimal. Conservationists are pressuring the Americans to invoke tougher measures but the danger is that these would merely lead to tit-for-tat economic penalties. "The problem is that the sanctions are not hard-hitting enough," Tessa Robertson protests. "The US can place restrictions on the Japanese quota within American fishing limits and import fewer Japanese goods, but whether they do so remains to be seen."

Keiran Mulvaney agrees: "The American attitude has been pathetic. Unless there is a change of administration we cannot rely on the Americans to use their power. They have shown incredible reluctance to use sanctions and have imposed them now only because they know they do not worry Japan any more. They would not use them against Iceland or Norway because those countries have NATO bases on their soil."

A Need for Culling?

The Norwegians argue that minke in their traditional hunting grounds in the northeast Atlantic are relatively plentiful and maintain that unless the population is culled regularly, the whales will breed too quickly, eat unacceptable quantities of fish, and have a deleterious effect on the Norwegian fishing industry.

The Whale Conservation Society contends that this is untrue. "There is absolutely no scientific evidence to back up the Norwegian claim. Their entire argument is a ploy," Mulvaney alleges. "They are well aware that the IWC has no jurisdiction over culling, that its remit is essentially to oversee and fix quotas for what is called 'direct harpoon fishery', and that until recently it was not even able to regulate scientific whaling."

Moreover, Mulvaney believes the Norwegians are implementing a steady campaign to discredit the IWC and propagate the impression that its scientific committee is run by scientists who are biased, untrustworthy and inherently opposed to commercial whaling.

Under IWC regulations, member nations conducting whaling operations or research are required to provide available data to the IWC Scientific Committee so that it can determine whether stocks are plentiful, depleted or rare, and should be protected. "The Norwegian government recently appointed its own scientific committee and supplied it with data, which it had gathered, on the northeast Atlantic minke whale stock, but refused to hand this

The Japanese see scientific research as a loophole enabling them to resume commercial whaling under a different name. When the new rules were announced, the Japanese Joint Whaling Company was quickly renamed the 'Cetacean Research Institute'.

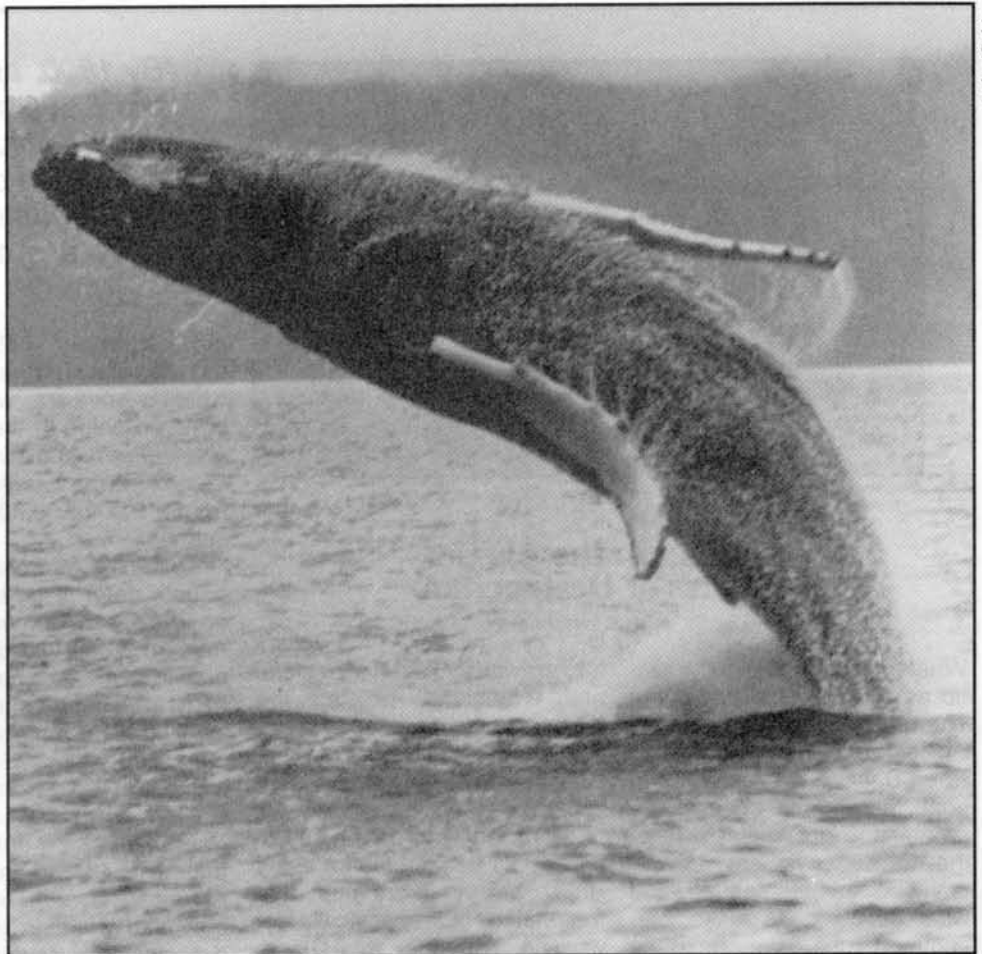
data over to the neutral IWC scientists, probably because it suggests very strongly that minke whales should be protected," Mulvaney says. "Indeed, the IWC has already listed them as protected stock, but the Norwegians say their data suggests they are plentiful: as long as they do not show anybody their findings, noone can disagree."

Not surprisingly, the IWC, having condemned the Japanese, also denounced the Norwegians. Notwithstanding the rebuke, the Norwegians declared that they would continue to hunt minke and predicted a catch of 30 this year, all for export to Japan, a lucrative market which last year paid \$8 million dollars for an Icelandic catch of 100 fin and sei whales. Their carcasses, like those of the 273 minke whales brought back by the Japanese fleet, were sold at a handsome profit and consumed in Japanese restaurants hungry for fresh supplies. Encouraged, the Japanese announced that during the Antarctic summer of 1988-89, they intend to kill more than 800 minke, the same number that initiated the original IWC condemnation and US sanctions in early 1988.

At the Japanese Fisheries Agency, the head of the whaling section, Mr. Junichiro Okamoto, was quoted as saying: "The first trip showed our sampling methods were correct. Now we need to catch 825 minke whales, the minimum number for studying the ages of groups of whales in various regions of the Antarctic." Tessa Robertson at WWF headquarters retorts: "Their sampling methods are not right. It is impossible for them to gather the kind of information needed to manage Antarctic whale stocks effectively from dead whales."

Hunted to Extinction

What makes the Norwegian and Japanese assertions more remarkable is that scien-



A humpback whale breaching. The International Whaling Commission has no powers to enforce its moratorium on commercial whaling. Indeed, according to Greenpeace, at least 10,000 whales have been killed since the "ban" was agreed.

tists still know so little about whales that almost all statements about them are veiled in uncertainty. What is irrefutable is that for centuries, in both arctic and antarctic waters, whale stocks have consistently been depleted to the point of 'commercial extinction'. Today, only the minke remain in reasonable numbers. The problem is that demand has continually exceeded the ability of whales to reproduce quickly enough. The great whales generally produce only one calf every two or three years, which combined with a natural death rate of up to eight per cent a year, means that depleted populations can recover only very slowly.

Nevertheless, the public has always been prepared to pay handsomely for whale products, as in Japan today. In the European markets of the 18th and 19th centuries, the strong and flexible bone plates, or baleen, which enabled the whale to filter its food from the sea, were used for the corsets of fashionable women, for the ribs of umbrellas and in the manufacture of furniture. On the tables of the aristocracy, whale tongues were considered a delicacy. The price of whale oil, used to fuel street lamps, was so high that the income from two or three bowhead, or Greenland

whales, which were 70 feet long and weighed 60 tons, was enough to pay for a new ship.

The sole interest of the whalers was money. They spent months working round the clock in miserable conditions, their lives frequently in danger. They cared no more for the consequences than the public whose voracious appetite they were feeding. In this respect, little has changed since vessels from Holland and Britain, Germany, Scandinavia and North America sailed north to the arctic, to Davis Strait and Hudson Bay, as if to a seaborne gold rush (see Box).

The Introduction of Controls

The butchery in the Arctic caused little concern to the merchants of the south, who, with the northern seas no longer a viable commercial proposition, next directed the whalers southwards to the Antarctic. The Norwegians were the first to report a successful catch in antarctic waters, 195 whales caught in 1904. Eight years later, there were six land-based whaling stations, 21 factory ships and 62 catchers. In all, nearly 11,000 whales were



Whaling in the Arctic: Decades of Destruction

Whalers first arrived in the arctic as a result of over-fishing. The industry began in the 10th or 11th century in the Bay of Biscay when Basque whalers in open boats harpooned huge, slow-swimming 'right whales', but by the 13th century, there were virtually no right whales left, and when the compass passed into common use, the Basques moved north to Spitsbergen. Later, they followed the baleen and sperm whales across the Atlantic into arctic waters.

Nearly three hundred years later, in 1576, the English Muscovy Company sought and was granted a monopoly to kill whales, but despite hiring experienced Basque crews, the company achieved only limited success. This was partly due to the presence of Dutch whalers, who viewed the English intrusion into their whaling grounds with hostility, a rivalry tantamount to open warfare which persisted until the late 17th century.

With more experience than the British, the Dutch enjoyed a dominant position, establishing a shore-based processing plant at Smeerenburg, on northwest Spitsbergen. At the height of the season, apart from the British, German, Danish and Norwegian contingents, 300 Dutch ships and 18,000 men were employed by the Smeerenburg industry. At times, 450 ships were engaged in hunting and processing whales. Inevitably, the whale stocks were depleted to such an extent that it was no longer commercially viable to hunt them.

New whaling grounds had to be found. The Basques, who

had previously fished off Iceland and Greenland, pointed the whalers in the direction of Davis Strait and Baffin Bay.

To stimulate the industry, parliament passed The Bounty Act of 1749, entitling merchants to receive £1 0s 0d a ton for every British ship of more than 200 tons fitted out specifically for whaling. This offer was subsequently doubled, and with the demand for oil and bone increasing, the number of vessels sailing to the Arctic grew steadily.

By the turn of the century, approximately 140 British ships and 6,000 men were plying arctic waters. With the ships of other nations, the whaling fleet off the coast of Greenland every summer amounted to several hundred vessels, and more than 10,000 men. Their prey was the bowhead, a cumbersome creature which, migrating north through Baffin Bay and Bering Strait in the spring, could yield 20 tons of oil.

To offset the expenses of a voyage, a ship's crew needed to catch at least three medium-sized whales, yielding 40 to 50 tons of oil. On many occasions, they returned home with 150 tons, enough to finance possible losses for years ahead.

Vast Profits

Year after year, the European whaling ships returned to amass fortunes for their owners. In 1873, the crew of the *Arctic* caught 28 whales between May and August, returning to Dundee with an unprecedented 265 tons of whale oil and 14 tons of baleen, a cargo worth £19,000, or

approximately £450,000 at today's values. At the peak of the whaling bonanza, with several hundred ships in the area, the whalers were depleting stocks in Davis Strait and Baffin Bay at the rate of 2,000 to 3,000 whales a season.

American merchants were equally determined to capitalise on European demand, and to market whale products to a growing American nation. By the mid-19th century, the American whaling fleet numbered more than 700 ships. Some ships rounded Cape Horn to catch Californian grey whales in the Pacific. It was in pursuit of these that, in 1848, the captain of an American barque first sighted bowhead whales in Bering Strait, a discovery which was to have a devastating impact on the Alaskan Inuit.

For the next 50 years, hundreds of ships left San Francisco harbour for the whaling grounds in the Arctic Ocean. With an estimated 15,000 bowheads in arctic waters, there was plenty for everyone, including the Russians and Japanese.

Cultural Destruction

With several hundred Americans overwintering on Herschel, the island soon became the Klondike of whaling. Drunkenness and lawlessness were rife. The whalers showed the local Inuit peoples how to use tobacco, gave them whisky and taught them to distil spirits from molasses and potatoes, which they traded for slippers and tobacco pouches of seal skin.

Grievously unable to cope with the effects of drink, hundreds of Inuit, many of whom had acquired firearms from the Americans, died as a result of violence and alcohol-induced illness. The whalers, deprived of female company for many months, capitalised on traditional Inuit customs, corrupting the women and treating their menfolk with disdain. Soon, venereal diseases were ram-

nant. Sickness ravaged the Inuit population still further. The whalers, lacking vitamins and dehydrated by the dry atmosphere and an excess of whisky, succumbed to a variety of illnesses which they passed on to the Inuit.

Having no resistance to the white man's diseases, 80 per cent of the indigenous population were struck down by epidemics of measles and mumps, influenza and tuberculosis, all of which in those days could be fatal. By 1910, when whaling in the Bering, Chukchi and Beaufort Seas had again depleted stocks to the point where it was no longer deemed a commercial venture, the Inuit of the Mackenzie Delta region, who had survived for 5,000 years, were nearly extinct. Of the original 2,000 inhabitants, only 40 survived.

It was the same throughout the Arctic. When the whalers finally departed, the Inuit had become heavy smokers, their lifestyle had changed radically and the bowhead whale upon which they were partially dependent was all but extinct.

Nor did the whalers restrict their slaughter to whales. Sea cows, or walrus, were also considered fair game. Weighing more than a ton, these ponderous creatures were valued then, as now, for their ivory tusks, hides and oil. The skin of a bull could be an inch thick. It was so tough that it became the most expensive of all hides in use, much favoured for shields and armour, and later, for bicycle seats. The viscid oil was a valuable sealing agent for ships' planking; the ivory, perfect for women's toilet accessories. By the time the slaughter was finished, whalers from Britain, France, Norway and the United States had accounted for approximately four million walrus.

Eventually, international legislation was introduced to protect the sea cow.

Sam Hall

killed and processed. By 1930, more than 40,000 whales were being killed each season, a level that was maintained until the Second World War.

Initially, the whalers sought the humpback whales, which swam close to the shore, and the 100-ton blue whales. In 1958, nearly 2,700 humpbacks, and about 20,000 blue, fin and sei whales were harpooned for three million barrels of oil. After that, history again repeated itself and the stocks dwindled. The whalers turned their attention to the smaller fin whales, and the industry was finally brought under stricter control.

With only 600 to 1,800 bowheads apparently remaining in the Arctic, the International Whaling Commission, which had been founded by 22 member states in 1946, proposed in 1977 the imposition of a total ban on hunting bowheads. The concept of a zero catch came as a shock to the Alaskan Inuit, however, who had pursued the bowheads only for subsistence, never for profit.

The Inuit Controversy

In 1977, with little experience of the political arena, the outraged hunters made representations to the Commission, and denounced the ban as a needless intrusion. Led by Ebem Hopson, the mayor of the Alaskan whaling town, Barrow, the hunters claimed at a special meeting in December, 1977, that the Commission's figures seriously under-estimated the bowhead population.

They argued that if they were not permitted to hunt bowheads, the basis of community life would be destroyed for 100,000 people living in small villages along the arctic coasts of Alaska, Canada and Greenland. Reluctantly, Commission acquiesced. A small catch was re-instated; 12 bowheads landed, or 18 struck.

Disappointed but not defeated, the Inuit returned home and appealed to American marine biologists to conduct a new, independent study on their behalf. Counting the whales as they migrated, the scientists eventually established the bowhead population at 2,264, nearly twice the Commission's previous estimate.

Armed with these new statistics, Hopson and his fellow hunters flew to London, England, and demanded that subsistence whaling should be treated separately from commercial operations, in which whalers from Norway, Iceland, Japan, South Korea, and the Soviet Union were killing thousands of whales of all species. The

Inuits' efforts were rewarded by a small increase in the quota - from 12 to 14 bowheads landed, or from 18 to 20 struck.

The new quota, however, was still a long way from satisfying the needs of the Inuit. In 1979, they again flew to London, this time taking with them an *umiak*, a communal skin boat. Hauling it into London's Café Royal, the hunters climbed on board and, thrusting hand-held harpoons into imaginary bowheads, demonstrated how teams of four to six men establish a camp on the edge of the firm ice, and wait until a bowhead swims close enough to be harpooned. When the whale dives, they explained, the hunters launch *umiaks* one-third its size, and spread out in a wide circle until the whale surfaces two or three miles away. Here, inflated bladders are attached to the dying whale, slowing its progress so that it can be lanced for the kill. Afterwards, the carcass is cut up and divided among the crew, the largest portion going to the 'first harpoon', according to ancient custom. Subsequently, the meat is shared with other villagers, and elaborate festivals are held to honour the whale.

For the Inuit, whaling remains an important source of meat. Two-thirds of the carcass is edible, and none is wasted; what they do not eat themselves, they feed to their dogs. The baleen is used for carvings, which are sold through local stores and provide the only form of cash income. Above all, whaling is a source of pride, a way of showing the rest of the world that they are Inuit - 'Real People'.

By 1984, the quota for all the Inuit of Alaska was raised to 43 bowheads during

the following two-year period, with no more than 27 whales to be killed in any one year. The hunters were far from content, not because they were being made to suffer for the greed of the white men, but because they still hunted in much the same way as they had done a thousand years ago.

Flouting the Rules

Although the introduction of the Commission's quota system was designed to conserve stocks and develop the industry in an orderly fashion, the new rules were soon the subject of controversy, and the extent to which they were being honoured was brought into question.

In November 1984, the Japanese Whaling Association claimed that 70 per cent of the populace opposed the Commission's rulings and, in the same month, Japanese whalers were photographed by the environmental group, Greenpeace, hunting sperm whales in defiance of an international ban.

In July the following year, another conservation group, the Environmental Inves-

"Iceland negotiated a special deal with the United States. It was apparently worked out after the Icelandic government threatened to halt essential building work at the American NATO base at Keflavik."

Tessa Robertson, WWF.



The fleshing of a fin whale at an Icelandic fleshing station.

tigation Agency, released a report accusing eight countries, led by the Japanese, of the "systematic organisation of pirate whaling operations, drastically increasing the threat of extinction to many whale species." The hunting expeditions were in defiance of rules passed by the IWC in 1982 to protect certain species and phase out commercial whaling, banning it completely by 1986. Japan, the Soviet Union and Norway did not agree to the ban, flouted conservation quotas and each year killed hundreds of protected sperm whales in the Pacific.

Nevertheless, at the end of the IWC's annual meeting in Bournemouth in July 1985, Greenpeace announced that the number of whales killed annually by major whaling nations had fallen from 16,000 in 1980 to 6,000 in 1985. The Soviet Union halted its whaling industry in 1987. Japan eventually made a similar commitment with 1988 as the target date — but instead turned to research and became the only nation in the world to continue whaling in the Antarctic.

A Break-Away Movement?

Some conservationists believe that if the IWC moratorium is extended for another

five years, as seems likely, Japan, Norway and Iceland, possibly joined by the Soviet Union, might be tempted to break away from the IWC. At a meeting in Spring, 1988, their representatives discussed just this possibility.

"There were two main items on the agenda," Mulvaney says. "The first looked at ways of maintaining eco-system balances, their jargon for culling. The other discussed methods of dealing with problems within the IWC, a euphemism for their lack of respect for the Commission and the regulations it tries to enforce. The findings were not announced. It was a closed meeting."

Michi Mathias, a specialist in Japanese whaling at Greenpeace International, agrees. "There is no doubt that they see the IWC as a pack of antiquated conservationists, and that they were leaning towards breaking away, but I cannot see it really happening. If they had been going to do it, I think they would have done it long ago, before the industry went into decline, when they had a lot more to gain. Of course, the Japanese have used the threat of a pull-out for a number of years, but if they carried it out they would be isolated. The rest of the world would regard them as a pirate whaling nation. The Japanese Foreign Ministry would have to bear the

brunt of the criticism, and I think they would now like to be seen to be going by the rules."

There is some evidence to support this view. Japanese government officials are clearly hesitant to release onto the gourmet market some 1,000 tons of whalemeat from the last expedition south. Its value has increased by 30 per cent since the research whalers docked in March, 1988, and it is now estimated to be worth \$8 million wholesale. The meat is being kept in cold storage in case these considerable profits attract yet more criticism from Greenpeace and other western conservation groups, possibly forcing them to stop 'research whaling' until 1990, when the 10-year worldwide moratorium expires and they hope to obtain a quota once more from the International Whaling Commission.

An End in Sight?

Japan, then, is faced with a dilemma. Whilst harbouring contempt for the IWC, it has no real desire to provoke world opinion. Nor does it wish to be seen to lose face by succumbing to IWC pressure, especially with the powerful Japanese fisheries industry watching the government's every move. The resolution may lie in the disproportionate cost of whaling to the government. This year's expedition to Antarctica will cost nearly \$5 million in subsidies, whilst the total cost of bringing back 825 minke whales is likely to be about \$20 million. The remainder, like last year, will probably have to be raised by public subscription. Clearly, without subsidies, further whaling expeditions would be economically pointless.

In August 1988, the New Zealand Foreign Ministry revealed that despite Japan's public posturing, Japanese authorities may already be having second thoughts about whaling. New Zealand officials indicated that during talks with the Japanese, they had discerned an element of dissent within the ranks of the Japanese Fisheries Agency, the government policy-making body which governs the whaling industry. If this assessment is correct, it may well be that financial pressures will prompt Japan's decision makers into defying the industry's lobbyists, who are safeguarding the interests of no more than a handful of poor fishing villages and a score of whale meat restaurants, and provide the Japanese government with an honourable way out of an international problem, to the great relief of conservationists everywhere.



Wayburn/Ambio

The controversy over whaling has led to conflict between conservationists and the native peoples of the Arctic for whom whaling is a way of showing the rest of the world that they are Inuit — 'Real People'.

Non-Local Local Government and Local Power

by John Papworth

True democracy is only possible when people have effective power over their own affairs, their own goals, and their own resources. The larger the governing unit, the less responsive it is to human needs, the more bureaucratic and inefficient its administration, and the greater the impoverishment suffered by peripheral regions, as resources (both human and material) are drawn inexorably towards the centre.

"Nothing is real unless it is local": thus a characteristic snippet of wisdom from G.K. Chesterton and, in this sense, local government in many advanced countries during the twentieth century has become increasingly unreal and often nonexistent.

One might have supposed that most of the lessons of government in this period indicate a need for decreasing its strength and increasing its localisation. After all, its problems have not shrunk, they have grown, and grown to an enormous extent; and if we focus mainly on Britain, we see that nearly all the exercises of government in this period have proved to be demonstrable failures.

Appropriate Size

To be 'real', it is doubtful if any local area of government ought to exceed 5,000 people. This appears to be about the maximum number which enables local people to have a grasp of and an involvement in local problems, and, on a basis of mutual awareness and knowledge, to achieve the kind of interaction among themselves which enables them to solve them. Government, we need always to remind ourselves, is not (or should not be) a professionally organised system to tell people how to run their affairs; it is (or should be) a means whereby people themselves are enabled to resolve those matters which are common to their being citizens. A local unit of government which begins to grow significantly beyond 5,000 persons begins to be less 'local', and there emerges a need

for the employment of more professional people to manage and order affairs which in a smaller community people are able to order and manage for themselves.

And to much better effect! Almost any general statement about local government, where practice and conditions differ from place to place, from urban and rural centres, between cities and towns, between densely and lightly populated areas and so on, is bound to be subject to considerable qualification. With this in mind, we may recall that until the modern era, local government really was *real*. Some local problems, such as destitution, enclosures of farmland by landlords who drove off tenant or freehold farmers or those deriving a living from what had been common land, standards of goods that might be produced for export, apprenticeship conditions and so on, might be regulated by the central government, but even here the executive arm of government was emphatically local in the form of the manorial lord, the churchwardens, the constable and that Tudor maid-of-all-work, the justice of the peace.

Over a considerable area of civic life, which might include some of the above concerns and which would also generally include schooling, street paving, provision for the sick, the aged, the orphaned and the infirm, the holding of markets, the establishment of a corn exchange (a building often meeting a wide range of other needs of the local community) and so on, the provision was *local*; its particulars were decided by *local* people in the light of no doubt distinctive *local* needs, *local* monies were used to fund them (the very idea of a grant or a subsidy from a central exchequer would, if it had occurred to people at all, have struck them as being a somewhat bizarre form of hallucination) and

invariably *local* resources, whether of labour and materials, would be used.

And, on the whole, the system, over the centuries, worked. Of course, it had its drawbacks and shortcomings; what system of government does not? But if it had not worked, why else should it have endured down to the dawn of the 20th century?

Overburdening the System

A system of local government tailored, however homespun the cloth, for the needs of a national population of five million or so is one thing; to adapt such a system to a population over ten times greater bespeaks a need for a proportionate increase in the number of local government units. It is safe to say that the professional ruling and administering cliques of modern Britain have never recognised this need nor understood it and the evidence of this abounds in the extent to which they have strenuously pursued a disastrously contrary course.

Far from multiplying the number of units of local government to keep pace with the growth of population and recognising the need to keep local government local, they have reduced the number of units to a quite staggering degree. In 1855 there were 78 parish vestries in London — and the government boundaries of London were then much smaller. Today, there are none at all. In the place of these highly efficient and democratically controlled parish units, a number of much larger bodies were formed. These were later amalgamated into metropolitan boroughs, and these in turn lost their identities in a measure, the name of which is a glittering example of Orwellian doublespeak, called 'local government reform', into monster

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'boroughs' which ceased to have any vestige of locale in their workings and which were run as a series of separate departments by highly professionalised managers.

I, myself, live in an area of London known as the Parish of Saint Mark, and the parish boundaries of the local church to this day still correspond to what would have been the old parish vestries administrative area. In due course the parish was merged with others into the Royal Borough of St Marylebone and in the late 1960s even this monster borough was merged into the Borough of Westminster, making a unit with a population of 169,000.

Dismal Failures

In national affairs, the national media, especially at election times, can generally be counted on to generate a high level of rather bogus excitement about the personalities and the issues of the day. In local affairs, conducted as they are today on a scale where the ethos, the spirit and the identity of locale has been abolished by the giant nature of the scale itself, local interest, local involvement and local concern to resolve local problems has become, where it exists at all, quite peripheral to the main concerns of local government.

And to what extent has this policy succeeded? Looking at the results, one is led to speculate not whether it has succeeded in any way at all but whether it ever could have succeeded. Housing policies, for example, have been based very largely on the provision of 'high rise' tower blocks. Despite the almost unanimous dislike of these blocks — many twenty-four stories, or even more, in height — and the outright refusal of many families to move into them; despite the pronounced *local* opposition to the destruction of numerous streets of older houses to achieve 'site clearance' for these blocks, the 'experts' and the professional and highly paid managerial knowalls went ahead with their construction, so that today they constitute the chief and most obnoxious landmarks in many of our larger urban areas.

After a generation of this kind of folly, there now appears to be general agreement, not least in the architectural profession itself, that the policy has been environmentally, socially and economically disastrous.¹ So disastrous indeed that some councils, Liverpool's is one, have been impelled to embark on a policy of demolishing its high rise flats — a policy proving



High-rise housing in Liverpool. "After a generation of this kind of folly, there now appears to be general agreement, not least in the architectural profession itself, that the policy of building high-rise tower blocks has been environmentally, socially and economically disastrous." Many of the worst estates have now been demolished.

even more expensive than their construction. These blocks were, and are, scenes of inordinate school truancy, vandalism, gangsterism, violence, crime and stress-induced forms of illness. So too are the huge council estates of smaller apartments to which thousands were pressurised to move after their homes in areas where many had roots and relationships going back generations had been earmarked for demolition on the grounds, frequently specious, of slum clearance. These estates have proved impossible to superintend, to manage, to police or to maintain in decent order and yet the construction of new ones continues.

Clearance versus Renewal

It is worth asking, what would the residents of a small 'slum' neighbourhood, having access, proportionately, to the same sort of funds as these monster units of non-local government, have decided to do to improve their housing conditions? It is a commonplace that, structurally, many so-called 'slum' houses, even though they might be over one hundred years old, were sound and fully able to stand for another century. But they belonged to another age which knew not indoor lavatories and bathrooms, and, besides, little money had been spent on their maintenance or external appearance.

The need for refurbishment and the provision of indoor washing and sanitation facilities, at a fraction of the cost of 'site clearance' and rebuilding, was obvious.

Obvious to all, it would seem, except to those who actually held the purse strings and who made the decisions. Certainly it was obvious to the people most nearly (and dearly) affected, but they it seems, under this new gigantic dispensation of non-local local government, were the last people anyone found it worthwhile to consult or listen to.

Schooling and Community

The same folly continues to prevail in education. Local schools which served a given neighbourhood, and which were often run by the local church were, all too often, under the impetus of some tidy centralised bureaucratic education 'plan', shut down or merged with others so that they were enlarged to serve a much wider catchment area than the immediate neighbourhood. Never mind that they had provided a close neighbourhood link where the clergy (in poor areas often the only professional people actually living in the district) knew the parents and the children, knew which were the problem families, and which children were at risk of maltreatment or neglect, and where an informal closely related interacting support group operated which would enable a personal crisis to be headed off or mitigated should it threaten to blow up.

Indeed, tidy-minded bureaucrats and their political paymasters appear to have no conception of how the living stuff of community life operates. Hence, as so often, the solution to a bureaucrat-created

"Tidy-minded bureaucrats and their political paymasters appear to have no conception of how the living stuff of community life operates."

problem, involving the destruction of a local school, or at least of its local identity, at once creates a dozen or so more social problems. Confronted with this, the bureaucrats at once engage more bureaucrats, social workers of one kind or another, all working in a remote office from nine till five on 'cases'. At five o'clock they disappear, generally to homes as far removed from the scene of their 'cases' as they can get. The result is more work for all the arms of the bureaucracy — the police must combat more crime and hooliganism; the fire service must deal with more vandalism; school attendance officers with more truancy; hospitals with the mugged, the drug addicts and those victims of one form or other of stress-induced illness. More 'care' officers are needed to deal with the children of broken homes; more magistrates to sit in judgement over increasing numbers of disaffected juveniles; more probation officers, more remand homes and borstals, more prisons. . .

And as a consequence, are the schools

any better? Is the education given to children improved? There are far too many voices, both within and without the schooling system, bewailing the results of the changes which have been introduced into the state system to leave any room for doubt that in a matter of two decades since numerous small schools began to be shut down, or merged, and their character and identity, sometimes going back for several centuries, simply obliterated, there has been a comprehensive collapse of standards, of attainment and of the whole ethos of teaching.

Perhaps some of this was inevitable; ideas about education have been changing rapidly. Serious objections are increasingly heard to any form of compulsion in schools, the abolition of corporal punishment has made far greater demands on the teaching abilities of the members of a very large profession, only a minority of whom may have the gift of inspired communication with the young, and voices are even heard questioning the very existence of schools as institutions.²

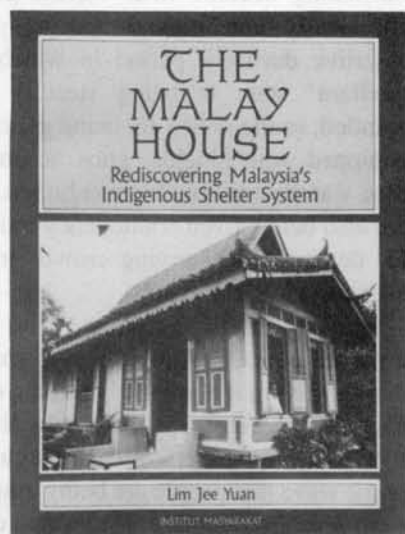
We have been, and indeed still are, going through a period of great ferment and change in educational matters and past standards of judgement about what constitutes excellence of attainment are now increasingly discounted. All we have to note here is that as a result of changes forced on local communities by forces outside the communities, schools have not only markedly deteriorated from the stan-

dards the regional educational bosses themselves established, but they have also lost much of their identity as part of a recognisable community. Moreover, few people outside that class of professional politicians and bureaucrats which has engineered these vast changes appear to be happy with the results — and few would deny that they have resulted in a dreadful impoverishment of what sense of local community still remains in modern Britain.

Depersonalised Health Care

We may make the same point about hospitals. Many local hospitals were built and funded entirely from local resources; the nursing staff would have been recruited from local people and an active local voluntary body would have involved itself with fund-raising, patients' welfare, a library and ward trolley-shop service, flowers in the waiting room, family liaison and so on. Nursing, like teaching, is a service requiring a high level of personal involvement and understanding, and the kind of care which is at its best when the parties involved are known to each other. All this — and more — local hospitals were able to provide; all this and more is what so often has been lost as local (they were frequently called 'cottage') hospitals have been shut down to further bureaucratic schemes for 'rationalisation' which are supposed to

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*"People who sit in offices and view the needs of other people
as variable parts of an administrative machine will doubtless have a
foreshortened view of genuine human needs."*

lead to better service at lower cost in bigger, much bigger, hospitals. Few would disagree that the bigger hospitals are no match for the standards of personal patient care provided by the smaller ones, and the evidence abounds that not only have costs soared in the larger hospitals but that the biggest proportion of increased costs is going not on the patients, or on the salaries of the medical and nursing staffs, but on the bureaucracy itself.

People who sit in offices and view the needs of other people as variable parts of an administrative machine will doubtless have a foreshortened view of genuine human problems and needs as they plan their ever-so-tidy and neat superhospitals; they will have an opaque view of a sick person's need to feel in familiar surroundings, able to note familiar faces among other patients and the staff, to contemplate a familiar view from the ward window, or to enjoy frequent visits from local friends and relatives. It will matter little to such bureaucrats that the very young and the very old are apt to be alarmed and made to feel insecure by a vast unfamiliar hospital factory, where, at a time when they are likely to feel most vulnerable, they are among "new men, strange faces and other minds", enmeshed too in the bewildering complexity of a vast administrative machine and where friends and relatives may need to travel 30 or 40 miles to visit them.

Crime and Punishment

Bureaucracy has become Britain's biggest growth industry of recent years, and the dynamic of 'empire building' in the public services, so that bigger and bigger units of this or that require bigger and bigger directors at bigger and bigger salaries, all too often underrated and unnoticed by the public at large, has led to the creation of a new class of parasites whose labours seem devoted to making the country a more difficult, hostile and unpleasant place in which to live.

The police service, in its own terms, tells much the same story. Bigger police units, loss of local involvement, more centralised control, more expensive equipment, more 'panda' cars dashing around with

screaming sirens to the general alarm and disorientation of the citizenry, and all to what end? Crime rates are soaring, our prisons are so inhumanely overcrowded that even prison officers are resorting to industrial action to improve conditions, and the instances of police corruption and of police law-breaking are constantly growing.

There are obvious and important reasons why the community policeman, even if there need to be two or three, should be a local person chosen by the local people. (And, by local, I am referring to a neighbourhood, a parish or village; I am not referring to areas the size of a modern borough of a million or more people but to a social unit of around 5,000.) The chief purpose of a police force is not the detection of crime but its prevention. And, as so often is the case, prevention is a thousand times better than any cure. Crimes are not committed by robots or computers, they are committed by people and if we want to prevent crime the first requirement is to have some personal knowledge of those who may be disposed to commit it. And how else can that knowledge be acquired except by living in a community where people are known to each other and where a neighbourly visit and exchange over a cup of tea by the local bobby can resolve problems in a matter of moments which might otherwise occupy the legal process for many months, and perhaps the prison service for as many years?

The question of policing, as our Victorian forbears fully understood even if we have since forgotten it, is intimately bound up with liberty. "Who will watch the watchman?" is a cry of agony drawn from generations of experience of civic abuse, but all too often it is difficult to draw a clear line between the efficient discharge of police duty and the freedom of the citizen. This is the main reason why the establishment of a police force at all was proceeded with so tardily. London did not have a regular force until 1829, and then only after prolonged debates in the House of Commons and after careful provision that police forces generally should be overseen by a *local* Watch Committee. The powers of these Watch Committees have since been successively whittled away, and in

any case the growth in the size of units of area administration which have replaced local government has meant that all local-community involvement in and control of the functioning of the police has virtually ceased to exist. In consequence, a gulf of suspicion and mistrust now prevails between the public and the police, the latter no longer being seen as serving the former, but rather as agents of the vast impersonal bureaucracies which now dominate so much of modern life.

All power corrupts; yet today the power wielded by the police is only subject to the scrutiny and control of the citizen at increasingly remote levels — at those very levels of the bureaucratic and political stratosphere, in fact, where people generally have a common interest in protecting, supporting and covering up for each other. Police corruption and the abuse of police power, even though they are increasing, are still relatively rare, but it is the trend which is important and we need to couple it with the new methods of training of the police, ostensibly in so-called riot control. As the economic climate grows harsher, and as industrial relations become more bitter, as the need for 'security' at nuclear energy plants and military bases increases, as terrorism, both foreign and domestic, becomes an increasingly familiar aspect of our daily lives, as the ripples of illegal drug trafficking become tidal waves, as the chronically unemployed become more assertive during a period in which the 'welfare' state is being steadily dismantled, so the police are being generally equipped with shields, guns, armoured cars, water cannon and rubber bullets, and are also being given contingency training for dealing with starving crowds in the event of a nuclear attack.

As always the question is: "Who controls the police?" And whatever answer may be given, it is certainly not the ordinary citizen. Yet it would seem the citizen still has a role to play; so great is the current crime wave that people are being asked to form neighbourhood (crime) watch committees to protect each others homes from break-ins and burglary and to keep an eye on doubtful characters. These committees, called into being because the police, acting on principles of remote bureaucratic con-

trol, are unable to do their job, are not envisaged as an exercise in community control of the police in the name of liberty; rather they are seen as being under the control and supervision of the central police force. As such, they represent a significant step towards *further* police supervision of the citizen. Their development can scarcely fail in due course to become a system of professional paid informers, operating at the neighbourhood level, unless the citizen-in-community rouses himself to assume control of his own community police whilst there is time.

Economies of Scale?

We should never lose sight of the fact that the justification for the enlargement of the units of local government to a point where they cease to be either *local* or instruments of *government*, and become instead units of regional *administration* under *central* control, is that they are cheaper and more efficient to run. Anyone who still has any lingering illusions about the efficiency of giant schools, hospitals and police forces over small local ones is simply not keeping abreast with everyday life as reported in our daily newspapers, to say nothing of what is appearing in official reports.

Does the case for such services (and others) being cheaper when provided on a large scale hold any more water? This is a very complex question if only because a genuinely 'local' service would tend to be

a different kind of service and, as we have seen above, able to yield positive results which are not easily quantifiable. But let us turn the question round. It is frequently argued that small, local communities cannot 'afford' to run these services. Any suggestion that they might do so is at once countered by the seemingly unanswerable question, "Where is the money to come from?"

The immediate answer is, "From where it is now going." And, of course, it is now going increasingly to fund vast centralised bureaucracies. Obviously if, as the question implicitly conveys, "the money" is needed to fund *both* local control *and* the central bureaucracies, the question will then — but surely only then — have some legitimacy. But otherwise?

Local Funding

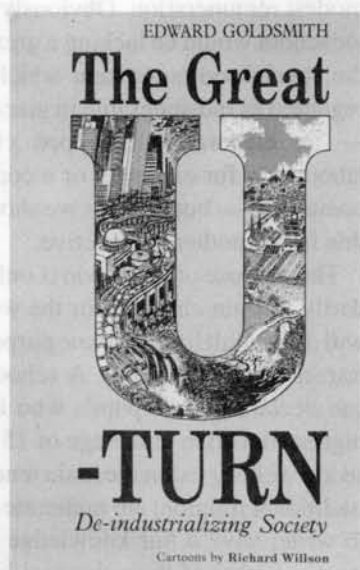
A community of 5,000 will, if recent figures are any guide, consist of 200 households, each of which will enjoy an income (on average) of nearly £12,000 per year. About a third of this money is currently taken in taxation and rates, which are the largest source of government revenue. If a local community ran its own affairs (by which I mean its schools, hospitals, police, housing, welfare, and other local services), and if central government ran only those concerns which can be described as truly national (such as defence, foreign affairs, the judiciary and so on), then central gov-

ernment would require far less money. In fact, on the available evidence, it would be possible for central government to ensure that its national obligations were met in full without recourse to personal taxation at all, simply by raising its requirements from commodity taxes (on petrol, beer, tobacco etc) and through V.A.T. and other measures.

At current levels of personal taxes plus rates, a community of 5,000 could have an annual sum of about one million pounds with which to fund its local services and with which to make a due contribution for regional services which are beyond its own resources to provide. Our community, for example, might well be able to fund its own school for its children up to the age of 14 years. On average there would be 70 children of this age and at the cost of £2,000 per year, the current cost of *private* schooling for older children, it would amount to £140,000.

The employment of two local constables with their housing and so on would not exceed £60,000. Sickness and hospital provision would take another £200,000.

The community's library, park and cultural programme might take another £80,000, and there would be a need to provide doles for the unemployed, provision for the welfare of the handicapped, using the word in a broad general sense, and pensions for the retired. In national terms all this costs around three and a half times what is spent on education (it is also three and a half times what is spent on



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paying interest on the national debt!), so let us assume that this will cost our local community - well, what?

An estimate could be made but conditions vary so greatly, it would be meaningless. Five thousand people in Belgravia would have different needs from 5,000 people in a northern industrial town with a shut down steelworks and an unemployment rate of 15 per cent.

What it amounts to is that, as in all other matters referred to above, the community would make such provision as it could afford, and in most cases it would be able to afford far more than it is at present receiving from centrally, or even regionally organised, dispensations; and who would dispute that the *quality* of its self-provided services would be infinitely superior?

The Swiss Model

The figures quoted above are very crude averages, but even so they take no account of the different kinds of savings and economics that local control would make possible. The shutting down of a completely superfluous Ministry of Education, for example, would result in considerable savings, and if there is a disposition to wonder *how* we would manage without it, let us recall that the Swiss people have never felt the need for such a Ministry; indeed, they would regard any suggestion to establish one as a frontal assault on their liberty. Yet would anyone suggest that the Swiss are less well educated than anyone else? How then do they do it? The answer is simple, they control the schooling of their children themselves in their communes, of which there are thousands.

Of course, each commune cannot provide for all the schooling requirements of its children, especially at senior levels, hence the power for this provision is delegated either to a group of communes or to the canton. But this power is delegated and decided upon *from below*; it is not devolved from above by some overworked central government minister whose permanent officials are probably running rings around him.

A Decaying Society

We live in a decaying society and some of the sickness signs that have characterised such societies all through history are high rates of taxation, an increasingly devalued currency and a proliferating bureaucracy. Before the establishment of the disastrous

"A national 'health' service does not reduce the rate of sickness; it increases it and ends up with more doctors and administrators and with fewer beds available for patients."



The John Radcliffe Hospital in Oxford. Unlike local hospices, regional hospitals are too large to provide the individual care so vital to a patient's recovery

National Health Service, the principle of voluntarism was markedly pervasive in Britain's medical services, but the ethos of volunteer work has largely disappeared, and with it the economies that voluntary service made possible. Such service is generally only operable on a modest scale. The team of almoners now employed in giant hospital complexes would not be required in a small cottage hospital; the work would be done, happily and willingly, on a part-time basis no doubt, by a small group of voluntary workers.

It appears to be an iron law of government that if its powers are increased at the rate of an arithmetical progression, its problems increase at the rate of a geometric progression. And the 'fixit' solutions to one group of problems invariably create others. A national 'health' service does not reduce the rate of sickness; it increases it and ends up with more doctors and administrators and with fewer beds available for patients. In the USA, it is now estimated that nearly half of all hospital patients are being treated as a result of previous hospital treatment!

Solving One Problem, Solving Many

One cheerful aspect of this is that as central government powers decrease, we can expect to see a multiplier effect at work reducing the problems to be resolved at a much greater rate. A giant comprehensive school, for example, appears to require a very high proportion of service and administrative staff; yet, despite this, the rates of pupil (and staff!) absenteeism are high, theft of equipment in such schools in London has reached epidemic proportions (necessitating yet more staff to ensure security), vandalism is commonplace and both verbal and physical hooliganism is rife.

The seventy pupils in our community would need a senior and junior school of no more than 35 pupils each! If it were financed and run by the community, instead of by some centralised educational bureaucracy, the members of the community would be able to feel it was *their* school and they would then take good care to ensure it was a school of which everyone could feel proud. It is not difficult to envisage a rota of volunteer parents to sweep and dust the school daily, or a group of parents volunteering their labour for an annual springclean, to do the triennial repainting and to undertake the occasional repairs to lights or to equipment.

Nor is it difficult to envisage some of the retired members of the community offering to give a weekly lesson in carpentry, needlework, cookery, gardening, literature, French, Latin, music, painting or any other subject of which they may have a sound knowledge, either for free or for a modest remuneration. Obviously the senior school would be lacking a great deal of the specialised equipment which is now regarded as indispensable in giant schools — an elaborately equipped chemistry laboratory, for example, or a complex of computers — but perhaps we should view this from another perspective.

The purpose of education is only secondarily to train children for the work they will do in adult life; its prime purpose is the transmission of culture. A school which can declare that its pupils who leave for higher education at the age of 15 years or so are well versed in the main tenets of the traditional religion; are numerate and able to write; have a fair knowledge of some items or other of their classical literature, their music and art; who have imbibed the rough outlines of their history; who know something of geography and ecology; and

who have the rudiments of at least one foreign language; can surely boast it has accomplished its purpose and has given its pupils a sound basis from which to develop into other fields of knowledge. In this way, it will be possible for scientific subjects to be taught and learnt as a natural extension of culture, rather than as forms of specialism which are counterpoised to it.

Manageable Problems

The return to localism does not mean that we will solve all our problems, what it does mean is that many problems which have now become unmanageable will become more effectively controlled. We have yet to hear of any society which does not produce some proportion of criminals and other misfits. Today, in a period which is reputed to be one of progress, the problem of crime has grown beyond manageable proportions simply because the machinery of government is being conducted on a similar unmanageable scale. Our prisons, which in themselves, in their structure and their ordering, are a disgrace to civilisation, have now become so overcrowded

that authoritative voices are repeatedly being heard declaring the entire system is on the verge of breakdown. Meanwhile, a cabinet minister, who must answer to parliament for the conduct of prisons, is heard requesting judges to inflict longer sentences on those guilty of rape. Yet rape, like other crimes of violence, is largely a product of *mass* urban living. How much rape is there in an African village, where community relations are still strong? How much in several hundred African villages? Would any compilation of the crimes of violence in hundreds of small community villages come near to matching the crime rate of a single *mass* urban agglomeration? In New York City, the number of murder cases reported to the police *each day* is more than 30. Nobody knows the number of those unreported, although the names of thousands of missing persons are posted every year.

In a village society any murder would normally be a landmark in the lives of an entire generation; in an urban mass, a murder which may occur in a block of rented apartments might result in the other residents learning nothing about it at all. The price of urban anonymity can be very

high indeed and is often paid in blood.

Centralisation: Creating Poverty

Any discussion about the localisation of government sooner or later raises the question of how poor localities are going to manage compared with rich ones, especially since under centralised government the revenues are used to ensure some equalisation between rich and poor.

Nobody wants to see poor localities left to stew in their own juice, but we need to ask, "Why are they poor in the first place?" And why, for that matter, is the Robin Hood policy of the central government manifestly failing to work? After all, if it was working, why are the poor areas still poor?

These questions gain in pertinence when we recall that many of the areas now being described as 'poor' are the ones in which much of the material wealth of the country has been produced. What then has happened to the wealth? It is a commonplace that in Britain over the last 100 years, under the impact of increasingly central-

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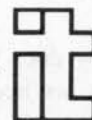
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ised forms of government, there has been a steady drain of wealth and power away from the north to the south and especially to the capital city. This has led to other forms of impoverishment such as a 'brain drain', a drain of talents and abilities away from the north, and, consequently, to a crippling form of lopsided development.

People of talent and ability will normally tend to gravitate to places where their talents are used and their abilities recognised; this means they will gravitate to where the decisions are made and where funding for their projects and careers are likely to be found. Increasingly the magnetic pull of London, the over-centralised capital and the centre of decision-making, of wealth, of influence, of communication, of opportunity and of recognition, proves irresistible.

The cultural scene tells its own story. In London, in any one evening, there will be over 50 live theatre performances from which to choose, plus a number of live orchestral concerts, at least two operas and a ballet performance, plus a fair number of ensemble or solo concerts. Without enlarging on this, it is worth noting that few provincial cities can boast more than one theatre, which generally has to struggle to survive at all. Yet why should this be? Why cannot Greater Birmingham, for example, with its two and a half million population, representing more than one third of the population of greater London, not be able to boast of at least one third of the number of London's live theatres?

The answer is to be found in the little-recognised fact that centralisation creates poverty. One person who has recognised this fact is Professor Leopold Kohr, who was the first to propound "the law of peripheral neglect", a law which states that the further a place is from the centre, the poorer it is likely to be, so that if Wales and Scotland are poor in relation to greater London (despite their superiority of natural resources), so too are Brittany, Champagne and the Languedoc in relation to Paris; Sardinia, Sicily and the Italian South in relation to Rome; and the American South and Mid-West in relation to Washington.

Trade: Surrendering Local Control

How does this come about? To answer this, we need only look at what actually happens in the economic sphere. A community of 5,000 people which was largely self-governing and largely economically

"The purpose of education is only secondarily to train children for the work they will do in adult life; its prime purpose is the transmission of culture."

self-sufficient would presumably have established itself and developed on the basis of some natural resources. Let us assume that those natural resources consist of no more than fertile land, water, air and the ordinary talents for living of the people. It is a commonplace that every mouth to be fed possesses two hands with which to accomplish this and to enable a body to live. But to live well a body also requires clothing, shelter and sanitation.

In today's complex societies, this list becomes greatly extended but one basic principle remains operative. If a community provides most of its needs from its own resources, it will have a basis on which to advance to prosperity; if, however, it comes to rely on others for most of its basic needs, it will simply be providing a basis for the prosperity of others.

This holds true even if it produces (as ordinarily, in this regard, it must) a considerable surplus for export. Why then is not the value of its own exports sufficient to enrich it and enable it to use such riches to enhance its own consumption standards? The answer is to be found in the fact that trade is conducted on certain terms, and the small community is generally in no position to ensure that those terms will be favourable to itself. Trade also requires a money and credit system and the small community does not control that either, and neither does it control the legislative system which determines the legal basis on which trade is conducted, or on which the currency and credit system is managed.

Hence for a community to engage in trade is unavoidably to surrender some part of its power to determine the conditions on which it shall live, and the more it depends on trade the less it is able to depend on itself.

It must not be supposed that this power-to-decide, on being surrendered, simply evaporates into thin air or hangs around in diffused form over the general mechanism of trade, money and government. On the contrary power has its own specific laws, and one which is fundamental to its nature is that if power is surrendered or fails to be retained by one party, it will increase that of another.

In the case of trade, what is increased is the power of the central controlling mechanisms — whether in trade, money or political life — and this increased power will ordinarily be used to enrich those in whose hands it is wielded. If, for example, a family sits down to breakfast off bread made from the wheat grown in local fields, butter and milk produced by local cows and honey from local bees, it will accomplish a number of specific goals — not least of which will be that of asserting a measure of economic and political independence, and helping to enrich both itself and its community. If the family produces the food itself, it will save money with which to enrich itself in other ways; if it buys food from neighbours who have produced it, it is helping to generate local incomes and local employment. It is not difficult to see how this process is further enhanced if the local bank is locally owned (whether by the community or by a local individual) so that the profits of banking and credit are also retained for local enrichment.

Yet what happens if the same family decides to breakfast off, let us say, a packaged breakfast cereal, milk from a tin or a powder, sugar from Malawi and coffee from Kenya? It at once becomes part of a complex web of international trading relationships, the workings of which quite inevitably and inexorably proceed to impoverish not simply itself but the local community as a whole, and which results in a considerable diminution of both its political and its economic power as both accrue to remote centres. These centres will then proceed to use that power to further enhance their own dominance.

The Bacillus of Consumerism

One way this will be done will be through the power of artificial suggestion, prompted by the utilisation of advertising skills, which in turn, by playing on the ordinary frailties of human nature, on its greeds, its insecurities, its gullibilities and even its sexual and emotional drives, proceed to propagate the bacillus of the social disease of consumerism. This in turn, by prompting people to 'want' goods or services which they do not produce themselves and for which often no real need exists at all, and which might never otherwise have occurred to them, impels yet further the disposition of the local income into the tentacles of the international markets.

(I recall, for example, travelling by road in the Philippines and, feeling thirsty in a

tropical climate, stopping at a poverty-stricken Village for a drink. The tiny store, little more than a box-sized shack, was set in the midst of a coconut grove but an enquiry for coconut milk, a cool, slightly sweet, translucent liquid which it is one of the joys of existence to taste, produced a resigned shaking of the head and the information that there was nobody available to climb the tree to cut the fruit down. It transpired the only drink available was a widely advertised and excessively sweetened liquid chemical, dark brown in colour, brewed in the capital city by interests centred on New York. A sale of the coconut milk would have enriched the storekeeper, the sale of the bottled drink could only contribute to her relative impoverishment whilst enriching New York. Alas, this lesson was lost on her, as it is lost on countless other communities all over the world.)

We may recall here Aristotle's insight that "He who has fewest wants is nearest to the Gods", and reflect that perhaps he who has the most wants is nearest to a state of enslavement, both to others and to his own propensity to consume. We need to be crystal clear that the plethora of mass-produced consumer goods which fill our shops, far from being a sign of affluence, is simply the flaunting of the impoverishment of a community in its members faces by forces external to it.

Sound Money and Human-scale Trade

Let it be understood that no attack on the social use of money, or of trade, is here being mounted. Money is one of the great liberating mechanisms of human history and, like trade, has been a source of immense enrichment of the human condition for many centuries. This does not mean that they are not subject to abuse, especially when conducted through overlarge centralised mechanisms on a mass scale. Trade is a very useful servant, but when allowed to play an overlarge part in our affairs it becomes a most tyrannical master, and money, in view of its quite crucial role in human societies and the power it represents, should surely be the subject of very special forms of democratic management and control.

One theory of government holds that in order to preserve freedom, and to prevent abuse, the different powers of government should be conducted separately, so that the legislature should have two separate chambers, and that each should be sepa-

"It is as though the very spirit of human life has taken a tragic wrong turning and is running into the quicksands of sterility, morbidity and enervating ugliness."

rately run from the judiciary, the executive (that is, the civil service) and even from the head of state. The American system was set up in accordance with this kind of thinking in the mistaken belief that this is how the British system operated, but nobody yet seems to have spotted the need for a completely independent governing body for the management of currency, banking and credit.

One of the main tasks of such a body would be to guard the value of the currency. Any currency represents a promise to pay those who have worked to earn it goods and services of equivalent value to the labour given. It is a promise almost universally dishonoured, for this is what inflation means, that governments are constantly 'clipping the coinage' by spending more money than they have and printing banknotes to make up the difference. With a special, independent and democratically-elected controlling body, governments would no longer be able to pursue such a policy, and the sleight of hand of draining wealth away from the local centres where it is produced, by constantly devaluing the medium used to pay for it to the benefit of the central government, would cease.

We have here an important reason why, when government is too large and too centralised, it is able to denude peripheral areas of their wealth even when they produce it. In the nineteenth century, there was a major (and largely) unresolved dispute among historians on whether "trade followed the flag" or whether "the flag followed trade". The dispute serves to stress the close relationship between trade and political power; indeed, we should expect a powerful centralised political capital to be also a strong trading capital, the one aspect reinforcing the other and in turn being reinforced by it. But to what end? For the enrichment and the aggrandisement of both. But then at whose expense? Granted that there may ensue a general increase of trade and wealth, who will get the lions share but the centre and who will lose it but the periphery?

We may see here how things rise and fall together and why, if a locality, however

rich it may be in natural resources, is denied its decision-making power to run its own affairs, it will also be denied the fruits of its own labours and be the exploited creature of that centre where its own rightful decision-making power is exercised. There are probably no areas of the world so richly endowed with natural resources as the Welsh mining valleys, yet within Britain they are areas of chronic unemployment and poverty.

So the answer to our question, "Why are the poor areas poor?", may be summarised in a sentence: they are denied the use of their own economic surplus. The fruit of whatever is produced, over and above their immediate needs, is syphoned off to provide social and investment capital elsewhere.

Drained Resources

We may perhaps see this more clearly if we turn the matter round by making a reckoning in general terms of those sums which are constantly being drawn off from a locality to sustain a powerful centre.

Some of these sums are by means of one form or other of taxation; others are syphoned off by the purchase of goods and services not locally produced; yet others are drained off by what may be called 'invisible earnings', meaning the earnings of others outside the community from services provided which the community itself is perfectly well able to provide for itself. This latter would include banking, the provision of mortgages for home ownership, most forms of insurance, hire purchase charges and even voluntary contributions to national charitable bodies.

It is not difficult to see that this situation could be reversed in most respects. High taxes to finance mammoth national health and education budgets simply means that the citizen is funding huge bureaucratic colossi at the expense of the quality of the services themselves as they are locally received. The evidence is unambiguous that independent fee-paying schools are providing better teaching and superior school buildings and facilities at lower cost than is provided by the national and county bureaucracies in state schools. How long will it be before the moral of this lesson is learned and acted upon? A moral which indicates that the educational bureaucracy is an entirely superfluous charge on the taxpayer.

The same consideration may be applied to health. The subject is too complex to be explored here in detail;³ it must suffice to

assert that the increasing forms of sickness in modern societies — and they centre on cancers, 'strokes' and neuroses — can be as well cared for by local cottage hospitals as in the mammoth hospital factories spawned by mammoth national health bureaucracies at much less cost and for a higher quality of service.

What needs to be more clearly understood is the effect of draining a community of its economic surplus in establishing a downward spiral of community disinvestment. Since the taxes, the profits and the 'invisible' earnings of the community go elsewhere, then so too does the power to make investment decisions; this in turn means that the brighter and more innovating spirits will also be drawn away from the community to the centres where these (and other) decisions are made.

With its economic surplus and its ablest members thus siphoned off, the community becomes increasingly dependent on external forms of 'aid', in the form of 'welfare' payments, 'grants' (of its own money!), 'job creation' schemes and so on. Its impoverished condition leads to lower levels of local wealth creation, and a more sluggish apprehension of local possibilities — thus leading to greater dependency, to a greater drain of ability, more impoverishment and so on. The lesson here is a simple one and one that reinforces Professor Kohr's conclusion; overcentralised forms of national government and national decision-making create poverty.⁴

Using Local Resources Locally

We may see this more clearly if we assume that local wealth is retained by local people able to use it to develop local resources and local skills. On these terms, the economic surplus would be available to the local community. Its own members would thus decide, on the basis of their knowledge of local resources and local needs, how it should be used. We may expect in consequence the Keynesian 'multiplier' effect to become operative. Instead of being impelled to consume its own seed-corn to keep itself going, the community would have at its disposal a constantly growing surplus to use for its own enrichment. A community which beautified its buildings, built a fine theatre and concert hall and produced high quality local products, for example, would find itself becoming a magnet for its own talents as well as those of others, rather than being a boring backwater of social stagnation.

But first and foremost is the need for the localisation of the crucial power-to-decide. It is indeed the absence of this power which makes so much well-intentioned 'community' work and 'community' activity so artificial and contrived, so lacking in genuine vitality and in the capacity to generate further advances. Efforts confined to the provision of table-tennis tables for teenagers, television lounges for loungers, and subsidised bouts of amateur dramatics for the enthusiasts are not so much expressions of positive community power as of its absence. All too often the cessation of a grant or a subsidy leads to the collapse of the concern.

On the contrary, it was the exercise of this power which made possible the splendours of the city states of Europe. Almost without exception, they were splendid — a judgement confirmed down to this day by the unrelenting hordes of tourists drawn to visit the city centres, art galleries and museums where they achieve an enrichment of the spirit which they are quite unable to attain from the locales of their origins scattered around the modern world.

And if localised decision-making power is the secret of the grandeur of the medieval city-states, its lack is the secret of the poverty of so many provincial centres today. Venice had no resources to begin with; it was built on a swamp! And to this day its enchanting cityscape is based on nothing more than tree trunks driven into the mud. Yet, in its hey day, before the baleful influence of Garibaldi and the Risorgimento, to say nothing of Napoleon, Venice was not a mass city; it was organically structured, each parish having its own guild, its own wealth, its own public buildings and its own magnificent church, often of cathedral-sized proportions. It was a collectivity of small and largely self-governing communities, and Titian's work, for example, pertains to the *scuola* of just one of them.

The Power-to-Decide

On the wider stage, we are able to see perhaps more clearly now why it is that for all the wonders of technological achievement bequeathed to humankind over the last two centuries, the general human condition, in terms of those achievements of the spirit which alone make the adventure of life itself exhilarating, has been so meagre and dispiriting. It is as though the very spirit of human life has taken a tragic wrong turning and is running into the

quicksands of sterility, morbidity and enervating ugliness. In this light, we need to see that the power-to-decide is not an optional political attribute, it is a basic biological drive, the functioning of which is a vital condition to human fulfilment and the general enrichment of human life.

Britain today, like many other countries and for much the same reason, is in the grip of a convulsive economic decline. That decline is caused in great part because the kingdom is *united* instead of being *divided*. Very few of the city states of the past, whose achievements in almost every field of creative enterprise and endeavour continue to glitter and sparkle across the pages of history, numbered more than a quarter of a million people, and when they did begin to do so, as in the case of Rome, Carthage and Alexandria, it was the beginning of their decline.

It is a law of life that everything that grows must divide, if it fails to do so it will sooner or later collapse. We are collapsing now because of our failure to grasp the lessons of this law and to act on them. For politics is first, foremost and always, about people. To rob them of the power to make their own decisions about their own affairs, their own goals and their own resources is not only an affront to the basic ethos of democracy but is also to make a mockery of the very concept of progress and to rob them of any prospect of the life abundant.

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Predicting the Monsoon: Modern Science vs. Traditional Wisdom

by
Madhu Ramnath

When it comes to predicting the weather, the patient observation of animal and plant behaviour is often more accurate than modern meteorology.

For many farmers in India, the annual summer monsoon is an important and long awaited event. The monsoon, and the accuracy with which it can be predicted, assures or denies the people a sustainable harvest. To judge whether a season's monsoon has come on time, and whether the rainfall was normal, is only possible in comparison to past seasons. The accuracy of monsoon prediction thus depends largely on the amount of past data available. In a sense, the more such recorded data a scientist has at his disposal, the easier it is for him to follow the trend monsoons are likely to take.

Groping in the Dark

The summer monsoon sets in over Kerala by June 1st and progresses northwards and eastwards, reaching Bombay by June 10th and Delhi by June 28th, respectively. According to meteorological reports, there has been a standard deviation of only seven days in these dates of onset in the last hundred years. As each year's onset has different background circulation features, there is considerable inter-annual variability of the monsoon. This in turn leads to variations in time and space scales during a season; an area may suffer successive years of drought while neighbouring regions may have normal rainfall. Or, again, most of the rains of a season may fall during a particular week or two. Such variations are not reflected in the season's normal figures.

As of today, there are no workable models, based on first principles, for the prediction of monsoons. It seems that our super computers do not have the necessary information about wind and temperature conditions over the oceans to understand monsoon patterns. Also, sudden erratic behaviour, caused by depressions and

pressure areas, could delay the onset of the monsoon. Would it be wrong to say that scientific weather prediction, based chiefly on available data, and a few experienced and synoptic observers, is still largely guess-work?

The Rains in Central India

Over a large part of central India, the rainy season begins in June and lasts until the end of September. The monsoon sets in between the 5th and 10th of June. Approximately 75 per cent of the annual rainfall falls during the monsoon. Normally it rains for fifteen days a month during July and August, accounting for two-thirds of the season's rainfall. When such normal conditions prevail, the weatherman has little difficulty in forecasting the monsoon.

In 1987, the monsoon over central India was an unusual one. Many farmers, especially those who live in villages affected by rapid deforestation, had ploughed the land and sown their grain. But no rain fell: instead, the hot, dry days of summer stretched on until the middle of July. (In June, only 3 cm of rain was measured, against a normal rainfall of 10 cm). Only after July, after some erratic downpours, did the monsoon gain momentum. It took until the end of August for the dry air to become moist and the temperature to cool down.

Reading the Forest

The people in the forests of central India, who are predominantly tribal, have never depended on recorded data of past monsoons for their understanding of weather patterns. With the onset of monsoon, many plants, like the Kodoma, begin to flower. Black ants appear in long winding rows from cracks in the ground. Some birds, like the Goborliti, migrate away from the forest, as they do every year when summer

draws to a close. For the people of the forest, these have been the signs with which to interpret weather. Their memory, and the ability to read such signs, is all they have to rely on.

If, as in 1987, the monsoon is an abnormal one, the signs too are confused and unclear. Plants and animals deviate from their usual patterns of behaviour. The following are a few such examples:

- Mushrooms, which usually appear during the wet season, do so in a very specific order. By understanding this order, it is easy to tell which stage of the monsoon is in progress. The Manai mushroom, which normally appears at the end of monsoon, was seen in the first days of September in this unusual year.
- The Thummi plant, which has a root like that of turmeric, flowers every

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"Ants, mushrooms and boars are not just food to be gathered and hunted; they are also the guides and calendars of the forest."

year when the rainy season begins. After the monsoon, the leaves shrivel and die; it is then that the wild boar dig up the thick roots to eat. In 1987, the wild boar did not wait for the leaves of Thummi to dry; rather they dug up the roots well before the rains ended.

- Kenil, red-ants, are eaten by both humans and bears. These ants build their nests in the folds of green leaves often on very tall trees. Egg-laying for the kenil stops when summer ends but, with an erratic monsoon, nests with eggs and young ones continued to be found even in August.

- The Goborliti bird disappears from these forests when summer begins and returns only when the monsoon is

over. This usual pattern was broken in 1987; these birds returned in the first days of September.

Where forests still stand, such deviations test the inhabitants' awareness of the complex and delicate relationship between their environment and the weather. This kind of an understanding of natural phenomena can only come from a lifestyle which has a direct, day-to-day contact with its surroundings. Ants, mushrooms and boars are not just food to be gathered and hunted; they are also the guides and calendars of the forest. Their behaviour tells the people when to plough their land, and whether their grain should be sown on sloping ground or flat. Conversely, it is possible to predict the behaviour of plants and animals from the weather itself. For instance, when bright sunshine breaks the monotony of a long spell of cloud and rain, Udul, monitor-lizards, come out to sun themselves. Sought after for their meat, Udul, which live in burrows, abandoned ant-hills and hollows of tree-trunks, are predominantly hunted when the weather changes dramatically.

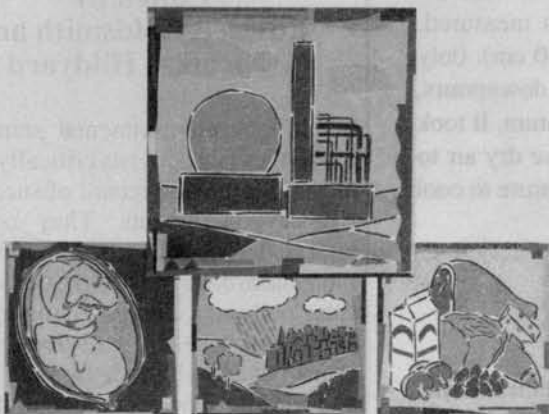
Computers vs. Wisdom

Modern meteorology depends, directly or indirectly, on the laying of roads, the construction of huge dams for electricity, and the ongoing processes of industrialization, for its practice. The synchronic disappearance of forests has been viewed as an inevitable, or as a necessary, sacrifice for the 'progress' of mankind. Rarely, if ever, are the effects of satellites and computers on the environment questioned.

On the other hand, the very fact that tribal people continue to live in the few surviving patches of forests today, is proof enough that there are sciences as good, if not better, than twentieth century meteorology. Further, it is the experimenting scientist who takes for granted the luxury of making mistakes.

Deprived of signs and forests, the links which the tribal people had with nature have been broken. Having become strangers in their own homes they have no choice but to conform to the uncertain modern tradition. Who needs monitor-lizards and red-ants when there are space-ships and satellites?

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As a result of coral mining and sand extraction, Sri Lanka's south-western coast is now grossly eroded.

Economic Development and Coastal Erosion in Sri Lanka

by
Manel Tampoe

The last decade has seen a massive building boom along the south-west coast of Sri Lanka, a coast that is particularly vulnerable to erosion damage from the south-west Monsoon and from the Indian Ocean. The extraction of sand and coral for building materials, combined with other pressures, have so degraded the coastline that it is now unable to withstand even the effects of a mild Monsoon. The result is widespread coastal erosion and a threat to the livelihood of Sri Lanka's poorest citizens.

Sri Lanka is especially vulnerable to the powerful hydrodynamic forces of the Indian Ocean that converge along its southern coast. Of its 1600 kilometre (km) coastline, a length of some 500 km is also subject to the south-west Monsoon as it sweeps in across the Indian Ocean creating seas that batter the south and south-west coast with great intensity from June to September every year. Before human intervention altered the situation, sandstone and coral reefs provided the coastline with a measure of defence against the seas; in addition a continuous process of beach formation maintained the sand balance, with wave action piling back on to the beaches the sand particles carried out to sea by the several rivers that rise in the western escarpment of the Central Highland mass and the Sabaragamuwa Hills where the Monsoon deposits torrential rain.

In pre-colonial times, the coastline in Sri Lanka was under minimal stress since the indigenous centres of civilisation were inland and were so organised that they made practically no demands on coastal resources. Although the drift southward from the inland centres commenced a century or two earlier, the peopling of the south-west coastal area was in response to opportunities created by the Portuguese, Dutch and British colonial powers in the 16th century. The building of forts at strategic points along the coast to safeguard against attack by rival European powers, and the collection for export of hinter-

land produce such as cinnamon, arecanut¹ and arrack², led to the development of a string of small coastal towns along the south-west coast. To judge by a brief description left by Reverend James Cordiner, Chaplain to the British garrison at Colombo, of the situation in Galle where the Dutch had built a fort, the building programme involved the extensive, almost wasteful, use of coral:

"Immense quantities of white coral lie along these coasts. Here a great part of the fortification is built of it; and we often discern beneath our feet, a variety of beautiful specimens forming part of the pavement."³

Pre-Colonial Times

Even by the 1st Century B.C., Sri Lankan builders could confidently handle large masses of brick masonry, judging by the massive *dagobas*⁴ which they constructed at Anuradhapura, the capital of the Sinhala kings from mid-3rd Century to the 10th Century A.D., but domestic architecture was confined to timber-framed earth structures that were, for socio-political reasons, designed to be unpretentious. Early European visitors to the island have left valuable descriptions of these houses which even today constitute the basic rural dwelling. Robert Knox, who was a prisoner of the King of Kandy, Rajasinghe II, from 1660 to 1679⁵ was quartered on certain villages during most of his imprisonment and thus had plenty of opportunities to observe

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"If immediate steps are not taken . . . there will be no coast to protect, and no railway or road left to conserve."

Sinhala village life around Kandy at leisure. Of their houses he writes:

"Their Houses are small, low, thatched cottages built with sticks daubed with clay, the walls made very smooth. For they are not permitted to build their houses above one story high, neither may they cover with tiles, nor whiten their walls with lime, but there is a Clay which is white and that they use sometimes. They employ no carpenters, nor house-builders unless some few noble-men, but each one buildeth his own dwelling. In building whereof there is not so much as a nail used; but instead of them, every thing is tied with rattans and other strings, which grow in the woods in abundance; whence the builder hath his timber for cutting. The country being warm, many of them will not take pains to clay their walls, but make them of boughs and leaves of Trees. The poorest sort have not above one room in their houses, few above two, unless they be great men. Neither doth the King allow them to build better. . . ."⁶

Dr. John Davy was a surgeon to the British army and he has likewise described the housing as he found it in 1821:

"Their domestic architecture is of the most unassuming character in which appearance is sacrificed to convenience and economy. Their best houses, those of the chiefs, are of mud with tiled roofs, raised on a low terrace, and always of a single story, built in the form of hollow squares; presenting externally a dead wall, and internally bordering the open area a verandah, with which the side-rooms communicate by narrow doors. A large establishment consists of many such squares, communicating by passages inside, and having only one or two entrances from without. Most of their rooms are dark or only furnished with windows hardly large enough to admit the human head. The floors are of clay plastered with cow-dung⁷ and the walls are covered with the same composition or with a wash of white clay, the use of lime for the purpose being prohibited, and appropriated solely to royal palaces and temples. The dwellings of the people in general are much on the same plan, and differ little, excepting in size, and in the circumstance they are invariably thatched; only those of the highest rank being permitted to have tiled roofs. The royal palaces too were constructed nearly on the same model, and differed very little more from the residences of the chiefs, than these did from the dwellings of the people."⁸

Ecological Housing

The prohibitions were clearly intended to demonstrate the power relations obtaining in a monarchy but the prescribed housing incorporated several principles now recognised as ecologically sound. The houses were completely bio-degradable, the energy input (outside what the builder contributed) was minimal; the building materials consisted of unprocessed earth and renewable resources, available in plenty, from the local tropical forest, such

as poles,⁹ vines and leaves for thatching. Significantly, the hardwood available in the forest was minimally used. By discouraging the ostentatious in domestic architecture and restricting the materials to forest-based renewable resources, the traditional Sinhala house was ecologically sound.

The European House

The transition to modern housing, based on the European urban tradition, commenced in Sri Lanka in the late 18th Century. Housing became much more ostentatious as wealthier, urbanised Sri Lankans copied the imposing, commodious houses that European residents built for themselves. The style and durability of these structures involved an increased use of such building materials as timber, sand and coral-based lime, as well as energy for processing other materials such as bricks and tiles. Since such housing was capital-intensive, and as the process of capital formation in the rural areas was very slow, the transition to European-style housing was effected only by the very elite of the economically affluent. The introduction of this durable and imposing domestic architecture led to indigenous houses being denigrated as "mud huts".

Five years after Independence,¹⁰ the Government of Sri Lanka discussed launching a major drive to replace all traditional housing throughout the island, but decided against it on account of the capital outlay involved. However, in order to alleviate the acknowledged shortage of urban housing, it elected to provide a restricted sum of loan capital annually for building. This was chiefly taken up by the higher income groups; nonetheless, with considerable government resources being channelled into the rural sector to increase food production, the farmers used their earnings to effect the transition to tiled brick-built houses themselves, but on a very gradual scale. The lack of an ecological perspective led to traditional housing being 'upgraded' without due consideration being paid to environmental factors.

An Eroded Coast

The post-Independence era brought an intensification of development activities, although the growth rate achieved in Sri Lanka was never high. Unfortunately, development initiatives were sectorally planned, generally as ends in themselves, with almost no awareness of the possible impact on other areas, least of all the environment. Being the most densely populated region, the south-west coastal area, always liable to the erosive impact of the Indian Ocean and the South-west Monsoon, and already subject to pressure from human activities since the colonial era, came under still further stress due to the increased pace of development. For instance, large scale inland irrigation schemes, involving the impounding of rivers, led to a reduction in the amount of sand and silt replenishing the shoreline, a problem further compounded by the construction of badly designed river outfalls. Similarly, fishery development projects emphasized mechanisation, leading to the construction of fishery harbours close to important fishing centres without due regard to the configuration of the adjacent coastline, and thus contributing to an increase in coastal erosion. In addition, the sandstone and coral reefs that had previously afforded considerable protection to the coastline were breached to provide motor boats with access to the coast. As sea bathing and 'golden beaches' constituted two of the principal tourist attractions of Sri Lanka, hotel complexes were built on the

beach edge in popular tourist resort towns with little understanding of the destabilising effect on the beach sands.

As a result of the combined effect of increased population pressure in the south-west coastal areas and the growing exploitation of building materials derived from coastal areas for both housing and urban development, the south-western coast soon began to show increasing signs of ecological stress. Commenting on one of the most vulnerable locations in the area, Hikkaduwa, where reef mining for coral has been severest and which has also in recent times developed into a busy tourist resort, the Director of Coast Conservation observed:

"Erosion has caused parts of the Hikkaduwa coast to retreat inland by about 1000 feet in the last sixty years representing a loss of over Rs. 100 million of land value alone along a stretch of two miles of coastline."¹¹

By the early 1970s, the need for adequate coast conservation legislation and a specialised agency to replace the small unit attached to the Port Commission (which had hitherto executed coast protection works) was perceived and the Department of Coast Conservation (DCC) was set up.

The Construction Boom

From the mid-1950s to the late 1970s, Sri Lanka pursued a development policy in which the state sector played a dominant role, the private sector being restricted and international capital being permitted only limited access into the country. In 1977, the United National Party, a conservative party pledged to reversing the previous socialist economic policies, was returned to power and received World Bank and IMF support for a 'structural adjustment' aimed at transforming the economy into an open capitalist economy. With a view to creating a capital base in the country, a Public Investment Programme was formulated, the objective of which was clearly outlined by the Minister of Finance on an investment promotion mission abroad:

"The Government for its part has undertaken a massive development programme in the public sector. This will create avenues of employment and help to build up the capital base of the country to promote future economic growth and development."¹²

Three out of the four major projects initiated under the first post-1977 Public Investment Programme — the 100,000 Houses Programme, the Urban Development Programme and the Accelerated Mahaweli Diversion Programme — involved massive building works, and provided numerous opportunities for financial gain at public expense for the various vested interest groups which the ruling party represented. The 100,000 Houses Programme was allocated 2.4 billion rupees, of which Rs.1766 million went to the private sector to build 36,000 houses and Rs.668 million to state agencies to build 64,000 houses. The programme resulted in the building of hastily designed housing estates and high-rise complexes that were highly resource-intensive and did nothing to ameliorate the major housing problem in the city — indeed, more than half of the population still live under deplorable slum and shanty conditions. Similarly, the priorities of the Urban Development Programme were high-rise hotel and office complexes to upgrade the image of the Sri Lankan metropolis; today, there is a recession and most of the luxury hotel complexes constructed with generous tax concessions are demanding government grants to keep themselves afloat.

Urban development outside Colombo has consisted of the construction of supermarkets, which are not only incompatible

with the level of commerce transacted in these towns, but which also involve a very high level of resource use, especially as they tend to be over-designed by architectural firms interested in maximising their fees.

Furthermore, in order to create a 'home-owning democracy' (and in the process mitigate the effects of previous housing policies which had adversely affected house-owners), Sri Lankan taxpayers were offered a rebate on the full capital cost of either purchasing a site and constructing a house thereon, or purchasing a house after 1973, regardless of cost.

In contrast to its policy on the Mahaweli Diversion Programme, the World Bank did not require an Environmental Impact Assessment to be carried out prior to the construction programme being implemented.

The construction programmes came under the direction of the then Prime Minister, as Minister of Local Government, Housing and Construction. An ambitious politician possessing exceptional organisational capabilities and immense drive, he enlarged the Housing Programme within the first year to include two new components, the Electoral Housing Programme and the Model Village Programme. All these programmes were so vigorously pursued under pressure from him that a construction boom occurred, hailed by the ruling party as proof of its successful development policy — until the World Bank reviewed the effects that the escalating cost of construction had had on budgetary discipline and advised that continuing IMF credits should be made conditional on the programmes being trimmed close to their original size. Despite this, the construction boom continued.

With the completion of the 100,000 Houses Programme in 1983 the Prime Minister launched a 'One Million Houses Programme' to be completed by 1989 with funds from U.S. banks through a USAID Housing Guarantee Programme to supplement the issue of local loans. While this programme is designed to assist low-income rural and urban groups to upgrade their housing, it is also designed to be supportive of property developers utilising U.S. loan capital, and has led to property development emerging as one of the most thriving sectors of the economy so that the construction momentum continues.

Raging Seas

In June 1985, as the south-west Monsoon set in, the south-western region of Sri Lanka and the western peninsular coast of India experienced very heavy rain. As the Monsoon progressed, there was extensive flooding in India. In Sri Lanka, there were landslides in the hill-country and floods in the lower reaches of the Kalu, Kelani and Nilwala rivers, which originate in the Western escarpment and Sabaragamuwa Hills, where the Monsoon generally deposits 100 to 200 inches of rain. Gale force winds lashed the South-west coast followed by tidal waves. Normally the worst of the storm lasts an average of two days; this year it lasted five.

During a normal south-west Monsoon, the period between waves along this stretch of the coast is 8 to 10 seconds and the wave height 3 to 3.5 metres. During the storm surge, the wave period averaged 20 seconds, which meant that wave energy increased not two-fold but fourfold, resulting in waves 5 to 5.5 metres high (20 feet). The situation was further aggravated by higher tides with the sea level rising one metre at high spring tide.

One of the principal occupations in the south-west coastal belt is fishing and traditionally fishing settlements have been close to

the beaches where the boats are. As urbanisation has followed the main road and rail lines that skirt the coast, competition for coastal land has pushed the poorest of the fisher families virtually on to the beach edge where they live in fragile huts made of plaited coconut leaves (*cadjan*). Competition for land is so severe that some have even erected their huts on the revetments built for coast conservation purposes.

The tidal waves ripped through these houses, rendering hundreds of these families homeless, uprooted the coconut trees that fringe the coast, and surged onto the road, tearing up entire stretches in some places and depositing up to three feet of sand in others, thus making much of the main southern highway impassable for vehicular traffic.

The Government acted with great promptness. Those families whose homes had been destroyed by floods, gales and tidal waves were temporarily housed and fed and Rs.6 million was spent on their rehabilitation. The roadway was speedily repaired and buttressed with large boulders at a cost of Rs.16 million.

The Extent of the Problem

The elemental fury of the sea shook the public, which had not experienced the like of it within living memory. Sri Lanka has a very vocal environmental lobby, which has from time to time raised the issue of coral mining, but has never campaigned with sufficient pressure to put an end to the practice. In the wake of the tidal waves — which were severest in the Hikkaduwa area, where coral mining has been most extensively carried out — the damage caused by coral mining received considerable attention in the media.

According to official figures, published by the Coast Conservation Department, there are 1700 families engaged in coral mining and lime manufacturing along the south-west coast, where coral processing is a cottage industry. A survey conducted by the Department showed that to meet the present demand, 7730 tons of lime is currently being extracted from beach coral formations and 2140 tons direct from the reef. There are 208 lime kilns operating along this coastline.

But even more startling are the statistics on sand mining. The permissible limit for sand extraction from the rivers draining the south-west is 345,000 cu. ft. per year, but the total currently mined is approximately 1.2 million cu. ft., so that the rate of extraction exceeds the permissible limit by four times. The Kelani river is the biggest provider of sand to the country's construction industry on account of its proximity to Colombo; mining here is in the region of 600,000 cu. ft. per year — three times the annual sand deposit. The Maha Oya which enters the sea near Chilaw is exploited to nine times its capacity; its sand deposit is only 35,000 cu. ft. whilst the removal rate from its lower reaches is 300,000 cu. ft. per year. Current sand removal figures from the west and south coast rivers are as shown in **Table 1**. Indeed, such is the present predicament that the CCD's Manager for Planning and Development has stated that "sand mining has reached such alarming proportions that this problem would be a greater threat to the country in the next decade than even sea erosion."¹³

The Final Straw

With its reefs damaged and denuded, and its beaches deprived of sand, the south-west coast is now unable to withstand the sort of

Table 1

Annual Rate of Sand Extraction from Western and Southern coastal rivers

Kelaniya Ganha	600,000 cu. ft.
Maha Oya	300,000 cu. ft.
Nilwala Ganga	6,000 cu. ft.
Gin Ganga	60,000 cu. ft.
Madu Ganga	15,000 cu. ft.
Kalu Ganga	125,000 cu. ft.
Gin Oya	30,000 cu. ft.
Deduru Oya	60,000 cu. ft.

*'Ganga' means 'river' in Sinhala; 'Oya' denotes a smaller water course. Sometimes an Oya is a tributary of a river by the same name.

exceptionally strong Monsoon that occurs periodically in this region. The depredations caused to meet the demand for sand and lime for the heavy construction programmes of the post-1977 period appear to have been the final straw. Yet the devastation caused during "Tidal Wave Week" was no more than a spectacular illustration of the everyday damage that occurs as erosion inexorably takes its toll on this coastline. For example, Joslin Fernando, who has lived for 19 years close to the coast of Moratuwa, has stated that five rows of coconut trees between her hut and the sea have been washed away during the past two years.¹⁴ In August 1985, a 10-foot strip of beach extending 30 metres was washed away at Matara along the southern coastline, and at Hambantota, fifty miles eastwards, severe erosion was reported for the first time when a 500-foot strip of beach was washed away.¹⁵ In November, when there was bad weather owing to a depression in the Bay of Bengal, huts belonging to fisherfolk in the Panadura-Moratuwa area were swept into the sea, and train services were disrupted at Lunawa when the sea came up to one foot of the main coastal railway line.¹⁶ On the night of 11th November 1985, tidal waves surged into the Preethipura Home for disabled Children, seven miles North of Colombo, and an emergency evacuation of the children had to be arranged.¹⁷

Although the damage in 1986 was not on the same scale as in 1985, the Coast Conservation Department was on an emergency alert and issued the following warning to the public:

"With the south-west Monsoon gathering momentum, the Western coast areas prone to coastal erosion are facing a grave threat from the unkind sea activity with the attendant violent wave and current movements. The Coast Conservation Department has moved all the heavy machinery and men to (the) south-west coastal zone areas in readiness to face sea erosion threats."¹⁸

A team was rushed to a southern village Madampagama where the unauthorised excavation of a sandbar has resulted in large scale erosion.¹⁹ The Minister of Fisheries also approved immediate *ad hoc* conservation measures for the Kalutara-Beruwala stretch of coastline after it had been pointed out that "if immediate steps are not taken, such as placing boulders, pending the long term conservation plan, there will be no coast to protect, and no rail or road left to conserve."²⁰

The Government Acts

Following the storms, the matter was discussed at Cabinet level,

where it was generally agreed that "the root of the problem lay in mining of corals both at reef and shore level."²¹ The Minister of Fisheries (who is responsible for coast conservation) gave an assurance that legislation would soon be passed to put an effective stop to coral mining, by making not only the mining of coral, but also its possession and processing penal offences. Those engaged in these occupations would be offered alternative forms of employment. The Minister stated:

"It is no longer possible to allow coral mining to continue and immediate action has to be taken if a major calamity is to be avoided."²²

It is likely that the devastation of Tidal Wave Week helped to secure Cabinet approval for legislation to ban coral mining and processing, in spite of a possible reduction of the government's popularity among the groups affected.

On the question of sand mining, the government sought ways and means not of scaling down extraction limits to a level commensurate with the ecosystem's capacity for renewal, but rather of replacing sand losses through modern technology. With technical assistance from DANIDA,²³ a two-phase Master Plan for Coast Protection has been formulated: the Short-term Plan for 1986-1990 is expected to cost Rs.360 million and will be partly financed with a loan from DANIDA; meanwhile the long-term Plan for 1986-2000, to be backed with aid from USAID, is being drawn up. These plans will be based on the principle that

"Erosion is basically a negative balance in the coastal material budget. A logical solution to the problem is therefore to supply the balance material in order to make even. This process is named 'Artificial Nourishment' whereby material predominantly sand and gravel are supplied to the coast either mechanically or hydraulically by pumping from dredgers."²⁴

The programmes will be undertaken by the Department of Coast Conservation in collaboration with DANIDA and USAID, the Department's Research and Engineering Unit being transformed into a Government-owned Company.

The problem is typical of the impasse in which Third World Governments now find themselves. In order to achieve politico-economic objectives designed to benefit power groups whose interests they represent, governments launch massive development schemes in collaboration with international financing agencies (such as the World Bank), and when as a result severe environmental stress occurs, they resort to borrowing again to take corrective measures recommended by representatives of major international organisations that are themselves channels for investment in the Third World. In this way the dependency cycle of Third World countries is perpetuated while opportunities are created for the sale of Western technological hardware and expertise. Thus the Sri Lankan authorities obtained funding from US banks through the USAID both for the One Million Houses Programme and to complete the 100,000 Houses Programme: now that those programmes have aggravated coastal erosion due to enhanced sand and coral extraction, USAID will profitably tap the coastal management expertise available in the States through a co-operative agreement with the U.S. University of Rhode Island for a coastal management programme involving the artificial reconstitution of the Sri Lankan beaches. The technology involved will be capital-intensive and will increase Sri Lanka's debt burden.

The Traditional Alternative

It is probably because Third World countries like Sri Lanka have

not really 'de-colonised' themselves that they are unwilling to opt for development alternatives based on their own cultural traditions; they thus only succeed in enmeshing themselves further in dependency relationships. For, had the government based its housing programme on improving *traditional* housing designs, things might have been different. Traditional Sri Lankan housing causes minimum ecological destruction and could have been upgraded to satisfy modern shelter requirements. A design appropriate to the present, but incorporating the ecologically sound principles of the past, could have provided the basis for a housing strategy that would have been cheaper, as well as less destructive of the environment, but this possibility only received attention when the 100,000 Houses Programme was threatened with liquidity constraints imposed by the World Bank, and then only in respect of rural housing.

Misguided Policies

Coastal erosion in Sri Lanka provides an example of the complex interplay of international and local factors operating to aggravate environmental problems in Third World countries.

Development programmes involving the use of renewable natural resources must take into account the ecosystem's capacity for renewal if environmental degradation is not to ensue. This fundamental principle was generally overlooked in the pillaging of Sri Lanka's coastal resources for housing materials, even though coastal stress had begun to manifest itself by the early 1970s. Nor is this surprising, for it is clear that the primary objective of the construction boom which followed the accession of the United National Party was *not* the provision of housing in a manner consonant with the country's long-term interest, but rather private financial gain. Once funding was assured, this goal combined with political drive to speed up implementation unmindful of all other considerations. Indeed, it is significant that the housing programme was drawn up without any survey being carried out as to how best to use the country's resource base on a sustainable basis. Nor was prior consideration given to the consequences that heavy mining of sand and coral would have on the coastal ecosystem.

It has to be emphasized that construction programmes of the magnitude of those carried out by Sri Lanka were only made possible through massive World Bank and I.M.F. support. Though the programmes were not directly sponsored by the World Bank, they were components of a Medium-term Public Investment Programme which was formulated in consultation



Competition for land is now so intense that many families have moved on to the beach. Tidal waves have led to many fishing huts being swept away.

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with the World Bank, and its approval helped to secure aid commitments, amounting to some Rs.12 billion, from donor countries through the Sri Lanka Aid Consortium. Without that money, it is improbable that the assault on Sri Lanka's fragile coastline would have been possible.

Here, then, is another instance of World Bank-IMF funding resulting in grave environmental degradation in a Third World country. The main purpose of the Bank's massive capital injection into Sri Lanka was to change fundamentally the economic structure of the island from a capital deficient, socialist economy to a capitalist one, by pump-priming the economy to enable the Government to undertake programmes that would offer ample opportunities for capital accumulation by favoured groups, and, equally, to strengthen it as a market for the goods and services of the developed countries. In Sri Lanka itself, the Bank's goals have been pursued with unprecedented vigour by the government. However, the price for the entire exercise has been paid by the very under-privileged group whose housing predicament it should have been the government's priority to solve — namely, the poorest sections of the fishing community, who have experienced the trauma of their frail huts being swept away by the raging seas.

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Books

Alarm Bells

THE EARTH REPORT: Monitoring the Battle for our Environment, edited by E. Goldsmith and N. Hildyard, Mitchell Beazley, 1988, Available from: Ecosystems, Worthyvale Manor, Camelford, Cornwall, £7.95 (plus p.&p.)

Many publishers are now realising that there is a demand for books on the parlous state of the Earth. However, a multiplicity of facts about this crisis do not take us any further forward. What matters is the intellectual framework that alone can give them order and meaning. This is the great strength of *The Earth Report*.

The Earth Report is therefore able to break out of the ideology that dominates books such as *The Gaia Atlas of Planet Management* and the outpourings of institutes such as Resources for the Future. There, the grip of what Neil Everden has called 'Resourcism' holds sway, the planet being treated as nothing more than a cupboard whose shelves are getting bare and need restocking. Known reserves of this or that resource are totted up, like a supermarket manager doing the stock-taking. Colourful symbols locate future sources, blotting out the inconvenient little fact that on top of them are often wildlife habitats, the lands of tribal peoples and of peaceful farming communities which would be obliterated if such resources were ever to be tapped. The fact that resource production itself consumes resources, especially energy, and generates pollution and environmental degradation is also inadequately recognised. Most important, the really significant questions — why do we want these resources? What is the 'good life'? What is right relationship with the rest of nature? And so forth — go begging. Not surprisingly, the solution proffered is a plea for 'more information'.

The Earth Report contains as much, if not more, information about humanity's

ecological predicament as those books which have emerged from the 'resourcists' but, unlike them, it looks beneath the symptoms, asking why all this destruction is taking place, what are its consequences and what must be done about it if we care about the future.

Overshoot

As Teddy Goldsmith spells out in the foreword, the crisis is a consequence of one part of the Earth's community — human society — growing out of balance with the rest. Through its numbers, its appetites and the technologies that serve them, human society has become a malignant cancer draining the richness and vitality of the very web of life itself. Goldsmith notes that words such as 'development' and 'progress' have helped camouflage this process. When set against the loss of fertile soil, clean air, sweet water and all those life forces that distinguish the Earth from the dead Moon, the history of the recent past can only be seen as 'regress'. All systems have built-in limits against excess — machines as well as living creatures. As the rest of *The Earth Report* chronicles, on one front after another, we are crashing through one safety barrier after another and the bills are piling up fast.

Most of the book is an alphabetical listing of entries. The one under 'Extinction' shows that the most grievous price is being paid by those species being driven into oblivion. A whole series of topics, cross-referenced under 'Third World', spotlight how it is mainly the global poor people who suffer from the environmental destruction caused by the dams, ranches, timber plantations and other development packages which their promoters claim are for the social good. The treatment of migrant workers could have merited a special mention, not least because they are often on the receiving end of backlashes from the very countries which have benefited from their labours. The exploitation of such groups is often the other side of the coin of environmental destruction being caused, for example, by the mega agribusiness enterprises in the sunbelt states of south-western USA.

Another set of cross-references under 'Lifescan' show how even the affluent peoples of the world are gambling with their own physical and mental well-being in the pursuit of expanding material consumption.

In general, the picture is one of a fast-rising crescendo of waste and destruction. I have not had time to check the facts and figures in great detail, but the overall impression is confirmed by what I read in the daily press and saw on the television

news whilst I was writing this in the last week of September. Some of the items that stick in my mind are: dying seals (Baltic and North Sea); dying palm trees (Caribbean countries); destroyed and damaged nature reserves (Southern England, Brazil); export of toxic chemicals (Nigeria); lethal levels of water pollution (Estonia); droughts, forest fires and floods (various countries); leaks of poisonous gas (Los Angeles); destruction from tourism (Turkey, Cyprus, Malta); plane crashes (the by-product of excess air travel, congestion and reliance on inexperienced pilots); and the genocide of ethnic minorities (Kurds and others).

False Alarms?

There are those who may reply that *The Earth Report* is crying wolf. Richard North, environment correspondent of the *London Independent*, has recently been claiming that North Sea pollution "has largely been reduced in quantity and toxicity" and that the waters are "bursting with life". Where there is an undeniable problem, mainstream opinion still plays it down. Sometimes, it tries to single out a pest or disease as the culprit. At others, it ponders whether there is some natural cycle at work, of whose existence and duration we are unaware. In fact, each and every cause is suggested — except the whole system of industrialism.

The Earth Report goes to the heart of the problem. A whole number of different species of plants and animals are simultaneously undergoing a decline. What matters is why they have lost their former resilience to cope. The answer is to be found in the *totality* of harmful impacts from human activity upon the rest of nature. This or that pollutant may be on the decrease but the significant point is the overall weight, variety and especially the interaction of the cocktail of man-made pollution and environmental degradation. We now seem to be at, or perilously close to, the point of triggering a domino effect of environmental collapse. Prudent people will conclude from the evidence presented by *The Earth Report* that, even if we can never be sure exactly how far we can push environmental tolerances, we have now lost that vital margin of error which once permitted us to get away with our mistakes. Many of the problems which the book chronicles have *already happened*, and individual communities, from Palmyra in ancient Syria to the Mayans of Central America, have paid the price. What is new today is the sheer number of problems encircling just about every part of the globe.

It can be concluded that conventional forms of environmental management are a

massive failure. Environmental impact statements, cost/benefit analyses, the zoning of a handful of small, fragmented reserves and all the other tools of what Johann Galtung once called the 'Ecocrats' are the equivalent of the little Dutch boy with his finger in the leak in the dyke at a time when holes are appearing all over the dyke's wall. Many people may react against magazines like *The Ecologist* with its repeated calls for a programme of deindustrialisation. It seems to me that, painfully difficult though it may be, it is the only way human society can prevent its ecological, predicament from getting worse.

A to Z

Moving away from the report's overall message to the specific entries, I was surprised just how few disagreements I noted. I suspect the format inevitably produces a bias towards things as opposed to ideas. Though 'Deep Ecology' gets a mention, other concepts such as 'entropy' and 'steady-state economics' are omitted. More explicit emphasis might have been given to the fact that it is food and fibre production that are the biggest environmental problems, contrary to the impression given by television pictures of protesters outside some particularly obnoxious factory (though, with the Greenhouse Effect and acid rain, the manufacturing, power and transport sectors are doing their best to catch up).

There are a few odd imbalances — Mono Sodium Glutamate might not do you any good but desertification does a lot more people somewhat greater harm, yet rates a smaller entry. Some important developments in fields such as information technology and artificial intelligence are not covered. As Theodore Roszak's latest book triumphantly shows, the cult surrounding them is based on a grossly mechanistic and reductionist way of thinking about and valuing human faculties, a significant contributory factor to our present malaise. It would have been useful to have had a separate entry on the realities of the much touted free-enterprise economic zones in countries such as Sri Lanka, especially regarding the sufferings of women workers in many high-tech factories. The entry on Antarctica comes close to the kind of resourcism I mentioned above. It is not free from a tendency to talk as if this continent were a treasure trove, left by some beneficent deity for human purposes.

The book is a bit thin on the kind of changes necessary to create an alternative. 'Zero Population Growth' gets an entry, for example, but it does not mention anything at all about how, in countries like the

USA and UK, we might seek to reverse the pronatalist bias of our tax and welfare system, let alone our cultural institutions. However, unlike so many purportedly environmentalist books these days, overpopulation is squarely faced. Migration, on the other hand, is discussed only in passing. Many decent and intelligent people equate immigration controls with racism. While, in practice, the two have often marched hand in hand, this should not be a reason for rejecting the necessity of controls. They are the inescapable concomitant of what the entry on 'Carrying Capacity' implies. Oregon, for example, will go the same way as the Los Angeles Basin and Florida without them; people who care about tribal peoples — they receive a well-written entry — cannot avoid facing the same kind of conclusion.

Rogues Gallery

Perhaps the biggest omission is people in another sense — those individuals and organisations who are promoting and benefiting from environmental destruction and social disruption. True, the World Bank gets a drubbing but there are many more who reap financial profit, status and power from what is going wrong. In the sense that everyone of us uses resource-depleting and polluting goods and services, we are all to blame. But some are more to blame than others. Perhaps subsequent editions of this book should have a section on 'Ecocrime' and spotlight examples of those who, in key positions of authority and influence, make statements and take decisions that deepen the crisis.

All Together?

One sticky problem is where to draw the line is criticising bodies that clearly have their heart, if not their head, in the right place. The Brundtland Report gets an uncritical entry, yet Greenpeace and others have rightly commented upon the hypocrisies of the Brundtland government in Norway. Band Aid is praised but the point could have been made that a lot of its visual propaganda initially portrayed Africans as helpless and dependent. Again, many development charities and lobbies propagate the kind of thinking dissected in the entry on 'Demographic Transition' but are not named as doing so.

These kind of quibbles apart, the standard of entries is very high. Sample the entry on the fashionable concept of 'sustainable development' with which *The Earth Report* does not duck from taking issue. The very phrase is surely a contradiction in terms when put in the context of what we know about entropy, ecology and

the earth's finitude, as well as the technological, social and ethical limits to growth. (In passing, it should be noted that the notion of 'personal growth' cannot evade these constraints and costs: I might develop myself musically but it still helps to have the physical hardware of instruments and hi-fi.) In general, the entries are a mine of both information and insight.

Stimulating Essays

The A-Z entries are preceded by a number of essays. Again, these are generally most commendable. Donald Worster's celebration of the work of Aldo Leopold is timely and most stimulating. As might be expected after his own history of ecological science, Worster makes some pertinent comments about the way ecology too has not escaped the distortions of compartmentalised, atomistic and pseudo 'value-free' approaches of the dominant ideology of Industrialism. (A stimulating follow-up is the recent collection of essays assembled by J. Baird Callicott under the title *Companion to a Sand County Almanac*, Univ. of Wisconsin Press.)

Lloyd Timberlake contributes a well-researched piece on Food Aid. I felt that the notion of fair prices, put forward by the Brundtland Committee, deserved more critical scrutiny since even a reformed world trade system would perpetuate the wasteful and polluting transportation of produce, as well as encouraging the tendency towards monocultural economies and land use patterns. Nevertheless, Timberlake makes many good points, as do Peter Bunyard, Don Hinrichsen and Armin Maywald, Barbara Zeschmar-Lahl and Uwe Lahl on, respectively, Chernobyl, acid rain, and water pollution.

I hesitated, however, over James Lovelock's piece on the Gaia Hypothesis. The notion of the Earth as some integrated, self-correcting system can be a source of complacency: it is all too easy to believe that we can pollute away regardless because the planet will make the necessary evolutionary adjustments and take it all in its stride. I certainly detected a flavour of that in Lovelock's original book, though this essay registers far more concern about the human impact.

My main fear, however, is that the Gaia Hypothesis can legitimise even more fateful expressions of what Ehrenfeld has called 'the Arrogance of Humanism'. I have already read quite a few books in which genetic manipulators, space colonisers, nuclear fusers and the like are portrayed as the legitimate children of Gaia, licensed to give evolution a push in whatever direction human whims take a fancy. It is a view that can spark off some amazing technocratic fantasies. Consider the following:

"Deflecting oncoming asteroids into space and spearheading the colonisation of life on other planets represent additions to the Gaian repertoire that our species must initiate."

Significantly, these words come from Dorian Sagan and Lynn Margulis, two leading Gaia advocates.

Hard technologies and hard societies feed off each other, and the type of space programme envisaged above would be quite incompatible with the kind of human-scale technologies, decentralised and self-reliant communities envisaged in the *Blueprint for Survival* years ago. I am also not totally convinced that 'Gaian Science' is as revolutionary as its apostles proclaim. Switching from the smallest indivisible fragments of reality to the planet as a whole certainly involves a big shift in the goal posts, but the game might still in essence remain part of the more familiar Cartesian paradigm. Articles by Gaian ideologists now appear regularly in *The Ecologist* and similar journals. I wonder whether we are all in fact on the same journey. Or is it that we've found ourselves on the same platform waiting for trains. . . to go in different directions?

Finally, let me note that Mitchell Beazley have generally served the authors well, with one exception. The text is easy to read and the pictures are well chosen. The diagrams, however, are a disaster. Whoever signed them might well think they are flashy and exciting but they gave my eyes severe indigestion.

Sandy Irvine

Sandy Irvine is a lecturer and co-author of *A Green Manifesto* (Optima, 1988).

Commercialism and Local Society

NOT FOR SALE: Young People in Society, by Benny Henriksson (Translated by Susan Davies and Irene Scobbie), Aberdeen University Press, 1983.

In 1981, the Swedish Government published a report issued by the National Youth Council on commercialised youth culture. The report, entitled *Not For Sale* ran to 650 pages and caused a sensation because of the radical and wide-ranging nature of its critique and the imaginativeness of its proposed solutions. A year later, a shorter version entitled *Your money or your life* was published to make the report's findings more widely available. The English version, published in 1983, bears the title of the full report.

Not For Sale is a devastating indictment

of the emptiness and sad state of modern society, but, more important, it makes drastic proposals for fundamental reforms to recreate a local culture which can reassert traditional values and folkways within a modern context. For these reasons the book deserves a wider readership. Hence this somewhat belated review.

The first third of the book describes traditional Swedish rural society, which, despite its grinding poverty, facilitated an integrated and self-contained life-style in which children could grow up as reasonably well-adjusted members of society. This part of the book also describes the changes which industrialisation has led to — in particular the separation of work into alienated periods of wage-labour to be made as short as possible, and 'leisure' in which identity and self-respect is found through consumption. The importance of leisure is accentuated by the absence of a meaningful role for children in society because they are kept in an extended social limbo for many years — their most formative years.

The author, Benny Henriksson, succeeds very well in capturing the essence of modern society. The shearing away of the local society, with its dense networks of relationships, its variety of age groups and of people with a wide range of skills and abilities, leaves a social vacuum for commercialism to fill. Children are left with an isolated nuclear family, a sense of purposelessness, and a milieu which is almost devoid of adults and lacking in nuances and variety. Until the age of eighteen or more, they are left to float in this No-Man's land. Even parents are often unwilling or unable to provide children with moral and spiritual guidance under the misguided belief that they must not indoctrinate them. The result is a mentality of "living for the moment" and of narrow egoism. Above all modern life encourages a passivity which places the emphasis upon being entertained. Children are encouraged to become 'observers' rather than 'participants'.

The Logic of Consumerism

Henriksson puts his finger on the fundamental problem of modern society. In order to produce more and more, work becomes increasingly rationalised, losing its meaning and becoming an activity from which people flee as fast as possible. It no longer confers a sense of identity or allows the development and application of what might be called 'natural' skills which produce products which are visibly useful in any immediate local sense. All this production has to be consumed, and this is where 'leisure' comes in. It is here that the money earned at work can be spent and used to create some sort of personal iden-

tity through consumption.

But the price of this carousel is high. Consumption tends to be passive and, in an ultimate sense, unfulfilling. It becomes a treadmill on which (in order to keep up with the Joneses) consumption must take place at an ever more frenetic pace. New fashions, passing fads, the throw-away society and planned obsolescence are all part of this. The social vacuum which consumption must fill can never be overcome in this way. Yet instead of realising this, most of us just go on consuming, trying to dull the pain by thinking that the solution lies in still more and more consumption.

Social Alienation

Henriksson tries to explain how the market fills a real need arising out of the collapse of local society. Here the book makes an important contribution to our understanding of modern social alienation. For the social vacuum is not just a generalised and abstract emptiness resulting merely from too much spare time; it is a real lack of emotional fulfilment, deriving from specific social forces.

Two examples of this are particularly striking. The first is the absence of fantasy, as expressed in sagas and folk-myths. Traditional societies are, of course, rich in these. They provide for constructive, participatory story-telling which is absent in our passive consumer society. But more important, they provide a fantasy world in which children can work through, in a symbolic manner, moral problems and life problems which cannot otherwise be addressed. The collapse of local society deprives children of this. In its stead, the commercialised market provides *ersatz* fantasy, based on mindless violence without any subtle moral or social problem-solving, and which does not challenge children to think.

The other example involves the need for the love and affection which come through close local relationships with a wide variety of people of different ages, abilities, and characters. The failure of modern society to provide such relationships is compensated for by commercialised culture. This is why pop music has such a wide appeal, and why pulp literature — romances, thrillers and such — is so eagerly read. Starved of direct personal experiences by an impoverished social milieu, the market provides a substitute in the form of a second-hand experience.

But the real problem with commercialised culture is deeper than this. These market substitutes are also part of a sales pitch to get children (and adults I would add) to consume more. Admiration for film stars or sport personalities (in the

absence of real live local heroes) is used to sell a cheese spread; diamonds become a symbol for love; drinking a soda becomes a passport to social popularity ("joining the Pepsi People"), and so on.

What the market does is to sell consumer products as 'personifications'. That is, things are given characteristics drawn from those they are meant to represent. Diamonds are forever, and so diamonds become synonymous with eternal love. Products can even speak themselves: saying it with flowers, or a little gold says everything. In this way, a world of objects and consumer products are infused with emotions. The end product is a 'James Bond' world in which everything centres on *things* — a profusion of wondrous gadgets, as well as interpersonal relationships which are thing-like, Bond girls being mere objects. Consumer products gain such a symbolic importance that, as in the Bond stories, the differences between gadgets and people become decidedly blurred.

In effect, commercialised culture fills a social and spiritual vacuum by charging consumer products with emotions, thereby tying us to them more effectively and increasing their desirability.

Radical Solutions

The final third of the book develops in some detail an argument for a radical solution, based on developing a vibrant local milieu. Henriksson argues that the only way to counter the empty commercialism of modern life is to create a local society which fills the social vacuum currently filled by the market and commercial consumption. Children in particular need to be re-integrated into a local society providing rich and varied social contact and the opportunity for their active participation.

Henriksson argues for the development of a 'care-economy' at the local level, which replaces the 'buying and selling' of the market economy with the 'give and receive' of personal care. Local units should be formed out of existing housing areas, comprising some 200 to 300 households. Schoolwork should be changed to include a substantial element of participatory local care-work — on the school itself, or local facilities, the elderly in the area and so on. The age-stratification of the classroom system should be abolished and teaching should be anchored more in local practical matters. For adults, reductions in the length of the working day to further increase the amount of 'spare' time should cease. Instead, reductions should be made explicitly for people to engage in unpaid local care-work. A local economy based on crafts and small-scale work should be encouraged.

The book argues for a fundamental shift

from passive entertainment and passive welfare care run by professionals to self-help: 'de-professionalisation' and 'de-institutionalisation' are the key words. Such local activity would provide the seed-bed for a local culture to emerge once again. The role of the state and local government in all this would be as 'enablers' rather than forcing change from top-down. An important catalyst for the change would be local societies, on the model of the folk-movements which were very active in the interwar period in Sweden.

Henriksson is aware of the problems with this strategy. He makes it clear that it is very long-term and will take a long time to show results. He is also aware of the fears it may engender and discusses some of the problems that might occur: that many people might not want to shorten their working day in order to do care-work locally; that sexual inequalities will increase as women do most of the care-work while men work even harder on their careers; that social divisions between rich and poor areas will increase, and so on. But none of these are seen as reasons for not trying. Rather, it is necessary to push ahead without a centralised plan and meet problems as they arise.

Two Reservations

For a public report, *Not For Sale* shows extraordinary insight and vision. But I have two major reservations. The first is that I am not convinced it is possible to graft an effective local society onto modern industrialism. The tensions between the two would surely lead to one or the other becoming dominant. Can we both have our cake and eat it? If a local society really did work, who would be left to man the factories and workplaces of the commercial sector? And who would produce? Would the monstrous medical system, with its chemicals and carving-knives, gradually disappear as people re-learned to heal themselves and keep themselves whole? Would the whole apparatus of state control gradually fall into decay?

My feeling is that the two systems are incompatible in the long-term. Just as a society which expands production every year is untenable over the centuries, so Henriksson's compromise solution can be nothing more than a transition from modern society to a simpler society. Yet perhaps it is precisely this transition which we should be searching for. For how otherwise can a truly human society be gained? In this sense, this book confronts us with some of the central questions which our own and coming generations must address.

My second reservation is more fundamental. What I found lacking in the entire discussion was any awareness of the need

for any spiritual renewal. The book remains entirely on the material plane. Yet, surely, spiritual awareness and growth must underly any attempt to change society. Otherwise we have no guarantee that empty commercial consumption will not creep back into our lives. After all, industrial society was only allowed to emerge in the first place because enough people were seduced into believing that if their material hunger could be sated they would then be truly happy. And modern society can only continue in its present form because so many people still believe that to be true. Transformation must thus begin within each of us.

But having said all this, *Not For Sale* is an important book which crystallizes many intuitive feelings into thoughts. It points to one possible way forward out of the mess which we have got ourselves into. It forces me to ask myself how I personally should contribute to the change that is desperately needed. Should we abandon mainstream society and build alternative communities; or is there another way, through helping to change existing communities, however difficult and unpromising this might at first appear? This book provides a convincing critique of commercialism and suggests one way forward. It is a hard way, but one that, perhaps, we might seriously consider.

Jim Kemeny

Jim Kemeny is based at The National Swedish Institute for Building Research

Green Escapism?

CONSERVATION IN THE HOME by Michael Allaby, Unwin/Hyman, London, 1988, £7.95

The environmentally-concerned householder, hoping for a 'Which'-type guide to the products he uses, is in for many a shock if he opens this book. He will discover that, according to Mr. Allaby, "...the risk to the public from nuclear power generation, even allowing for the Chernobyl accident, is very small. . ." Small. . .but acceptable, Mr Allaby? When a meltdown could leave a sizeable area of the country uninhabitable for years to come? So out of touch is this book that it might have been published ten years ago. Everybody, for example, knows that CFCs are causing a hole in the ozone layer, apart that is from Mr Allaby who concludes, in a minority of one, "but so far there is little hard evidence of any

real risk." Similarly, when we have all been informed about the dangers to certain skin types of a sun-induced melanoma, it is strange to read that, according to Allaby, "prolonged sunbathing can cause a mild, non-malignant form of skin cancer."

"Some 'health foods' are of doubtful quality," announces Mr Allaby sternly. On the other hand, "The safety of additives used by the food industry is subject to rigorous scrutiny." So proud of their work are they, one might add, that they seek to prevent us from knowing what goes into even a loaf of bread. But Mr Allaby is all in favour of modern methods of food production. "Hormone growth promoters were investigated very thoroughly by independent scientists who found they presented no risk whatever to human health." Weren't they the ones banned by those dirty foreigners in the EEC who thought the hormones would give us enlarged genitals with matching breasts? Not to worry, says our conservation guide, "They are implanted in the ear, which is not eaten. . ." Huh? You mean if the animal swallowed poison and we didn't eat its mouth. . .?

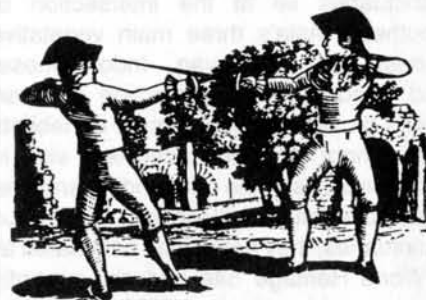
There is much more to quarrel with; the pathetic section on wood (no mention of rainforest timber to be avoided), a peculiar attitude to vegetable gardening ("the main disadvantages are economic and aesthetic"), the author's robust message that all will be well if we live in a bungalow

("Never mind your fears about pesticides, nuclear power stations or food additives; the stairs are likely to get you before any of the supposed risks of modern life") but I will end on a stylistic note. How sad that Kenneth Robinson will not be reviewing this wrong-headed book on *Start the Week*. One can so easily imagine that aggrieved, heavily-sarcastic voice intoning, "We learn from Mr Allaby that "Sheep are raised for meat and wool", that "Feet and moving air are constantly carrying material from outside the house to inside", and that "When British ants come indoors they are usually looking for food". . . whereas American ants are presumably on a package holiday.

It would appear from the blurb on the dust-jacket that Mr. Allaby is proud of his former association as an editor of *The Ecologist*. I can only suggest that he looks up a few back numbers of the magazine to refresh his memory as to the real dangers facing the individual and the environment.

Joe Potts

Joe Potts is a freelance writer with an interest in environmental issues.



Letters

Nam Choan Threat

Dear Sir,

As you know, by opposing the Nam Choan Dam in Thailand (*The Ecologist*, Vol. 17, No. 6), you helped save the Thung Yai Narasuan and Huay Kha Kaeng Wildlife Sanctuaries, which together form the single largest tract of protected primary forest in mainland Southeast Asia, from destruction. What you probably did not know is that they were saved to be logged. For 480 square kilometers of the Huay Kha Kaeng Wildlife Sanctuary are to be logged by the Thai Plywood Company.

The legal claims of the Thai Plywood Co. are somewhat complicated. In 1973, the Huay Kha Kaeng Sanctuary was established next to a pre-existing forest concession owned by the Thai Plywood Co. Several years later, the Forest Department persuaded the Thai Plywood Co. to relinquish its claim to 944 square kilometers of the concession bordering the wildlife sanctuary in exchange for a forest concession elsewhere. This was formalised in 1986 by a Royal Decree increasing the size of the sanctuary to 2,575 square kilometers. As of December 1987, however, a new interpretation of the Wildlife Sanctuaries Law was ratified by the cabinet. It states that land which has been turned over to private ownership cannot be incorporated into a wildlife sanctuary.

Armed with this interpretation of the Wildlife Sanctuaries Law, the Thai Plywood Co. has asked for its 944 square kilometers of virgin forest to be returned. Unable to compensate the Plywood Co. for its original donation to the sanctuary, the Royal Forest Department has struck a compromise. It will allow the Plywood Co. to log 480 square kilometers, a little over half of the disputed area.

The integrity of the most diverse primary forest in mainland Southeast Asia is at stake. According to Ann Danaiya Usher (*Bangkok Post*, March 1988), the



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WORTH WATCHING

Huay Kha Kaeng and Thung Yai Narasuan Sanctuaries lie at the intersection of Southeast Asia's three main vegetative zones: Sino-Himalayan, Indo-Chinese, and Sundaic. The intersection of these zones provides a unique array of habitats that cannot be found anywhere else in Asia. Because of the outstanding and irreplaceable value of these two contiguous sanctuaries, they have been nominated as a World Heritage Site and are currently under consideration by UNESCO.

The Huay Kha Kaeng Sanctuary is of tremendous ecological value in its own right. With a range in elevation of 1,300 metres, the sanctuary contains six distinct forest types: deciduous riverine forest, monsoon evergreen forest, hill evergreen forest, dry evergreen forest, dry dipterocarp forest, and bamboo forest. Within the sanctuaries' borders, 477 species of animals have been identified. Four of these species are close to extinction and 53 are endangered.

The area to be logged under the Forest Department's compromise is nearly 20 per cent of the Huay Kha Kaeng Sanctuary. This represents a major threat to many animal species. Logging roads will cut across the seasonal migratory routes of elephants, Indian bison, and banteng exposing them to poachers and other hazards. Several species of great hornbills are especially endangered by logging in this area due to the current scarcity of trees suitable for nesting. In particular, the red throated hornbill is close to extinction. This part of the reserve is also an important habitat for the rare forest buffalo and the Thai peacock, two species which can no longer be found in any other part of Thailand. Furthermore, there is no reason to believe that the destruction will be limited to 480 square kilometers. As has been the case in Thailand time and time again, once logging roads are cut into a forested area it rapidly becomes deforested by illegal logging and the influx of settlers.

The Forestry Department's compromise has provoked a vociferous outcry among Thai conservationists and intellectuals alike. They have been quick to point out that the Thai Plywood Co. is a state enterprise under the Ministry of Agriculture (the same Ministry that the Forest Department is under). As a state enterprise, it is subject to the current Five Year Economic and Social Development Plan which explicitly states that 15 per cent of the area of Thailand is to be set aside as protected forests. If anything the area of protected forest needs to be increased not decreased.

Now is the time to act! The nascent Thai conservation movement needs all the help it can get. For more information contact: The Project for Ecological Recovery, 1705 Rama IV Rd., Bangkok 10500, Thailand (Tel 252-5940). Letters opposing the logging in the Huay Kha Kaeng Sanctuary can

be sent to:

Mr Udorn Tantisuntorn, Deputy Minister of Agriculture and Co-operatives, Rajdamnoen Nok Road, Bangkok 10200, Thailand.

Lt Col. Sanan Kojornprasarn, Minister of Agriculture and Co-operatives, Rajdamnoen Nok Road, Bangkok 10200, Thailand.

Prime Minister Chatichai Choonhavan, Government House, Nakorn Pathom Road, Bangkok 10300, Thailand.

Yours faithfully
Daniel K Guyot
New Jersey
USA

Mechanistic? Or Misunderstood?

Dear Sir,

I was somewhat dismayed, if not shocked, to read Lorna Salzman's letter to you (Vol 18, Nos 2/3) in which she accused me of "mechanistic reductionism" in my recent article 'From Fragmentation to Wholeness' (*The Ecologist* Vol 17 No 6; and Vol 18 No 1). Some labels are easier to bear than others, but this one is particularly unacceptable and shows a gross misunderstanding of my position. At best, I might be able to credit Ms Salzman with not having read Part 1 of my article (Vol 17) in which I argued a case *against* the mechanistic approach in science.

Ms Salzman says that "life is more than matter and energy" and I thoroughly agree with her. I never intended to give the impression that what we can learn from the New Physics can tell us anything about life as we perceive and experience it in the everyday macroscopic world. But where it is of crucial importance, and this applies especially to quantum theory, is in the extent to which it demonstrates the essentially *indeterministic* nature of sub-atomic reality.

What we have before us in such a reality, to paraphrase the points I made in my article, is atomic particles in a set of never-ending interconnected relationships with each other so that the parts become *indistinguishable* from the whole. Similarly ecology, especially its 'deep' version, by emphasising total interconnectedness in nature, reflects an indeterminism at the macroscopic level of reality corresponding to that of the sub-atomic world. If this principle of indeterminism is accepted, and it was the central argument in my article that it should be so, there can be no place for a mechanistic, reductionist science in which the focus of analysis is on the part rather than the whole.

Ms Salzman's critique of the 'atomistic view of physicists' is, I would contend,

directed primarily against Newtonian physics rather than quantum theory on which I have based my article. But her alternative scenario — that we should all embrace Darwinism — is to argue for an equally deterministic world in which human beings accept their fate with equanimity and resignation, a sure recipe for disaster on this beleaguered and devastated planet! Is she not guilty of a form of biological reductionism even more pernicious than the reductionism of which I am accused?

Yours faithfully
Alwyn Jones
Pontypridd, Wales

An End to Cartesianism

Dear Sir

I have just read Alwyn Jones' essays on fragmentation and wholeness. Both are outstanding. Their clear and simple presentation of some complex philosophical issues is laudable, but they are especially worthy for their emphasis on the unity of natural systems and the impossibility of analysing whole systems with Cartesian dichotomies.

I drew similar conclusions myself when I began to study ecological matters about five years ago, and I have tried to incorporate them in the ecological theory I was developing. Certain elements of Cartesian science, for example a constituent reductionism, are retained in this theory; but its thrust also embodies some of the philosophical underpinnings for which his essay argues.

I recently presented a paper on this subject to the annual meetings of the American Sociological Association. The paper was well received by some but vigorously criticised by others who dismissed Deep Ecology as 'utopian'. Sad to say it seems that much of environmental sociology is 'shallow'.

Ironically, the native Indians of America, more than any other group of hunter-gatherers, gave expression in their religion and oratory to the idea of the unity of nature and mankind. It may be wishful thinking on my part, but I sense this idea may be gathering interest — even here, in a culture excessively affected by Cartesian thinking. I am optimistic that a change in world view may be starting. If nothing else, eventually a change shall be forced upon us by the sweep of ecological events.

Yours faithfully
Lee Freese
Washington State University,
USA

Classified

DIARY DATES AND COURSES

The Year of the Microscope 1989. Commemorative Meeting, 11 and 12 September 1989 at The Royal Institution, London. Details from: The Royal Microscopical Society, 37/38 St. Clements, Oxford OX4 1AJ (Tel: 0865 248768).

Professions for World Disarmament and Development are holding a conference on Saturday, March 18th 1989: Pathways to International Security. Venue: Royal Society of Medicine, Wimpole Street, London. Further details from: Dr Hugh Gordon, 1 North End, London NW3 7HH, Tel: 01-458 5316.

The Royal Society of Chemistry—Water Forum and the Industrial Water Society are holding a one-day symposium: Chemical Cleaning and Renovation of Water Systems. The meeting will take place at the University of Bristol on February 21st 1989. Please contact Sue Pipe, I.W.S. Secretariat, 1 Tolson's Mill, Lichfield Street, Fazeley, Tamworth, Staffs B78 3QB.

LOSEHILL HALL, Peak National Park Centre, offers a range of courses for all interested or involved in countryside conservation. For detailed prospectus of 1989 courses write to: Peter Townsend, Peak National Park Centre, Losehill Hall, Castleton, Derbyshire S30 2WB.

UNESCO SEMINAR on the integration of environmental concepts in university teaching. This seminar will take place in Brussels from June 7-10, 1989 under auspices of the Department of Human Ecology. Working language will be English and French. The seminar will be of interest to all ecologists and human ecologists. Details from: Dr L. Hens, Human Ecology, Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussel, Belgium.

THE CENTRE FOR PROFESSIONAL ADVANCEMENT is again holding various conferences and courses on subjects such as Evaporation Technology, Process Plant Start-

up, Good Design Parameters for Laboratories, Fundamentals of Biochemistry etc. Please contact the Center at Palestijnstraat 1, 1071 LC Amsterdam, The Netherlands.

CALL FOR PAPERS

INTERNATIONAL ASSOCIATION FOR IMPACT ASSESSMENT (IAIA)—1989 Meeting. This will take place at the Queen Elizabeth Hotel in Montreal, Quebec from June 24-28, 1989. Emphasis will be given to the need to develop local, national and international policies that aim for sustainable development, especially in Third World countries and the role and potential of impact assessment in meeting this imperative. Please submit a 150 word abstract as soon as possible to: Dr Victor Goldbloom, Programme Chair IAIA 1989. Bureau d'audiences publiques sur l'environnement, Gouvernement du Quebec, 5199 rue Sherbrooke est. bureau 3860, Montreal, Quebec, Canada H1T 3X9, Tel: (514) 873-7790; Fax (514) 873-5662.

Wageningen

Agricultural University

INTERNATIONAL CONGRESS 'FUTURE OF BUTTERFLIES IN EUROPE: Strategies for Survival' Wageningen, The Netherlands, April 1989.

An international congress on the conservation of butterflies in Europe will be held in Wageningen, The Netherlands, from 12 to 15 April 1989.

The meeting will review the current knowledge on butterflies in order to set up a working programme for their conservation in Europe.

The planned themes are: The status of butterflies in Europe; Mapping; Population dynamics; Isolation; Monitoring; Management policy; Perspectives in conservation.

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MOUNTAINS SOUTH SPAIN. Enjoy a natural holiday with Benamonarda: rambling, hiking, naturalism, riding in small guided groups, March-Oct 1989. Wonderful scenery and wildlife. Accommodation in picturesque white villages, special vegetarian holiday in July. Brochure: Benamonarda, 6 Kipling Place, Eaton Ford, Cambs PE19 3RG. Tel: 0480 212540 or 0223 243765.



The congress is being organised by the Department of Nature Conservation of the Wageningen Agricultural University, in cooperation with the Dutch Butterfly Foundation and the Netherlands Entomological Society.

Requests for further details should be directed to the Congress Building, International Agricultural Centre, P O Box 88, 6700 AB Wageningen, The Netherlands.

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A PLANET IN CRISIS

As readers of *The Ecologist* will know better than most, our survival depends absolutely on the health of our environment. Unless we understand the complexities of the planetary environment and take care of it we cannot expect for long to enjoy clean air and water, food, shelter and the other essentials of life, to say nothing of the natural beauty that surrounds us in the infinite variety of Nature.

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