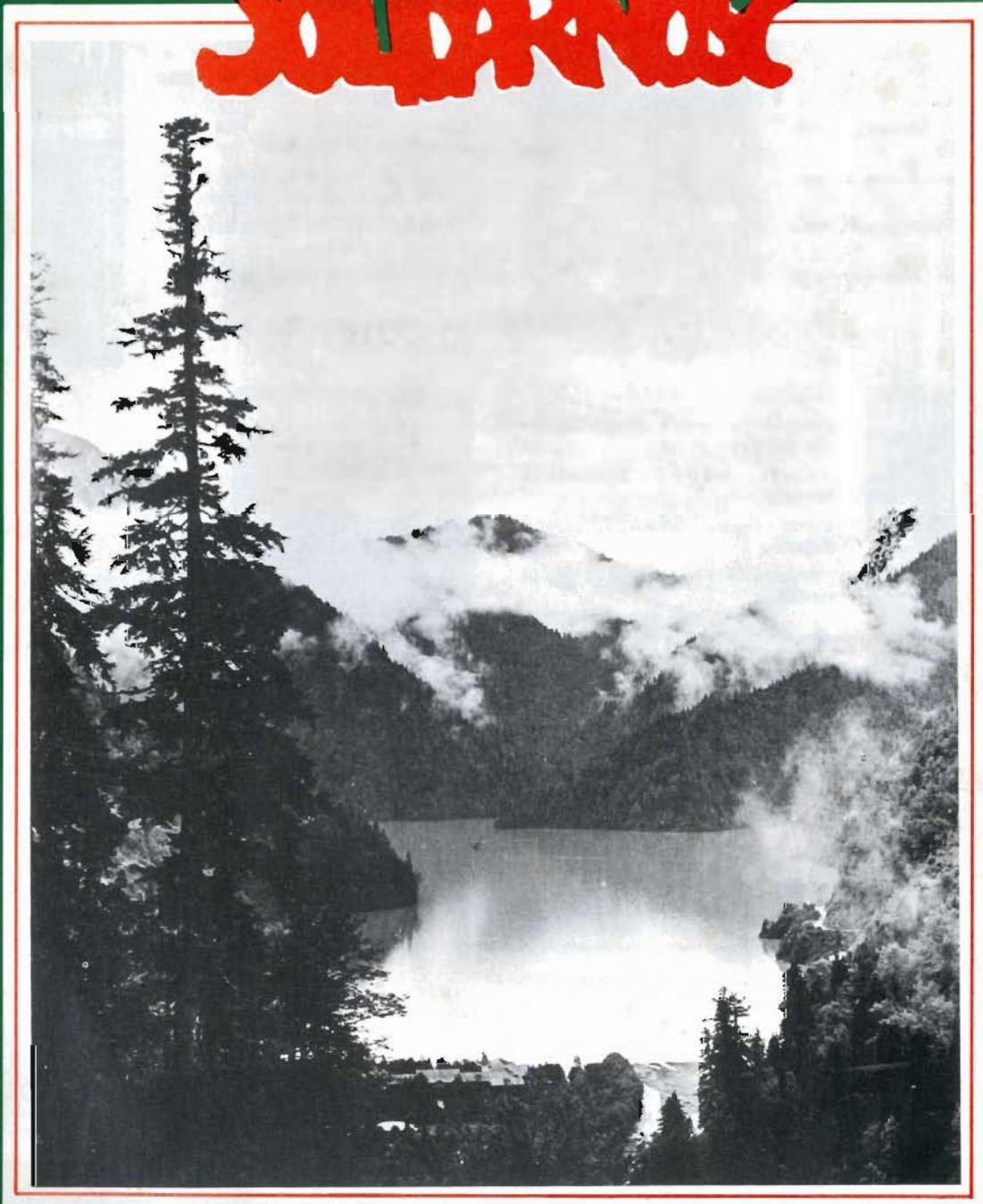


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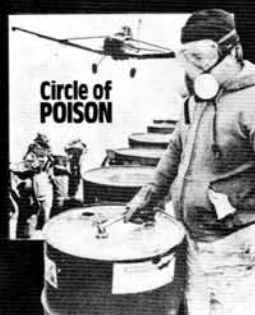
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## The Ecologist Journal of the Post Industrial Age

Published by: Ecosystems Ltd., Edward Goldsmith

Editors: Edward Goldsmith, Nicholas Hildyard, Peter Bunyard. Managing Editor: Maria Parsons.

Associate Editors: Robert Prescott-Allen, Brian Johnson, Bernard Gilbert, Jimo Omo-Fadaka, Andrew MacKillop, Robert Waller, Lawrence Hills, John Papworth, Nicholas Gould, Raymond Dasmann, Richard Wilson, John Milton (USA), Henryk Skolimowski (USA), Manfred Siebker, Sigmund Kvaloy (Norway), Wouter Van Dieren (Holland).

Editorial Department: Whitehay, Withiel, Bodmin, Cornwall, UK. Tel: Lanivet (020883) 237.

### Annual Subscriptions:

Ordinary Rate: £12.50 (US \$28.00) (Students £11.50)  
Institutional Rate (excluding schools): £18.00 (US \$36.00)  
Airmail Rate: £6.00 (US \$12.00) extra  
Special Rates for Members of the Ecology Party: £11.50

Subscriptions are payable to The Ecologist and sent to:  
The Ecologist, Subscription Department,  
Worthyvale Manor Farm, Camelford,  
Cornwall PL32 9TT. UK. Tel: (0840) 212711

The Ecologist Bankers: National Westminster Bank Ltd.,  
26 Molesworth Street,  
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### Contributions:

The editor welcomes contributions, which should be typed, double spaced, on one side of the paper only, and with generous margins. Contributions should be accompanied by black and white photographs, line drawings, and tables where appropriate.

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The Ecologist's International Serial Number is ISSN 0261-3131.

Printed by: Penwell Ltd., Parkwood,  
Dupath, Callington, Cornwall. UK.

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The Mobil Corporation is soon to build the world's first commercial synthetic petrol plant in New Zealand. The plant will convert natural gas from New Zealand's offshore Maui gas field into petrol—and the plan is backed to the hilt by the Government. Environmentalists argue that the plant is a grossly inefficient — and socially unacceptable— means of using the gas. Alternative processes are more efficient, cheaper and less polluting. Such arguments, however, have been ignored rather than rebutted. The Government's intransigence has less to do with clear thinking than political opportunism.
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The Polish independent trade-union, Solidarity, did much to highlight the extent of environmental destruction in Poland. The union clearly recognised that the solution to the nation's problems lay in a reorganisation of Polish society — not just in a better system of economic or environmental management. To that end, Solidarity argued for a dramatic shift in moral values. But whilst the Union took on board many ecological ideas, it never embraced fully the 'ecological ethic'.

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## Richard St Barbe Baker: A Tribute

Richard St. Barbe Baker will always be known as 'The Man of the Trees'. In Kenya, where he was assistant conservator of forests for many years, he was known as Baba Wya Miti, 'The affectionate Father of the Trees', also as Bwana Wya Miti, 'The Master of the Trees'. In Australia, he was often referred to as the 'King of the Trees' and sometimes as 'The Saint of the Trees'; in California, he has been called 'The Redwood Saint'.

I like to think of St. Barbe as a prophet, in the Old Testament sense of the term; that is to say, as a wise man, a teacher and an inspirer. Alan Grainger writes of "St. Barbe's unique capacity to pass on his enthusiasm to others". "Many foresters all over the world", says Grainger, "found their vocations as a result of hearing 'The Man of the Trees' speak. I certainly did, but his impact has been much wider than that. Through his global lecture tours, St. Barbe has made millions of people aware of the importance of trees and forests to our planet."

He has also done so, of course, via 'Men of the Trees', the association he founded in 1922 and which now has branches throughout the world.

St. Barbe besides being a wise man, a teacher and an inspirer, was a tireless fighter for the values and ideas that he held to be so important and on whose acceptance by the world at large, he felt sure, must ultimately hinge the fate of our planet and of all those who inhabit it. Those who have looked seriously at the problems that we and future generations must face realise that St. Barbe's values and ideas are quite as important as he made them out to be.

The *Global 2000* report to the last president of the United States, for instance, specifically concludes that, of all the problems we are faced with today, deforestation is probably the most serious, particularly in the developing countries.

St. Barbe realised this decades ago. In 1954, in *Land of Tane*, he writes: "When the trees go, the rain goes, the climate deteriorates, the water table sinks, the land erodes and desert conditions soon appear". What is more, this cannot go on forever. As St. Barbe always told us, "If a man loses one-third of his skin he dies; if a tree loses one-third of its bark, it too dies. If the Earth is a 'sentient being', would it not be reasonable to expect that if it loses one-third of its trees

and vegetable covering, it will also die?"

Government scientists in India, Bangladesh and Nepal have now admitted that the only way to stop the terrible floods that every year engulf tens of thousands of villages, drown large numbers of people and their cattle and destroy crops over an ever wider area, is to reafforest the denuded mountains of the Himalayas.

St. Barbe knew decades ago that global reafforestation was essential. He played a key role in persuading the American government during the great depression to set up its Conservation Corps, with its tens of thousands of otherwise unemployed youths going out into the countryside to plant trees and perform other essential tasks. Today, it is a new world-wide conservation corps that is required. In his book *Green Glory, Forests of the World*, he proposes "that all standing armies everywhere be used for the work of essential reafforestation". He repeated this proposal in *My Life, My Trees*; "If the armies of the world now numbering 22 million, could be redeployed in planting in the desert, in eight years a 100 million people could be rehabilitated and supplied with protein rich food, grown from virgin sand."

But such action, he realised, could not be successful unless we first obtained the full co-operation of local people everywhere. More so, it is they—rather than governments and international institutions—who should take the lead. In *The New Earth Charter*, he writes; "We believe in the innate intelligence of the villagers, the country men and the workers, that they should be allowed to manage their own affairs. We believe they will put into their work not merely their hands and their feet, but their brains and their hearts. Each can experience the transcendental joy of creation, and can earn immortality and bestow immortality."

It is for this reason that he was so impressed by the Chipko movement in the Himalayas. At the age of 91, he went there and took part in the struggle of the villagers to protect their forests. In a booklet he helped to write for the movement, he recounts how government foresters were sent to persuade the villagers to give up their struggle. The confrontation was recorded in one of the many folk songs of the Chipko movement.

In this particular song the forester asks:—  
 “What does the forest bear?”  
 and answers:  
 “Resin, timber and foreign exchange.”  
 To this the village women reply in chorus:—  
 “What does the forest bear?  
 Soil, water and pure air.  
 Soil, water and pure air  
 Are the basis of our life.”

We have here a confrontation between two conflicting world views. The one sees nature as but a source of commodities to be sold on the world market. The other sees nature as St. Barbe's ‘vast sentient being’ and, as the Chipko villagers put it, “the basis of our life”. The one reflects the ingenuity of science and technology. The other the wisdom that is only embodied (as Eugene Odum, the father of modern ecology, admits) in the culture of traditional peoples—the wisdom that itself reflects as St. Barbe would have put it, “The Divine Law and the Laws of Nature”, whose violation can only lead to destruction and annihilation.

“Almost everywhere in the world,” St. Barbe wrote, “man has been disregarding the Divine Law and the Laws of Nature, to his own undoing. In his pride, he has rampaged over the stage of the earth, forgetting that he is only one of the players put there to play his part in harmony and oneness with all living things.”

St. Barbe realised that to stop the destruction we must abandon our present goals and move our society on to a very different course. “Man has lost his way in the jungle of chemistry and engineering,” he writes in *Land of Tane*, “and will have to retrace his steps, however painful this may be. He will have to discover where he went wrong and make his peace with nature. In so doing, perhaps he may be able to recapture the rhythm of life and the love of the simple things of life, which will be an ever-unfolding joy to him.”

He realised too that if we did not do this soon it would be too late. In *The New Earth Charter*, he warned: “This generation may either be the last to exist in any semblance of a civilised world or that it will be the first to have the vision, the bearing and the greatness to say, ‘I will have nothing to do with this destruction of life, I will play no part in this devastation of the land, I am determined to live and work for peaceful construction for I am morally responsible for the world of today and the generations of tomorrow.’”

What is required is nothing short of a spiritual renewal, a new religious world view and one very much closer to that of our forest dwelling ancestors. To begin with, we must learn once again to regard Nature as ‘holy’, as a vast ‘sentient being’—a phrase that occurs again and again in St. Barbe's writings. St. Barbe undoubtedly saw nature in this way. “It is with a spirit of reverence that I approach God's creation—this beautiful Earth”, he wrote. “We may climb mountains or wander through field and forest, intoxicated by loveliness through the changing hours and seasons recorded by the length of shadows cast by the trees—and as we watch the pink, opalescent fingers of the dawn reaching up from beneath the dark horizon, so we wait for the sunrise of our awakening to the realisation of our kinship with the earth and all living things.”

To view Nature as a vast ‘sentient being’ is to see it as alive and imbued with a spirit or a soul, just as did



Richard St. Barbe Baker.

our tribal ancestors for hundreds of thousands of years. Today we tend to dismiss this view as archaic, crude or rudimentary, but why, as Theodore Rozsack wonders, “Should it be thought crude or rudimentary to find divinity brightly present in the world where others find only dead matter or an inferior order of being?”

Once we cease to see Nature in this way, once we desanctify it, it is in effect condemned. As Rozsack puts it, “The desacralized world is doomed to become an obstacle inviting conquest, a mere object. Like the animal or the slave who is understood to have no soul, it becomes a thing of subhuman status to be worked, used up, exploited”.

What was previously our home, our temple, the abode of our gods, and a source of poetic inspiration “becomes but a source of resin, timber and foreign exchange”.

Sadly, we must concede that such an attitude is fully consistent with the ethos of the great monotheistic religions of today.

The abstract deity that we worship is indifferent to the fate of the natural world and offers it no protection against our depredations.

St. Barbe was unquestionably an animist, though we all know of his attachment to the Baha'i faith and

to the Christianity of his youth. I actually posed the question to him on one of the three afternoons I spent with him in Auckland just before his departure on his final world tour. "Do you agree," I asked, "that we, in the ecological movement, must all be animists?" He answered, "Yes, that is why I so much admire the work of the people at Findhorn".

He also recited to me those lines by Stanton Coblentz on the spirits of the redwoods which those who knew him well must have heard many times:

I think that could the weary world but know  
Communion with these spirits breathing peace  
Strangely a veil would lift, a light would glow  
And the dark tumult of our lives would cease.

If the world is eventually moved by St. Barbe's inspiration and is converted by his teachings, if it adopts his strategies and eventually becomes imbued too with that animistic world view that he has preached, to what sort of world would this lead? St. Barbe described his utopia very clearly: "I picture village communities of the future living in valleys protected by sheltering trees on the high ground. They will have fruit and nut orchards and live free from disease and enjoy leisure, liberty and justice for all, living with a sense of their one-ness with the earth and with all living things."

This is a beautiful vision. Some may think it wildly unrealistic. I do not think so. I think, on the contrary, that it is a far more realistic goal than that towards

which present policies are supposed to be taking us. The vision of St. Barbe may or may not be realised—but it could be. The only obstacles to its realization are man-made ones. They are comparatively trivial.

The vision of Milton Friedmann and Herman Kahn—a vision which is implicit to the World View of Science, Technology and Industry—can only conceivably be realized if, as Paul Ehrlich puts it, "We start off by repealing the very laws of Biology and Ecology"—the laws of God as opposed to those of industrial man.

Ben Sira, author of the apocryphal book of *Ecclesiasticus* praised great teachers. "Their fame," he wrote, "shall eclipse the immediate triumph of kings and conquerors;" their bodily death "counts for nothing—indeed it should be celebrated since great ideas must live forever."

Of course it is difficult to agree that the death of St. Barbe counts for nothing. He was a unique figure whom we shall never replace. Nevertheless I feel sure that in death, as in life, he will continue to teach and to inspire us. It is up to us, his disciples and his friends to celebrate the life and work of Richard St. Barbe Baker. It is up to us too, to carry on the fight—as tirelessly as he did in the past; to assure that his vision is realized and that his ideas live forever.

Edward Goldsmith

## Why Save Trees? Why Plant Trees?

It is easy to leave the preservation of our environment to others, or to 'providence' isolated as many of us are behind our barricades of bricks and mortar, steel and concrete.

If you look out of your windows can you see any trees? If you can—reflect on how fortunate you are. Consider carefully how they give distinction and charm to the suburban avenue, civilise a jungle of urban concrete or provide a haven of rural calm in the city centre park—obvious? worth preserving? certainly, yet trees are being felled through lack of co-operation and the low priority accorded 'amenity'.

Why do we need trees? to make the world a more beautiful place? yes, of course, and to provide us with valuable timber BUT, every thinking person must look beyond this.

Trees literally hold the earth together with their network of roots, holding the soil and preventing the creation of deserts and dust bowls. They maintain a high water table (the level of water in the soil), by drawing up water through their roots, trunks and branches, using what they need for their own growth and giving off the surplus in the form of transpiration back to the soil, and of course

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# The Naked Experts

by  
Brian Martin

Department of Mathematics, Faculty of Science, ANU, Canberra

Experts — whatever their expertise — no longer enjoy the public's uncritical admiration of trust. Increasingly, their objectivity is questioned and there is a growing reluctance to accept that their often limited expertise either gives them a monopoly of the truth or the right to a more powerful voice in public affairs than any other member of the public. Some put this revolt down to a 'new irrationalism' in Western society. But are the experts themselves really to blame? Often using irrelevant or inaccurate arguments, they have frequently shown themselves to be ciphers of vested interests. Brian Martin discusses the record of Leslie Kemeny, Australia's most vociferous pro-nuclear 'expert' and asks: Why are the experts' clothes so threadbare?

Since the late 1960s, public trust in scientific experts has taken a severe battering in Western industrialised countries. This has caused soul-searching in many circles, not least within the scientific community itself, where considerable demoralisation has set in. Gone are the heady days of rapid exponential growth in funding for science, during which the public prestige of the profession was bolstered internally by the enthusiasm of youthful would-be scientists. This period, particularly the three decades since the beginning of World War II, has been succeeded by almost stationary funding, 'the switch from science' by students (including the best ones), and by public scepticism and even hostility. The scientists ask, what went wrong?

One answer has been given by those, such as Passmore, Ashby, Burhop and Shils, who diagnose a new irrationalism in Western society.<sup>1</sup> The 'youth culture' and 'counter-culture' of the late 1960s rejected many of the products of Western society and, such commentators argue, in doing so it also incorrectly rejected some of society's premises, including rationality. The evidence for this, it is claimed, lies not only in an increase in interest in mysticism and Eastern religious doctrines, but also in 'unthinking' opposition to developments such as fluoridation, artificial fertilisers and food additives, modern medicine and the peaceful uses of nuclear technology.

This interpretation by the critics of 'anti-science' is flattering to scientists and others supporting what is conceived as technological 'progress', but on closer inspection the culprit—'anti-science'—is hard to identify, much less convict. While it is true that some people read astrology columns, visit naturopaths and meditate, it has yet to be shown that any major change to habits of this sort has occurred or, if it has, that this change is linked to attitudes about orthodox science. Even amongst those who seldom come in contact with the 'alternative culture', and years after this culture was the focus of media attention, trust in scientific experts is as low as ever.

Secondly, the critics of anti-science have a hard time identifying their opponents, aside from the often criticised Theodore Roszak.<sup>2</sup> A belief in the potency of

anti-science would be more persuasive if a few more people could be identified who clearly subscribed to it. Finally, the critics of anti-science completely overlook the political critique of science, which is coherent, organised and readily identifiable.<sup>3</sup> These points suggest that the focus on 'anti-science' obscures rather than clarifies the reasons for public distrust in scientific experts.

## Scientists or Publicists?

The interpretation outlined here is based more on the rationality of the public and less on the rationality of science and scientists. In the two decades after the end of World War II, citizen protest movements in the West were weak, in particular because of the Cold War, which allowed dissidents of any kind to be labelled as subversive, and because of continued economic growth, which muted discontent. During this time the scientific community became to a large extent incorporated into the government/industrial/military complex.<sup>4</sup> Many scientific experts became almost by definition defenders of their patrons in government or industry. But for the most part, the scientists who defended the established institutions did not need to take their case to the public, since there was little public opposition to the policies, practices and products of these institutions.

This picture is a familiar one but, of course, it is not complete. Opposition to official US nuclear weapons policy developed among nuclear scientists in 1945 and persisted, flaring especially during the debate over atmospheric testing.<sup>5</sup> Rachel Carson's *Silent Spring* sparked public concern over pesticides in the early 1960s, a concern which had been brewing within the scientific community for a number of years.<sup>6</sup>

The late 1960s brought an upsurge of public discontent over the direction of social development, following the easing of the Cold War and the expansion of the South-East Asian War. One feature of this re-emergence of social protest was a questioning of technological developments such as pesticides and supersonic transports, and a questioning of institutions such as education, medicine and the military.

In response to public criticisms of established policies and practices, a certain fraction of the normally cloistered experts entered the public debates over war planning, nuclear radiation, IQ and the like. And when this happened, public trust in experts plummeted because, I would argue, the public saw that all too often the experts had no clothes.<sup>7</sup> The experts in the public debate—or at least a sufficient fraction of them—were seen to have irrelevant and inaccurate arguments, to behave more like publicists than ‘objective scientists’, to reflect the influence of vested interests, and to be truly expert only in areas irrelevant to the real issues—which in most cases were social and political rather than technical. Indeed, far from being irrational, the public *correctly* perceived the failure of the experts to live up to the image they had fostered. Also aiding this process was the emergence of ‘counter-experts’ who argued cases contrary to those supporting the positions of the established institutions, and who were seen to be at least as credible as the experts.

Needless to say, the attitude of ‘the public’ is more complicated than this outline would suggest: my point here is that much of the growing public distrust of experts is well grounded. This is not to suggest that experts have anything but the best of intentions (‘All persons believe in their own virtue’—Parenti<sup>8</sup>). It is for each person to decide whether to trust or distrust a particular expert. Nor is my purpose to condemn experts in general: rather it is to bring into discussion some of the problems in trusting them blindly. The experts are not hesitant to point out their own strengths: it is up to others to point out their limitations.<sup>9</sup>

#### **An Expert in Action: the Case of Leslie G. Kemeny**

From about 1976 onwards, Mr Leslie G. Kemeny has been one of the most active of the scientists and engineers who have supported nuclear power in the Australian public debate over uranium mining and nuclear power. He has written numerous articles in magazines and newspapers and letters to newspapers and given numerous talks, all supporting the case for nuclear power. By my assessment, Kemeny has been one of the four most prolific public advocates of nuclear power in Australia, the others being Sir Philip Baxter, Sir Ernest Titterton and Mr John Grover.

During the time of his participation in the public debate, Kemeny has been Lecturer and (since 1977) Senior Lecturer in the School of Nuclear Engineering at the University of New South Wales. His record of experience is not unimpressive. He graduated in mechanical and electrical engineering from the University of Sydney; was a design engineer with the Electricity Commission of New South Wales; won a Metropolitan Vickers Overseas Exhibition in 1955; was on the design team for the Berkeley nuclear power station in the UK; held a Harwell research fellowship; held a lectureship at the University of London; has consulted on nuclear marine propulsion and nuclear desalination; has attended numerous international conferences on nuclear topics as an Australian representative; and has travelled extensively in Europe, North America, Japan, China and South-East Asia studying resource and energy, as well as nuclear, developments.<sup>10</sup>

Because of his high activity in the public debate as a self-declared pro-nuclear expert, and because of his

ostensible qualifications to play this role, Kemeny’s pro-nuclear writings\* provide a suitable basis for assessing whether his public activity as an expert is likely to inspire public trust in pro-nuclear expertise.

#### **The Range of Kemeny’s Arguments**

Most of Kemeny’s writings are composed of one or more of three components: a recitation of existing nuclear developments; statements that the hazards of nuclear power are very low; and criticisms of opponents of nuclear power. But do his writings stand up as a cogent argument? Does he answer the criticisms of the anti-nuclear movement? To answer those questions, it is worth examining Kemeny’s treatment of the major issues raised by the anti-nuclear movement in Australia, and asking, in relation to each, whether Kemeny treats the issue at all; and, if so, whether he responds to the anti-nuclear case. Here is my brief assessment.<sup>11</sup>

##### **1. Environmental Hazards arising from the Nuclear Fuel Cycle.**

Kemeny devotes considerable space to presenting the pro-nuclear case regarding hazards. Thus, he states that the risks from nuclear power are less than the accepted risks of daily life; that the nuclear fuel cycle is 200 times safer than coal; that radioactive waste disposal is not a problem; and that no member of the public has been hurt through the nuclear fuel cycle. But Kemeny seldom replies to the counter-arguments. For example, he has never\*\* mentioned nor replied to an Australian comparison which indicates that, within large ranges of uncertainty, the risks to human life and health from the generation of electricity from nuclear and coal cycles are comparable.<sup>12</sup> Nor, for example, has he mentioned—when asserting that total radioactivity is *reduced* by the nuclear fuel cycle<sup>13</sup> that the radioactive isotopes generated by the nuclear fuel cycle are both more toxic and less well contained than are the products of unmined uranium ores.

In addition, in making comparisons between nuclear and other hazards, Kemeny uses several techniques which tend to show nuclear power in a favourable light<sup>14</sup>—never mentioning, for example, the unique characteristics of nuclear hazards such as the enormous scale of devastation possible from a military attack on a nuclear power plant or reprocessing plant.

In summary, Kemeny makes many statements about what he considers to be the low level of hazard from the nuclear fuel cycle, but seldom replies to arguments raised by opponents of nuclear power about what they regard as the major health hazards. For those who follow the debate, Kemeny’s arguments about risks are less than comprehensive.

##### **2. Proliferation of nuclear weapons capabilities via expansion of the nuclear power industry.**

Proliferation is seen by many people as the central hazard arising from the spread of nuclear technology.<sup>15</sup>

\* Written views rather than speeches or radio interviews are used here because of their accessibility and reliability as a record of considered views.

\*\* In this and later similar contexts, it is assumed that universals such as ‘never’, ‘not’ and ‘only’ are qualified by ‘to my knowledge’. A full list of articles and letters by Kemeny consulted for this analysis is available from the author, Department of Mathematics, Faculty of Science, Australian National University, Canberra ACT 2600, Australia.

Kemeny has not responded to these concerns in any detail, but rather has made a number of bald assertions in the few paragraphs he occasionally devotes to proliferation. For example, he asserts that 'Thermonuclear bombs can be built without the use of commercial power reactors and that whether mankind has 200 or 2000 nuclear power stations by the year 2000 will have little effect on the world's nuclear arsenals'.<sup>16</sup> No more detailed justification is given. Elsewhere he claims: 'A world short of energy would be a far more dangerous (place) to live in than one in which energy costs are stabilised and environmental pollution minimised by the use of a very good, energy dense fuel, uranium.'<sup>17</sup> Hence, he argues, 'The danger to mankind from the world's nuclear armouries will not be increased but lessened by the spread of peaceful nuclear technology.'<sup>18</sup> Again, no further argument or evidence is offered to support this contention. In summary, Kemeny seldom mentions the proliferation issue, makes exceptional claims with no supporting arguments or evidence, and does not respond to anti-nuclear arguments.

### 3. Political and social threats and restraints of a nuclear society (terrorism, reduction in civil liberties, centralised political and economic power).

The longest treatment by Kemeny of any of these issues is two paragraphs<sup>19</sup> in which he says that 'these phenomena (the police state and international terrorism) already exist and have no real connection with any future regulatory treaties or policies associated with nuclear fuels' and that a terrorist 'could find easier methods safer to him or her than by attempting to steal a few kilograms of plutonium'. By providing no further argument or evidence, it is clear that Kemeny fails to come to grips with the issues or the anti-nuclear arguments.

### 4. Economic and employment disadvantages of nuclear power.

In a few articles,<sup>20</sup> Kemeny reproduces figures taken from other sources showing the alleged lower economic cost of nuclear power for producing electricity compared to coal and oil. He has never mentioned, nor commented upon, the numerous critical examinations of the economics of nuclear power—those, for example, by Bupp and Derian, Sweet and Jeffery.<sup>21</sup> On a couple of occasions he has mentioned the number of Australian jobs that might be generated by uranium mining, but has never dealt with the argument that investment in other industries could produce several times as many jobs as investment in uranium mining.

### 5. Impact of uranium mining on Aboriginal culture.

This issue, a key one in the minds of many Australian people, has not been mentioned by Kemeny in his writings.

### 6. Inadequacy of nuclear power as a solution to energy problems.

The arguments against nuclear power—that it currently provides only about 2 per cent of world primary energy and so is not yet essential; that it provides only base-load electricity and not low cost liquid fuel (the shortage of which is the only real energy 'crisis'); and that massive nuclear power programmes to satisfy ever-growing energy use may be unfeasible due to shortages of capital and the long



Anti-uranium demonstration in Brisbane, 1977. There were 400 arrests. Kemeny is adamant that the anti-nuclear movement is funded by powerful right-wing interests and should be 'recognised for what it is — anti-working class activism aimed at maintaining the last 'status quo' for a fortunate minority'. He gives no evidence to back these claims. Ironically, in Europe and the USA, the anti-nuclear movement is often branded as a tool of East European interests.

times between planning and completing nuclear facilities—are not mentioned by Kemeny.

### 7. Advantages of a 'soft energy path' based around conservation and renewable energy technologies.

This is the one area in which Kemeny appears to address issues raised by opponents of nuclear power, in an October 1981 article in *Quadrant*.<sup>22</sup> Prior to this, the few paragraphs he devoted to conservation and renewable energy technologies<sup>23</sup> were simply dismissive: 'Science is many decades away from being able to harness an infinite, cheap, non-polluting supply of energy from any of these sources (sun, wind and tide)'.<sup>24</sup> No substantiation was given for the statement.

In his *Quadrant* article, 'Alternative energy: the myth and the reality'<sup>25</sup>, Kemeny states that the effectiveness of solar technology is increasingly questioned; that all solar technologies may be net consumers of energy; that many solar demonstration plants have been failures; and that solar energy 'would represent the greatest drain on the earth's heavy metal and raw materials of any technology yet devised by man'.<sup>25</sup>

Kemeny does not come to grips with any of the comprehensive scenarios for a 'soft energy future'.<sup>26</sup> Nor does he treat, in his October 1981 article, the role of conservation, which he had dismissed in earlier comments. Furthermore, the accuracy of several of his claims about solar technology can be questioned. In summary, in most of his writings Kemeny makes at most a few unsubstantiated statements about conservation and renewable energy technologies, while in one

article he appears to address a number of claims about 'alternative energy'.

### How Relevant are Kemeny's Arguments?

Roughly one third of Kemeny's writings are simply glowing accounts of the extent of nuclear developments around the world. The clear implication of this material is that investments in nuclear power demonstrate its benefits and superiority: 'The only alternative is nuclear power for at least the next 50 years. And 39 countries on both sides of the Iron Curtain—the 19 of which have it and another 20 which have decided to use it—all agree'.<sup>27</sup>

That this does not constitute an argument for nuclear power is clear: just because many countries have nuclear power does not necessarily make it a good thing, any more than the prevalence of smoking, gambling or nuclear weapons justifies their existence. In essence, Kemeny slurs together the concepts of investment, necessary investment and beneficial investment: 'The facts of nuclear electricity generation in overseas countries . . . provide a positive and stimulating contrast to the negative statements so often heard. Australia's trading partners have no alternative but to move steadily ahead with their nuclear programmes'.<sup>28</sup> For anyone who is able to distinguish these concepts, Kemeny's portrayal of nuclear developments will read more like public relations than like scientific argument.

Kemeny's glowing accounts of the development of nuclear power around the world are also potentially misleading. When he says (or implies) that 'countries' agree that nuclear power is the 'only alternative', he glosses over the distinction between different parts of society, in particular governments and citizens. While it is true that many governments or their agencies have supported nuclear power, it is equally true that there has developed strong citizen-based opposition to nuclear power in virtually every part of the world where this opposition is allowed.<sup>29</sup>

### And How Accurate?

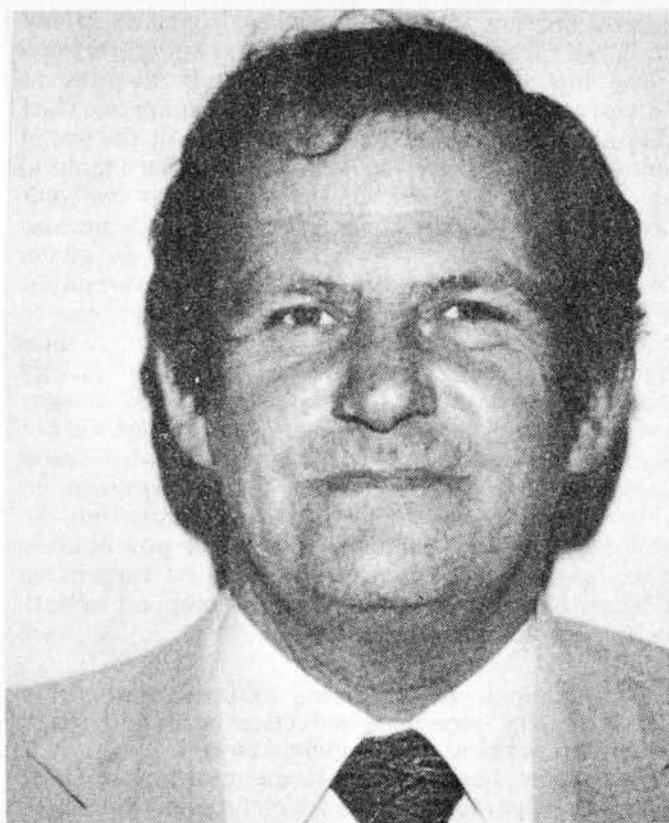
Experts are expected to be accurate in their statements, and to acknowledge and correct any inaccurate statements. How do Kemeny's statements stand up on this basis?

First, the bulk of Kemeny's writings for the public debate are not technical material relevant to the nuclear debate, but are accounts of growing nuclear programmes, attacks on opponents of nuclear power, and general pro-nuclear statements. Hence there are relatively few technical statements to evaluate concerning the issues central to the debate.

Second, Kemeny provides very few references in any of his articles. It is often difficult to challenge data presented from unknown sources. The very lack of references will reduce the credibility of Kemeny's statements for some readers.

Third, Kemeny has made some mistakes which he has been slow to acknowledge. Concerning the bomb survivors in Hiroshima, he has stated: 'Despite the tragedy of 1946, international experts in radiation biology and genetics have not found an incidence of genetic malformation, cancer or leukemia amongst these people above that of the national average'.<sup>30</sup>

The evidence is not sufficient to determine whether or not radiation exposure from the 1945 nuclear weapon explosion has increased the rate of genetic



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defects, but the evidence is incontrovertible that cancer and leukemia rates have increased substantially, as pointed out by Diesendorf.<sup>31</sup>

In his reply to Diesendorf, Kemeny does not correct his mistake (aside from his use of the year 1946 instead of 1945) but instead says:

'Within the limits of uncertainty associated with medical diagnostics nothing in this report ('The Delayed Effects of Radiation Exposure Among Atomic Bomb Survivors, Hiroshima and Nagasaki, 1945-1979') and the many others dealing with the issue ('the radiobiology of high level radiation') which I have on file, changes the veracity of the third paragraph of my (article) which relates to the first and second generation progeny of the Hiroshima survivors.'<sup>32</sup>

As noted above, Kemeny's original error was about cancer and leukemia rates, but he has responded as if the only question concerned genetic effects. Furthermore, the third paragraph to which Kemeny refers is completely irrelevant to the issue.\*\*\* In analysing Kemeny's response, Sibatani concludes: 'In fact Kemeny failed to contradict the charge made by Diesendorf but successfully obscured the issue by his rhetoric'.<sup>33</sup>

Similar cases can be found elsewhere in Kemeny's writings. Thus, Kemeny<sup>34</sup> referred to a talk by a solar energy expert, Edward Lumsdaine of the University of Tennessee, citing statements critical of solar energy out of context and giving the impression that Lumsdaine opposed solar energy. Lumsdaine replied that he took 'strong exception to the impression that

\*\*\* In fact, most of the highly visible advocates of nuclear power in Australia fall into one of three categories: nuclear scientists and engineers; people working for uranium mining companies; and politicians (Martin 1980: 14-19).

(Kemeny's) comments create about my position and the lecture', which Lumsdaine said was 'a call for energy conservation and sensible use of energy whether it is solar or from other sources'. Lumsdaine also said that he was 'saddened to see that people with special causes attempt to capitalise on these remarks'.<sup>35</sup> Yet Kemeny later continued to cite the Lumsdaine statements in the same manner.<sup>36</sup>

In his article about 'Alternative energy', Kemeny stated; 'The cost is enormous and the quantity of manufactured materials used may ensure that all devices based on solar energy—water heaters, air conditioners, power towers, windmills, photovoltaic units and biomass fuels—will be net consumers of energy'.<sup>37</sup> For this statement he provides no references or calculations, and fails to cite the long-available and overwhelming evidence that his statement is wrong for most of the solar technologies he has listed. For example, a large wind generator will generate the energy required for its original construction in 6 to 12 months of operation<sup>38</sup> (NE 1977; ETSU 1977). When challenged on this point,<sup>39</sup> Kemeny failed to provide any substantiation of his original statement.<sup>40</sup>

In these and other cases, Kemeny's inaccuracy and his lack of acknowledgement of errors are at variance with normal expectations for an expert.

### Attacks on Opponents

A large fraction of Kemeny's writings on nuclear power are taken up with attacks on the motivations and credibility of opponents of nuclear power. A few examples out of many should illustrate this point:

□ 'The anti-nuclear initiatives of prejudiced pressure groups, thriving on half-truths and innuendos, are being used to scare an ill-informed public';<sup>41</sup>

□ 'The clearly defined scientific issues are lost sight of, or deliberately clouded over, by political activists, pseudo-environmentalists and emotionally motivated malcontents';<sup>42</sup>

□ 'The anti-nuclear movement must be recognised for what it really is—anti-working class activism aimed at maintaining the last "status quo" for a fortunate minority';<sup>43</sup>

□ 'Mr. Robotham is clutching at straws with the usual emotional approach of the anti-nuclear lobby';<sup>44</sup>

□ 'The dedicated anti-technology intellectual is contradictory and parasitic';<sup>45</sup>

□ 'The anti-nuclear "silly season" is on again. Australia swarms with imported, articulate but ignorant opponents of uranium mining and peaceful nuclear energy'.<sup>46</sup>

Kemeny makes little attempt to document such statements; apparently disagreement with the pro-nuclear stance is sufficient to warrant these sorts of attacks. Contrary to Kemeny's statements, an investigation of the anti-nuclear movement will show the presence of a wide range of people, including many members of the working class and of the scientific community.<sup>29</sup> Nor has Kemeny shown any evidence that the anti-nuclear movement is, as he has claimed, is, 'supported by immense funds from affluent right-wing interests'.<sup>47</sup>

While attacks on the motivations and personal credibility of scientists are more common within the scientific community than usually acknowledged, such attacks are usually seen by scientists and public alike as lapses from the scholarly behaviour that might be expected of objective experts. The large amount of

space devoted by Kemeny to attacks on opponents; the discrepancy between his assessments of opponents and the assessments of these people by many who personally know them; and the lack of backing for his statements; cannot help but be seen as a strong divergence from what is normally considered the appropriate behaviour for an expert.

### Vested Interest

It has been noted that public advocates of nuclear power are especially likely to include those who have a direct financial interest in nuclear power (such as uranium mining company executives) and those in careers which are likely to be benefited or justified by the expansion of nuclear research.<sup>48</sup> Kemeny clearly fits into the latter category.\*\*\*\* (Note that this says nothing about the motivations of advocates of nuclear power.)

Experts can lose credibility if they appear to have some financial or career stake in the issues on which they pronounce, since they are in a situation of conflicting interests: to 'objectivity' and to a particular stance on the issue.<sup>49</sup> Kemeny never hides his position in nuclear engineering, so readers are never in doubt about the possibility of a conflict of interest.

### The Relevance of Expertise

Although experts often come forth or are brought forth to support particular policies, practices or positions, on many occasions their expertise is irrelevant to the issue at hand. Kemeny's technical expertise—reflected in his training and technical experience—is mainly in engineering, in nuclear engineering in particular. The quality of this expertise is not readily determined except by other experts in the same discipline. But, in any case, it is not obvious that expertise in nuclear engineering has great relevance to the great bulk of issues raised by nuclear power—issues which are social, political, economic and ethical in nature. So while Kemeny has authored technical papers on 'Stochastic identification and parameter estimation of nuclear power systems and nuclear fuel channels', it is unlikely that this gives him any special insight into comparisons of risks, power supply planning, the threat of nuclear proliferation or the psychology of opponents of nuclear power.

However, Kemeny claims for himself expertise broader than nuclear engineering, noting for example that he 'has had the opportunity to work with fossil, hydrocarbon and liquid fuels, wind and solar energy'.<sup>50</sup> There is little technical output to support his claim about expertise in wind and solar energy, aside from an article about an assistance project in Bangladesh. As part of the project, 'We built the first tube-well pumping windmill in Bangladesh'<sup>51</sup> at the Agricultural University of Bangladesh at Mymensingh. Prior to the commencement of the project, the average annual wind speed at the site was measured as 1.7 miles per hour.<sup>52</sup> This wind speed is simply too low for effective use of a windmill. Kemeny notes: 'As one academic remarked, perhaps a little wistfully, "our wind conditions aren't

\*\*\*\* The third paragraph of Kemeny (October 1980) reads as follows: 'The Australian visitor to an average Japanese family, will soon elucidate from his host the atmosphere of informed realism which prevails in most minds concerning all aspects of nuclear energy. There would be a large measure of agreement concerning the economic and environmental benefits of nuclear energy.'

ideal, but we have plenty of students who can blow at the sails together".<sup>53</sup> It is also appropriate to note that such a siting for a windmill is not a good recommendation for one's expertise in wind power.

### Objective? Trustworthy? And 'Expert'?

In quite a number of ways, Kemeny in his public advocacy of nuclear power does not fit the image of the objective, trustworthy expert: he addresses only some of the issues and seldom replies to anti-nuclear arguments; he presents large amounts of irrelevant material; he is subject to inaccuracy, and on occasion fails to acknowledge his mistakes; he continually denigrates opponents; he speaks from a position representing a potential conflict of interest; and his expertise is mostly irrelevant to the issues, or of doubtful quality. Of course, not all members of the public who read Kemeny's writings will be aware of—or swayed by—these factors, but their impact often can be felt indirectly. For example, people familiar with the issues will pass their assessment of Kemeny's arguments and accuracy on to others; and people with acquaintances in the anti-nuclear movement can form their own opinion about the motivations of opponents of nuclear power. My judgement is that many people will decide, correctly or incorrectly as the case may be, that they have good reason not to trust Kemeny as an expert on the issues of nuclear power.

### The Failure of the Experts

The argument here is that in many areas of science which become the subject of public debate, many of the experts who defend positions agreeable to powerful organisations do not behave in the manner normally expected of an objective scholar. The experts often trade on their status rather than maintaining the standards of behaviour normally expected of experts: they do not respond to the arguments of opponents; their points may be irrelevant or inaccurate; they attack their opponents' bona fides; they claim objectivity but present value-laden arguments; and their expertise is largely irrelevant to the broad issues at stake.

The initial response to criticisms is normally silence. For example, the content of the most influential critique, by R. and V. Routley, of Australian forestry policy and practice<sup>54</sup> has never been rebutted in any depth. More common than reasoned argument are attacks on those who raise the criticisms. Thus, attempts were made to block publication of the Routleys' book.<sup>55</sup> In other cases attempts have been made to block promotion, deny appointment or tenure, and dismiss critics of corporations and governments causing environmental impacts.<sup>56</sup>

Such a response is the opposite of what might be expected from scientists concerned first and foremost with the truth. Those who delve more deeply into the issues often find that it is the critics who have more faithfully adhered to conventional scholarly ideals.<sup>57</sup> Another area where this pattern prevails is occupational health and safety.<sup>58</sup>

The failure of experts to behave in the way that might be expected of them is especially clear in areas in which any dissent is automatically relegated as unscientific. One such area is fluoridation, in which leading scientists have suppressed debate on scientific as well as ethical aspects, and demanded acquiescence to

accepted medical-dental policy, not allowing any sort of debate on the issue to be considered legitimate. The established view has become so entrenched that any scientist who disagrees is almost automatically labelled a crank. Yet as Barnes<sup>59</sup> notes, those scientists critical of fluoridation have not been shown to be irrational—they merely deviate from the Establishment position. Furthermore, there is growing scientific evidence for the existence of adverse effects on a minority of the population from fluoridation<sup>60</sup> and of inadequate experimental design and statistical analysis to establish the benefits claimed for the procedure.<sup>61</sup>

A similar situation has prevailed regarding the ideas of Immanuel Velikovsky, who claims that, on the basis of historical evidence, major planetary catastrophes occurred a few thousand years ago. When Velikovsky's ideas were first published in 1950, many scientists launched a vicious attack on both Velikovsky and his views, and among other things attempted to halt publication of Velikovsky's book. Many of Velikovsky's attackers did not condescend to read his work. The opposition did not subside in the following decades.<sup>62</sup> Whatever the eventual evaluation of Velikovsky's ideas, the violation of scholarly norms has been so blatant that many sociologists of science have been at pains to explain away the scientific community's behaviour.<sup>63</sup> But contrary to the apologists, part of the explanation seems to be that the interdisciplinarity and popularity of Velikovsky's ideas posed a threat to the professional status of scientists—a status based on specialisation and control over the opportunity to propose and publicise theories.<sup>64</sup> In any case, the public behaviour of opponents of Velikovsky has not been an edifying example of experts in action.

The following example speaks for itself. In 1975, Fred and Merrelyn Emery of the Centre for Continuing Education, Australian National University, published a book which, among other things, discussed the neurological effects of television viewing.<sup>65</sup> In response to a press article about the book in a university publication,<sup>66</sup> six professors and heads of departments (zoology, physiology, pharmacology, psychology, neurobiology, behavioural biology) wrote a letter<sup>67</sup> which strongly criticised the book and abused the authors. The six professors outlined what they considered to be 'The current limits of scientifically acceptable investigation of the nervous system' and after criticising the Emerys and their work concluded that the article about the Emerys' book 'reflects upon the standards of brain research done in this University by those who are in it for the sake of finding out how a nervous system really works rather than for the support or refutation of a particular social issue'. It would seem that the professors' case rested primarily on their collective prestige, since not only had they not read the Emerys' book, but their specific criticisms did not stand up to scrutiny.<sup>68</sup>

As indicated earlier, a common pattern is nonresponse by experts supporting the positions of powerful bodies when the challenge is small. In several areas in which a fundamental challenge has been made to the rationale of a field of activity—such as transport planning<sup>69</sup> or military research<sup>70</sup>—the very existence of criticism is hardly acknowledged by the experts.

When public pressure is added to the criticisms, response becomes more likely, as in the case of nuclear power since the mid-1970s. But the response is usually

simply promotion of the standard viewpoint, with attacks on vulnerable or symbolic opponents rather than consideration of the most cogent criticisms. For example, while critiques of medicine abound,<sup>71</sup> it is hard to find a single satisfactory direct response to the criticisms. But there are plenty of attacks on 'alternative medicine'. Similarly, a study of the US Federal Drug Administration<sup>72</sup> found that while there were areas (such as reducing food-borne disease and ensuring proper packaging and labelling) in which action would have greatly helped the consumer, these were given cursory attention while much regulatory effort was spent chasing 'quacks'. With such discrepancies between the model and reality of behaviour of medical and health experts, it is no wonder that many people decide, for better or worse, that they can no longer fully trust their doctors.

The above examples are samples of a phenomena common in many other areas, including women's health, IQ, politics, economics, town planning and education. The burden of proof should fall on those who say, contrary to the evidence indicated here, that the experts involved in public debate have set a high standard of scholarly behaviour when defending positions helpful to powerful bodies.

### Why Have the Experts Failed?

While the major object here has been to point out some of the ways in which experts who enter public debates on the side of powerful interests differ from the standard public image of experts, it may be useful to outline some possible reasons for this. Since the incorporation of the scientific community into the government/industry/military complex, the large majority of scientists are beholden, directly or indirectly, to government, industry or military interests. Indeed, the scientific community adheres to scientific paradigms which selectively serve the interest of its patrons—not least by focusing on narrow technical problems without examining what the research is used for, but also by promoting the belief that scientific knowledge is separate from its applications. So while the scientific community's belief system stresses freedom and professional autonomy, in reality it is largely a servant of power.<sup>73</sup>

When the orthodox view on an issue such as nuclear power, fluoridation or cosmology begins to be questioned by significant numbers of members of the public, this poses a threat to politically powerful scientists in two possible ways. First, government or industry interests, to which portions of the scientific community are committed and by which they are supported, may be at stake—as in the case with nuclear power, supersonic transports, pesticides or military research. The government and industry interests, thus, have a strong incentive to promote public trust in and acquiescence to their subservient experts,<sup>74</sup> and to encourage their experts to help attain this objective. Second, the internal power hierarchy of the scientific community may be under threat, especially if critics are in subordinate positions or from competing disciplines.

In this situation, a number of self-appointed—or sometimes hired—scientific supporters of the orthodox position may join the public debate. Their role in practice is to reinstate the status quo: public acceptance of the policies and practices which serve govern-

ment and industry, and trust in the experts who speak on behalf of these interests. That role—and this is the key point—is largely incompatible with fulfillment of the normal public expectations for an expert. By actively joining the public debate, the experts have already strayed from their usual role. By being committed to a particular viewpoint; by conceiving this viewpoint as the sole truth and not responding to criticisms; and by using castigation of opponents as a justification for their commitments; the experts drastically diverge from the image of the 'objective', knowledgeable scholar.

Looking at the situation another way, an expert who behaved like experts might be expected to behave—who treated criticisms and contrary viewpoints openly and fairly, acknowledging that alternative viewpoints might be valid; who highlighted agreements and differences of fact and values; and who encouraged members of the public to pass judgement on at least the values involved in the issues—would be a poor servant of elites in government, industry and the scientific community itself. After all, it is quite possible as a result of full and open debate on the issues that the public perception of the public interest might diverge from the interests of the elites.

As noted above, the experts who join the public debate to defend positions beneficial to government and industry certainly do not conceive their roles in these terms. It seems clear that they sincerely believe in the causes they support, that they see the debate as one between those who know (the experts) and those who don't know, and that to them the opposing arguments are so weak or unscientific that little response to them is required. And when fundamental conceptual differences or value judgements underlie the dispute, the experts are unlikely to be able to fully comprehend the contrary view.

### A Sad Reflection on the Scientific Community

The experts who join public debates are not always powerful or prestigious scientists, though this often is the case. Does their failure to live up to the image of the expert say anything about elite scientists generally, or about the vast majority of scientists who do not participate?

That non-participation is itself a highly significant—but seldom remarked on—feature of public debates involving scientists: it constitutes the almost complete failure of public peer review. Within the normal functioning of the social system of science, evaluation of one's works by scientific peers is a highly regarded method by which assessments are made of the adequacy and value of scientific work—in addition to being the basis of the process used to decide on appointments, promotions, research grants and publication of research articles.<sup>75</sup>

There are various inadequacies and abuses in the peer review system,<sup>76</sup> but these are nothing compared with its virtual absence from public disputes involving scientists.<sup>77</sup> It might be expected that scientists who, in public disputes over issues, are not accurate; do not respond to counterarguments; attack the motivations of opponents; and do not demonstrate the appropriate expertise; would be publicly called to task by other scientists. But in practice, scientists who publicly defend positions supportive of the interests of government, industry or scientific elites are almost never

publicly criticised for irrelevance, inaccuracy or vindictiveness except by known and active critics of those positions. For example, it would be hard to cite a single instance in which a scientist, not identifiably an opponent of nuclear power, has openly criticised factually incorrect or inconsistent statements by the leading advocates of nuclear power in Australia.

The reasons for the failure of public peer review can readily be traced back to the links between government, industry and the scientific community and to

the power structure of the scientific community itself. For the present argument, it is only necessary to note that the failure of public peer review is one more good reason why members of the public cannot reasonably be asked to put their trust in the experts.

#### ACKNOWLEDGEMENTS

Mark Diesendorf and Rosemary Walters provided valuable comments on the text. Leslie Kemeny declined to comment.

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Social Forestry aims to supply firewood for cooking. Has it succeeded?

## Social Forestry — No Solution within the Market

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Deforestation in India has caused severe ecological damage and brought untold social misery. To combat this, the Indian Government has adopted an ambitious programme of 'social forestry', the aim being to rebuild the country's forest wealth through the active participation of village communities. But despite the radical objective, the programme has turned out to be little more than an extension of earlier forestry practices. Industry has benefited — and the losers are the rural poor.

Between 1947 and 1977, India's forest cover decreased from 40 per cent to 20 per cent, with only about 11 per cent of the total land area being under adequate tree cover. Besides having a deleterious effect on agriculture, deforestation has caused severe ecological damage in many areas of rural India, where 90 per cent of the population continues to depend on forests for its domestic energy needs, fodder for animals, poles and posts for housing and for organic fertiliser for agriculture.

In part, the crisis of India's forests results from decisions taken in the 1960s when the principal goal of development was seen to be the need to boost food production. Caught up in the euphoria of the Green Revolution, the Indian Government adopted a land-use policy which brought thousands of hectares of forest under the plough. Thus, of the 3.4 million hectares of forest destroyed from 1951 to 1973, 71.5 per cent was lost to agricultural expansion and 11.8 per cent to river

valley projects, mainly aimed at providing irrigation for agriculture.<sup>1</sup> That deforestation has led to soil erosion and has severely disrupted the natural processes of water conservation, thus exacerbating the problem of both floods and droughts. Ironically, the expansion of agriculture under the Green Revolution has thus succeeded in undermining the very basis of sustainable food production.

Although linked with the expansion of agriculture, however, the crisis in India's forests does not arise solely from it. It is also rooted in the organisation of forestry in India—an organisation which, both in structure and orientation, was adopted from the British. Although the rural people had been using forest resources for centuries before organised forest management was introduced by the British, the forest stock remained healthy under community management. Indeed, the rapid deterioration of the forest stocks in India during the last cen-

tury can be traced both to the reservation of large forest areas for the monopolistic use of the British Government and to the sudden and drastic reduction both of those forest lands open for community use—the civil or revenue forests—and those forests which belonged to local *panchayats* (the village councils). An irreversible trend in forest management and land-use was thus initiated, the most significant social impact being the slow but sure exclusion of local communities from the use and management of forest resources. The result was the alienation of the whole rural population from the forests which, in its eyes, now came under the exclusive control of such 'external' authorities as forest officers and contractors. That sudden restriction of the rural population's free access to forest produce led—in the absence of any other alternatives—to the remaining civil and *panchayati* forests being rapidly stripped of their trees in order to

provide the basic needs of the local peoples. The reserve forests, in the meantime, dwindled through inefficient and misguided commercial over-exploitation.

Although India's Forest Act of 1952, on paper at least, puts stress on the satisfaction of the needs of the rural areas, conventional forest management has conspicuously failed either to protect and regenerate India's forest resources or to provide the rural population with its basic needs. While forest stocks have been whittled away, the total dependence of rural communities on forests for the satisfaction of their basic needs has continued and has become a critical issue. Furthermore, it is increasingly accepted that commercial sources of fuel, fodder and many other items will be well beyond the meagre incomes of the majority of the poorer people in the villages. Traditional sources of wood will continue to provide the cheapest options for the underprivileged majority. In most cases, those options are still available free of cost.

### Social Forestry: The Goals

Under the joint crisis of unsatisfied basic needs and ecological instability, the rebuilding of India's forest wealth has, in recent years, become one of the major issues in land-use policy and has provided a new paradigm for development—social forestry; the strategy being to regenerate forest resources through the participation of the community in the protection and management of forests.

Social forestry has as its primary aim the development of firewood resources, since the shortage of domestic energy (which continues to be satisfied predominantly by firewood), rather than a shortage of food, is expected to pose the most difficult problem in the coming years. As Eric Eckholm puts it, quoting an Indian official, 'Even if we somehow grow enough food for our people in the year 2000, how in the world will they cook it?'<sup>2</sup> Nor is the firewood crisis an isolated problem since it diverts agricultural waste and dung from its use as organic manure to fuel for cooking, thus sabotaging sustainable agricul-

tural activity. It also undermines agricultural activity by diverting some 20 per cent of available manpower from productive farm work to fuelwood gathering. It is estimated that 18 per cent of the human labour spent on domestic work is taken up by firewood gathering. In parts of India, two man-days of labour are spent per family simply collecting enough firewood for the week. In the State of Karnataka alone, according to official reports, the gap between existing demand and production of firewood is one million cubic metres.

The supply of firewood is, of course, only one of the roles fulfilled by forests—for trees also supply fodder for the animals which provide the draught power for the vast majority of Indian farmers for both agriculture and transport. Social forestry is, thus, also expected to bridge the tremendous gap between the demand and the supply of such green fodder. Table 1 gives an indication of the extent of this gap in the State of Karnataka.<sup>3</sup> Ninety per cent of the cattle population subsist on grazing grass both inside and outside forests. Regenerating trees with fodder value will, on the one hand, improve the health and strength of the draught animals and, on the other hand, reduce the pressure on the soil from overgrazing. An improvement in the fodder resources for livestock through social forestry is also an essential component for improving the resource base of another significant renewable energy source, biogas, while also ensuring higher milk production.

The third task to which social forestry is committed is the rebuilding of exhausted resources for rural housing needs. No viable alternative to timber (in material and economic terms) is available to the lowest income groups. Some attempts at cheap and appropriate rural housing

with new materials have been made but the diffusion and transfer of these new technologies does not seem possible in the near future. Therefore if the basic need of shelter is to be satisfied, dependence on forest resources for housing cannot be avoided.

Trees and forests also have a fundamental role to play in the stabilization of both hydrological and soil systems. By planting trees in areas now devoid of tree cover, social forestry aims to prevent soil erosion and the silting up of tanks and reservoirs; to arrest the surface run-off of rain water on hill slopes; to recharge springs, streams and underground water aquifers; and finally, in areas which have been severely deforested, to halt the process of desertification. Reafforestation is thus a precondition for improving the stability of farm ecology.

But where social forestry differs most radically from past forestry programmes is in the recognition that the rebuilding of India's forest wealth cannot be undertaken without the participation of the local community. As Eckholm points out:

'Community forestry cannot be imposed from above and carried out in the face of a hostile population. New forms of land-use impinge upon, and are influenced by, the daily activities of everyone. When the local people are not active participants and supporters of a project, saplings have a way of disappearing overnight. With fodder usually as scarce as firewood, uncontrolled goats or cattle can quickly ruin a new plantation even when disgruntled peasants facing the alternative of a lengthy hike to collect fuel do not covertly cut the saplings themselves . . . Community involvement, then, is not just an ideologically appealing goal; it is a practical necessity if rural forest needs are to be met.'<sup>4</sup>

Feeds	Requirements million tons	Supply million tons	Deficit of Surplus
Straw	190	130	- 60 mt
Green Fodder	289	111	-178 mt
Concentrates	40	11	- 26 mt
Grazing	453	527	+ 74 mt

TABLE — 1: Fodder Situation in Karnataka

## Enthusiastic Support

According to the National Commission of Agriculture, the scope of social forestry should include 'farm forestry, extension forestry, reforestation in degraded forests and recreation forestry.'<sup>5</sup> Farm forestry in particular was defined by the Commission as '(the) practice of forestry in all its aspects on farms or village lands, generally integrated with other farm operations.' The same policy was reiterated in the Recommendations of the Second Forestry Conference held in 1980. The Conference stated that:

'Social forestry programmes should be given prime importance all over the country with the objective of growing trees on farmlands, community wastelands, road, canal and railway sides and any other land set aside for similar purposes, either singly or in groups, in strips or in blocks.'<sup>6</sup>

Thus, in theory, social forestry provides a programme for building forest stocks in two ways. Firstly, it is expected to provide the resources to satisfy the basic needs of the population through the creation and regeneration of tree wealth within human settlements. Secondly, by satisfying these needs *locally*, social forestry is seen as a mechanism for reducing the pressures which are at present destroying the reserved forests. Above all, social forestry provides a means of reversing the earlier trend of converting forests into agricultural land and human settlements. In view of the availability of denuded civil forests and degraded village commons, the reverse phenomenon of generating new forests within human settlements through community participation is a promising one.

Attracted by that promise, local government departments and international aid agencies are giving new attention to forestry. Both the Food and Agriculture Organisation and the World Bank have initiated programmes supporting social forestry. Meanwhile, the Indian Government has ear-marked one thousand million Rupees during its Sixth Plan Period (1980-85) in order to promote social forestry projects throughout the country. Under the Indian Government's programme, social and farm forestry projects will be imple-

mented in one hundred selected districts, supplying 530 million seedlings and raising fuelwood plantations in a total area of over 0.26 million hectares. In the State of Karnataka, the Agricultural Refinance and Development Corporation has been financing the Karnataka Forest Plantation Corporation through a consortium of 86 banks and has already contributed 21.4 million Rupees for social forestry programmes.<sup>7</sup> The Karnataka Forest Department has now submitted a 600 million Rupee project proposal to the World Bank for financial assistance for social forestry, (see Box). A similar proposal has already been submitted by the Gujarat Forest Department: indeed, the wording of the proposal gives an insight into the high regard with which social forestry is now held. According to the Gujarat Forest Department:

'(The purpose of social forestry) is the creation of forest for the benefit of the community through active involvement and the participation of the community. In the process, the rural environment will improve, rural migration will reduce, rural unemployment substantially cease . . . The overall concept of social forestry aims at making the villages self-sufficient and self-reliant in regard to their forest material needs.'<sup>8</sup>

How, then, has social forestry succeeded so far? Has it achieved its stated goals? What contribution has it made to satisfying the basic needs of rural Indians? Has it improved the environment? Or succeeded in involving local communities in the protection and management of the forests? In this article, we look at the social, economic and ecological impact of social forestry in the district of Kolar in the State of Karnataka. From the evidence we have gathered, it would appear that far from achieving its goals, social forestry is in many ways exacerbating the problems. Is poor management to blame? Or is the programme itself misdirected?

## Traditional Agriculture in Kolar

In the absence of a substantial irrigation system based on rivers

and streams, Kolar district has had a well developed irrigation system using tanks and underground resources mainly for the cultivation of paddy. The major rainfed crops in the region have been Ragi (*Eleusine coracana*) and Jola (Jowar—*Sorghum vulgare*) which are also the staple foods of the local population. These are planted with a mixed crop of pulses like Togari (red gram—*Cajanus indicus*), Avare (broad bean—*Dolichos lablab*) and Alasande (cowpea—*Vigna catjang*). In rotation with Ragi and Jola are grown other pulses and oilseeds like Huruli (horsegram—*Dolichos biflorus*), Kadale (chana—*Cicer arietinum*), Atchellu (gingily—*Sesamum indicum*), hutchellu (niger—*Quizotia abyssinica*), and nela kadle (groundnut—*Arachis hypogaea*).<sup>9</sup>

Supplementing these crops—as well as satisfying other basic needs of the village communities—a mixture of carefully chosen multipurpose farm trees were also grown. Some of these were planted on privately owned land, either along field bunds or in the fields themselves. In addition to these privately owned trees, there were communally owned trees on the village commons and along roadsides. All the trees both benefited the environment and provided a sustainable source of fuel, fodder, fruit, oil, medicine and timber for building. Moreover, they played a significant role in maintaining soil fertility, preventing soil erosion and conserving underground and surface water resources. Besides the use of land for growing crops and farm trees, land—known as 'gomal' land—was also kept aside for communal grazing.

## Private Versus Communal Ownership—Is there a Conflict?

Inequalities have usually been assumed to rule out the possibility of community ownership, participation and control. Thus Erik Eckholm points out:

'Perhaps the greatest impediments of all to community forestry are the local social and economic institutions that, in many poor countries, perpetuate the rigid stratification of social classes and the severe

exploitation of those at the bottom. Community forestry is not a technology: it is a process of social change that requires the continuous participation of whole communities in planning and problem-solving. It requires people to shift from an individualistic to a co-operative state of mind in spheres of life where communalism has not normally been the norm, at least in recent history. People must willingly give up land-use practices and privileges to which they have long been accustomed. Such a process of co-operative behavioural change, never easy to bring about anyway, is especially unlikely where grossly unequal land tenure and marketing systems ensure that a powerful minority will capture nearly all the benefits of any economic gains.<sup>10</sup>

Eckholm's assumption that community action is ruled out wherever inequalities exist, goes against the evidence. Village commons have been a historical reality in India. Relics of village woodlots or roadside plantations can still be easily found. In the traditional village, private and unequal landholdings existed side-by-side with common and equally shared resources. Thus, while self-interest might guide a landlord's use of his own land, the use of common resources would—even for the private landlord—be guided by community norms.

This was possible for two reasons. The first is rooted in the nature of community organisation. A community is a social organisation based on commonly accepted norms and values which provide the organising principles and control mechanisms for its members. A shared resource can be managed communally through the implicit acceptance on the part of all the members of the community of a commonly shared norm for the use of resources. Even while subscribing to one set of norms in the context of commonly-owned resources, it is possible for members of a village to subscribe to individualistic, class-dominated norms when it comes to privately owned resources.

The second reason why the commons could be maintained despite socio-economic inequalities arose from the self-sufficient nature of the traditional village economy. That



Dung is an important source of fuel in many parts of India. By planting trees for firewood, social forestry aims to release the dung for use as fertilizer. The preference for growing Eucalyptus, however, has led to a sharp reduction in the amount of food available for cattle and other animals. Eucalyptus cannot be browsed — and because it allows no undergrowth, it does not provide a source of forage either. Less animal dung is thus available.

self-sufficiency prevented individuals from undermining community action. Thus, for example, in a traditional coastal fishing village with its own socio-economic hierarchies, the exploitation of common resources (like fish in the ocean) was guided by rigid controls to which everyone was subjected. The exploitation of the poorer sections of the village took place on the shore when the catch was distributed on the basis of private ownership. However, the most powerful were prevented from over-exploiting the resources of the sea. Therein lies the primary reason why India's marine ecosystem was maintained over the centuries.<sup>11</sup>

The conservation of village woodlots was guaranteed through similar mechanisms, until the simultaneous operation of individual and community obligations was made impossible through the opening up of the village economy to large urban and industrial markets. By and large, access to the larger markets was—and still is—possible only for the most privileged members of the community, through easy access to educational, bureaucratic and financial institutions. That, in turn, started a process whereby the rich were no longer subject to traditional social bonds—which in turn led to the breakdown of the community. In the case of marine resources, the

introduction of mechanised trawlers (through international and local funding mainly made use of by the local rich) led to the violation of the traditional community norms and influenced the manner in which marine resources were exploited. Similarly, the introduction of new agricultural techniques—techniques that were adopted only by the rich farmers—made the village elite less dependent on local resources (example: chemical fertilizer in place of green manure). Under such circumstances, the participation of rich villagers in community efforts to maintain local resources was reduced, leading ultimately to the slow decay of those community norms which had previously governed the use of local resources.

### A Tragedy of the Commons?

It is important to recognise that competition has not always been a driving force in human societies. In large sections of the rural societies of the Third World, the principle of co-operation rather than competition among individuals still dominates. Similarly, production for one's own consumption—rather than for exchange—has long been the predominant motive for production in subsistence economies. In a social organisation based on co-operation amongst members and production based on need, the logic

of gain is entirely different from that of societies based on competition and profits through exchange. The general logic behind Garret Hardin's 'Tragedy of the Commons' does not operate under such conditions.<sup>12</sup> However, under certain circumstances where the common land cannot even support the basic needs of the population, a tragedy is to be expected even without competition.

There may, of course, be situations where undermining a community's resources does not bring ruin to those responsible for the exploitation of those resources. Under these conditions, as Daniel Fife points out:

'The tragedy of the commons may appear to be occurring but in fact something quite different is really happening. The commons is being killed but someone is getting rich. The goose that lays golden eggs is being killed for profit.'<sup>13</sup>

That situation is all too possible in the business world. Responsible business ensures that it can continue to run indefinitely. But when a business adopts 'higher temporary profits' as its principal goal, its irresponsibility may lead to the destruction of its own resources. In such a situation, it 'pays for the businessman to kill his business'.

The survival of such community property as pastures and village woodlots, or 'common goods' like a stable ecosystem, is therefore only possible under a social organisation where checks and controls on the use of resources are inherently built into the organising principles of the community. On the other hand, the breakdown of a community—with the associated collapse in concepts of joint ownership and responsibility—can trigger off the degradation of common resources.

#### **Eucalyptus: The Great Encroacher**

In the second half of the last decade, significant changes in land-use in Kolar emerged as a result of the State of Karnataka's social forestry programme. Through the distribution of free seedlings, farmers have put a large amount of land under farm forests. Although the social forestry scheme is supposed to make a variety of species available for farm forestry, very few

# Every Mistake

In 1980, the State Government of Karnataka submitted a 'proposal' to the World Bank asking for funds to back a five year programme of social forestry. The stated aim of the programme is both to combat ecological degradation and meet the basic firewood timber needs of the rural population. Reading the proposal, however, it seems that the State Government has learnt few lessons from the failure of other social forestry schemes elsewhere in India. Indeed, the authorities seem set on repeating just about every mistake in the book.

Under the programme, the State Government intends to forest 110,000 hectares of privately-owned land — some 60 per cent of the total area in the scheme. This despite clear evidence from other social forestry programmes that it is only communally-owned forests which can possibly bring the desired benefits to the local population — and despite the State Government's purported commitment to making 'the main strategy' of the scheme 'the utilization of hitherto unutilized' communal land.

In fact, the area given over to private forest farms is likely to be even higher than the State Government has estimated. Thus, whilst a similar World Bank project in

Gujarat aimed to forest only 1000 hectares of privately-owned agricultural land, in one district alone 10,000 farmers have already taken to growing Eucalyptus in place of foodcrops. And, although the Gujarat project clearly identified 'marginal' land as the target for farm forestry, large areas of irrigated food-producing land have already gone under Eucalyptus cultivation. There is no reason to believe that the experience of Gujarat will not be repeated in Karnataka. Inevitably those who will lose out are the very people whom the social forestry programme is intended to help.

The problem is further compounded by the choice of species which farmers are encouraged to plant. For whilst the pattern of land-ownership determines who accrues the benefits of forestry, the nature of those benefits depends on the type of trees planted. It is quite clear from the proposal that the main species to be encouraged in the project will be Eucalyptus. No mention is made of such traditional farm trees as Honge, Neem or Mango. That emphasis on Eucalyptus is hard to justify. Eucalyptus fulfills fewer ecological functions than the traditional trees; it cannot be browsed by

species except Eucalyptus have been planted.

Almost all the extension of Eucalyptus plantations in the villages is on private landholdings which were earlier under food crops. The 'civil' forests are in the process of being transferred to the forest department. The community (or gomal lands) have almost disappeared. Since, outside private lands in villages, gomals are the only category not under the ownership of the forest department, one can conclude that the only social forestry programme in which people have voluntarily participated has been the extension of farm forestry on private land. Whether this participation amounts to community participation, in contrast to individual participation, is questionable.

Community participation in forestry is an essential component to social forestry since, in its absence, market demand—rather than material need—dictates the pattern of land use and the choice of tree species planted. While afforestation can be taken up primarily for

high commercial returns by individuals, if it is to lead to improvement in community services, the better satisfaction of basic needs and a stable resource base, then the involvement of the community in planning, raising and using the forests becomes a practical necessity.

The adoption of Eucalyptus on the present scale, however, makes such community involvement extremely difficult. Thus, one virtue of Eucalyptus is that it is not browsed by cattle and is quick-growing: *that virtue gets translated into a lack of responsibility on the part of the community to protect the trees.* Social forestry programmes which place stress on species like Eucalyptus implicitly accept the impossibility of community participation. Community participation is further excluded by the disproportionate success of plantations on private land-holdings which makes individuals and not communities responsible for the plantations.

The successful propagation of species like Eucalyptus through farm forestry is rooted in new and

# in the Book

animals: it allows no under-growth and, thus, provides no fodder: it produces no fruit, nuts or other food: it is not favoured as a fuel for cooking because it burns too fast: and, above all, it is too expensive for most villagers to buy. If other social forestry schemes are anything to go by, then it is more than likely that the harvested Eucalyptus will be sent straight for sale to the pulp and rayon industries. Without safeguards to ensure that Eucalyptus does not cover all the land under the social forestry project (as it has done in other projects) it is impossible to guarantee even a minimum supply of basic forest products for the rural population.

Such safeguards are also essential if employment is to be protected. On the basis of our study (see main text), it is observed that the labour displaced through Eucalyptus plantations is far more than the employment generated. For each hectare of land lost from food crops to Eucalyptus, there is a loss of some 250 mandays of employment per year. Assuming that the present trend towards Eucalyptus monocultures continues, then by the end of the fifth year of the project the loss of employ-

ment will be 137.5 million mandays.

The State Government's social forestry programme also aims to increase agricultural productivity by improving soil and water conservation and by releasing cowdung at present used for fuel for use as fertilizer. Assuming that 50 per cent of the firewood to be grown would be sufficient to release the total amount of dung being used for fuel, 0.4275 million tons of extra food grain are expected to be produced over a period of 35 years. That figure, however, is misleading. Firstly, the rural people of the region do not use much cowdung for fuel. (In other parts of India, there is a significant use of cowdung for fuel). Secondly, when the land at present under foodgrain is put under Eucalyptus, there will be a direct loss of some 5.77 million tons of foodgrains, oilseeds etc. That loss has not been taken into account in the project proposal.

Such omissions, together with the general thrust of the project, do little to encourage us that Karnataka's proposed social forestry programme will fare any better than similar schemes elsewhere. Sadly, the losers will be precisely those whom the project is intended to benefit most.

growing markets for the produce as well as in the decay of those traditional ties which once provided the social organisation essential for the production of traditional food crops. Eucalyptus plantations have provided a way for farmers to make profits from land without a corresponding dependence on the community. That detachment from the community has, in turn, led to insurmountable problems in generating community participation for the raising of village woodlots. When the richer farmers can make large profits by planting Eucalyptus on their own land and simultaneously reduce their dependence on poorer people and local resources, it is utopian to expect them to take part in parallel community efforts to raise village woodlots on the commons.

## Excluding the Community

The social forestry programme has also succeeded in excluding the community from its traditional roles in forestry. The first level at which the community was traditionally involved in forestry was through its

store of knowledge about useful tree species, the knowledge of traditional silviculture. The most popular farm tree in the Kolar region used to be Honge (*Pongamia glabra*) whose leaves provide fodder and manure, whose oil is used for lighting and which, finally, makes extremely good firewood.\* Neem (*Melia azadirachta*), another traditional farm tree, is used as a pesticide, and as medicine, food, oil and firewood. Tamarind, Mango and Jackfruit are other fruit trees that provide an essential part of the local diet. Together, the mix of species maximised self-sufficiency without making conflicting demands on land for food, fodder, fuel and manure.

The second level at which the community as a whole participated in raising farm trees was in the material production and distribution of forest wealth. Most of the trees selected were multipurpose in character. Moreover, the species chosen and the land on which they were planted was carefully chosen to maximise their ecological as well as their economic value. Thus, trees were planted along tank bunds, field

boundaries and on common land to hold the soil and conserve moisture. Hence the distribution of the trees, together with the choice of species, lent itself to the maximisation of material benefits for the community as a whole.

The organisation of the social forestry programme, however, has systematically ignored these traditional forms of community participation in forestry. The Eucalyptus hybrid is not an indigenous species. Moreover, the simple process of growing trees (which farmers in India have been doing for centuries) has suddenly been transformed into a task of specialists from forest nurseries. The total isolation of the rural population in the preparation of seedlings is thus creating a dependency in an area of activity over which the villagers once had complete control.

## Failure to Supply Firewood

The primary objective of the social forestry programme is to meet the basic needs of the rural population—insofar as they can be supplied by forestry. Among these basic needs, an adequate supply of firewood has been singled out as the most urgent. According to the logic of the social forestry programme, an increase in the local production of wood will automatically lead to the better satisfaction of the fuel needs of the rural population—particularly the poorer sections of the community, who continue to depend totally on dry bushes and twigs for their domestic fuel.

Yet Eucalyptus—the primary product of social forestry projects—is not found to be a major source of fuel within the village. The small number of families using Eucalyptus for cooking are usually poor families who collect it from reserved forests—in the absence of any other species, they have no other choice.

Very few of the farmers who are growing Eucalyptus on their own land use its wood as domestic fuel. One reason is the economic returns on the sale of Eucalyptus wood are

\*Honge oil is used for lighting. Discouragement of Honge plantations automatically increases the dependence of rural people on kerosene for lighting. Thus they are forced to switch from a renewable local resource to a non-renewable imported one.



Firewood is so scarce in rural India that twigs are cut from living trees. But despite the impressive growth of Eucalyptus plantations under numerous social forestry programmes, the firewood crisis is unlikely to improve. Eucalyptus is too expensive for villagers to buy: for the most part, it is sold to urban industries.

high and alternative sources are still cheaper. The second reason is that Eucalyptus—unlike such traditional fuel woods as Honge or even Casurina—is unsuitable for cooking that requires slow and controlled heat: quite simply, it burns too fast—thus also making it more expensive than other fuel woods since more wood is inevitably required to cook a meal.

In the city of Bangalore, according to estimates made from all the weighbridges in the city, about seventy to eighty truckloads of firewood are transported daily from the surrounding rural areas. The total weight of the firewood imported is about 700 tons. About 500 tons of this is Casurina—a fast-growing hardwood—and the rest is made up of traditional species like Tamarind, Mango and Honge. Except for lops and tops, no Eucalyptus wood is supplied to Bangalore as firewood.

About one to two truckloads of lops and tops of Casurina and Eucalyptus comes in daily to Bangalore. In Bangalore, the retail price of Casurina firewood is some 45 Rupees per quintal; for Honge, it is some 35 Rupees per quintal. The price of Honge in the villages is some 150 Rupees per ton; for Casurina, it is about 200 Rupees per ton. On the other hand, farmers get around 250-300 Rupees per ton for

Eucalyptus (at some places, it was found to be even higher). At that price, Eucalyptus is too expensive to be a major source of fuelwood for either urban or rural consumers.

The high market price of Eucalyptus is a result both of its suitability for use in pulp-based industries and of the higher purchasing power enjoyed by such industries. The price of Eucalyptus offered to farmers is above the price for firewood—thus ensuring that Eucalyptus wood is supplied exclusively to the few paper mills and one rayon factory in the region. Thus, about 80 per cent of the Eucalyptus from Kolar is earmarked for the polyfibre industry in Harihar. What remains after dressing the Eucalyptus for use by the rayon industry is sold in the urban markets of Bangalore as fuel. This leaves hardly any Eucalyptus for the consumption of the rural population. In sum, the growth of Eucalyptus plantations in Kolar has made no positive contribution to the satisfaction of the fuel needs of the rural people. On the other hand, because of the decline in traditional species like Honge, the supplies that were once available are becoming increasingly restricted. If that trend continues, the firewood crisis will worsen during the years to come, despite the impressive growth of Eucalyptus plantations in the villages.

## Eucalyptus and Fodder

Traditional farm trees, besides being appropriate for domestic energy requirements like cooking and lighting, have also been a rich source of fodder for cattle. Eucalyptus, on the other hand, has spread throughout farm forests largely because it is not only fast growing but also because it is not browsed by cattle. The latter, however, excludes its use as fodder—and since Eucalyptus allows no undergrowth, the plantations themselves cannot be grazed either. Thus, instead of creating additional fodder resources, the widespread planting of Eucalyptus on farmland and communal lands has succeeded in further depleting the already scant fodder resources of the area.

By increasing fodder shortages, the planting of Eucalyptus has also indirectly affected the viability of two alternative, renewable energy resources—animal energy and biogas energy. Less fodder reduces the number of, or weakens, the work and milch animals—and that, in turn, reduces the inputs to biogas plants, thus accentuating the already acute problem of firewood shortages.

## Simplistic Assumptions

Why has the social forestry programme failed so conspicuously to achieve its primary objective—the satisfaction of the basic forest needs of the rural population? The answer, in our view, lies in the simplistic assumptions that have been made about the production and distribution of primary products. Thus, it is assumed that just growing more trees will satisfy basic needs: no distinction is made between what trees are grown or who grows them—even though the evidence suggests that the tree species which get planted determine to a large extent which groups accrue the benefits. So, too, it is assumed that by producing more of a particular commodity in a particular area, the availability of that commodity to the local people is automatically increased. That assumption, however, takes little account of the nature of the market economy: for in a market economy, it is those with the highest purchasing power who have command of resources—and, in this case, those with the highest

purchasing power are not the local people but distant urban-based industries. Indeed, as Erik Eckholm points out:

'With forest products, as with food, merely growing more produce is not necessarily sufficient to eliminate deprivation. Who does the producing, and how the benefits are distributed are equally crucial considerations . . . With wood, as with other resources, buying power rather than need, determines the allocation of the traded products.'<sup>14</sup>

#### Land for Food or Land for Wood?

Policy makers and bureaucrats who have viewed the decline in tree cover as one of the major problems in the management of land are very easily impressed by the spectacular success of raising forests on farms. This partial assessment, however, fails to take into account another more basic use of land—that is, to grow crops. The social forestry schemes to date have made no bones about entering agricultural land but they do, however, stress the 'marginal' nature of the land being used for Eucalyptus plantations.

But just as it is unrealistic to blur over distinctions between types of forests and trees, it is also unrealistic and misleading to blur over distinctions in food crops. The food consumed by the rural population is usually very different from that consumed in the cities. Food productivity, food shortages, food surpluses are issues that have focussed only on items for urban consumption. Thus, the recent import of wheat to check inflation has come as a response to the rising price of wheat—but wheat is *not* the staple food for a large section of the rural poor in India. On the other hand, the fact that in Karnataka; the price of Ragi—the staple millet in rural areas—has shot up by 200 per cent in two years (and has become nearly as expensive as wheat and rice) has brought little response or reaction from the Government.

While the Food Minister of Karnataka has claimed that the price increase in Ragi is the result of crop failure in 1980-81, the price of Ragi has in fact been rising sharply for several years. Significantly, the area under Ragi has been systematically

shrinking in Kolar, as it has throughout Karnataka. Moreover, the lands previously under Ragi are now predominantly given over to Eucalyptus plantations. During the next five years, about 12 per cent of the agricultural land in the area is expected to be under Eucalyptus. Most of the transfer will be at the cost of Ragi and associated crops—crops which the authorities still insist on classifying as 'marginal'. Table 2 gives the decline in the area under Ragi since the beginning of the social forestry programme.

The rural poor of Kolar have been doubly hit by this loss of traditional crops to Eucalyptus.<sup>15</sup> First, the decrease in food production leads to higher food prices; and, second, it leads to less employment—and, hence, lower incomes, thus increasing even further the gap between basic requirements and the ability of the rural poor to satisfy them. That impact cannot be assessed merely in financial terms. More important is the decline in physical health and nutritional status as a result of shifting from the traditional staple diet of millets and pulses to diets (made possible through debt or food for work programmes) of wheat or rice.

Despite its proclaimed objectives, the present social forestry programme thus appears to be little more than yet another policy for supplying industrial raw materials. Unlike conventional forestry, which simply supplied industry with its raw material from land specially earmarked for reserved forestry, social forestry is ultimately performing the same function by putting new demands on land that has not, in any sense, been lying waste but has been used for the production of the basic food necessities of the rural population. At worst, such calculated displacement of basic food production must lead to the slow emaciation and death through star-

vation of a significant number of the rural poor.

#### The Impact of Social Forestry on Employment

Generating employment and raising the income of the rural poor, particularly landless agricultural labourers, is one of the objectives to which the social forestry programme has directly addressed itself. In the light of the serious rate of unemployment and underemployment in rural areas (and the recognition that the modern industrial sector cannot employ this large number of people) additional employment in the agricultural sector and in the rural areas is the only hope for improving the material well-being of the rural poor in the years to come.

The hope of increasing employment opportunities for the landless is, however, utopian if the present approach to farm forestry persists: the current programme simply provides a convenient means for farmers to be independent of labour in their farm operations whilst, simultaneously, increasing the returns from land. From the individual farmer's point of view, the change in land-use is rationally motivated by the higher returns and the lower costs and risks involved in shifting from crop production to farm forestry.

Moreover, whilst the cost of mixed and rotation cropping of traditional food crops in rainfed areas requires an annual expense of at least 600 Rupees (Rs) per acre, Eucalyptus plantations only require an initial expenditure of Rs 600 per acre — with no repeated expenditure for 30 years and a guaranteed high return. The present rate at which farmers sell Eucalyptus is around Rs 250-300 per ton and it easily provides for an annual return of Rs 2500 per acre. Farm forests of Eucalyptus thus simultaneously provide the big farmers with freedom from

TABLE — 2: Area and Production of Ragi in Kolar District during 1977-78 to 1980-81.

Year	Area(He)	Production (tons)
1977 - 78	1,41,772	1,75,195
1978 - 79	1,46,361	1,65,174
1979 - 80	1,40,862	99,236
1980 - 81	48,406	13,340

Source: Bureau of Economics and Statistics, Karnataka

labour and other farm inputs and an avenue for good profits.

According to a recent report, a farmer in Gujarat who has embarked on farm forestry with Eucalyptus earns an income of Rs 10,000 to Rs 16,000 per acre of wet land annually whilst his wheat and sugar cane growing neighbours can expect around Rs 3,000 and Rs 4,000 respectively. With the promise of such returns, ten thousand farmers in one district of Gujarat alone have gone in for Eucalyptus farming on irrigated farmland.<sup>16</sup>

For the landless labourer, however, what little employment was available to him through the production of food crops disappears as the farmland goes under Eucalyptus. Kolar district has no significant canal irrigation networks and has primarily rainfed crops. Those food-crops, besides generating employment through sowing and harvesting, also require labour for manuring the fields, thinning, weeding, threshing and winnowing. The annual labour requirement for traditional rainfed cropping patterns is of the order of 100 man-days per acre. The Eucalyptus crop, on the other hand, requires absolutely no labour after planting, since it is not browsed, and thus generates negligible employment until it is ready for harvesting. At harvesting, however, it is rarely local people who are employed since the agents who collect the Eucalyptus normally provide the labour for harvesting. Moreover, the employment generated through harvesting is available only a rotation period of three years, if the returns of the plantation are to be maximised. Even if local people are employed at this stage, the numbers involved are not very significant. All in all, we calculate—on the basis of the amount of land expected to be under Eucalyptus at the end of the next five years—that the social forestry programme will cause the loss of at least 200 million man-days of labour per year.

Eucalyptus plantations destroy what little employment opportunities exist in the rural areas. Consequently, for their survival, the displaced labour is forced to search for alternative means of livelihood. That, in turn, has led to increasing pressure on the reserved forests

which are being stripped of their trees by villagers seeking firewood *not* for their own consumption but for sale in urban and semi-urban centres. Thus, in one of the villages in our survey, 15 out of 60 households were found to be fully dependent on the firewood trade. Villagers spend nearly eight hours a day walking 6 to 8 kilometres to the local market where a headload of firewood sells for some Rs 4.00 (approximately 25 pence).

When firewood becomes a commodity against which the poor villagers have to buy their food, it is unrealistic to expect them to burn firewood for their own cooking, which continues to be done with shrubs and twigs only. The theft of wood as a means for survival has

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### **The long-term impact of Eucalyptus on the fertility of agricultural lands is expected to be deleterious.**

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become the only option left open to more and more villagers. Recently two hundred villagers were caught stealing firewood in the Sakrabaile forest of Shimoga district and one person was killed in clashes with the police.<sup>17</sup> Thus the form that social forestry has taken has neither resulted in better employment opportunities for the rural poor, nor, relatedly, has it increased the chances of the healthy survival of the reserved forests.

### **The Ecological Impact of Social Forestry**

By rebuilding forest wealth in villages social forestry aims at maintaining the eco-system by reducing soil erosion, increasing soil fertility and conserving surface and underground water resources while directly satisfying basic material needs. Traditional farm forestry performed these functions in a very well integrated and sustainable manner. The farm trees directly contributed to inputs for crop production. Thus the leaves of Honge were widely used as green manure while the

leaves of Neem worked as pesticide. The farm trees planted along field bunds and tank bunds helped to bind the soil and prevent evaporation. Besides contributing to the maintenance of agricultural productivity, the traditional farm trees also met the basic local needs of fuel, fodder, construction material and fruits. Fig. 1 illustrates the role of traditional farm trees in the ecological processes necessary to sustain the ecosystem. Fig. 2 gives the comparative contribution of Eucalyptus to the same system.

The failure of Eucalyptus to contribute to those ecological processes which are basic to the sustenance of agriculture arises partly from material inappropriateness and partly from economic inappropriateness. Thus, the fact that Eucalyptus leaves cannot be used either as fodder or green manure is related to the material properties of these leaves. Similarly, the impossibility of using the tree for implements is related to its properties as a softwood. On the other hand, the fact that Eucalyptus is not being used for poles and posts is related to the inability of the rural population to match the 'demand pull' on Eucalyptus created by industry. Similarly, though Eucalyptus is not preferred as a fuelwood by the rural poor due to its quick burning rate, even in the absence of better fuelwood it cannot be used in large quantities (except lops and tops) due to the same 'demand pull' from the industries.

The traditional farm trees, on the other hand, were carefully selected from the local species to maximise material benefits and ecological stability. They were also specially suited to the tropical environment having wide canopies which provided shade in the intense summers and soil stability in the intense monsoon periods. The large-scale introduction of a non-indigenous and non-tropical species like Eucalyptus has failed to provide these benefits which are so essential in a tropical climate.

The role of Eucalyptus in soil and water conservation is still highly controversial. In terms of soil building, the species definitely does not compare with traditional species like Honge. There is much contro-

versy, however, over its soil binding properties or its influence on underground water tables—a controversy further complicated by the number of different varieties of Eucalyptus which exist. Earlier afforestation programmes of the forest department which raised Eucalyptus on forest land were motivated by the argument that it was often the only species that could survive on degraded soils. Through social forestry, Eucalyptus is being introduced for the first time on land where crops could grow. Since Eucalyptus leaves do not contribute to the building up of humus, and the tree does not allow undergrowth, the long-term impact of Eucalyptus on the fertility of agricultural lands is expected to be deleterious.

The spread of Eucalyptus as a farm tree has been motivated by a single criterion—the maximum production of wood in the shortest possible time. Yet, whilst it provides the maximum amount of wood in the short term, Eucalyptus fails conspicuously to provide for those basic material needs which are often better satisfied by the traditional farm trees—Honge, Tamarind, Mango and others. Moreover, the benefits from these trees are provided by a living resource, thus maintaining a sustainable base for human survival. The green leaves from Honge or the fruits of the Tamarind or Mango are available for years whilst the tree itself continues to grow and play its ecological role. Eucalyptus, on the other hand, only yields its principle product—wood—when it is dead.

The spread of Eucalyptus, at the cost of food and other farm tree species, has also led to a drastic decline in the genetic diversity of crops and trees. While the disappearance of such living resources is dangerous for human society as a whole—irrespective of its stage of development—the immediate impact is felt by the poor, whose income is so low that substitutes brought from outside are too expensive. Thus, the disappearance of Honge trees which provided oil for lighting, leads to dependence on Kerosene—whose supply is irregular and over whose production and price the local people exercise no control. Similarly, the disappearance of

FIG — 1: The Contribution of Traditional Tree Species to the Rural Life-support Systems.

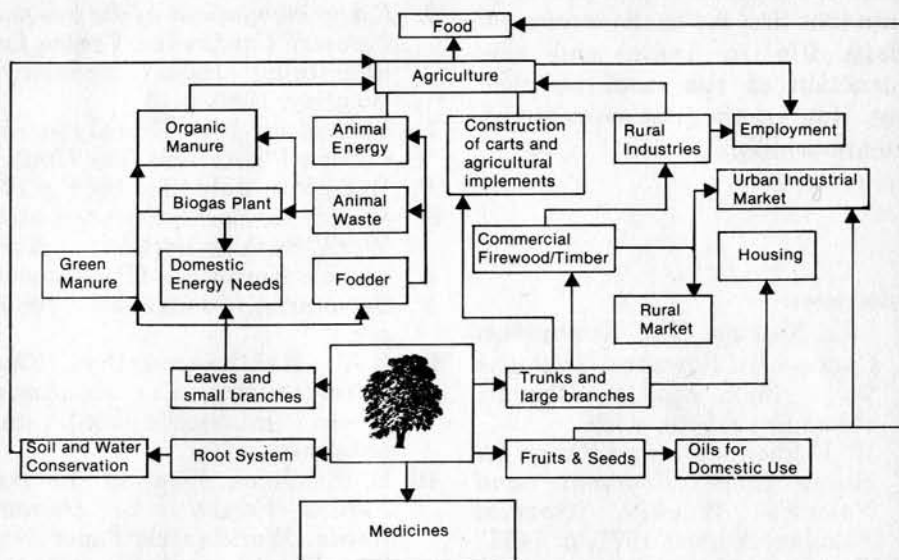
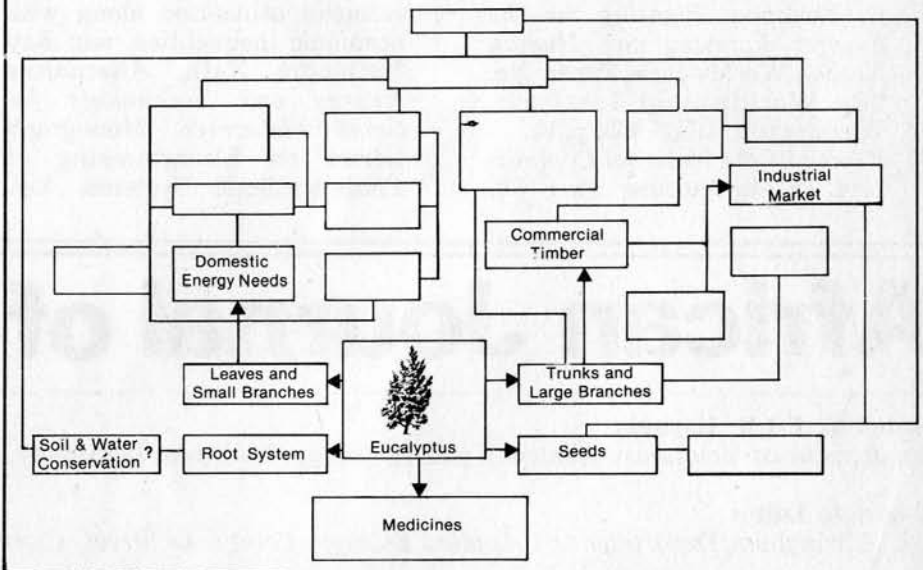


FIG — 2: The comparative Contribution of Eucalyptus to the Rural Life—support Systems.



green fodder creates a dependency on commercial cattle feeds to which only the richer villagers have access.

### Conclusion

The high sounding objectives of social forestry—serving the basic needs of the deprived rural population through a strategy of involving them in the management of forests raised on hitherto unused or uncultivated land—are inconsistent with the content of the project. Instead of special effort, being directed at involving rural communities in raising and protecting useful species on common and wasteland, the thrust is on providing incentives to farmers to transfer land from foodcrop cultivation to farm forests. Instead of the selection

of species being made on the basis of appropriateness to the needs and purchasing power of the people, the species to which importance has been given—the Eucalyptus hybrid—is neither ecologically suitable nor within the financial reach of the rural population, given that there exists a better market for Eucalyptus away from the villages.

Indeed, despite the declared radical and pro-people aims of social forestry, there is nothing to indicate it will lead in the long run either to basic needs being better satisfied or to an improvement in India's severely degraded environment. Indeed, one wonders whether such an improvement will ever come about so long as the basic strategy for development remains a committ-

ment to satisfying human needs through the operation of market forces. After all, it was those very forces that first led to the erosion of village life in India and the destruction of the rural environment. How are they not supposed to cure the problem?

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# African Journal of Ecology

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# Beyond Logic — The Real Reasons for Synthetic Fuels

by

**Jeanette Fitzsimons**

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The world's first commercial synthetic fuel plant is soon to be built in New Zealand. Environmentalists have raised a formidable array of arguments against the plant — but the Government is adamant that it will be built. Why?

New Zealand is soon to be proud host to the world's first commercial synthetic petrol plant, turning methanol from natural gas into petrol, using a zeolite catalyst developed by the Mobil Corporation. I say 'host' advisedly, because it does not imply ownership or control, but rather lavish hospitality, parasitism, and eventual subservience to the wishes of the parasite.

The plant will be owned 25 per cent by Mobil, 75 per cent by New Zealand (largely government) interests. At first sight this might seem like New Zealand control, but control of the technology, the supplies of catalysts and chemicals, and access to foreign finance, rests securely with Mobil. In return for

only a quarter of the equity capital and risk, Mobil has the chance to have its new process tested commercially, in a 'politically stable' country. In addition, the New Zealand government is providing all the off-site infrastructure—port development, roading, water supply, effluent disposal, gas pipelines, electricity substations, and more. Most of the details, and even the principles, of the commercial agreement, are secret.

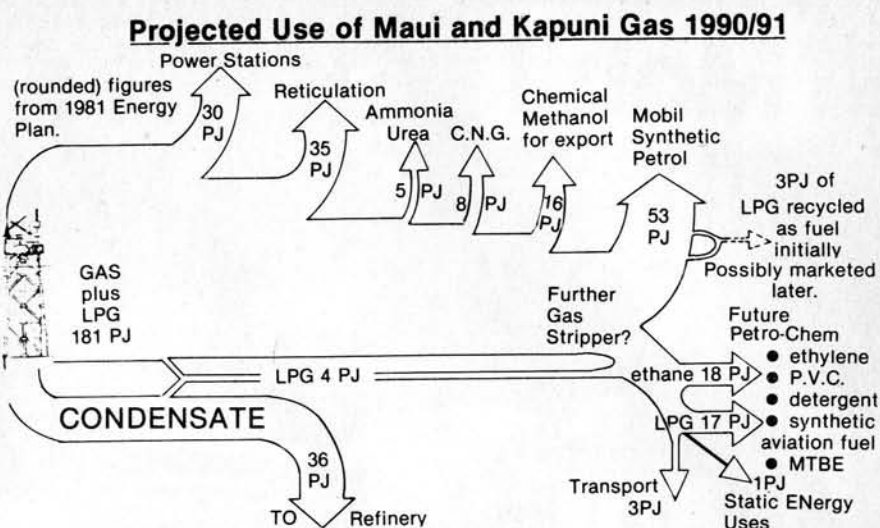
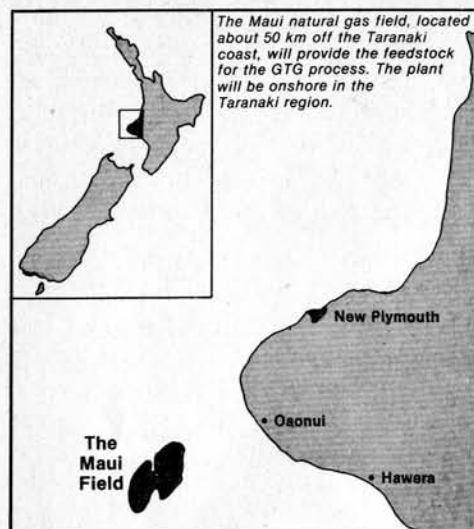
The plant is designed to produce 570,000 tonnes a year of petrol—one third of New Zealand's total projected petrol use—and 63,000 tonnes a year of propane and butane, to be used initially as fuel for the plant.

Detailed studies have been pub-

lished showing that it would be possible to supply the same amount of transport fuel for less cost, only half as much gas, and much less overseas funds, at the same time substantially reducing air pollution, creating more jobs throughout the country, and creating the right conditions for the development of renewable fuels in the future. These arguments have been ignored rather than rebutted, and the plant is going ahead.

## The New Zealand Energy Scene

Until recently New Zealand transport was totally dependent on imported oil. The railways run on diesel, despite abundant local hydroelectricity, and several cities have



replaced electric trolley buses with new diesels. Transport accounts for 70 per cent (growing) of oil use. Static energy needs are met largely from electricity, with some coal, and an increasing amount of natural gas. So the New Zealand 'energy crisis' is a transport crisis.

A large natural gas field, ('Maui', after the earliest hero in Maori mythology) was discovered off-shore in the late 1960s, and came on stream in 1979. A much smaller on-shore gas field, Kapuni, has been producing since the mid-60s. 'Condensate' (a light crude oil) associated with the gas in those fields has been providing up to 15 per cent of New Zealand's oil requirements. This proportion will not grow, as the fields have been developed in such a way as to maximise condensate production in the early years, and Maui, although larger, is much leaner in condensate than Kapuni. The consortium which developed the Maui field is half owned by the New Zealand government, and half owned by the Shell-BP-Todd oil companies.

Originally it was planned to use nearly all the gas from the Maui field as power station fuel. Only electricity generation could use (or waste) enough gas fast enough to provide an early pay-back on the capital invested in developing the Maui field. With these plans in mind, the government signed the Maui agreement—often called the 'take-or-pay' agreement—in which it

agreed to pay for a certain quantity of gas each year for the next thirty years, whether or not it actually used that much gas. Gas paid for (but not taken) in one year could be used without further charge in a future year, but the agreement leaves some doubt as to the ownership of any gas paid for but not used at the end of the thirty year contract period (i.e. 2008).

Environmental organisations led a public outcry at the waste of gas in power stations (which operate around 30 per cent efficiency) arguing that most of the electricity was to be used for heating, a need which could be met more efficiently by directly reticulated gas. They also showed that government planners had grossly over-estimated future electricity demand, thus forcing the cancellation of a giant 1400 MW gas-fired power station, and the eventual cancellation of all future gas-to-electricity plans, in favour of a policy to use the gas for transport fuel and other petrochemicals. As we shall see later, this victory was at the same time the origin of many of the energy decisions New Zealanders are now fighting.\*

### The Social and Political Scene

The New Zealander's love affair with the private motor car is as passionate as anywhere in the world. Car ownership is high—almost one car for every two people. Public transport is poor; partly because in a country the size of Britain with

three-million people and more difficult terrain, costs per passenger mile are high; partly because for decades public money has gone into motorways rather than railways, coastal shipping or buses. There is no New Zealand car, and we import more than 200 different models at any one time. Choice, status and fashion are clearly valued over efficiency and economy.

New Zealanders are conscious of being at the end of the line in international oil supply. They have already suffered car-less days, weekend bans on the sale of petrol, and price rises during the 1979 shortage. At that time, a rationing system was threatened which would favour business and two car families to the disadvantage of less privileged groups if supplies should again become short, or more expensive than the government feel the balance of payments can stand. The political importance of assuring the future of private motoring has not escaped anyone.

### The Case Against the Mobil Plant: Resource Conservation

The Mobil process is only about 50 per cent efficient. Half the energy

\* New Zealand electricity production is State owned. The power station programme has built up a tremendous momentum which is difficult to wind down once existing needs have been satisfied, so new 'needs' like smelters and pulp mills are constantly being sought in order to justify the continued expansion of the electricity system, both thermal and hydro.

value of the gas is lost as waste heat, or used as fuel to run the plant. More efficient ways of using natural gas to fuel motor vehicles are:

(1) *Compressed Natural Gas.* Fitting a proportion of vehicles, particularly those which do high mileages, with conversion kits which allow them to run directly on natural gas, which is distributed by pipeline then compressed at filling stations. This would approximately double the miles travelled per unit of gas, compared with the synthetic petrol option. Only about 60 per cent of the vehicles in New Zealand are based near present and planned gas pipelines, and some of these would not be suitable for conversion to CNG, but enough could be converted to save the equivalent of the total production from Mobil. A few thousand such kits have been fitted, and a skeleton of filling stations already exists in the North Island.

(2) *Methanol.* The gas could instead be converted to methanol in a smaller plant than the Mobil proposal, using proven technology. Vehicle carburettors could then be adapted to run on methanol—a process which is technologically proven, and cheaper than a CNG conversion. Gas efficiency would be worse than CNG, but better than synthetic petrol. The fuel would be distributed by tanker, so would not be limited geographically by the pipeline. This option would be more costly and less environmentally benign than CNG, but available to more of the vehicle fleet.

#### **The Case Against: Perpetuation of the Petrol Engine.**

By committing us to petrol technology for the next 30 years, synthetic petrol stifles the development of sustainable fuels from biomass such as ethanol and compressed biogas. Petrol will probably never be made from biomass via methanol, because the larger energy losses can only be sustained by a fossil fuel source which (while it lasts) yields higher net energy than any biomass system. Using natural gas as CNG or methanol would force us to develop a fleet of engines compatible with renewable fuels and stimulate interest in further developing them. Converting it to petrol leads into a

future of oil from coal, destruction of farm land by open-cast mining, water pollution, carcinogens, high capital cost, and more multinational control. However, the feasibility of liquid fuels from coal is still far from proven, technologically or economically, in New Zealand conditions.

#### **The Case Against: Air Pollution**

No country has a higher level of lead in its petrol than New Zealand (agreed limit, .84g/l). An energetic public campaign to go lead-free because of the well-documented health effects, particularly on the developing brains of young children, has met total government resistance. As long as the government (advised by the oil companies)

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### **The plant is a highly centralised, technocratic, growth-orientated, anti-ecological response to the fuel problem.**

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remains committed to leaded petrol, then maintaining the petrol engine condemns us to more lead. CNG and methanol are not only lead-free—they produce much lower (in the case of CNG almost negligible) levels of carbon monoxide, unburned hydrocarbons, and oxides of nitrogen.\*

#### **The Case Against: The Effect on Energy Planning.**

The sheer scale of a plant capable of producing one third of a nation's petrol is inappropriate. A breakdown would require emergency petrol imports, which may not be obtainable at short notice. It has a distorting effect on energy planning because it produces no diesel. Diesel will continue to be produced from the country's only oil refinery, and the associated petrol from the refinery, combined with Mobil petrol, will saturate the market, leaving no room for any petrol substitutes from sources which are environmentally more benign.

#### **The Case Against: Multinational Control.**

New Zealand's new move to indus-

trialisation is being carried out largely by multi-nationals. Their resulting control over our economy will give us even less independence in foreign policy, trade and life-style. The methanol-to-petrol process is commercially untested, and may not work satisfactorily when scaled up.

#### **The Case Against: Capital Cost**

Capital cost is stated to be 767m dollars (NZ) in 1980 dollars, but the corporation has just raised a 1524m dollar (NZ) loan overseas, plus a 500m dollar (NZ) contingency loan, for this project. The capital cost of the corresponding CNG programme (i.e. conversion of 400,000 vehicles, plus 800 compressor stations) would be, at my best estimate, 600m dollars (NZ) at 1981 values.

Two thirds of the cost of the Mobil plant will be in overseas funds. Only one third of the cost of a CNG programme would need to be spent overseas, as a larger part of it is labour. New Zealand has a large and growing foreign exchange deficit. The Mobil plant would require a continuous outlay of overseas funds for catalysts, chemicals and parts, throughout its working life.

#### **The Case Against: Land Use.**

The plant site takes up over 400 acres of prime agricultural land, which combines Taranaki's superb volcanic soils with a climate which is milder and sunnier than most of the province. It is particularly suitable for horticultural development, and is also on a beautiful stretch of coastline. Good agricultural land and beautiful coastal scenery are not as rare in New Zealand as in many countries, but they are certainly less abundant than they used to be. The noise, lighting and traffic effects of the plant will disrupt a quiet rural community, and the plant's demands for water will limit future horticultural or other developments in the region.

#### **The Case Against: Maori Values**

The land includes ancient burial grounds which are important to Maoris living nearby. Priceless carvings and other artefacts have been found buried in a swamp area on the

\* Methanol may not necessarily reduce oxides of nitrogen depending on engine tuning.

site, and more are undoubtedly there. The plant effluent (containing zinc and possibly other metals) will cross coastal reefs which at present provide 150 different types of seafood which are important to Maori tradition and culture. Their cultural beliefs, wisely, prevent them from eating these foods again if the effluent pipe is built as planned, even if non-Maori scientists say it is 'safe'.

#### **The Case Against: Jobs**

The plant will provide 250 permanent jobs, and 1300-1800 during construction. A CNG programme would provide far more jobs, spread evenly through the country, for less capital cost.

#### **The Case Against: LPG Products**

The Mobil project is intended to add 63-80,000 tonnes a year of liquified petroleum gas (LPG) as a by-product in a country where the presently-planned 110,000 tonnes a year is widely viewed as too dangerous. The CNG alternative would mix most of the LPG constituents (propane and butane) into the pipeline gas, maximising the range of CNG vehicles (around 3.3 gallons of petrol equivalent per fill) whereas the current oil industry plans entail creation of a nationwide bulk LPG system using a 1000 tonne payload coastal tanker to feed 1000-3000 tonne regional depots capable, in unlikely mishaps, of incinerating large parts of cities or suburbs. The retail competition against CNG thus created is increased by the Mobil LPG by-product; effort to sell this overseas have failed.

#### **The Case Against: Social Values**

The Mobil plant is a highly centralised, technocratic, growth-oriented, anti-ecological and militarily vulnerable response to the fuel problem. It discourages individual initiative and adaptation, conservation, and change in lifestyle. It encourages reliance on 'experts' and central government to maintain present lifestyles. This is no accident. Its psychological effect on New Zealand could be enormous.

Opinions will differ over which of these arguments are the most

important. Economists will concentrate on costs and efficiency; sociologists on employment and the effects on the local community; traditional environmentalists on air and water pollution and loss of farmland. But those who believe that only a shift in public consciousness away from consumerism towards a different value system can prevent final ecological disaster may agree that the psychological effects, the further erosion of individual responsibility, could well be the most damaging of all.

#### **Justification for the Plant**

One might well ask, in the face of all these arguments, what reasoning is used to justify the project.

1. The Liquid Fuels Trust Board, which advises the government, has not published any basis for its decision. Synthetic petrol is part of an energy-intensive strategy announced only after the conclusion in 1979 of a 2-year government-organised public discussion exercise which emphasised energy efficiency and moving to renewable sources. The government-funded Commission for the Future, which fostered public discussion of future options and published an alternative plan for liquid fuels, has been abolished. There is now no public forum for debating the direction of New Zealand's 'development'. No attempt was made to reply to the booklet produced by ECO, a coalition of environment and conservation organisations, which carefully costed and quantified the CNG and methanol alternatives, and elaborated on the arguments given above. Official response to this never really got beyond: 'The author is a member of the Values Party so of course . . .' and 'What right has she to criticise government plans?'

2. The issue was presented to the public as a choice between importing oil or making synthetic petrol. Considerable efforts were made to avoid comparing it with CNG.

Opponents of the project were cast as opponents of self-sufficiency, wanting to condemn New Zealand to perpetual reliance on imported oil. Ironically, it was these same opponents who first warned of the impending oil crisis a decade or more

ago, and argued strongly for rapid progress towards self-sufficiency in fuel—but by a very different route.

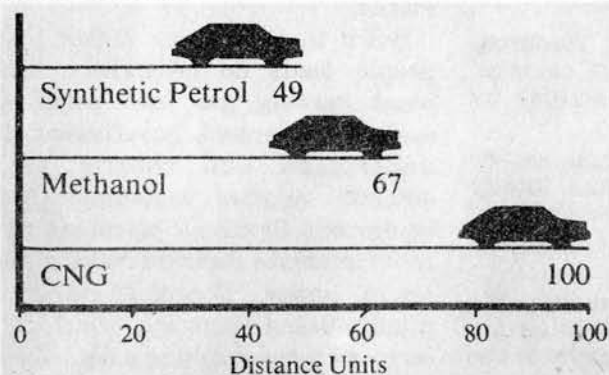
3. The cost is still expressed as '767 million dollars (NZ) at 1980 values', despite the fact that it is now 1982 and the project has only just begun. This figure ignores inflation, unfavourable US-NZ exchange rates, interest during construction and working capital, all of which are particularly unfavourable to projects with a long lead-time. Inflation affects major construction works far more than other sections of the economy, whereas the cost of CNG conversions is falling in real terms. Therefore, the earlier the date one chooses to compare costs, the more favourable it appears to Mobil.

4. When confronted with the CNG option, officialdom makes much of reduced range per fill of fuel, slightly reduced full-throttle power and reduced boot space because of the gas cylinder, implying that these problems are of the same magnitude as sustainability of fuel supply, air pollution and overall cost.

5. Insofar as the government agrees to compare synthetic petrol with CNG at all, their argument rests on the claim that motorists cannot be induced to equip their vehicles for CNG fast enough to achieve the same level of self-sufficiency as Mobil would produce. This is certainly borne out by the slow progress of the present CNG programme, but the constraints are largely of the government's own making. The small grant towards the capital cost of the conversion does not even equal the sales tax and duty on conversion equipment, which the government refuses to waive; the installation of filling stations has not kept pace with demand; and a recent draconian rise in the price of LPG which was being promoted as a cheap alternative to imported petrol, has left the public extremely suspicious that the price differential between CNG and petrol will disappear when the government needs more revenue. A package of incentives which would encourage public support for CNG has been rejected by the government as 'unnecessary', while at the same time they bewail the fact that CNG conversions have fallen well behind

## Relative Fuel Efficiencies

Distances travelled on a unit amount of Maui gas used to form each fuel.



Source: Peter Waring, DSIR. *Dominion* Feb 10, 1981.



Values Party

even the modest target they say they do favour.

### The Real Reasons behind the Mobil Decision

The obvious reason for Mobil's determination to press on, despite considerable local and national opposition, is their need to demonstrate that their process is technically and commercially viable. We are told by lawyers involved with the company that there are around three dozen such plants intended for the United States, and ready to go as soon as the process is proven. (Presumably the feedstock there would be coal, as gas in the United States is far too valuable to waste in such an inefficient process.) Where better to prove the process than New Zealand—politically and socially stable, with the infrastructure of a semi-developed country, and a government falling over itself to be friendly to multi-nationals.

A less obvious reason is the vulnerability of oil companies to alternative fuels based on simple technologies. Although rising oil prices have brought them windfall profits in the short term, they must be aware that this stimulates renewable resources for which they cannot control the raw materials. It is therefore vital to maintain the petrol engine, as petrol is never likely to be made from renewable resources, or with backyard technology. To use Maui gas as CNG or methanol would foster the development of vehicles capable of running on compressed biogas or ethanol, both

using decentralised biomass feedstocks and technologies which don't require the investment or expertise of multi-nationals. New Zealand is particularly well-placed to lead the world in developing biomass fuels. We have a low population density and an agricultural economy generating plant and animal wastes. We have local experience in distilling alcohol. We have an educated population and innovative scientists. The prospect of New Zealand demonstrating to the rest of the world that biomass fuels are an economic, locally controlled and environmentally benign alternative to costly oil, with very little opportunity for giant corporate investment or control, must terrify oil company executives if they have thought about it at all.

But what of the elected representatives of the people? Surely their priorities are somewhat different? No-one can get right inside the heads of decision-makers. What follows is, therefore, only an interpretation of their words and actions. I believe their real motivation can be classified as economic, political and psychological, but possibly in reverse order of importance.

### Economics

It is possible to use economics to justify almost anything one wants to do by adjusting rates of return or discount rates or by varying which costs are included and which 'externalised'. It is difficult to know whether the government really feels bound by the 'take or pay' agreement, or whether it is a convenient

way to provide some economic justification for what they want to do for other, (i.e. political and psychological) reasons.

It is interesting though, that another government contract with a multi-national, on the supply of electricity to the Comalco aluminium smelter, was re-negotiated recently to quintuple the electricity price paid by the company to the government without any disastrous consequences. Our international credit rating did not suffer; neither Comalco, nor other multi-nationals have shown any signs of packing their bags.

The most valuable part of the gas field, although only a small proportion of its energy content, is the condensate, which can substitute directly for crude oil at the refinery, yielding petrol, diesel, and other products. All policies are aimed to maximise early production of this condensate, which maximises the return on the investment which developed the field, regardless of today's oil prices and the certainty that the condensate will become more valuable. But increasing condensate production entails increasing gas production; so any policy which uses gas more efficiently reduces the flow of associated condensate. According to government accounting methods, therefore, the gas actually has a negative value, and the most 'economic' thing to do with it is to flare it to waste! This already happens in some Middle East oil fields where the gas is a minor component. To let it happen in a gasfield is surely a case of the

tail wagging the dog. The Mobil plant is to some extent just a complex way of flaring gas to waste, because to do so directly would be politically unacceptable. A similar strategy has already been used when gas-fired power stations (built before the change of policy) were run in preference to hydro, even in the knowledge that hydro lakes were full and that water would be spilled to waste over the dams shortly.

This view of government reasoning was borne out by an interesting slip of the tongue made by the Chairman of the Liquid Fuels Trust Board, which advised the government to build the plant. (He is also the Chairman of the Synthetic Fuels Corporation, composed so far of Mobil and government shareholders, which was formed to build and run the plant itself.) Questioned about the need for synthetic petrol rather than alternatives, he said, 'Nothing else can use the gas fast enough—I mean achieve self-sufficiency fast enough'.

### Political

Any government which wants to survive at this stage of history needs to be seen to be doing 'something' about the oil crisis. A huge petrochemical plant costing 20 per cent of our annual export earnings, is a very visible 'something'. In fact, the more it costs, the more evidence there is of government concern for keeping our tanks full. A diesel shortage would be far more destructive to the economy than a petrol shortage, but it is petrol which is most visible to the voters, and which must be protected.

There may also have been some pork-barrelling involved. New Plymouth, the city 12 miles from the plant site which is expected to experience boom conditions during the construction period, is a marginal seat. The government member was returned with an increased majority in the November 1981 election despite an overall swing against the government. Even though 60 per cent of the cost of the plant will be spent overseas, local contractors, especially in the New Plymouth area, expect to do well out of the remaining 40 per cent. So will local retailers and service industries, who will have

time to make their profit and sell out before the boom collapses at the end of the construction period.

### Psychological

'But exploiting these resources requires a new brand of courage, determination and *self-sacrifice* by the whole nation.'

'The processes and techniques we are using are, in many cases, totally new. We are on the *flame-front* of mankind's knowledge. We are pioneers.'

'As a nation we are gambling. We have to gamble. And the stakes are high. We are taking big risks in the hope of getting big rewards.'

If the gamble is successful, we could become what one leading oilman described as "the blue-eyed Arabs of the Pacific".

'It reflects the emergence of a *thrusting breed* of Cabinet Minister who has become impatient with the kind of decision-making that retarded New Zealand's development in the 1970s.'

'Oilmen Beat the Elements.'

'But to *conquer* it meant breaking new ground in oil technology.'

'... the pile driving operation was completed... the *battle* against the elements had been won.'

(*On oil from coal*)... 'The technology doesn't yet exist, but it will be found. It *must* be found.' (*emphasis added*)

These excerpts from a National Party publicity hand-out, distributed in letter boxes during 1980, illustrate the psychology of the 'Think-Big' philosophy which was the government's main plank in the 1981 election. Big projects confer prestige. It is difficult to have a glamorous opening ceremony for a decentralised CNG programme.

It is a phallocratic view of the world, concerned with dominating, conquering, subduing; fascinated by size and power. It is preparation for battle, and the rest of us are called on to make the sacrifices that war entails. The sexual overtones of the language used are not even subtle.

An integral part of this psychology is a belief in technology rather than people. This combines with the legacies of colonialism to produce the firm belief that we now need overseas capital and expertise to solve New Zealand's problems. We desperately want to be big boys, but ultimately we can only get the shiny new toys by asking Daddy. We scoff

at home-made toys and home-grown solutions, and prefer the passive consumerism of buying the 'latest thing' from the international supermarket.

Belief in technology rather than people leads to centralism. One plant turning gas into petrol is easier for central government to understand and control than 400,000 vehicles installing CNG equipment. Synthetic petrol is a way to concentrate decision-making and retain power. Decentralised community-based solutions, which rely on many people making a decision to adapt their vehicle to a different fuel, are unpredictable and uncontrollable.

The technical fix, rather than adaptive behaviour, is seen as the way out of resource or ecological constraints—yet this is in a country with a reputation, when it was much less 'developed', of designing and building some of the best bridges and steam locomotives in the world. (We now buy even our rolling stock overseas, and rely on foreign companies for much of our civil engineering.)

The analysis would not be complete without looking at the lifestyles and personal experience of the men who make decisions like these. It is unlikely that they have ridden a bicycle, walked any distance to work, or used public transport (other than airlines) for many years. Their reality is that the motor car is their link with everything they do. They have their vision of the future, just as we have ours. They get the same thrill and emotional satisfaction from large buildings, fast cars and rising GNP graphs as we get from organic gardening, solar energy, or tramping in wilderness. They equate our preferred future with 'cold baths and candles' (a quote from a previous New Zealand Minister of Energy) and are as frightened by it as we are by nuclear power. Their friends and colleagues reinforce their value system, just as ours do for us. When challenged about the rationale for this same plant, the Minister of Energy replied, 'It's a question of whose advice we believe.'

It is also possible that the phenomenon of 'Group-think', as described by Janis,<sup>1</sup> played a part.

According to him, individual members of a cohesive, closely-knit group may so desire to maintain consensus that they suppress any doubts or differences which might threaten it. Input is not sought from people who might have a contrary point of view, and if such people express critical opinions from outside the group they are labelled in some dehumanising way which allows their criticisms to be disregarded. (Communist, environmentalist, academic, member of a minor political party, woman, non-expert, have all been used as denigrating labels in New Zealand.) It is becoming apparent that the pivotal New Zealand energy decisions are being made by a very small group of men—a couple of senior civil servants, one or two heads of industry, a cabinet minister or two, leaders of research in universities or advisory bodies. These key people have a variety of overlapping positions in industry, academia, research and government. It must be difficult for an individual to jeopardise the harmony of such a group, and his role in it, by allowing full rein to his critical faculties and properly investigating alternatives to the group's decision.

### Conclusions

Battles like this will never be won on logic. Logic is used by each side to justify a point of view, but neither proponents nor opponents will ever be convinced by the others' logic. Some supporters may, however, change their allegiance if they are given sound logical reasons, so the arguments must still be put forward.

Economics is an untrustworthy ally. It appeared to support the case against Mobil because the capital and running costs of the alternative plan could be shown to be less. However, any system of logic which can seriously hold that the value of a non-renewable energy source in the 1980s is less than zero, must be regarded with deep suspicion.

The legal process, which was successfully used in the early 1970s in New Zealand to enforce standards of pollution control and require statutory bodies and local authorities to carry out their prescribed functions, was useless in this case. The

National Development Act, 1979, was created to prevent any 'delays' to major projects because of environmental concerns. It is said that Hitler never broke the law in Germany. Likewise, any legislation which threatens to get in the way of government policy will be changed.

Motivation which is emotional and political must be fought with emotion and politics. That proved possible in New Zealand over the nuclear power issue, which has now faded off our horizon, but in the present case, emotion and political leverage worked for Mobil, not for us because of public fear of fuel shortages. That will only change if New Zealanders can be induced to face squarely the nature of that fear, and their neurotic response to it—the belief that government can and should protect them from ecological reality; that throwing more money at a problem will make it go away; and the obsession with accumulating more 'things' to ward off eventual disaster. New Zealanders have been on the gravy train of cheap oil for 25 years. Politicians

promise that we can stay on the same tracks indefinitely; ecologists say that to attack fuel shortages with short-term, wasteful policies can only lead to a more sudden, catastrophic decline later. Politicians ask people to suppress any fears for the long-term future; ecologists ask them to address the problem and work towards new value systems and aspirations that will avoid catastrophe.

The challenge is to offer an image of a post-industrial age which will seize imaginations and emotions with the prospect of a more human and satisfying way of life than they enjoy at present.

### Reference:

1. Irving L. Janis, *Victims of Groupthink: a psychological study of Foreign Policy Decisions and Fiascoes*, 1972.

I would like to thank Molly Melhuish (editor of *Energywatch*), Louis Arnoux (Energy Research & Development Committee) and Robert Mann (Auckland University) for ideas and comments on drafts.

## Journal of Arid Environments

Editor

J.L. Cloudsley-Thompson

Publication: Quarterly Subscription: Volume 5, 1982  
£34.00 (UK) \$89.50 (overseas)

This important journal provides a forum for original scientific and technical research work and reviews concerned with the problems of desert environments. It contains book reviews, technical notes and short communications thereby maintaining a broad view of the subject. The major problems facing the inhabitants of the world's deserts are socio-economic rather than scientific and result from increasing population, overgrazing by domestic animals, drought, salinization and soil erosion. Although science may suggest strategies for development, administrators often have little access to the knowledge available. By presenting both accepted and controversial ideas, this journal provides administrators with guidance and firmly established scientific facts on which to base their decisions. Such an interdisciplinary approach is of immense value to administrators and government officials working in arid lands throughout the world. It is also essential reading as an important means of communication for research workers in meteorology, geography, biology, ecology, agricultural science and husbandry concerned with research on arid environments.

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# The Greening of Poland

by  
Rafal Serafin

The rise of Solidarity led to a new awareness of environmental problems in Poland — once described as the most polluted country in the world. How much did the union achieve? And what lessons can the West learn from Solidarity's experiences.

On the 20th June 1981, over 2,500 people from settlements along Poland's Baltic Coast marched in protest against the continuing environmental destruction of Gdansk Bay. The demonstration blocked the main highway between the cities of Gdynia and Sopot, and a petition with 20,000 signatures appealing for action against pollution was sent to Poland's Parliament, the Sejm.<sup>1</sup> Such a bold expression of public misgivings over environmental issues is without precedent in the Eastern Bloc. It represents a widespread recognition among working people along the Gdansk Coast that environmental destruction is intimately related not only to their own worsening economic circumstances, but also to increasing health hazards for them and future generations—a recognition that persists today, even amidst the infringement of civil liberties and widespread persecution being perpetrated under Poland's draconian Martial Laws.

The demonstration was much more than just a local reaction to a local problem. It was a witness to a new awareness in Polish society of, on the one hand, the impending dangers of pollution, ecological destruction and resulting health hazards; and, on the other hand, a complete loss of faith in the belief that scientific and technological expertise and innovation will always avail Man of a way out of any difficulties which he might face. The growth of this new perception accompanied the growth and development of the independent trade union Solidarity. Indeed, environmental issues—seen by the rank and file membership of the union as directly impinging on the everyday lives of millions of ordinary people—had been taken by Solidarity to be part and parcel of the social and economic problems facing Poland.

The Polish State—planning system is highly centralised and is committed to rapid industrialisation based on the Soviet model. During the seventies, under the leadership of Edward Gierek, economic growth became such an obsession that environmental considerations were either waived aside or simply ignored. Take, for example, the development of Poland's second aluminium smelter near Konin, in central Poland, in 1966. In 1973, official approval was given for the creation of a

three kilometre protective belt around the plant. Nothing came of it. In 1978, a modernisation programme was drawn up for the plant, aimed at reducing the amount of fluorine emitted from 20 kg. per ton of aluminium to 4 kg. The four-year scheme was to have been implemented in 1979 but the necessary funds were not made available.<sup>2</sup>

The dash for economic growth in the seventies was based on large scale borrowing, the transfer of technology and the acquisition of licences from the West. Those agencies responsible for controlling pollution found themselves with little standing in the Ministerial hierarchy, and their cumbersome bureaucracy robbed them of the chance of initiating conservation projects—industrialisation was thus allowed to proceed with little regard for the public's safety or for ecological balance.

In an attempt to redress this imbalance, the ten million strong Union recognised issues of public health, industrial safety, and environmental destruction to be of key importance in its proposed social and economic reforms. The union's first National Congress of Delegates, which took place in Gdansk in October 1981, ratified a 50-page programme of aims, activities and proposed social and economic reforms.<sup>3</sup> Resolution 15 states: "In the face of the biological endangering of the nation, ensuring public health is of special concern to the Union". Resolution 16 goes on to state: "The Union will fight for effective protection of man's environment". The importance of these Resolutions become clearer in the light of the opening statements of the Programme: "We constitute an organisation which combines the characteristics of a trade union with those of a massive social movement. (. . .) An opportunity has arisen for a real rebirth of our country. Our Union (. . .) wants to be, and will be, a force that will ensure this rebirth."

On 28th July 1981, Solidarity's National Co-ordinating Commission (KKP — Krajowa Komisja Porozumiewawcza) set up a National Commission for "Man and Environment" at the Social and Union Research Centre (OPS-Z — Ośrodek Prac Społeczno-Zawodowych), Solidarity's research and advisory body. It was to "speed up union activity working for environmental

protection and the rational use of natural resources (. . .) through social pressure and control (. . .) and cooperation with interest groups and institutions, concerned with environmental issues, planning and control. These groups include the Polish Ecology Club (PKE — Polski Klub Ekologiczny), the Association of Scientists and Technicians (NOT — Naczelna Organizacja Techniczna), the Nature Conservation League (LOP — Liga Ochrony Przyrody) and so on (. . .) as well as academic and research institutes and rural solidarity. The National Commission was given the brief of preparing a "multi-objective programme for environmental protection" which was to define the "role of the Solidarity Union".<sup>4</sup>

Dr Ryszard Paczuski, from Torun, was one of the leading architects of this programme. He prepared a Report for the Congress, which identified environmental issues as being key components of economic reform. His report begins: "Saving the environment from destruction, as well as natural resources from plundering exploitation is of national importance, requiring the inclusion of an environmental protection programme as an integral part of the overall programme of economic reform."<sup>5</sup>

The Congress endorsed the recommendation of this report very quickly and almost without debate. Why did this happen? And how did the conviction that environmental and economic considerations must be closely integrated come about? And, perhaps most important of all, what happened to the prevailing paradigm of technocentric values?

#### The Extent of Environmental Destruction in Poland

Many of the answers lie in the scale and pervasiveness of environmental destruction and pollution in Poland, and the extent to which it has affected the lives of ordinary Poles. The best known example and biggest symbol of the country's "ecological crisis" is the Aluminium Smelter at Skawina in Silesia. The smelter was constructed in 1952 in the valley of the Vistula River, some 14 kilometres southwest of Cracow. Production of aluminium began in 1954. The smelter's capacity was originally projected at 15,000 tons per annum, but production steadily increased, reaching some 53,000 tons in 1980. As production doubled and tripled, the plant was extended; old equipment was kept going long after it should have been retired, no improvements were made in the production process and there was a complete lack of anti-pollution facilities. Every year the smelter released 2,500 tons of impurities and 962 tons of gaseous fumes, forming over 1,000 tons of fluorine compounds, in the atmosphere.<sup>6</sup>

Westerly winds prevail in the area and blow the emissions over the town of Skawina and the southwestern part of Cracow. Moreover, inverse thermal systems are formed in the lower atmosphere, and cool air masses linger there longer than elsewhere. Impurities, therefore, accumulate, and the above average humidity (the annual mean is over 80 per cent) is conducive to chemical interaction and the formation of harmful concentrations of sulphur dioxide and hydrogen fluoride. These corrosive acids not only eat away at architectural detail in stone and stucco work but also seriously

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weaken walls, roofs, and many metal elements. Surface water is affected by these substances as is the whole underground water table because rainfall precipitation washes down the waste deposits freely dumped in the neighbourhood of the smelter and carries toxic compounds into underground streams. Fluorine compounds have also drained the soil of those minerals that would normally serve to neutralise them. This has led to markedly poor harvests in the area, and the accumulation of toxic substances in crops destined for fodder endangers livestock. Finally, the health of human beings is also endangered: experts believe that industrial fluorine emissions cause serious disturbances in the alimentary canal.<sup>7</sup>

To many, the Skawina Plant is a symbol of Poland's "ecological crisis" and, most important, of the direct links between that crisis and the misguided political and economic policies of post-war Polish planners. The plant became the focus of public pressure to establish effective safeguards for both public health and the natural environment; that public outcry marked the beginning of a uniquely Polish, environmental movement.

### The National Ecological Crisis

One direct result of the existence and activity of Solidarity was that information and reports, which had been strictly suppressed or censored prior to the summer of 1980, became not only available publicly but also widely discussed. Indeed, according to a remarkably revealing government report, pollution and environmental destruction in Poland were deemed to have reached the proportions of a "national crisis". The report, *An appraisal of The State of The Environment—1980*, was prepared by a fourteen member Commission from the National Centre for Environmental Protection and Development (Centralny Ośrodek Badań i Kontroli Środowiska) and the State Environmental Inspectorate (Państwowa Naukowo-Badawcza Inspekcji Ochrony Środowiska) under the leadership of Joanna Dusoga and Stanisław Zadrozny.<sup>8</sup>

The report paints a gloomy picture of neglect, and increasing environmental destruction. It estimates that in 1979, two thousand million cubic metres of industrial and municipal effluents were discharged into Polish lakes and rivers. Nearly half of the discharges are estimated to have been insufficiently treated to neutralise potential toxic effects. Polish watercourses are classified into categories of limpidity (cleanliness) based on standards of "acceptable indices of pollution density" as determined by the Decree of the Council of Ministers of 29th November 1975.<sup>9</sup> That decree also stipulates the levels of fines for violation of these standards. Both are based on the "guiding criterion of economic usefulness".<sup>9</sup> (See Table I)

Government statistics based on this classification show the seriousness of water pollution in Poland. The Vistula, Poland's largest and most famous river (1047 kilometres), has no class 1 waters: 54 per cent of the length of its course is classified as Class 3, while 28.8 per cent is in the unclassified category. The Odra (742 kilometres), Poland's other major river which flows through some of the country's largest industrial



Rafał Serafin

Information and reports, which had been suppressed or censored prior to the summer of 1980, became widely available as a result of Solidarity's activities. Poland's environmental crisis became a major topic of discussion.

centres, has 64.7 per cent of its watercourse in the unclassified category—that is, unsuitable for even industrial purposes. Pollution levels in the Odra's tributaries are not better: the Warta (808 kilometres) has 60.9 per cent of its course unclassified, the Bobr (269 kilometres) has as much as 88.3 per cent of its length unclassified and the Mala Panew (132 kilometres) has 64 per cent.<sup>9</sup>

The 1980 government 'Appraisal' predicts worsening water pollution. The length of the "most polluted watercourse" has increased by 6 per cent since 1967, while Class 3 waters have increased by 10 per cent. Only 9.8 per cent of inland waters now remain in the Class 1 category.

Air pollution is also getting worse. In 1979, 2 million cubic metres of dusts and 5 million cubic metres of gases were released into the atmosphere. Sulphur dioxide from the burning of sulphurous coal is the single worst problem of air pollution. In 1979, the national average for SO<sub>2</sub> fallout was 14 tons per square kilometre, while in Cracow the figure amounted to a massive 255 tons per square kilometre.<sup>8</sup>

Estimates for the years up to 1990 predict that current standards will have been dramatically exceeded—"phosphorus in air and water will be exceeded by 476 per cent, while 'nitrates' standards will be exceeded by 276 per cent". The 1980 'Appraisal' concludes that "the danger of a biological catastrophe on a national scale is immediate if no action is taken now".<sup>8</sup>

Meanwhile, leaflets handed out at Solidarity's Congress in Gdansk warned: "The biological basis of our country, our health, our children and future generations continues to be seriously endangered by the devastation of the environment in which we live. (...) One third of the country's food is poisoned, one fifth of the population is seriously endangered by air pollution, one third of Polish rivers are completely dead, the Baltic is dying, while 78 per cent of lakes have levels of pollution that far exceed any acceptable standard".

Agreement as to the seriousness of environmental damage is virtually unanimous, both in Government circles, in Solidarity, among academics, interest groups, but perhaps most of all among working people. The 1980 'Appraisal' estimates that losses to the national economy could amount to the order of 280-480 thousand million zlotys\* annually, as a direct consequence of environmental degradation. The escalating costs of treating drinking water, recultivating devastated agricultural and forest land, and the already stretched health services, lead to the conclusion that "environmental safeguards and protection must be a part of any social and economic reform".<sup>8</sup> This closing statement of the Government Report is echoed by Solidarity's Man and Environment Commission, which acknowledges that environmental destruction and economic revitalisation are closely related, that mismanagement of natural resources leads to mismanagement of human resources, and that pollution with its associated dangers to public health is one of the factors responsible for the current economic crisis.

#### Elements of the Crisis

Though "national crisis" is the term increasingly used to describe environmental problems in Poland, the effects of pollution and the hazards of ecological degradation are very localised and most keenly felt in the industrial regions.

The maritime regions of the Baltic coast are Poland's traditional tourist areas. As long as ten years ago, the local authorities submitted detailed plans for protecting the environment, and called for more investment in order to modernise or construct effluent treatment plants. In 1973, industrial air and water pollution, together with bacteriological infection of local waters from the discharge of untreated sewage, forced local Health Authorities to close the beach resort at Puck. This was only the beginning: today, the Health Authorities have closed more than twenty such resorts along the coast. Large yellow notices forbid all bathing and water sports, often restricting entry onto the sand itself by threatening large fines. It is estimated that there will be five million fewer tourists from Poland itself and 300,000 fewer visitors from abroad, annually, as a direct result—thereby leading to the loss of 14,000 jobs in the tourist trade.<sup>10</sup> Local fishermen protesting against the continuing destruction of their "workshop", estimate the loss of 300 jobs and a reduction in fish catch of 30,000 tonnes due to the poisoning of sea flora and fauna and the destruction of fish breeding grounds.<sup>10</sup>

\*Total Current Government Expenditure in 1979 amounted to 985.9 thousand million zlotys.<sup>9</sup>

Table I

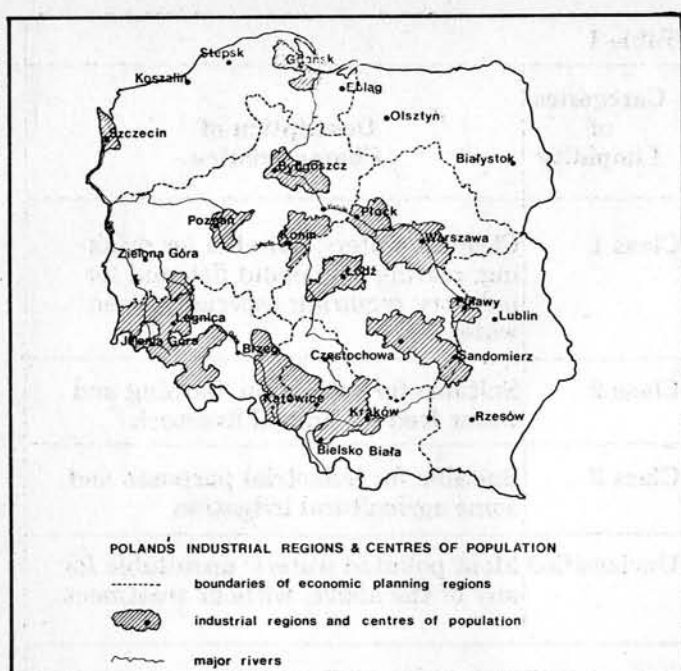
Categories of Limpidity	Description of Characteristics
Class 1	Cleanest waters: suitable for drinking, rearing salmonoid fish and for industry requiring especially clean water
Class 2	Suitable for recreation, bathing and water feed for animal livestock
Class 3	Suitable for industrial purposes and some agricultural irrigation
Unclassified	Most polluted waters: unsuitable for any of the above, without treatment
(Source: <i>Polish Statistical Yearbook</i> )	

The culprit is pollution from the massive oil and chemical industries of the Gdansk-Sopot-Gdynia conurbation. It is the largest port complex on the Baltic Sea, and yet has few facilities for dealing with spillages of fuel and cargo. It is also the centre for manufacturing sulphur and for processing phosphate fertiliser (together the best known and most blatant polluters in the whole region); the petrochemical industry; and the shipbuilding and repairing industry. Each year two-thirds of Poland's sea-going commercial cargo traffic passes through the ports of Gdansk and Gdynia.<sup>9</sup>

The Gdansk-Sopot-Gdynia conurbation is one of Poland's biggest population centres, housing one and a half million people. Yet the municipal sewage systems are old and ineffective, and simply unable to cope with demand. Only three mechanical effluent treatment works are in operation today—there is an urgent need for more biological treatment facilities. Dr Marian Idzikowski, the Chief Sanitary Inspector for Gdansk, has stated bluntly that there are no indications that the situation will improve in the foreseeable future. Modernisation of effluent treatment facilities is not due to begin before 1983. Detailed technological plans have yet to be drawn up, but costs are already estimated at well over 1,000 million zlotys.<sup>11</sup> The result? Untreated sewage and industrial effluent will continue to be dumped into the Gdansk Bay. Even the Gdansk Voivode (Governor\*), Jerzy Kolodziejski, has publicly stated that "the state of local water pollution has all the symptoms of the first phase of an ecological catastrophe".<sup>12</sup>

On the 3rd July 1981, the Environmental Protection Commission of the Inter-factory Founding Committee of Solidarity in Gdansk, appealed "To all NSZZ

\*Voivode: Poland is divided into 49 administrative provinces, called voivodships. Each has a Voivode or Governor who is responsible to the Central Authorities for the administration of the Province.



'Solidarnosc' Inter-factory Union Founding Committees and Factory Commissions in the Nation" to take heed of the "critical state of the natural environment . . .". The Commission warned against "organising summer youth camps and taking part in water sports" along the sea coast as a result of the increasing "bacteriological infection of maritime waters". The resorts at Mechaliniki near Rewa, Rewa, Puck, Gdansk-Brzezno, Gdansk-Sobieszowo, Orli, Gdynia-Orlowo, Miloszow, Stegnia and Jantarz have all now been closed. The appeal concludes that "the Gdansk Coast will be unable to fulfill its traditional role for tourism and recreation in the summer season (. . .) for years to come".<sup>13</sup>

To local inhabitants it seemed that, even after the unprecedented street demonstrations, the only people who refused to hear their cries for help were the central decision-makers, who continued to appear unimpressed about the clear and pressing nature of the ecological crisis along the coast. This only further aggravated and entrenched disillusionment with the cumbersome regulations and the empty rhetoric of Polish environmental planning. What is more the Government's indifference led to its environmental policies—such as they are—being openly challenged. Local interest groups, ecology clubs and Solidarity branches, together with academics and journalists, began seriously to question the basis of man's true relationship with nature. Cherished assumptions about Nature's "infinite malleability" came under strong criticism—indeed there was a growing conviction that such assumptions were founded on a dangerous illusion. For its part, Solidarity's Environment Commission began to formulate a new environmental strategy, based on respect for human and natural resources, as opposed to a policy of domination and exploitation grounded in a blind faith in science and technology.

The shift towards a more 'ecocentric' view of man and nature, however, was more a reaction to the failures of the economy in the last decade—the blatant misman-

agement of human and natural resources, nationwide corruption and waste, investment in large scale 'prestige' projects, and the associated sacrifices in democratic accountability—than a conscious reassessment of values. It was a reaction to the fast deteriorating living standards of millions of working people, as a direct result of health hazards, and it was recognised as such. Coupled with the recognition that Poland's economic problems were in part caused by an inadequate and ineffective environmental policy, based on the misguided supposition that man can shape nature to his ends with science and technology, the change in outlook was grounded in the everyday living and working experience of ordinary people.

### Poland's Industry: A Major Source of Pollution

In Poland, the main source of pollution is industry. It is responsible for 60 per cent of air pollution, while transport causes only 5 per cent.<sup>14</sup> This contrasts with the United States where the reverse is true: industry is responsible for 16.2 per cent and automobiles are responsible for 60.6 per cent.<sup>15</sup> Consequently the very worst pollution effects are closely associated with centres of industry, which in turn are also the country's main centres of population.

The Voivodship of Katowice is Poland's largest industrial region. It produces 30 per cent of the nation's wealth. It covers only 3 per cent of the land area, but houses over 11 per cent of the country's population. It produces 31 per cent of Poland's coke, 32 per cent of its electricity, 52 per cent of its steel and 98 per cent of its coal. There are 4700 kilometres of roads, which cater for 230,000 cars. The most highly industrialised part of the voivodship is the Upper Silesian Industrial Region (GOP — Gornoslaski Okreg Przemyslowy), which comprises over 1860 different workplaces and has an average population density of 806 per square kilometre (the national average is 102 per square kilometre). In the most urbanised parts of the GOP, densities reach 2,200 per square kilometre, with some residential districts with as many as 4,500 per square kilometre.<sup>16,14</sup>

The region is responsible for 32 per cent of all gas and dust emissions, according to official statistics. It is estimated that 70 per cent of its inhabitants live in conditions which are damaging to health. Studies in the Szopienice district of Katowice have found that 35 per cent of children and adolescents examined had symptoms of lead poisoning, which until only recently has been classified as an "occupational disease". Workers suffer 25 per cent more accidents and illness at work than elsewhere, while the population of the region as a whole suffers 15 per cent more diseases of circulation, 30 per cent more cancers and 47 per cent more respiratory disease than the rest of the country. Every urban area in the region receives more than the permitted 250 tonnes per square kilometre of dust fall-out, while many towns—such as Bytom, Gliwice and Zabrze—get as much as 1000 tonnes per square kilometre. Chicken eggs from the vicinity of the Legnica steel works were found to contain 75 times the permitted lead content (the national standard limit for lead is 20mg/kg ppm), while apples contained 18 times the permitted level and tomatoes 13 times.<sup>17,18,16</sup>

Meanwhile, in the nearby historic city of Cracow the situation is in many ways much more serious: 20 thousand hectares of forest have been devastated, from a total of 54 thousand hectares in the Cracow voivodship. The city has the highest infant mortality rate in Poland (258 per 100,000 inhabitants—the national average is 184 per 100,000), while “occupational illness” amounts to 92 cases per 100,000 workers (as compared with the national average of 63 cases per 100,000 workers). There are two main sources of pollution: the aluminium smelter at Skawina, and the Lenin Steel Works.<sup>18</sup>

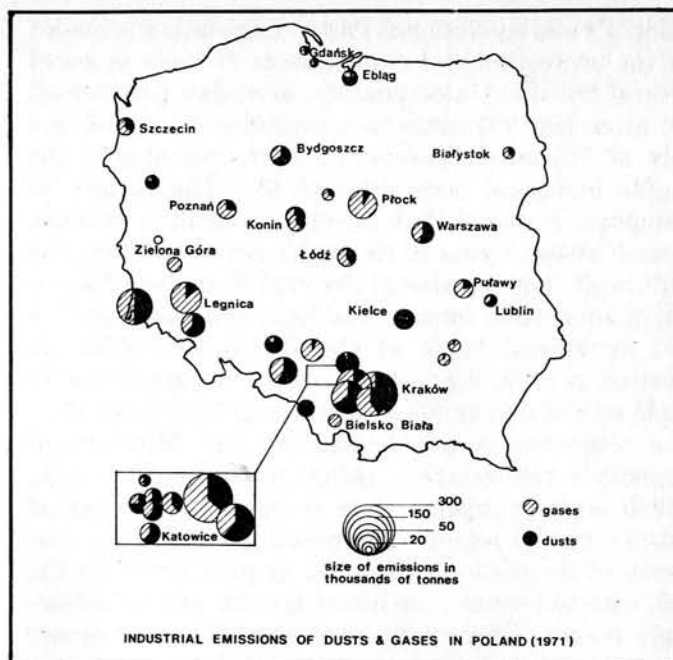
Though recognised as national problems, environmental pollution and health hazards are overwhelming in their effects in particular regions, most notably Silesia, Cracow, the Copper Basin (Zaglebie Miedzowe) and the Gdansk coast. The report to Solidarity’s Congress states: “Bad siting of industry and building development, inadequate action on the part of the Environment and Health Control and Development Agencies, together with absurd limiting of investments in environmental protection have already resulted in ecological catastrophe”.<sup>5</sup>

The true scale of the problem only began to become publicly apparent after the birth of Solidarity. Coupled with personal experience of environmental hazard and pollution and the hope and faith that society could be reformed, the seeds of an environmental movement of working people began to flower.

#### Poland's Environmental Movement

The surge of interest and enthusiasm for environmental concerns, which came to the fore in the West in the late sixties and early seventies, by no means passed Poland by. On the contrary, the recognition that environmental conservation and protection are vital to successful economic development is nothing new. Article 12 paragraph 2 of the Constitution states that “The Polish Peoples Republic will ensure the protection and rational development of the natural environment, which constitutes both a national resource and part of a common heritage”. Since the Second World War a large body of environmental legislation, policy making machinery, and control and research agencies has been built up in Poland. The importance of environmental considerations has been declared by the post-war Polish Governments, not only in the context of their own national planning and policy, but also through Polish participation in international environmental politics and initiatives.

It is important to note, however, that the Polish planners were committed to economic and industrial development through rapid growth. Their interest in nature and the environment was restricted to how one might control and exploit nature so that unfavourable economic effects could be kept to a minimum. Science and technology were seen as instruments to minimise the effects of pollution and the problems of resource depletion caused by the rapid industrialisation. With industry and the economy under the control of the State, it was thought that the environmental problems inherent in western capitalism would be avoided. This technocratic belief in man’s supremacy over nature,



built around a faith in the neutrality and innovative capacity of science, pervades the whole post-war philosophy of “environment is embodied through the post-war management” in Poland. For the authorities, it was always a question of how to achieve “progress”, rather than how to achieve stability.

By and large, attempts at environmental protection in Poland have been of a wholly cosmetic nature. Nowhere more so than the various efforts and initiatives aimed at cleaning up and safeguarding the Baltic Sea. In 1974, in Helsinki, all the Baltic countries agreed on a common programme to control and monitor fuel and oil spillages, build coastal effluent treatment works, develop facilities for dealing with collisions at sea, especially of tankers, and introduce tight controls on tankers washing out their cargo tanks in the proximity of ports. International agreement was further consolidated, largely at the instigation of the Poles, in Gdansk in 1976. But pollution of the Baltic is today worse than ever, even though the International Council for the Examination of the Sea has pronounced the Baltic “the most endangered natural water reservoir in the world”. Poland has not implemented a single one of the agreed resolutions, even though it is now estimated that two oil spills of 150,000 tonnes (the largest cargo tonnage sailing regularly on the Baltic currently) are capable of completely destroying life in the Baltic.<sup>19</sup> It is further estimated that last year alone a total of 93,000,000 cubic metres of impurities were passed into Gdansk Bay. In fact only 10 per cent of this actually originated from coastal resorts, the rest having been carried downstream from as far as Plock. There is a dearth of suitable pollution control equipment and materials, no trained personnel, and it is difficult to understand why local authorities have not come up with any significant measures to put a stop to at least some of the more glaring scandals.<sup>20</sup>

The gross discrepancy between official environmental policy and the reality of environmental abuses in Poland is further illustrated by the case of the

country's eleven National Parks. Legislation provides for the protection and maintenance of these areas of natural beauty. Unfortunately, everyday practice all too often bears witness to a complete disregard, not only of Poland's conservation laws, but also of the simple biological necessities of life. The history of Kampinos National Park provides a striking example of such abuse. Lying to the northeast of Warsaw, the park is all that remains of the vast Kampinos Forest, which from time immemorial provided the peat bog and marshland home of the Polish elk. Since its creation in 1959, the park's territory has been steadily depleted and now comprises an area of 22,353 hectares. The situation is not helped by the Ministry of Forestry's reforestation policy which, according to Polish ecology experts, may endanger the biological balance of the region. The practice of clearing vast tracts of forests is putting too great a strain on the soil, with the result that future growth will be increasingly poorer. Only rarely does one still come across trees more than 100 years old; everywhere one can see new plantations and bare clearings.<sup>21</sup> Although it is officially claimed that the present reforestation policy is designed to return the Kampinos Forest to its primeval state, critics argue that it is no more than a front to justify the ministry's timber production programme.

#### Cover-Ups in Abundance

The ineffective rhetoric of post-war environmental policy in Poland has been aggravated by secrecy. According to Solidarity: "In past years facts concerning the threat of ecological collapse were carefully suppressed in the mass media and information on environmental issues was heavily censored".<sup>4</sup> Indeed many of the environmental disasters of recent years have only begun to come out into the open, following pressure from Solidarity. Consequently, "Society is not fully aware of the impending dangers".

The case of 'Xylamit'—a chemical proofer for hemp fibre, hardboard building materials, insulation materials, and for all wooden building components—illustrates the kind of misinformation and cover-ups that had been rife. 'Xylamit', manufactured by the Industrial Enterprises Inco (Zakłady Gospodarcze Inco), was used in the construction industry between 1967 and 1968. It was then described as an "excellent fungicide and anti-bacterial agent"; no warning as to its toxic properties were given. Local sanitary and health authorities in Gdansk started investigations into the safety and health hazards of 'Xylamit'. However, in 1975 all investigations were stopped and the compound was withdrawn (officially) from use, without any reason being given. By that time, residential estates in Gdansk and Bialystok (notably the Bialystok housing estates of Piast and Bem) had been contaminated with the agent, which was found to be toxic to humans. All investigations into the poisoned apartments were simply stopped, and even epidemiological and statistical studies of children from these residential estates were forbidden.

Despite the official ban on 'Xylamit', however, it has continued to be used. It was used in reconstruction of

parts of the Lenin shipyard in Gdansk. When this became known, the contractor 'Budimor' explained it had not known about the ban. 'Xylamit' still appears in price lists and catalogues of building materials, without any warning as to its toxic properties. It comes in two versions and is described as an "effective" agent. It is not fully known, and perhaps never will be, how many people have been affected and endangered by 'Xylamit'. Nor is it known where and when it was used—the fact remains that it was used, and so has led to fear and paranoia among inhabitants of residential districts built since the late sixties.<sup>22</sup>

The case of 'Xylamit' is just one example of the lack of information available to the public on environmental and public health issues. Indeed, information about all sources of toxic emissions, together with their resulting effects, was suppressed. However, the relaxation of censorship in the course of 1981, as a result of the growing concern and outrage over environmental and health issues (not only amongst the public but also among Party activists and officials) led to many existing organisations becoming actively involved in environmental politics.

This was especially true of the Nature Conservation League (LOP), a long established nature conservation association, which began to demand far-reaching changes in the State system of environmental control and planning, vociferously criticising State legislation. It produced its own report, *The State of the Natural Environment in Poland and Dangers to Human Health*<sup>23</sup>. It called "for a new formulation of aims of a developed socialist state" and proposed two watchwords: "Quality of Life and Ecological Balance"—watchwords which should mould environmental policy "at every level". The key would be the formation of a body responsible solely for environmental protection and water management, which would co-ordinate a new national order. The leading Association of Scientists and Technologists (NOT) also began openly to make statements, pass resolutions and publicly call for reform in the system of environmental management. Its most popular journal *Przegląd Techniczny i Innowacje* (*Review of Technology and Innovation*) began to include many articles on questions of environment and technology. It recognised the deep-rooted links between technology, environment and the organisation of society. Discussions and commentaries concerning developments of an ecologically aware society began to appear regularly.

#### The Polish Ecology Club: Recognising the need for Solidarity

Perhaps the most important influence in the development of a true popular environmental movement in Poland, however, was the formation of the "Polish Ecology Club" (Polski Klub Ekologiczny—PKE) on the 23 September 1980 in Cracow. It was founded by a group of shop stewards, journalists, doctors and academics concerned about environmental destruction and mismanagement in Cracow and its environs, all of

whom were determined to do something about it. PKE was Poland's first truly independent environmental pressure group—and it recognised the political nature of environmental problems right from its birth. It quickly grew in popularity and was finally officially recognised and registered on 25 May 1981 in Cracow, having established 17 major branches in all the old voivodship capitals.\* The Club "organised discussions in many localities and neighbourhoods, concerning (Cracow's) most burning issues—the problems of economic stability and production in the light of environmental considerations . . . It initiated inquiries by experts and the documentation of evidence . . . so that it could intervene effectively . . . in the most dramatic and serious cases of environmental danger and destruction".<sup>24</sup> PKE is essentially a grass roots movement, similar to but separate from Solidarity, concerned and prepared to act in environmental issues and recognising them as indicative of the wider political and economic failure of the post-war Polish economy.

One of the biggest and certainly most widely publicised successes of the PKE, was the closure of the Aluminium Smelter in Skawina, one of Poland's biggest polluters. The closure of the works was ordered by the Iron and Steel Industry Minister, Zbigniew Szalajda, in January 1981 following a massive local campaign, which included a court action by local residents against the management of the plant and the local administrative authority, claiming compensation for damages to their health from toxic waste produced by the aluminium smelter.<sup>25</sup> The closure and its aftermath proved to the Polish people, as perhaps nothing else could, the emptiness of the slogan of the sixties "Technology will repair what it has destroyed".

Nor was the closure of the Skawina works the only PKE success. The PKE also forced the closure of other blatantly polluting industries, most notably the dairy at Grajewo which—although one of the biggest in the country—had been built without any facilities for treating its wastes and effluents. So too, it forced a re-assessment of many industrial planning decisions and the rehousing of people endangered by environmental hazards, as in Legnica where an estate had been built next to the massive steel works.

In many ways, PKE acted along the lines of a 'western' environmental pressure group collecting petitions, attracting publicity, holding meetings and lectures, sponsoring experts to prepare reports, and making persistent appeals to the Local and Central authorities. However, it differed in that many of its activists were also Union activists, and its support and success lay not in academic institutions or in 'middle-class' concern or awareness, but in the active involvement of working people fighting for the safety of their families and future generations.

A good example of a PKE campaign, which illustrates both its strengths and weaknesses took place in Tymbork. A bitumen processing plant had been built near a fruit juice factory. The bitumen factory was heavily polluting the local river which was used as a water source further downstream for making fruit juice. As a result of a local campaign coordinated by

the PKE, 2,000 signatures were collected urging "the relocation of the bitumen processing plant". In the end, the plant was moved to a location approved by PKE. PKE quickly recognised from these often lively campaigns, that they would only be effective if there was close cooperation and involvement of Solidarity and Rural Solidarity.<sup>24</sup>

PKE also realised, however, that it was "not enough to close a factory, collect signatures or carry out expert analyses". That was only the beginning. For example, the dismantling of Skawina brought with it a whole array of social and economic problems: the loss of jobs, the contaminated land surrounding the site of the factory (approx. 20 square kilometres) and so on. It will take at least five years to recultivate the contaminated land, under close ecological supervision and management. Local farmers are still fighting to get the polluted land recognised officially as unfit for cultivation, and so receive both compensation and expert help and advice to regenerate the land.<sup>25</sup>

In recognition of these two factors, the PKE drew up a document outlining the importance and nature of close cooperation with Solidarity. The document was drawn up and signed in Cracow. It represented a common recognition among all environmental groups and organisations that environmental problems and hazards are so vast and acute that only the influence and strength of people working through Solidarity can actually lead to any long term solution.

### Embracing the Ecological Ethic?

Solidarity's whole programme of reform—not just the sections relating to the environment—represents a shift in ideology away from the values of Poland's post-war planners. Underlying those values was a sense of optimism and faith in the ability of man to understand and control physical, biological and social processes through science and technology. Poland's current economic and ecological crisis, however, has shown such optimism to have been disastrously misguided.

But despite Solidarity's shift towards a new ideology, has the Union really embraced what might be called 'the ecological ethic'? To be sure, Solidarity recognises that there are limits to growth and sees both self-reliance and decentralisation as key elements in the fight against the dehumanising effects of industrialisation. So too, there is a growing awareness within Solidarity that man is subject to natural laws and that, if the ecological crisis is to be overcome, Nature must be held in greater respect. To that extent, then, there has been an identifiable shift towards 'eco-centric' values.

Nevertheless, the idea that man is separate and distinct from Nature—an idea firmly entrenched in Marxist ideology—remains part and parcel of the new values and attitudes which have become so widespread throughout Poland. That this attitude towards Nature still persists is a direct result of the enormous influence

Footnote

\*Prior to administrative reorganisation in 1975, which gave rise to the current 49 voivodship (provinces), there were 17 voivodships and 5 metropolitan voivodships.

of the Polish Catholic Church—both in the everyday lives of the majority of Poles and in the founding of Solidarity itself. Should this surprise us? It has, after all, been said that “Christianity is the most anthropocentric religion the world has ever seen . . . It has not only established the dualism of man and nature but has also insisted that it is God’s will that man may exploit nature for his proper ends.”<sup>26</sup>

That attitude is reflected in Solidarity’s own *Programme*: Resolution 16, for example, talks of protecting ‘Man’s environment’ rather than of protecting ‘the natural environment’ or even ‘Nature’. Nature is thus viewed by Solidarity in much the same terms as it is by the present socialist state—as a commodity to be used for man’s ends. The difference, however, is that Solidarity sees man’s exploitation of Nature being tempered by a new moral code: it is that moral code—rather than science and technology—which the Union sees as the means of bringing about the changes it seeks in Polish society. Nonetheless, the notion that Nature also has rights—the idea of ‘bio-ethics’—still has a long way to go before it is accepted.

Undoubtedly, Solidarity’s greatest legacy lies in its recognition that the social, economic and political problems of Polish society are all closely interrelated and, most important of all, that the solution to those problems lies in a reorganisation of Polish society—not just in a better system of environmental or economic management. To be sure, the Union’s programme represented more of a reaction to the economic, social and political failures of the post-war system than a clear-headed, reasoned blueprint for an alternative future. But that does not diminish Solidarity’s attempts to

solve the problems facing Poland. Until the founding of Solidarity, the Polish authorities had not only refused to face up to the extremely serious nature of environmental destruction in Poland, but had also provided a smokescreen of rhetoric and propaganda to the effect that the environment was being adequately protected. Although, today, the scale and severity of the ecological crisis facing Poland makes it seem insoluble, we should never forget that it was Solidarity which made the first serious attempt to tackle the crisis and which—perhaps most important of all—provided the first glimmer of hope that one day a solution might be found. That hope—and the promise of a popular environmental movement—was shattered on the night of December 13th 1981 when Poland’s military leader, General Wojciech Jaruzelski, proclaimed martial law, suspended Solidarity, imprisoned the Union’s elected leaders (who still remain in detention) and imposed a series of draconian laws which grossly infringed on the civil liberties of the whole nation.

Our own inability to cope with the economic, social and environmental problems facing the West should encourage us to look more closely at the solutions proposed by Solidarity in Poland, both because they recognised the interrelatedness of the problems and because they argued for essentially moral solutions. The whole nature of the role of trade unionism in solving the problems of society deserves further attention, as the trade unions comprise one of the key forces in our own society. We should ask ourselves: What can we learn from the Polish experience of Solidarity? After all, environmental issues are no respectors of national boundaries or political systems.

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## Will the Death Knell Sound in Silent Valley?

by  
Alan Grainger

India used to be blessed with tropical rain forests along a large part of its western coastline. Most of this has disappeared—cleared by farmers, itinerant cattle grazers, and loggers. But one small fragment of virtually intact\* rain forest still remains in a remote valley in the Palghat district of the state of Kerala. Silent Valley, as it is called, has since 1976 become the focus of a rapidly growing national environmental conscience as conservationists have fought to prevent the forest being cleared to make way for a hydroelectric dam. Its future even now hangs in the balance, as the Indian Government awaits the report of a prestigious committee containing representatives from all the interested parties.

### Paradise Almost Lost

The Indian plateau curls up gently as it nears the western coast, reaching a peak in the Western Ghats, the chain of hills that shielded the peninsula against invasion from Africa or Arabia, before plunging steeply down to a narrow coastal plain. Every year there is one invader, however, who is warmly welcomed: the south-west monsoon that is pushed upwards by the Ghats before releasing its precious cargo of rain which is the life-blood of the nation and the essential precondition for a good harvest.

The Western Ghats are crowned with a rich mantle of tropical moist forests. Above 3,000 feet there is evergreen rain forest, changing to semi-evergreen rain forest lower down, and then into moist deciduous (teak) forest below 1,500 feet. Silent Valley consists of some 8,952 hectares (some of which has been converted into grassland) covering the upper reaches of a tributary of the

Bharathapuzha just before the river drops a height of 1.5 miles from the Nilgiri Plateau to the coastal plain over a distance of less than 2.5 miles.

It is said that the name 'Silent Valley' originated long ago when an Englishman stumbled upon a dense uninhabited forest where in the evening the loud chirping of the cicada insects was uncommonly absent. Another explanation is that the name is a vulgarisation of 'Sairandhree Vana'. Legend has it that Queen Sairandhree went to live in the forested valley after her husband was killed in battle, and that the forest (vana) was named after her. Whatever the truth of the matter, there is no doubt that local people consider that the valley has a special religious significance. In contrast to adjoining valleys, it has never been settled by tribal peoples—a rare and possibly unique situation in this heavily populated country.

Silent or not, the forest is nevertheless teeming with life. Birds living there include the endangered Indian hornbill; the yellow-browed bulbul, endemic to this area; and the southern tee pie which is always found together with the noisy packet-tailed drongo that has a 15 inch tail and can produce many different metallic musical sounds. Almost all of the representative mammals of Peninsular India may be found in Silent Valley. The endangered tiger, mountain goat (Nilgiri tahr), mouse deer and sloth bear find a safe refuge in the forest, as do three very important arboreal mammals: the Malabar giant flying squirrel, the Nilgiri langur, and the lion-tailed macaque for which Silent Valley is one of the only two remaining habitats, containing half of its known world population of 500. If the forest disappears, so will the lion-tailed macaque. It is the

only species of truly arboreal monkey, and feeds exclusively on the bristly, ball-shaped orange coloured fruit of the tree *Cullenia excelsa*.

*Cullenia excelsa* is not known in other similar forests of the Western Ghats, and is but one of the many rare, endangered or endemic species of plants that grow in the Valley. Others include the tree fern *Cyanthaea gigantea*, the orchid *Aphyllorchis prainii*, and the trees *Hopea utilis* and *Aglaia minutifolia*. Preliminary botanical investigations have already found some 900 species of flowering plants and ferns, and many more wait to be discovered. The trees in the canopy include relatives of those found in the tropical rain forests of South East Asia: *Artocarpus hirsutus*, *Canarium strictum*, *Dipterocarpus indicus*, and other species of *Hopea* and *Aglaia*.

### Powerful Proposals

The Kerala State Electricity Board (K.S.E.B.) wants to drown about 950 hectares of evergreen forest in order to build a 130 metre high dam that will harness the power of the river as it crashes down to the Plain of Kerala. The average 3,180 mm of rain received each year will be turned into 120 MW of electricity and used to irrigate 10,000 hectares of farmland. Altogether, when the building of roads, settlements for up to 3,000 workers, and power houses is taken into account, the total area of forest to be officially cleared will be more than 1,000 hectares.

Unfortunately it is very unlikely that only one ninth of the Silent Valley forests will be affected by the project. The building of roads and the presence of so many workers for up to seven years will probably mean that most of the forest will vanish within a very short time. Dr. Madhav Gadgil, of the Indian Institute of Science's Centre for Theoretical Studies in Bangalore, has carried out a special study of the development of water resources in the Western Ghats. He found that five years after work commenced on the construction of the Panshet reservoir

\*Logging has been carried out in parts of Silent Valley on several occasions since the start of the century.

near Poona in 1955, not only the submersion area but over half of the catchment area was denuded of tree cover.

Initial work at the Silent Valley site, costing about £1.25 million, has been proceeding since the national Planning Commission finally approved the £42 million project in October 1976. Vociferous protests have resulted in many delays and the precise amount of destruction so far is uncertain. A large number of labourers were attracted to the site and Dr. Satishchandran Nair, Research Fellow in the Zoology department at the University of Kerala (Trivandrum), reported after visiting Silent Valley in January 1979 that: 'Around the (proposed) dam site the vegetation is extensively altered. Huge burnt patches and dense regeneration of 1-4 years old make a mosaic. The amount of destruction already done is staggering. The animals indicate by their speed of flight how harassed they are. There is a lot of sleeper extraction going on deeper than the dam site. The large crew is camping in the interior. A fire probably started by them had been burning for the last four days. There is evidence of elephant poaching and I saw parts of a skull yesterday. Occasionally gun-shots can be heard.'

Adjacent forests are being cleared for growing cardamon. A Forest Department rule states that if cardamon cultivation proves to be unprofitable, the land can then be leased out permanently for growing coffee, pepper or tapioca. Cardamon needs plenty of shade to grow well and therefore does not require the same extent of forest clearance as the latter three crops, but estate owners are deliberately removing large numbers of forest trees in order to give the least possible shade to cardamon. When the resulting growth is poor, the rest of the trees together with the cardamon can be legally removed and the entire area given over to coffee.

### **The Consequences of Losing the Silent Valley Forests**

Implementation of the Silent Valley Hydroelectric Scheme would spell the end for most if not all of the tropical rain forests in the area and therefore in India as a whole. That is the price which India

would have to pay for an extra 120 MW of electricity, and as Dr. Swaminathan has asked: 'Have we the right to deny to future generations the fruits of millions of years of natural evolution, just for adding about 7 per cent additional power to Kerala's vast energy resources?'

It is not a question of putting the interests of a monkey before those of man, because thousands of animals and plants would lose their habitat in this, the world's richest ecosystem. India has only about 15 per cent forest cover (compared with the official optimum of 33 per cent) and Kerala, which should be one of the most forested states of all, only has 19 per cent of its land covered by forest. Neither can afford to lose any more, and with tropical rain forests disappearing rapidly all over the world, the future of Silent Valley is a matter for global concern.

According to a very detailed assessment of the scheme by a group of local scientists led by Professor M.K. Prasad, of Government College Calicut, the loss of forests could cause climatic change and heavy soil erosion. Owing to clearance for the project and also by encroaching cultivators who swarmed into the area along the roads constructed for the contractors: 'At Idukki no natural forest exists any longer. The loss of protective cover . . . ultimately gave rise to land sliding which has become almost a regular recurring feature in recent years, destroying houses and killing people. Micro-climatic conditions in and around Idukki have undergone changes: the summer heat is now as intense as it is in the plains; land sliding is frequent in the monsoons, wells and ponds dry up during summer. There has been an acceleration in the growth of water weeds in parts of the Idukki reservoir. Engineers have estimated that the weight of water impounded . . . is about 2,000 million tons, and such an enormous weight poses grave geomorphological problems. The network of seismological stations which have been monitoring tremors in the area has recorded that within the two year period of 1976-77 four feelable shocks have occurred.'

Similar side effects could be expected from the Silent Valley development. The possibility and

repercussions of climatic change resulting from the deforestation are quite significant. There is already a rainless spell of 4 months which, when coupled together with the very low relative humidity on hot days, renders the environment extremely prone to fire. This can sweep through the grasslands and even penetrate forests and plantations. Fires can rage for several days. Further loss of forest would make the area even drier still.

It is the rule rather than the exception for little, if any, of the money invested in hydroelectric schemes to be devoted to protecting the catchment area's vital forest cover. Deforestation in the catchment of the Panshet reservoir, caused the top soil to erode rapidly, and he notes that for the eighteen reservoirs all over India for which data is available, the observed siltation rate has exceeded that expected in all but one of the cases, and generally by a factor of between three and ten. The build up of silt in the dam can cut the operational life by a half. Monsoon rains no longer held back by the forested watersheds flow down in torrents, overflowing and even bursting the dams and causing extensive flooding in the lowlands, as has been seen all too frequently in recent years in other parts of India.

The results of disrupting animal habitat can also be horrendous. People living near Silent Valley have already complained that tigers, elephants, wild boar and porcupine, forced out of the forests by the construction activities, are killing their animals and destroying crops. The disappearance of birds of prey and animals like the civet and other small cats would result in a population explosion of rodents in the area. One study has shown that the number of bird species sighted per day in a particular area of the valley dropped from sixty in 1977 to twenty-two in 1979-80.

Then there are the long term consequences of destroying the forest gene banks of under-exploited plants such as *Chrysophyllum roxburghii*, which bears a delicious fruit that is unknown except to tribal peoples and a handful of forest officers; and also the wild relatives of many plants cultivated outside the forest. Three new varieties of pepper have recently been reported from Silent Valley, as have the wild relatives of

cardamon, and the leguminous plants (*Phaseolus spp.*) from which blackgram and rice beans are obtained, and there is a considerable genetic diversity of wild rice from which new disease-resistant strains could be bred. The forests are also full of medicinal plants that are potential sources of new drugs, and the lion-tailed macaque might well be needed sometime in the future to provide vaccines against new strains of encephalitis.

### The Growth of Popular Protest

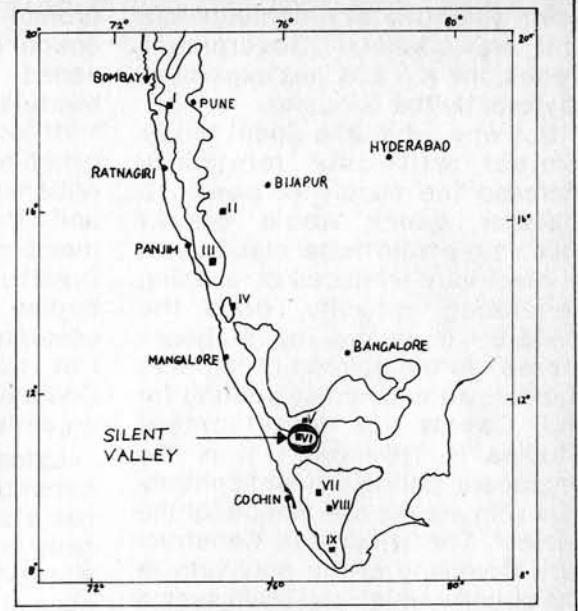
One observer has written: 'The Silent Valley project is the first one in India to see the intervention of environmentalists instead of them being silent spectators to a multitude of projects carried out earlier to the detriment of the environment.' Protests by a number of prominent environmentalists, after the Planning Commission gave the go ahead in 1976, led to the National Committee on Environmental Planning and Coordination requesting that work on the project be suspended until a special Task Force could make an ecological impact study. This was agreed, and the Task Force could make an ecological impact study. This was agreed, and the Task Force reported back that the project should be abandoned and Silent Valley declared a Biosphere Reserve, but if this were not possible then a number of environmental safeguards should be introduced.

The Committee only retreated from its absolute commitment to saving Silent Valley in its entirety under strong political pressure that not to do so would imply that the Central Government was acting contrary to the best interests of the people of Kerala. The crucial environmental safeguard requested was the formation of a committee to monitor Silent Valley for five years *before* the project started. As Professor Prasad has said, this was 'only a desperate attempt to get enough time to study the Valley in greater detail and to show posterity what they had lost.'

Unfortunately, this concession back-fired on the environmentalists, who were delivered into the tortuous world of the Kerala legislators. When the Parliament had passed the Silent Valley Protected Area (Protection of Ecological Balance) Act in 1978, containing

Map of Peninsular India showing locations of some of the ecologically important sites in the Western Ghats affected by the construction of 'development projects'.

- I Panshet
- II Hidkai
- III Kalinadi
- IV Linganamakki
- V Upper Nilgiri Plateau
- VI Silent Valley
- VII Idukki
- VIII Periyar
- IX Mundanthur - Kalakad



legislation covering some, but not all of the Task Force's proposals, an all-party delegation went to New Delhi to see the then Prime Minister, Mr. Morarji Desai, and ask for his blessing on the project, and this was given a week later on May 14th.

The 1978 Act was sufficient to get the approval of New Delhi, but did not prevent work on the project continuing or decree the vital five year moratorium which the Task Force wanted. The 1979 Act did place restrictions on the incursion of workers and their settlements on forests outside the project area, and established an environmental monitoring committee whose purpose was to make sure that these rules were adhered to. However, the committee was given no powers to act if the safeguard provisions were breached, and therefore its role was one of watching the forest being destroyed rather than gathering base-line data as had originally been the plan.

The intentions and commitment of the Kerala government to the spirit of even the proposals contained in the 1979 Act were open to question. Just before the vote was to be taken, the Chief Minister Mr. Vasudevan Nair asked the Speaker to define the word 'ecology'. Unable to do so the Speaker asked another member who looked the word up in a dictionary, and said that it had something to do with pollution. Mr. Nair said that he didn't understand why the hydro-electric project would create a pollution hazard. Says Professor Prasad: 'Neither the Chief Minister

nor anyone in the K.S.E.B. understand the basic issue the scientists have raised. Ecology for them is the same thing as pollution. If they don't know what the word means, what are they going to protect?'

Even if the most perfect piece of legislation were to be enacted, it is doubtful whether it could be enforced, as is evident from these comments of a local forest officer. 'More officers will be appointed, more meetings will be held, more orders will be passed, and more memos will be issued to subordinates. But who ultimately implements them? We do. Can we? Of course not. We can't even implement the existing laws. Once the approach road is complete there is no stopping anything—encroachment, felling, or poaching. Unless the people themselves stop, we can do nothing.'

For its part, the K.S.E.B. has doggedly persisted in maintaining that the project will continue. Mr. C.K. Koshukoshy, its Chairman, states; 'The whole of Kerala is a forest. What are 500 hectares submerged? Nothing. And 300 hectares of grassland? Together they are barely ten per cent of the Silent Valley area. Do you know how our rubber plantations are increasing? They are like a thick tropical forest now. What is the difference? They will attract rain. As for this talk of monkeys and all those other animals, it is the opinion of our scientific advisors that this is not such an unusual spot. We don't concede that any species will be lost.' For every

point which the environmentalists and the Central Government makes, the K.S.E.B. has experts to say exactly the opposite.

But why, when the Silent Valley project will only minimally increase the supply of power to Malabar, which would benefit much more from better distribution of electricity produced by existing generating capacity, does the K.S.E.B. maintain its stubborn stance? In the opinion of Mr. M.P. Kannan, an economist working for the Centre for Development Studies in Trivandrum, it is the engineers, politicians and contractors who are the real reason for the project. The Hindustan Construction Company is the only firm in the country which can build such a huge dam and it wants to make up for losses incurred at Idukki, while the politicians wish to ingratiate themselves with the people in the area.

### Can Silent Valley Be Saved?

The protests have grown stronger in the last few years, and while coordinated by the Society for Protection of Silent Valley (based in Calicut), and the Save Silent Valley Committee (in Bombay), the campaign is very broad based in its support. Students in Trivandrum and Calicut are very active and have succeeded in mounting some impressive local demonstrations. International support was received in October 1978 when the 14th General Assembly of the International Union for the Conservation of Nature (I.U.C.N.) called upon the Indian Government to protect the area and suggested that it be declared a Biosphere Reserve.

Conservationists failed to gain a High Court injunction that would have stopped the K.S.E.B. continuing with the project, and then pinned their hopes on Mrs. Gandhi returning to power after the Indian General Election in January 1980. In March of that year, a few months after becoming Prime Minister again, she succeeded in winning the agreement of the Kerala government to reconsider the

project in the light of the recommendations of a specially convened scientific seminar. This eventually led to the setting up in 1981 of a Joint State Committee which has representatives from the national and state governments and the K.S.E.B., as well as members drawn from scientific institutes and conservation bodies. Both the national and state governments agreed to abide by the recommendations of the Committee, and its report is now urgently awaited.

Latest reports suggest that all construction and clearance work has stopped and that the workers have left the area. No visitors are allowed into the valley except by special permit. The access road built for the project still poses a threat to the forest, and it will be necessary to close it. At the moment there is timber poaching going on, but fortunately not much.

The ingredients of a solution to the problem lie in the recommendations made in Dr. Swaminathan's report: the establishment of a 39,000 hectare Silent Valley National Park including the adjacent forest reserves of New Amarambalam, Kundas, and Attapadi; the development of the Kerala Forest Research Institute into an international research and training centre for the study of tropical rain forest ecosystems; promoting new employment opportunities in the area, and using funds already allocated to the Silent Valley project to link Malabar with transmission lines from the Idukki Dam, so as to satisfy immediate power needs; and the development of irrigation from ground and surface water resources at about a third of the cost per hectare of a hydroelectric irrigation scheme. There would also be a detailed study of Kerala's future energy needs and the type of generating capacity required to satisfy them.

Conservationists like Professor Prasad, one of the founders of the original Save Silent Valley Committee, are quietly optimistic about the future of Silent Valley. Mrs. Gandhi's Government has given strong support to the need for conservation of the environment since it took office, and a Ministry of the Environment has been established to coordinate such matters. Not least of the encouraging factors is that the governing party in Kerala

is now the Congress (Indira) Party, and this should prevent the divisions between the national and state governments which have prolonged this whole dispute.

### Conclusion

The Silent Valley story illustrates vividly the difficulties which stand in the way of translating ecological principles into action. The growth of a very skilled and effective *local* environmental movement in most if not all cases is a prerequisite for success. International protest may be an important contributing factor, but all too often can be self defeating—the protests concerning deforestation in the Amazon, for instance, certainly angered the Brazilian government and may have made it more intransigent. It was not until local scientists and environmental groups advised the government of the importance of conservation that its attitude softened.

The fate of Silent Valley is now very much in the hands of the Joint State Committee. If it recommends conservation of India's last remaining fragment of almost pristine rain forest, the Government will have the backing it needs to show that it means business with its new environmental policy, and conservationists all over the world will gain inspiration from knowing that local protests *can* prevent forest destruction. But all is not won yet, and the death knell may still sound in Silent Valley.

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### Aknowledgements

The author would like to thank the many people in India who have contributed their thoughts about Silent Valley, and therefore made this article possible.

\*The figures quoted by Mr. C.K. Koshukoshi refer to an earlier estimate of the amount and type of land to be submerged according to the K.S.E.B. proposals. The figures used in this article are modified according to those quoted by Prasad et al, who also quote the earlier figure for comparison. The later estimate is also given in Swaminathan M.S. (1979).



## Books

### The Unfolding of Darwin's Thought

THE DEVELOPMENT OF DARWIN'S THEORY NATURAL HISTORY, NATURAL THEOLOGY AND NATURAL SELECTION 1838-1859, by Dov Ospovat, Cambridge University Press 1981 £20.00.

This book is beautifully produced on high quality paper with a number of fine engravings. About the author, Dov Ospovat, we are told very little save that he was an associate professor of history at the University of Nebraska, that he devoted perhaps more time than any other scholar to the study of Darwin's manuscript material contained in a black trunk (known as the black box) at the Cambridge University Library, and that he died tragically at the age of 33 before the publication of this book. Had he lived, he would undoubtedly have reaped the rewards for his painstaking scholarship and very remarkable insights into what actually went on in Darwin's head as he developed his theory of evolution, for this book is undoubtedly a masterpiece.

Its thesis is that Darwin's ideas underwent a very considerable change from the time he wrote his sketch of 1842 and his essay of 1844 in which he first set out his theory to the time he wrote the *Origin of Species* which was published in 1859. These changes were not the result of new empirical investigations carried out in isolation from other naturalists. On the contrary "his interaction with nature was mediated by assumptions and ways of perceiving nature that he derived from other naturalists, both his predecessors and contemporaries and from the culture in which he was educated and carried out his work."

What is more Ospovat considers that the ideas of his contemporaries were very much influenced by their social and political outlook.

At the beginning of his career, the reigning paradigm among naturalists both in England and on the continent was influenced by the work of Georges Cuvier in France and of

Natural Theology in England whose principal proponents were John Ray and later Paley. They saw the world as a well adjusted mechanism whose constituent parts both organic and inorganic were perfectly adapted to each other. In order to illustrate this theme, as Ospovat points out, they filled the pages of their work "with instances of the adaptation of structure to function and of the whole organism to its environment". They insisted that every living thing, even such lowly creatures as gnats, as Paley went to great lengths to point out, fulfilled some key role in the 'Economy of Nature'. This perfect harmony they took to be evidence of purposeful design and thereby of an intelligent creator.

The paradigm of Natural Theology is a very ecological one (though Ospovat does not discuss this point). As Donald Worster points out in his book *Nature's Economy* the natural theologians must be regarded as the spiritual and intellectual ancestors of today's ecological movement.

One of the main features of this paradigm was its radical teleology. Ospovat describes it in considerable detail. The role, goal, or 'conditions of existence' of living things was to contribute to the proper functioning of the 'Economy of Nature' and hence of God's design. To know the goal or 'conditions of existence' of any living thing within the 'Economy of Nature' was all that was required in order to understand it.

It is clear that the paradigm of Natural Theology was irreconcilable with that of Science.

To begin with it introduced the notion of an intelligent creator — a metaphysical rather than a naturalistic notion.

Secondly, since the world was perfect, there was no need to change it — the accent being thereby on stability rather than on change (and Science since the days of Bacon has been committed to change, indeed to the transformation of the world we live in by means of technology and industry to serve our economic ends).

Thirdly the scientific study of the mechanism underlying the functioning and development of living things (morphogenesis) has no place in this paradigm.

For these reasons it was destined to be radically transformed. Ospovat describes the changes that occurred in biological thought which slowly led to the abandonment of the Paradigm of Natural Theology and its replacement with one that better suited the requirements of the times, and shows how Darwin's thought was affected by each of these changes.

One of the many features of the Paradigm of Natural Theology which began to be rejected during this period was its teleology. From Dar-

win's point of view this was necessary so as to accommodate his idea of 'transmutation'. Though he rejected the extreme teleology of the natural theologians he never really rejected teleology in its less extreme form. He continued for instance, throughout his writings to talk of 'final cause'. It is more accurate, as Ospovat notes, to regard Darwin as having succeeded in uniting "the morphological and teleological processes in the study of organic structure." This is in essence what Asa Gray stated in *Nature* in 1874, and Darwin wrote to him at the time saying that "What you say about teleology pleases me especially."

Another of the changes brought to the Paradigm of Natural Theology was the abandonment of the notion of "perfect adaptation" which Darwin still believed in even after he had rejected the teleology of the natural theologians. This change was very important to the development of Darwin's theory since, so long as organisms were held to be perfectly adapted to their environment, change could only occur in order to assure adaptation to environmental change. In such conditions natural selection could only be seen as applying intermittently. It was simply a means of adjusting organisms to temporary environmental changes. Once it was conceded that organisms were only relatively well adapted to their environment, then change could be seen as occurring on a continuous basis and natural selection, to which this change was attributed, could conceivably provide a theory of development as well as of adjustment.

Ospovat traces the effect on Darwin's thinking of reading Malthus's *Essay on the Principle of Population*. He saw in the geometric growth of a population "a force like a hundred thousand wedges to force every kind of adaptive structure into the gaps of the Economy of Nature or rather forming gaps by thrusting out bigger ones."

Malthus's influence, Ospovat regards as critical in determining the shape of Darwin's final theory of natural selection. So much so that he distinguishes between Darwin's pre- and post-Malthus thought.

He also describes the effect on Darwin's thought of the "Branching Conception of Nature" as developed by von Baer, Owen and Milne Edwards and the development of the notion of Divergence, which is closely associated in the minds of the naturalists of the time with the already fashionable idea of Progress.

The notion that as living things evolved so did they become increasingly diverse, so in fact was there among them an ever greater division of labour, was a key one for Darwin's theory. This growing diversity Darwin took to be the criterion of Progress and this fitted in perfectly with the

socio-economic ideas of the times.

This growing diversity, Darwin attributed to the workings of Natural Selection — a principle which complemented that of 'relative adaptation' and provided the basis for Natural Selection as a theory of development rather than a theory of adjustment.

The transformation in the biological thinking of the times, in which Darwin played a key role, is described in this book in great detail. As Ospovat points out, it transformed a paradigm that was suitable for a land based aristocratic society into one which very much better satisfied the requirements of our fast developing urban-based industrial world.

Edward Goldsmith

### **A Mixed Bag of Thinkers**

**THE SCHUMACHER LECTURES:**  
Ed. by Satish Kumar. Abacus, 1982.  
£2.50.

This book brings together in one volume lectures previously published separately in various issues of *Resurgence* during 1979 and 1980. The lectures were delivered by six well-known "alternative" thinkers: R.E. Laing, Amory Lovins, Fritjof Capra, Ivan Illich, Edward de Bono, and John Michell. Some alterations and amplifications have been made, notably to the lecture by R.D. Laing. In addition, two shorter essays by Leopold Kohr and Hazel Henderson appear at the end of the book as appendices.

The main value of the book is that it provides brief, readable introductions to some of the key ideas of the various contributions. Amory Lovins' lecture is entitled "Soft Energy Paths", de Bono's — "Lateral Thinking", and their lectures, like most of the others, give an overview of the central themes which are treated at length and in detail in their books. In so far as they do this, and in so far as they are all written in non-technical language, the lectures will appeal more to those unfamiliar with the currents of alternative thought that have been flowing through the last decade or so, than to those who are looking for new contributions from the authors. The two exceptions are R.D. Laing and Ivan Illich. R.D. Laing's article, "What is the Matter with Mind?" is a brilliant attack in some of the assumptions at the heart of orthodox scientific method, while Illich's is a plea for a return to the spontaneity of vernacular language and values.

That such a diverse group of people should be drawn together under the name of Schumacher, is certainly a tribute to the range and comprehensiveness of Schumacher's

work. However, in reading through the lectures, it is difficult to detect in these highly individualistic thinkers any real unity of standpoint that might be described as "Schumacherian". De Bono's lecture on lateral thinking, for instance, lacks anything that could be called an ecological or spiritual perspective, and forms a marked contrast to the concise essay by Leopold Kohr on appropriate technology, which clearly follows the leading inspiration of Schumacher's work. It's a mixed bag, providing a taste, and no more, of the ideas of some important and influential contemporary thinkers.

Jeremy Naydler

### **Power Costs**

**THE COST OF NUCLEAR POWER**  
by Colin Sweet, The Anti Nuclear Campaign £1.00.

The past year has seen the economic case for nuclear power in Britain torn to shreds. Colin Sweet, who was on the Committee for the Study of the Economics of Nuclear Electricity, the report of which we published in *The Ecologist* in February 1982, has certainly been prominent in exposing the deception behind the CEBG's assertion that nuclear power gives the cheapest electricity.

As Sweet points out, the CEBG has fixed assets of over £30,000 million, and is consequently the UK's largest industrial institution. That the CEBG's ludicrous accounting practices stem from naiveté is more than Sweet can honestly believe. It is hard therefore to avoid the conclusion of a conspiracy and Sweet alludes to the link between the generation of electricity and the production of plutonium for military purposes. In reality then, the electricity consumer is paying for nuclear warheads. Certainly a totting up of the plutonium that should have been produced by Britain's nuclear reactors reveals discrepancies; a sizeable amount of plutonium appears to have gone missing.

In essence, through its accounting practices, the CEBG has made a nonsense, verging on the comic, of all the officially held tenets of nuclear economics. Thus, we have been told, *ad nauseum*, that the capital cost component of nuclear power is cheaper than electricity generated by plants operating on fossil fuels. Indeed the entire case of the CEBG for investing in new nuclear plant in 'advance of need' rests on the savings on fuel cost alone more than covering the large capital investment required; reckoned three years ago at some £15,000 million for ten nuclear power stations.

Colin Sweet's Table 5 tells a tale in itself. In it he has done no more than quote the CEBG's own figures for its

nuclear power stations. Just over ten years ago, in 1971/2, the proportion of generating costs attributed to capital costs complied with the dogma, and comprised some 65 per cent of the whole. By 1978/80, the situation had apparently reversed itself in a most remarkable fashion; no longer did the capital costs make up the larger proportions but had fallen to less than 10 per cent of the whole. Meanwhile, against the expectations of all the pundits, nuclear fuel costs were soaring and were rapidly approaching those of coal. But the CEBG had somehow to show that nuclear power was still the cheapest bet, and the only way it could do that was to indicate the capital costs plummeting in real terms. "The apparent result," remarks Sweet, "is that nuclear power is moving to a zero capital cost and an overwhelming fuel cost."

As was done in the CSENE report, Sweet adjusts for the discrepancies and nonsenses generated through the CEBG's jumbling together historic and current costs. Such adjustments are sound accounting practice since they give a closer assessment of the replacement value of plant and give a better indication of comparative generation costs. In his figure 4, Sweet gives his own view of the likely trends in generating costs of different generating systems. All the nuclear options, past, present, and future, in the case of the PWR and fast reactor, show nuclear power costing the consumer double or even triple what he should expect to pay for coal-fired generation.

By assessing all the costs of a nuclear power programme consisting of the two AGRs now being built, the ten PWRs proposed and one fast reactor, Sweet reckons a gross investment would include all the ancillary facilities, such as reprocessing plant and nuclear waste disposal associated with a nuclear programme. Since "gross investment spending in manufacturing in the UK in 1978 was £3,706 million", Sweet points out that if the aim of starting one reactor per year until the mid-nineties were kept to, the nuclear programme would "require two thirds of the investment now going into manufacturing investment."

The price of such a financial commitment would be immeasurable in terms of opportunities foregone and the savage recession it would engender. Clearly it is vitally important that the British Public, for too long apathetic about nuclear power, should waken to the enormous repercussions of the CEBG proceeding with its blinkered single-minded nuclear plans. There is much at stake, indeed many thousands of times more than the £10 million the CEBG has reckoned it may have to

spend on the Sizewell B PWR public inquiry; and we should protest.

Peter Bunyard

## Politics in the Garden

**GREEN THOUGHTS:** A Writer in the Garden, by Eleanor Perenyi. Random House, \$15.50.

"Most gardeners," writes Eleanor Perenyi, "come to organic gardening through the kitchen door. Their first concern is fresh, uncontaminated vegetables . . . But it doesn't make any sense to keep the kitchen garden free from poisons if you apply herbicides to the lawn and something that smells like boiled rubber to the flowers. A garden is a world, and its parts are not separable."

Ms Perenyi has been gardening for more than thirty years, and amassing opinions and expertise for as long. In *Green Thoughts*, she passes on what she's learnt: 72 short essays, alphabetically arranged, cover such diverse topics as asparagus, birds, compost (essential), daylilies ("there is something engaging . . . about a plant so bent on giving value"), failures, herbs, longevity (the gardener's birth-right), night, pruning, seed tapes ("a swindle"), tomatoes ("Americans, basking in the belief that they are the best-fed people in the world, will put up with almost anything"), tools (hard to find), and wildflowers.

Although her garden is in Connecticut and, as she makes clear, growing conditions in England and New England are very different, there is plenty here to interest any reader, even those who have spent not so much as an afternoon on their knees with a trowel.

In *Green Thoughts*, advice and information emerge from a rich soil of reminiscence, anecdote, historical aside, literary allusion, biographical sketches, and musings on the qualities of particular plants and the pleasures of gardening. There is a tribute to J.I. Rodale, a pioneer of organic practices in the USA; a long paean to mulches ("the subject most actively boring to an organic gardener's friends"); an account of Hidcote Manor, reputedly the most original modern garden in England and the source of many of the design ideas incorporated into Victoria Sackville West's Sissinghurst; and an appreciation of the French intensive method, described as the best and aesthetically most satisfying way of growing vegetables. Digressions abound: one notes, for example, that the lawnmower was the invention of a textile engineer, who, impressed by the resemblance between lawn grass and the pile on fabric, adapted the principle used in cutting textiles; another

ating the economic importance of food, imposed a centuries-long embargo on information regarding their horticultural discoveries in the New World.

One of the book's most important themes concerns what might be called the politics of gardening. US seed companies are steadily being taken over by a small number of conglomerates, many of them petrochemical companies. As Ms Perenyi points out, the implications of this monopoly aren't simply a matter of price-fixing: the petrochemical industry, which also produces fertilisers and pesticides, is coming to be in a position where it has absolute control over what is grown, even in private gardens. Already, seed companies favour varieties (often fungicide-coated) that cannot survive without liberal use of chemical fertilisers and pesticides; research on disease- and pest-resistant strains is negligible. Gardeners who complain that the quality of seed is not what it was have more than nostalgia on their side.

Seed companies' promotion of hybrids means that native strains are increasingly at risk of extinction, with the resultant loss to the gene pool. Ms Perenyi praises the US Academy of Science's seed-bank project, but warns that the only certain way to save these species is to preserve the habitats in which they live.

At the prey of a self-interested corporate monopoly, the gardener is poorly served and poorly informed: how many knew the risks they ran from 2,4,5-T in the herbicides they were sold? To take another example, Ms Perenyi has found that clover, which she recommends as a component in lawns, is hard to get from seed companies, and has made efforts to discover why. The reason, it seems, is that clover is killed by the broad-leaved herbicides intended for lawn use. "Once again," she comments, "a good thing is pushed off the market for reasons that have nothing to do with the consumer's interests."

Whether advising on how to prune roses or taking a dim view of hydroponics, Ms Perenyi writes a vigorous, good-humoured prose. She is not afraid to express her opinions: her tongue is sharp, and so are her perceptions. Surrounded by a culture where children think that peas come from the packet and not the pod, she regards herself as one of a dying breed, unless the "slow-motion collapse" of technological society intervenes. Those of us who hope it does will derive much pleasure from her book.

Bernard Gilbert



## ANC Consumer Campaign

Dear Sir,

I would like to express my appreciation of the CSENE report and, more recently, Professor Jeffery's article on nuclear power costs. Along with other recent publications, these finally provide the proof to what before was only suspected: that nuclear power is the most expensive method currently used of generating electricity, is a colossal waste of taxpayers' money and will prove to be an economic disaster for the country.

I would like to take this opportunity to inform your U.K. readers of the Consumer Campaign which is especially pertinent to these economic arguments. Briefly, this involves withholding 11 per cent of one's electricity bill (11 per cent being that proportion of electricity produced by nuclear power according to CEBG accounts). This 11 per cent is paid instead into a special Trust Fund the terms of which allow the money to be returned to the Area Boards at such time as they cease to promote or supply nuclear-generated electricity. A great deal of background legal work has been carried out and the viewpoint of the Campaign is that the Area Boards are failing in their statutory requirements to promote economic methods of generating and distributing electricity, to secure the cheapening of electricity supplies and to investigate means of utilising waste heat. In other words, consumers are being overcharged by 11 per cent which represents the extent to which the Area Boards have acted against the 'public interest' and are in contravention of their legal obligations.

About 1,000 people in England and Wales are taking part in the

Campaign which was launched just over a year ago. Similar campaigns are in existence in Scotland and West Germany. The latter has been especially successful, with 10,000 households involved and has forced the equivalent of the Area Boards into considering their responsibilities and entering into debate. The Consumer Campaign provides a practical way of withdrawing co-operation from a dangerous and costly technology, which we have never been consulted about and run by a nationalised industry in which we have no participation. Further information can be obtained from the Anti-Nuclear Campaign, P.O. Box 216, Sheffield S1 1BD, telephone 0742-754691.

Yours faithfully,  
Theresa Hurst  
23, High Street,  
Ascot.

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### Nuclear Costs

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Dear Sir,

Professor Jeffery's article in your March/April issue is based in part on the CSENE Report, on which I have commented in Atom (April 1982) and in part on an extension of his arguments, to which I understand the CEBG will be responding, in Energy Policy. I will therefore confine my comments to the new material.

Firstly, the recently published Statement of The Case for Sizewell, together with the back up material, present the best current views on electricity generation costs, including extensive sensitivity calculations. These show that under a wide range of economic and energy demand scenarios new nuclear capacity will cost less to build and operate than the fuel required to run older, less efficient fossil stations now on the grid; that is, building nuclear stations will save money. Doubtless these figures will be debated at the Sizewell Inquiry but they are based on detailed design and costing studies, unlike those of Professor Jeffery which rely on simplistic extrapolations and arbitrary adjustments to published data.

Professor Jeffery's text also mixes accountancy practices with economic appraisal and puts forward ideas on coal subsidies

which, if generally applied, would stultify the economy and inhibit any kind of innovation.

His calculations of the effect of nuclear plant on electricity prices are based on his own unique view of resource economics, employ his own cost figures, which have been criticised elsewhere (Atom, op.cit.), and use his own demand forecasts based on an unlikely extrapolation of past forecasts. A more conventional economic view would lead him to the opposite conclusion to that which he puts forward.

Early in his paper Professor Jeffery questions the AEA's objectivity. As author of the article from which he takes his second quotation I can only reiterate that my calculations of generation costs from new stations support those published by the CEBG.

Yours faithfully,  
Dr. P.M.S. Jones,  
Economic and Energy Studies  
Branch,  
U.K.A.E.A., Harwell,  
Didcot, Oxfordshire.

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### Rain Forest Destruction

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Dear Sir,

I have read with interest and approval the article on "World Rainforest Destruction—The Social Factor". Having been involved for a long time in both nature conservation and population control activities, I very much agree with the author's balanced view on the subject. It is the profit-machinery of Development Inc. that is responsible for a pseudo-development composed of the destruction of nature and the envelopment of people in a tangle of false values and alien dependencies.

It should be added that the forces behind the destruction of the rainforests and the rest of nature not only use population pressure as a pretext for their schemes but actually help to produce the pressure by supporting pro-natalist policies in the countries that are being developed. To assure an abundance of "human resources" and to maintain an adequate stock of unemployed, thereby keeping or pushing wages down and discouraging any kind of self-defence or protest, is part of

the economic package designed for those countries.

There can be no doubt that the future of the "human resources", i.e. the working population, is linked to the future of the natural resources, i.e. the flora, fauna and the other living elements of the biosphere. Exploitation is indivisible, just as peace. Ruthless exploitation of nature also means ruthless exploitation of human beings, and vice-versa. Treating nature only as a means to satisfy greed goes side by side with treating people the same way. The same profit-at-any-cost "philosophy" shapes the approach to nature and to manpower. Disregard and contempt for the well-being of fellow-creatures and the natural world is the sign of those who hold fellow-men and the workers' world in equal disregard and contempt. This is a truth the majority of the working population still has to grasp: that nature's cause is their own cause and that in respect for nature and cooperation with it lies man's only hope to establish a society inspired precisely by the principles of respect and cooperation.

Yours faithfully  
Godofredo Stutzin,  
Santiago, Chile.

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**VOICE OF NATURE.** Indonesia's wildlife journal. Colour photographs. English translation included. Proceeds to environmental conservation. Details from: Green Indonesia Foundation, P.O. Box 208, Bogor, Indonesia.

## CALL FOR PAPERS

The Israel Ecological Society has issued a call for papers for the Second International Conference on Ecology and Environmental Quality to be held May 24-26, 1983 at the Hebrew University of Jerusalem, Jerusalem, Israel. Papers should be in English, maximum number of pages 10 and deadline for submission is December 31, 1982. For further information contact: Prof. H. Shuval, Chairman, Israel Ecological Society, Hebrew University-Hadassah Medical School, P.O. Box 1172, Jerusalem, Israel.

## CONFERENCES & COURSES

**WORLD NATIONAL PARKS CONGRESS** 1982, Bali, Indonesia, 11-22 October. This once-a-decade congress will bring together 450 professionals involved in planning and managing protected areas and chart a course for the coming ten years. Details from Raisa Scriabine, Public Affairs Director, International Union for Conservation of Nature and Natural Resources, Avenue du Mont-Blanc, 1196 Gland-Suisse.



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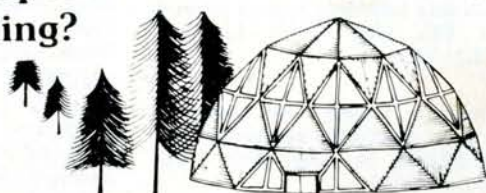
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Most communes are NOT hippy dope scenes  
or gurus exploiting innocent babies.  
That's just the media trying to sell papers  
to bored suburbia.

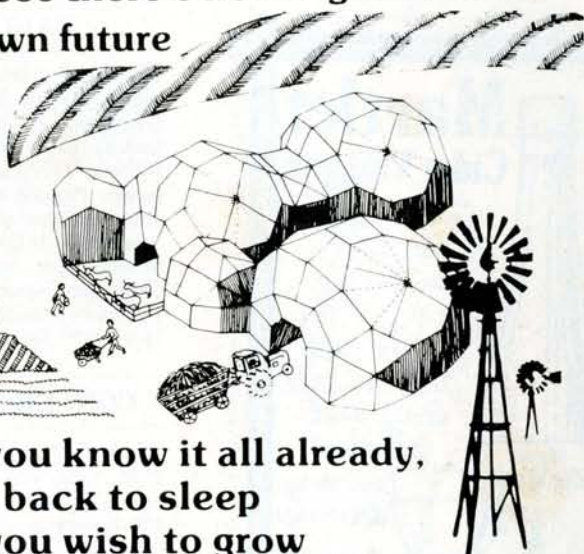
There are at least 100 communities in  
Britain already — why don't you live in one?  
Someday most people will live in communes  
— why are you waiting?

become part of the future  
join the culture of the future  
you don't have to live in a bedsit  
you don't have to get married 'cos there's nothing else to do

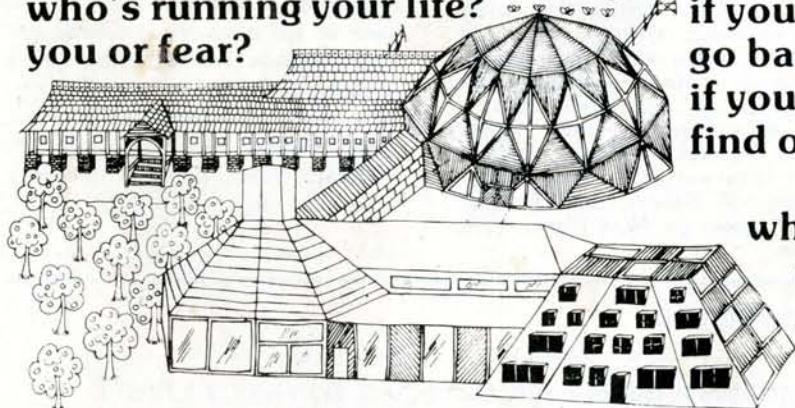


get lots of friends and work for your own future  
leave the fossiled culture of the past  
All you have to lose are your chains

stop worrying about your security  
learn to make friends instead  
So what, you make mistakes —  
those who don't take risks don't learn  
so what, you're shy  
so what, you're scared  
who's running your life?  
you or fear?



if you know it all already,  
go back to sleep  
if you wish to grow  
find out about community living



why lock yourself in a house  
with one person, when  
you could join  
a commune?



Worried about the standards of the local school?  
Why not join a commune  
and run your own school?

Stop thinking about communes — join one  
Stop being put off by problems — solve them  
So what, the first one collapses — learn from it and make  
sure the next one is better —  
else you'll always be trapped by fear  
you only live once

