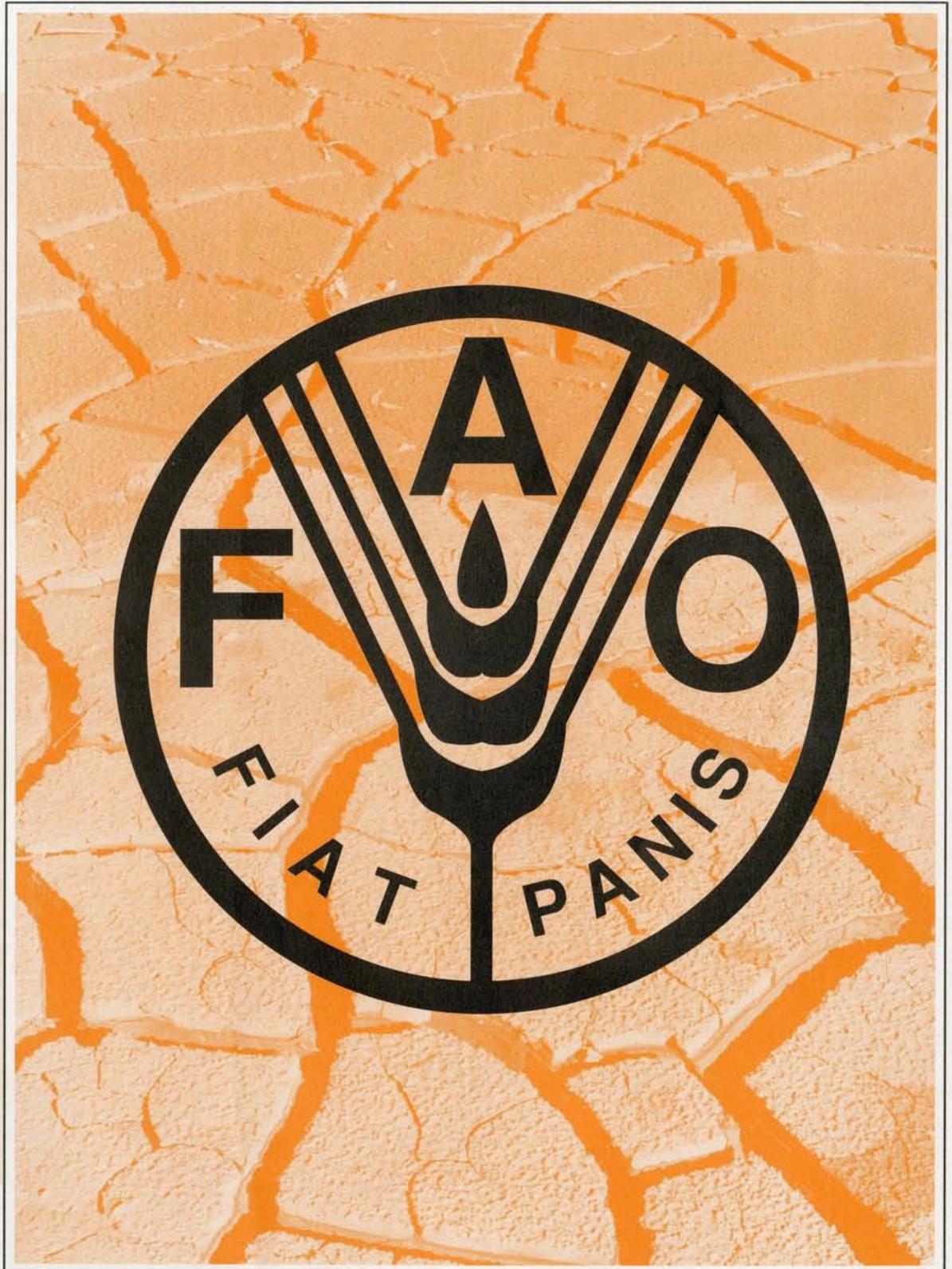


# The Ecologist

Vol 21 No 2 March/April 1991

£3 (US \$6)

- Open Letter to  
FAO's Director-  
General
- An Insider's View
- The Failure of the  
Green Revolution
- FAO and  
Pesticides,  
Forestry and  
Fisheries
- A Critique of  
FAO's Plan to  
Feed the World
- The Neglect of  
Traditional  
Agricultural  
Systems
- Declaration of  
the International  
Movement for  
Ecological  
Agriculture



The UN Food and Agriculture Organization:  
**Promoting World Hunger**

## POSTER OFFER

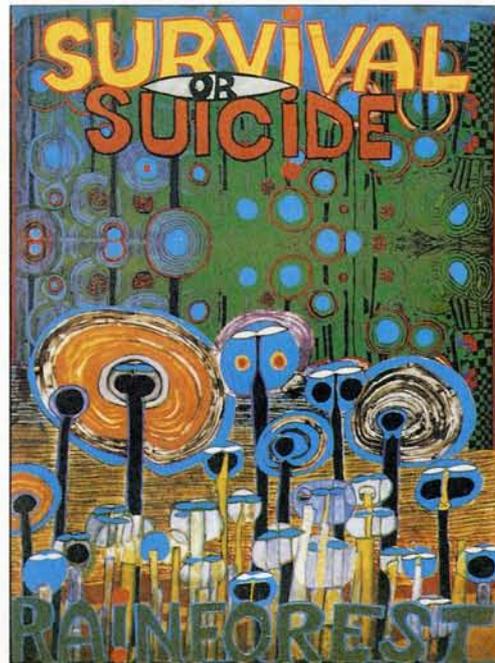
The cover illustration of the September/October, 1990 issue of *The Ecologist* by the renowned Austrian artist Friedrich Hundertwasser, has generously been donated to Ecoropa, Paris and the World Rainforest Movement.

It is available as a poster from The Ecologist's editorial office (address below).

Metal embossing on the poster is either in gold, silver, green or red depending on availability.

Cost is £30/US\$55 plus £1.50 postage to Europe and N. Africa and £3.50/US\$5.50 to the rest of the world.

Payment by cheque/postal order to *The Ecologist*.



*All proceeds go to Ecoropa, Paris and the World Rainforest Movement.*

**The Ecologist is published by Ecosystems Ltd.**

**Editorial Office:** Corner House, Station Road, Sturminster Newton, Dorset, DT10 1BB, England.  
Tel 0258 73476 Fax 0258 73748 E-Mail gn:ecologist. **Editorial Assistant:** Sally Snow.

**Subscriptions:** RED Computing, 29A High Street, New Malden, Surrey, KT3 4BY, England.  
Tel 0403 782644 Fax 081 942 9385.

**Books and Back Issues:** WEC Books, Worthyvale Manor, Camelford, Cornwall, PL32 9TT, England.  
Tel 0840 212711. Fax 0840 212808.

### Annual Subscription Rates

**£18 (US\$30)** for individuals and schools;

**£40 (US\$65)** for institutions;

**£15 (US\$25)** for students and Third World citizens and groups.

Air mail **£10 (US\$17)** extra.

Student/Third World price only available direct from RED Computing and not through subscription agents outside England.

The Ecologist is published bi-monthly. The rates above are for six issues including postage and annual index.

Subscriptions outside N. America payable to The Ecologist and sent to RED Computing Limited (address above).

We welcome payment with sterling or US dollar cheque or eurocheque, Access or MasterCard, banker's draft payable through an English bank, international money order, postal order or banker's order.

N. American subscriptions payable by check drawn on US banks in US funds to: **MIT Press Journals, 55 Hayward Street, Cambridge, MA 02142, USA. Tel (617) 253-2889.**

### Advertising

#### Display Rates:

Full Colour Outside Back Cover:	£485
Full Page (265x185mm):	£305
Half Page (130x185mm/265x88mm):	£155
Quarter Page (64x185mm/122x88mm):	£95
Third Page (265x58mm/85x185mm/175x120mm):	£110
Sixth Page (86x58mm/43x120mm):	£80
Eighth Page (65x88mm):	£50

15% VAT to be added to above rates.  
Typesetting charge 20% of advertising rate.

#### Inserts:

Up to 265x185mm and not more than 10g each:  
£45 per thousand plus 15% VAT.

#### Classifieds:

See inside back cover.

Further information and full rate card from Sally Snow at the Editorial Office (address above).

### Contributions

The Editors welcome contributions, which should be typed, double spaced, on one side of the paper only. Two copies should be sent with original. Word processed contributions should be on a 3.5 inch disk (MS-DOS or Macintosh) in text file (ASCII) format. Illustrations (B/W or colour prints or transparencies, line drawings, tables, maps etc.) should be included where appropriate. Detailed guidelines for contributors are available on request. Manuscripts should be addressed to The Editors and sent to the Editorial Office.

While every care is taken with manuscripts submitted for publication, the editors cannot guarantee to return those not accepted. Articles published in *The Ecologist* do not necessarily express the views of the Editors. The Ecologist International Serial Number is: ISSN 0261-3131.

Printed by Penwell Ltd., Parkwood, Dupath, Callington, Cornwall, PL17 8AD. Tel 0579 50522.

Computer output and equipment supplied by Windsorgraphics, Kings House, Kings Arms Lane, Ringwood, Hampshire, BH1 1AH. Tel 0425 474936.

© The Ecologist 1990

The Ecologist is available on Microfilm from University Microfilms Int., Ann Arbor, MI, USA.

**Editors**

EDWARD GOLDSMITH  
NICHOLAS HILDYARD  
PETER BUNYARD  
PATRICK McCULLY

**Associate Editors**

PATRICIA ADAMS  
*Probe International*  
(Canada)

MARCUS COLCHESTER  
*World Rainforest Movement*  
(England)

RAYMOND DASMANN  
*University of California,*  
*Santa Cruz (USA)*

SAMUEL S. EPSTEIN  
*University of Illinois*  
(USA)

ROSS HUME HALL  
(USA)

SANDY IRVINE  
*The Green Party*  
(England)

MICK KELLY  
*University of East Anglia*  
(England)

MARTIN KHOR KOK PENG  
*Consumers Association of*  
*Penang (Malaysia)*

SMITHU KOTHARI  
*Lokayan Social Action*  
*Group (India)*

SIGMUND KVALOY  
*University of Oslo*  
(Norway)

LARRY LOHMANN  
(USA)

JOHN MILTON  
(USA)

JIMOH OMO-FADAKA  
*African Environmental*  
*Network (Kenya)*

JOHN PAPWORTH  
*Fourth World Review*  
(England)

ROBERT PRESCOTT-ALLEN  
PADATA  
(Canada)

JOHN SEED  
*Rainforest Information Centre*  
(Australia)

VANDANA SHIVA  
*Research Centre for Science*  
*and Ecology (India)*

HENRYK SKOLIMOWSKI  
*University of Michigan*  
(USA)

ROBERT WALLER  
*Commonwealth Human Ecology Centre*  
(England)

RICHARD WILLSON  
(England)

DONALD WORSTER  
*University of Kansas*  
(USA)

EDITORIAL OFFICE, CORNER HOUSE,  
STATION ROAD, STURMINSTER  
NEWTON, DORSET, DT10 1BB, UK.  
TEL +44-258-73476  
FAX +44-258-73748  
E-MAIL GN:ECOLOGIST

# The Ecologist

Vol. 21, No. 2, March/April 1991

## FAO SPECIAL ISSUE

### Editorial

**An Open Letter to Edouard Saouma, Director-General of FAO** ..... 43  
*Nicholas Hildyard*

### Feature Articles

N.B. The authors of feature articles do not necessarily endorse the open letter.

**FAO: An Insider's View** ..... 47  
*Khalil Sesmou*

Founded during the colonial era, FAO still has a colonial attitude to agricultural development. It promotes export crops and the application of pesticides and fertilizers, and derides the potential of traditional agriculture. The organization's Director-General is notoriously autocratic and allows no internal criticism of FAO's policies. FAO's structures and policies need to be drastically overhauled.

**The Failure of the Green Revolution: A Case Study of the Punjab** ..... 57  
*Vandana Shiva*

The Green Revolution was promoted by Western institutions, multinationals, aid agencies and Third World governments as a technical answer to the socio-economic problem of hunger. The Revolution has had catastrophic social and environmental consequences and much of the evidence produced in its favour is little more than myth.

**FAO and Pesticides: Promotion or Proscription?** ..... 61  
*Barbara Dinham*

Since the late 1950s, FAO, which has close links with the agrochemical industry, has been committed to increasing the use of pesticides in the Third World. Recently, pressure from NGOs has resulted in FAO drawing up a voluntary code of conduct on the marketing and use of pesticides. The code is widely flouted.

**FAO and Forestry** ..... 66  
*George Marshall*

FAO's forestry policies have encouraged the commercial development of the rainforests, accelerating their destruction. FAO coordinated the much-criticized Tropical Forestry Action Plan, which it continues to defend, and it is now drawing up a global forest convention which appears to be set to repeat the mistakes of the past.

**FAO and Aquaculture: Ponds and Politics in Africa** ..... 73  
*Douglas Cross*

The promotion of modern fish farming techniques in the Third World has been a hugely expensive failure. A study of some of the totally unsuitable, high-tech fish farms established by FAO shows how agricultural development policies favour bureaucrats and politicians rather than the rural poor.

**FAO and Fisheries Development** ..... 77  
*Patrick McCully*

The fisheries policies espoused by FAO have contributed to the depletion of fish stocks and the impoverishment of traditional fishing communities. FAO remains optimistic that the continuation of past policies can reverse current trends.

Edward Goldsmith and  
Nicholas Hildyard

**World Agriculture: Toward 2000, FAO's Plan to Feed the World** ..... 81

FAO's main policy document is complacent about the present world food situation and argues for the continuation of current modernization policies. These may increase food production in the short term, but in the long term will lead to environmental degradation and famine on a massive scale.

Miguel A. Altieri

**Traditional Farming in Latin America** ..... 93

Traditional agricultural techniques can produce high yields of varied crops, while maintaining soil fertility and saving the farmer the expense of modern inputs. They are able to do so because of the diversity of crops grown and because they mimic natural ecological processes.

Winin Pereira

**Traditional Rice Growing in India** ..... 97

Countless different agricultural strategies are used in rice growing in India. Their most notable features are that they aim to maximize food security rather than food production, and they maintain the fertility of the soil using renewable, local resources.

Helena Norberg-Hodge,  
John Page and  
Peter Goering

**Agriculture in Ladakh** ..... 99

A system of agriculture which is an integral part of the social and economic framework of Ladakhi life has enabled the inhabitants of this harsh mountain desert to maintain a remarkably high standard of living.

Chatchawan Tongdeelert  
and Larry Lohmann

**The Muang Faai Irrigation System of Northern Thailand** ..... 101

The traditional *muang faai* water-management system allows villagers to control the supply of water to their rice fields in ways which are responsive to the needs of individuals and communities. The sophisticated systems both require and help strengthen social cohesion and local protection of natural resources.

**Declaration of the International Movement for Ecological Agriculture** ..... 107

A statement drafted by social and environmental activists at a meeting in Penang in January, 1990.

*The Ecologist* is printed on recycled paper whitened with hydrogen peroxide.

◆ The Best Book to Read on the Uruguay Round ◆

**RECOLONISATION:**

**Gatt, the Uruguay Round and the Third World**

by Raghavan Chakravarthi  
foreword by Julius Nyerere

*Recolonisation* is the only available book on the Uruguay Round written from a Third World perspective. It exposes how the industrial countries and their TNCs are attempting to expand their control of the world economy, especially by the introduction of services, foreign investments and intellectual property rights into the ambit of Gatt.

Published by the Third World Network. 319pp.

▲ Send cheque and orders to WEC Books, Worthyvale Manor, Camelford, Cornwall, PL32 9TT, England. Price £9/\$17. Please add £1.50 per copy UK and £2/\$4 overseas surface for postage and packaging.

▲ US readers can send cheque and orders to: Michelle Syverson & Associates, 1442 A Walnut Street, Suite 8, Berkeley, CA 94709, USA

▲ A Spanish edition of the book, *Un GATT sin cascabel*, is available from: Third World Institute, Miguel del Corro 1461, Montevideo 11200, Uruguay.

Other Third World Network Publications  
Available From WEC Books

**TOXIC TERROR: Dumping of Hazardous Wastes in the Third World**

A dossier of documents and clippings related to toxic wastes and their export to the Third World. It gives recommendations on what Third World governments and peoples should do in future to minimize the risk of hazardous wastes, whether imported or locally produced.

132pp. £6/\$12. £1.50 per copy UK and £2/\$4 overseas surface for p&p.

**MODERN SCIENCE IN CRISIS:  
A Third World Response**

This book provides a scathing and comprehensive critique of modern science and the essential ideas for a reconstruction of a holistic alternative science that respects life.

81pp. £4/\$8. £1 per copy UK and £1.50/\$3 overseas surface p&p.

## An Open Letter to Edouard Saouma, Director-General of the Food and Agriculture Organization of the United Nations

Dear Edouard Saouma,

This letter is to inform you that we are launching an international campaign to urge member states of the UN Food and Agriculture Organization to withhold payments from FAO pending a radical reappraisal of its policies and a complete restructuring of its organization. We have taken this course of action because we are convinced that the policies being pushed by FAO — policies for which you, as Director-General, must take prime responsibility — are a major cause of world famine, ecological destruction and social alienation. This issue of *The Ecologist* documents our case.

### A Decade and a Half of Failure

In 1974, two years before you were elected to office, the United Nations hosted the first World Food Conference in Rome. In his keynote speech to the conference, Dr. Henry Kissinger vowed, "Within a decade, no man, woman or child will go to bed hungry." FAO endorsed that view, launching a series of ambitious programmes which it claimed would boost food production and rid the world of famine.

Yet a decade and a half later, there are more people starving than at any time in human history, the environment is more degraded than ever and conditions for growing food have never been less propitious. Africa now teeters on the brink of continent-wide famine, with two-thirds of its countries wracked by chronic food shortages and malnutrition. In Sudan and Ethiopia alone, 15 million people are currently facing a slow death through starvation. Many countries in South Asia and South and Central America are in similarly desperate straits. In 1987, more children died from malnutrition in India and Pakistan alone than in all the 46 nations of Africa put together.

No doubt, as in the past, you will attempt to blame this massive human tragedy on a lack of resources, or the failure of "ignorant peasant farmers" to apply your policies of modernizing agriculture widely enough or vigorously enough.

This will not wash, Mr Saouma. It is your policies that are at fault, not peasants or lack of finance. Whether in agriculture, in forestry, or in aquaculture, you have promoted policies which benefit the rich and powerful at the expense of the livelihoods of the poor. Policies that are, in effect, systematically creating the conditions for mass starvation.

### FAO: The Famine Machine

As the International Movement for Ecological Agriculture rightly notes (see pp.99-104): "The history of hunger is a history of unjust social and economic systems which, frequently in combination with ecological degradation, have marginalized the poor and deprived them of the means to eat."

FAO has refused to act on this simple truth. Indeed, for the past quarter of a century, it has systematically avoided confronting the hard political and social causes of hunger and malnutrition. In 1979, FAO organized the World Conference on Agrarian Reform and Rural Development, which resulted in what you termed a "Peasants' Charter". But FAO balked at the challenge of land reform: instead, it chose to continue on the politically expedient path of defining the problem as one of underproduction and a lack of "effective demand".

You vigorously supported the "Green Revolution", which promoted an agricultural strategy based on intensifying production through the use of modern inputs, dragging peasants into the market economy and promoting export-led development. It is a strategy that has both intensified and extended the grip of hunger, strengthening those very forces that reduce the availability of food to the poor. Landlessness has been exacerbated, the environment degraded, wealth further concentrated in fewer and fewer hands and ecologically sound systems of agriculture systematically undermined (see Vandana Shiva, *this issue*).

And how could it have been otherwise? In promoting "off-farm" inputs — that is, chemical fertilizers, pesticides and "improved seeds" — FAO has delivered peasant farmers into the hands of those who control such inputs, creating dependency where there was independence, forcing farmers to buy what was previously free, locking farmers into a cycle of diminishing returns on fertilizers, increasing pesticide use and debt. Thus whereas peasants formerly set aside their seeds every year — giving them a free source of supply for the next harvest — the new hybrids which FAO promotes leave the peasant with no option but to return year-in, year-out to the seed companies if they are to have seeds to plant. Worse still, the seeds are now designed so that they will not grow without fertilizers. Small wonder that thousands of small farmers go to the wall every year, that land holdings

become more and more concentrated as the richer farmers buy out those who are in debt, and that the seed houses, chemical companies and fertilizer manufacturers now hold farmers in their thrall.

Promoting farm mechanization has had similarly disastrous social consequences. In many areas, the introduction of farm machinery has changed the very economic and social basis on which farm-work is traditionally organized. Tasks which previously required the cooperation of farmers can now be performed by a machine: those who are able to buy the machinery can pick and choose their labour force regardless of social obligations, and are often able to take over land from the poor due to the increased control over production which mechanization brings them. Independent peasants are thus transformed into farm labourers, whose working conditions and rewards are increasingly determined by "market" forces. In this context, displacing labour through mechanization can only further marginalize peasants, thousands of whom are cast out to join the growing ranks of the rural unemployed. In a buyer's market, and without effective legal or trade union protection, real wages for labourers have declined in many Third World countries, making the survival of the poor even more precarious.

Mechanization, the creation of a pool of landless labourers, the introduction of non-traditional crops and the availability of fertilizer have enabled wealthier farmers to expand the size of farms, either because they are no longer constrained by labour shortages or because the new machinery and inputs enable them to cultivate previously marginal land. One result has been to raise the value of land, fuelling land speculation, triggering rent rises, squeezing peasant farmers and encouraging rural violence. In some cases, farmers have simply sold out; in others they have been forcibly dispossessed by hired gunmen. In both cases, it is the hand of the largest landowners which has been strengthened at the expense of the poor.

## The Corporate Stranglehold

FAO's die-hard commitment to promoting export crops has further compounded the social and economic fall-out of agricultural intensification. In some countries, almost all the best agricultural land is used for export crops — including non-food crops, from carnations to cotton. In Guatemala, the area of land under coffee production rose by almost a third between 1950 and 1977, whilst that under cotton leapt from 5,000 hectares in 1948 to 89,500 in 1967. In the Philippines, half the country's prime agricultural land is used to grow export crops. Vast plantations have displaced thousands of peasants, forcing them to cultivate marginal, less productive lands with predictable ecological consequences. The beneficiaries have been multinational corporations and the élites of the Third World. The further intensification of agriculture can only tighten their stranglehold on the production and distribution of agricultural produce.

FAO has never satisfactorily explained how encouraging export crops is in any way compatible with its avowed goal of "eliminating hunger and rural poverty." By definition, food that is exported cannot be eaten by local people. This may seem obvious but it has not deterred FAO from encouraging farmers in the poorest and most famine-stricken countries in the world to grow crops for export. In 1973, 36 of the nations most seriously affected by hunger and malnutrition exported food to the US — a pattern that still continues. Indeed, the Third World as a whole exports more food to the industrialized world than it either imports or receives in food aid. How can you possibly hope to feed those starving in the South by exporting their crops to the already well-fed populations of the North? Nor is it just their food that is exported: the biomass of the crop is also lost to them, and with it a major source of soil fertility.

## The Global Supermarket

Similarly, the policy of forcing peasants into the cash economy — or, as you put it, transforming agriculture into "a dynamic sector" — has only served to intensify the plight of the poor. In the global supermarket which your policies have helped create, people earning perhaps 25 dollars a year — if they are lucky — must compete for the same food with people who earn 25 dollars an hour, or even 25 dollars a minute. In such circumstances, food can only go in one direction — towards those with the money to buy it. Only those who have the income to translate their biological needs into "effective demand" get to eat — and such people constitute a smaller and smaller proportion of the world's population. Not surprisingly, study after study has shown that when peasants enter the market, their nutritional status declines, principally because they do not have hard cash to buy the food they once grew for themselves.

You seem unconcerned by this. So long as a country can satisfy the "effective demand" for commercially-grown foodstuffs, such as wheat, you judge it to be "self-sufficient". On that basis, you proudly proclaim even India to be a success story — blithely ignoring the fact that many tens of millions of Indians are malnourished and that many of the foodstuffs you use as indicators of self-sufficiency are not staple foods for the mass of the population. It is a telling example of your blinkered approach to the problems of hunger.

## More of the Same

We could go on. We could detail the environmental devastation caused by your policies (see Vandana Shiva, *this issue*), we could point to the number of people killed and poisoned by pesticides (see Barbara Dinham, *this issue*), and to human rights abuses that have resulted. The question, Mr Saouma, is why you refuse to reassess those policies? Why you so strongly opposed a serious and independent review of FAO

proposed by Norway at your 1987 Conference and insisted on engineering a whitewash for your policies? Why, despite all the evidence of their destructiveness, your only response is to push ahead with these policies still more vigorously? You now want to extend the Green Revolution to Africa. You want farmers to embrace biotechnology. You want governments to be more aggressive in promoting a free market in agricultural goods. You want them to endorse the new GATT proposals under the Uruguay Round – proposals which would make it “GATT-illegal” to ban imports of cheap foods even when such imports undermine a country’s agricultural base; proposals which would also make it illegal to prevent exports of food, even in times of famine. How can such policies help the poor? (For a discussion of the new GATT proposals see ‘Special GATT Issue’, *The Ecologist*, Vol. 20, No. 6, 1990).

## Sustainable Development?

The only concession you seem to be prepared to make to your critics is to cloak your policies in the fashionable but vacuous language of “sustainable development”, even describing your latest policy document – *World Agriculture: Towards 2000* – as providing a “transition to sustainable agriculture” (see Edward Goldsmith, *this issue*). But what is sustainable about a policy that seeks to extend cultivation onto land which you admit to be highly vulnerable to erosion and desertification? That seeks to increase the amount of land under perennial irrigation by 20 per cent, when irrigation is already depleting water sources at a rate far above recharge? That seeks to increase fish production from seas which you admit are grossly overfished? That seeks to increase the number of cattle on rangelands which you admit to be overgrazed? That seeks to “protect” forests by intensifying their commercial use and clearing them for agricultural land? What is sustainable about encouraging farmers to adopt crops that require high inputs of water in an age when water scarcity is likely to be a major constraint on production? That seeks to increase the dependence of farmers on fossil fuels when this can only add to global warming? And where will the 1500 billion dollars needed to implement your programme be found? You tell us that it can be raised through taxing farmers. How will this help those who are already crippled by debt? How will this sustain their livelihoods?

## Food Security

You will no doubt respond that in an increasingly populated world, we have no option but to increase agricultural output through intensification. But there is little to be gained by increasing production if those who produce the food do not get to eat it or if their environment is degraded in the process. The issue is not how to maximize output, Mr Saouma, but how to

maximize food security. It is surely time you learned the difference.

Throughout the Third World, local people already know the value of food security. Indeed, they have evolved numerous different agricultural strategies for achieving precisely that end (see pp.86-98) – strategies that are fine-tuned to local environmental conditions and which reflect the inventiveness, vitality and dynamism of local people in meeting the challenges that agriculture has always posed.

You will say that such systems are unproductive and outdated, that they cannot meet the needs of the modern age. But whose needs do you have in mind, Mr Saouma? Certainly they have little to offer the manufacturers of pesticides; or the manufacturers of tractors and other farm machinery; or those who would construct large-scale irrigation works; or the political élites in the developing world whose allegiance you rely upon. But they have everything to offer those who are starving, those who have been marginalized and impoverished by the development process. The problem, Mr Saouma, is not that such strategies are outdated but that they are being systematically undermined by the policies you are promoting.

Indeed, ensuring food security requires an approach to agriculture that is, in almost every respect, the reverse of FAO’s present policies:

- Instead of encouraging the spread of monocultures, it requires encouraging systems that grow a diversity of crops – thus protecting genetic diversity, minimizing pest infestations without recourse to pesticides and safeguarding farmers against the vagaries of climate (see Miguel A. Altieri, *this issue*);
- Instead of encouraging resource-intensive, capital-intensive and bureaucratically-managed agricultural systems, it demands farming systems that put the control of inputs and decision-making in the hands of local people, not middlemen or distant government officials;
- Instead of encouraging export crops, it would encourage growing food for local people and letting them plant what they want to plant, rather than what international markets dictate;
- Instead of encouraging trading patterns that favour the developed countries and Third World élites at the expense of the world’s poor, it would encourage trading patterns that encourage local self-reliance;
- Instead of encouraging the concentration of land in the hands of those who have no obligations to feed local people, it would encourage the devolution of control of local resources to those who depend upon them.

## Fighting for Farmers

We have no doubt that there are powerful lobbies

pushing FAO to maintain its present policies — from dam builders and irrigation engineers to agrochemical corporations and farm machinery manufacturers. For them, the intensification of agriculture in the Third World is a bonanza — a bonanza mined at the expense of the poor and of future generations. Your job should surely be to fight the naked opportunism of such industrial lobbies, not to industrialize agriculture on their behalf. Third World farmers do not need FAO's expertise. They know more about farming their land than your "experts" do. If they have a need for an organization such as FAO it is to take up the cudgels against those who would undermine their livelihoods, to tackle those issues that they cannot tackle by themselves. You should be taking up the battle to reduce greenhouse gas emissions, not promoting an agriculture which will increase them. You should be fighting to prevent land and water resources being hijacked for non-agricultural uses, not pushing for

the expansion of industry. You should be fighting to prevent the food resources of the underfed being exported to feed the already overfed, not seeking to boost export crops.

But instead of making common cause with the farmers you say FAO seeks to support, you have consistently bowed to industrial interests. No doubt, their support — and particularly that of the multinationals — has gained FAO powerful political allies: no doubt, too, it has proved of great value in increasing your own personal power and influence. But it is not you, nor your employees, who have had to pay the price: it is the poor and hungry whose lives have been blighted — and, all too often, ended — as a result of your policies. That is why we are launching this campaign.

*Nicholas Hildyard  
for The Ecologist*

*This letter has been endorsed by the following groups.*

Animal Welfare Institute, USA  
Asia-Pacific Peoples' Environment Network (APPEN), Malaysia  
Bank Information Centre, USA  
Both Ends, Netherlands  
Campagna Nord-Sud, Italy  
Centre for Environment and Development, UK  
Centro de Estudios Uruguayos en Tecnologías Apropriadas (CEUTA), Uruguay  
Centro Latino Americano de Ecología Social (CLAES), Uruguay  
Coalition for Environment and Development, Finland  
Consumers' Association of Penang, Malaysia  
The Development Group for Alternative Policies, USA  
Ecoropa, France  
Environmental Defense Fund, USA  
Environmental News Network, USA  
Friends of the Earth, Australia  
Friends of the Earth, USA  
Gaia Foundation, UK  
The Humane Society, USA  
Instituto de Antropologia e Meio Ambiente (IAMA), Brazil  
International Rivers Network, USA  
International Workgroup on Indigenous Affairs (IWGIA), Denmark

Ladakh Project, UK  
London Rainforest Action Group, UK  
Milieudefensie/Friends of the Earth, Netherlands  
Minewatch, UK  
Monitor, USA  
NOAH/Friends of the Earth, Denmark  
Permaculture International, Australia  
Pesticide Action Network-Latin America, Colombia  
Probe International, Canada  
Project for Ecological Recovery (PER), Thailand  
Rainforest Action Network, USA  
Rainforest Information Centre, Australia  
Red de Ecologia Social (REDES)/Friends of the Earth, Uruguay  
Regnskovsgruppen Nepenthes, Denmark  
Research Foundation for Science and Technology, India  
Sahabat Alam Malaysia (SAM)/Friends of the Earth, Malaysia  
Sierra Club, USA  
Third World First, UK  
Third World Network, Malaysia  
Transnational Institute, Netherlands  
World Economy, Ecology and Development Association (WÖ&E), Germany

*We request others who wish to endorse this open letter to inform The Ecologist's editorial office (Corner House, Station Road, Sturminster Newton, Dorset, DT10 1BB, UK). The open letter may be translated and/or reproduced in whole or in part without prior permission, provided credit is given to The Ecologist.*

*Please write letters in support of this campaign to: Mr Edouard Saouma; to your regional FAO liaison office; to relevant national government officials and politicians, especially in ministries of agriculture and development agencies and departments; to the media; and to environment, development, human rights and other relevant groups who may wish to join in the campaign.*

**Mr Edouard Saouma**, Director-General, FAO, Via delle Terme di Caracalla, 00100 Rome, Italy.

**FAO Regional Office for Africa**, PO Box 1628, Accra, Ghana.

**FAO Regional Office for Asia and the Pacific**, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand.

**FAO Regional Office for Europe**, FAO Headquarters, Via delle Terme di Caracalla, 00100 Rome.

**FAO Regional Office for Latin America and the Caribbean**, Casilla 10095, Santiago, Chile.

**FAO Regional Office for the Near East, FAO Headquarters**, Via delle Terme di Caracalla, 00100 Rome.

**FAO Liaison Office for North America**, 1001 22nd Street NW, Suite 300, Washington, DC 20437.

# The Food and Agriculture Organization of the United Nations:

## An Insider's View

by  
Khalil Sesmou

*FAO, set up to "develop" world agriculture so as to enable the world to feed itself has disastrously failed in its task. It has ignored and even derided traditional agricultural methods and permits no internal criticism of its policy of promoting Western-style intensive farming and the export of cash crops. FAO's performance is judged on the amount of money it spends, not on the effectiveness of its projects, it ignores the voices of the people it is supposed to be helping and it has close links with agribusiness multinationals, whose products it actively promotes. The organization's Director-General has been much criticized by FAO staff and others for his autocratic style, and the political manoeuvring he has engaged in to ensure his re-election. A massive overhaul of FAO's basic philosophy, structure and function is urgently needed.*

**"It is astonishing how often and how badly development professionals have been wrong."**

**Robert Chambers<sup>1</sup>**

The Food and Agriculture Organization was the first specialized United Nations agency to be founded after the Second World War. Officially it came into being in October 1945, a few days before the UN itself. It remains to this day the largest of the UN agencies.<sup>2</sup>

FAO currently handles something over \$500 million each year in core and "extra-budgetary" funding (see Box, p.49). This is less than 10 per cent of the \$5.2 billion in net official development assistance devoted to agriculture in 1987, and a very small share of the total ODA in 1987 of \$39.4 billion. As of June 1989, FAO had a staff of 6483, divided roughly two-thirds to one-third between desk jobs and field work. Approximately half of the staff are employed at the Rome headquarters.

Though the following is essentially critical of FAO, the organization does a lot of good work which is insufficiently known. Its success in keeping the desert locust in check (albeit partly with toxic chemicals), its defence of plant genetic diversity and its vernacular languages programme (which brings technical literature to a wider audience), are among its many achievements which deserve recognition.

### Modernizing Agriculture

FAO originated during the colonial period. As the Third World gained its independence, many in the colonial administrations left to place their "expertise" at the service of FAO. The agency's

whole approach to development was moulded in those early days and has scarcely changed since: then, as now, the promotion of export crops and the application of modern inputs was seen as the key to agricultural development.

Although the introduction of modern techniques through the much vaunted Green Revolution (see Vandana Shiva, *this issue*) has arguably been a technical success, considerably increasing yields, it has proved an environmental, social and human disaster. Poor and small farmers have been systematically marginalized, the environment has been degraded, genetic diversity has been drastically eroded and the dependence of the South on the North has been increased. Even within FAO itself, voices of concern could be heard as early as the 1960s. By the mid-1970s, the criticism was out in the open, with a report from the UN's own Research Institute for Social Development highlighting some of the many problems.<sup>3</sup>

At the time, dissent was accepted and even allowed to flourish. Today, however, staff contest the official wisdom at their peril, and FAO remains committed to modernizing agriculture along the lines of the Green Revolution while disparaging traditional agricultural practices as out-moded and unproductive. One report notes:

"Many low-external input systems [i.e. those using fertilizer, seed etc. produced on the farm, instead of being bought] available for the tropics and sub-tropics cannot produce the required output levels or match the net producer returns of the high-input systems they would have to replace."<sup>4</sup>

This statement is not backed up by any supporting evidence. On the contrary, study after study reveals the farming systems being swept aside by FAO's modernization policies to be efficient and productive and well suited to their specific social and ecological contexts (see pp.93-106). Nevertheless, throughout its 45 years,

The author is a senior FAO official. Khalil Sesmou is a pseudonym.



*Edouard Saouma, the sixth Director-General of FAO. FAO publicity claims that Saouma is "leading FAO's drive for ecologically-sound and conservation-based 'sustainable development'." It is hard to find any evidence of this from his three terms at the helm of the UN's largest specialized agency. (Photo: FAO)*

FAO has done nothing to assist Third World farmers to develop alternatives to high-input systems. It has not committed a single staff member to the study of traditional agricultural practices.

So keen is FAO to promote chemical inputs that at its 1987 conference it put forward a plan to provide such inputs in the form of aid-in-kind.<sup>5</sup> FAO insisted that "without modern agricultural inputs, Africa will be seriously constrained by being locked into traditional production technologies". The conference report records that, "inputs would inevitably play a critical role in raising agricultural production and productivity in Africa". The programme, which would have been managed by FAO, was aimed at pleasing both Third World governments (particularly in Africa) and the industrialized countries. Both were expected to grasp at the chance of filling the "possible supply gap" of \$400 million worth of fertilizers, tractors, tools and pesticides. Doubtless, the proposal was not unrelated to the re-election campaign of the Director-General, Edouard Saouma, which was then in full swing.

In the event, the proposal received only lukewarm support, not only from potential donors but even from African and other Third World countries.<sup>6</sup> But the debate served its purpose: to stress to the assembled delegates and the watching world that feeding the poor depends on modern inputs and that insufficient supplies of them would lead to increasing famine and misery. Sadly, not a single delegate suggested that there was scope for up-grading local technology and traditional inputs. FAO's brainwashing on this subject is virtually complete.

## Export Crops and Debt

FAO is equally intransigent in its commitment to boosting export crops. When Third World countries gained independence, they inherited economies geared to exporting agricultural raw materials and minerals. Today, in large part due to FAO policies, Third World governments are placing even more stress on export crops. Burkina Faso's cotton production, for example, multiplied 37 times to 75,000 tonnes between 1960 and 1984, while output of the subsistence food crops millet and sorghum, barely doubled. The chief reasons for this are that:

- Export crops, necessarily passing through controllable channels, can easily be taxed by governments, contrary to food crops marketed locally;
- With the exception of the major cereal grains (wheat, maize and rice), virtually all research, be it national or international, funded by ex-colonial powers or by international institutions, has been directed towards improving export crops. Only in very recent years has attention finally been given to local food crops such as sorghum, millet and cassava;
- As external debts have increased, and adjustment programmes have been imposed on Third World countries by the IMF and the World Bank, the need for foreign currency has further increased, placing greater stress on cash crop production and exports to the detriment of food production.

FAO can hardly be blamed for the inheritance of the colonial system. But ever since the late 1960s, when the agricultural trade balance of many countries moved from surplus to deficit as their food imports increased, it has been clear that agricultural exports were no solution to the Third World's food problems. Indeed, for the past three decades, FAO staff and government representatives have been repeating the same cycle of reports and discussions in which the instability and unreliability of international commodity markets are regularly deplored. Yet FAO has steadfastly refused to draw conclusions from experience.

## International Market Instability

Some typical lamentations can be found in the 1989 report of FAO's Committee on Commodities. It records that the FAO export price index (1980=100) stood at 92 in 1988, and "even in current terms, prices were lower than in 1980". In the second half of the 1980s, the prices for cocoa, coffee and tea (on which many countries depend for a large share of their export receipts) were bringing in 25 per cent less than at the turn of the decade. In 1987, coffee prices averaged little more than half their price of a year earlier. Coconut and palm oil in 1986 were barely more than one-third of their value at the turn of the decade and in 1989 — after 10 years of heavy world-wide inflation — brought in only two-thirds of their 1979 value.

Some countries' exports are concentrated on a very limited number of primary commodities. In 1986, nearly 90 per cent of Somalia's exports consisted of cattle and sheep; nearly all of Uganda's exports were coffee; one-third of Bangladesh's exports consisted of jute and jute products. These countries are extremely vulnerable to international market instability, and the resulting swings in government revenues make forward planning, and even planning current expenditure, virtually impossible. The serious rioting in Ivory Coast in March and April 1990, which was

provoked by the government's inability to pay civil servants as a result of the collapse in commodity prices, illustrates the gravity of the problem.

Despite its wide-ranging technical mandate and assumed competence, FAO has been unable to assist member countries to find effective solutions to the problems its export-led policies have created. Indeed, at times the deliberations of the Committee on Commodities have a surreal quality. At the June 1989 meeting, for instance, the "situation" discussions covered 1987 and the "outlook" discussions 1988. It is thus possible to read in the committee's report, dated September 1989: "Regarding 1988 . . . the global volume of agricultural trade [is] expected to rise". Rip Van Winkle would have felt at home in such a committee!

FAO, which for years did its best to promote international commodity agreements as a means of achieving greater price stability, now argues that, "it is essential to continue and intensify the [agricultural] reform process in the interests of improving conditions of world agricultural trade". Such advice is purely theoretical, lifted from the best economics text books. No account is taken of the practical realities of export-based development. Political vulnerability, the power of multinational corporations (which control as much as 90 per cent of the market for certain commodities), declining terms of trade, the ecological damage resulting from export crop monoculture, the negative trade-off between export crops and food security — all of these factors are squarely outside the scope of the Committee on Commodities

Given that FAO was set up to assure that the world is properly fed, one wonders how it can justify committing the poorest and least well-fed countries in the world to exporting the bulk of their agricultural produce to countries which, in many instances, have an embarrassing surplus of food? As Susan George points out, encouraging small farmers to produce, say, green beans for the

export market, contributes nothing to the producer's security.<sup>7</sup> One can go further than this: it is often a recipe for starvation.

### *Agriculture: Toward 2000*

In 1979, FAO published a major study, *Agriculture: Toward 2000*, a shortened version of which was distributed in 1981 to professional and academic bodies worldwide. The study has been widely quoted and used for further research and academic publications. Insofar as FAO has any official policies, *Agriculture: Toward 2000* might be seen as its policy for world agriculture.

The study contained a doomsday picture of what would happen to Third World populations unless they adopted modern technology wholesale. A revised version, issued in July 1987, argued that from 1985 to the year 2000, the use of fertilizers and other inputs including "chemical plant protection" agents — FAO-speak for pesticides — should double.<sup>8</sup> While the original *Toward 2000* concluded that an annual rise in agricultural production of at least seven per cent was required to improve Third World diets, the 1987 "realistic" study halves this growth rate to 3.5 per cent. Yet the assumed Third World population by 2000 is roughly the same as in the previous version (3485 million compared to 3630 million). Consequently, either the previous study was way off the mark, or the 1987 one is under-estimating the dietary shortfall.

True to form, the need for modernization of Third World agriculture is unquestioned, while traditional methods are demeaned. Reference is made, for example, to the transformation of agriculture into "a dynamic productive sector". The point is also made that "labour productivity in [the developing countries] rose by a half, although in absolute terms it is still only a fraction of that in developed countries". The comparison could hardly be more

## Where Does FAO Get its Money From?

FAO's budget is approved biennially, by the FAO Conference, on the basis of proposals from the Director-General. The Regular Budget for the two-year period 1991-92 is \$560 million. This is funded almost entirely from *obligatory* contributions from its 158 member countries. The biggest contributor is the US, which pays a quarter of the Regular Budget under the agreed UN budget sharing system. The US continues to stick to its 25 per cent of agency budgets as this gives it considerable leverage throughout the UN system. Japan and Germany, the second biggest contributors, pay 13.5 per cent each (\$75 million for 1991-92). The UK's share is \$32 million or just under six per cent of the budget. These four countries, together with France, Italy and Canada, contribute almost 70 per cent of the organization's core budget.

The size of the payments are assessed in accordance with the UN contribution scale which, in principle, is proportionate to the national incomes of the member countries. Few developing countries contribute more than the minimum quota of 0.01 per cent. As the budget is decided on a basis of "one country, one vote", Third World governments are able to pass the Director-General's generous budget increases with the knowledge that most of the funds will have to be paid by the rich countries.

No country is allowed to withhold its contribution to the Regular Budget. Thus, in theory the main contributors must maintain their contribution or withdraw from the organization. However, in the 1980s, the US, citing various technicalities, withheld its funds from FAO due to concerns over the non-accountability of the agency. President Bush has now promised to pay up its £360 million of arrears over a five-year period. The only other significant debtors as of early 1991 are Brazil at about \$4 million and Argentina at just under \$1 million.

Further to its core budget, FAO also manages trust funds valued at \$332 million in biennium 1986-87. In addition, it executed technical assistance projects for the UN Development Programme worth approximately \$300 million. This "extra-budgetary funding" is based on *voluntary* allocations from other UN bodies as well as from individual member countries. The contributions from governments are mainly used for the funding of special "action programmes". FAO's biggest financial worry comes from UNDP's decision in 1990 to fund projects direct to national governments rather than through FAO or the other UN specialized agencies. FAO therefore looks likely to lose its biggest single source of funding.

Patrick McCully

irrelevant: in the industrialized countries barely five per cent of the population now works on the land, whilst the Third World has a huge under-employed rural labour force and little capital. The last thing the Third World needs is United States- and European Community-type agricultural "productivity".

The impression the study gives is one of naivety, hypocrisy and wishful thinking. It states that "agriculture fared well in assistance to developing countries", since its share of total official aid rose from 12 per cent in 1974-1975 to 18-20 per cent in the early 1980s. It is difficult to understand how the international agency for agriculture can feel that a 20 per cent share of development assistance is satisfactory when the sector represents 50-90 per cent of the economies of most Third World countries and feeding the world is the central theme of the study.

The authors of *Agriculture: Toward 2000* recognize that "design and implementation [of price policies] is difficult", but nonetheless state that "producer price policies must ensure that small farmers are fully catered for by the marketing systems through which the policies are applied". This is pure wishful thinking:

- First, price policies in Third World countries are nearly always geared to export crops and cereals, which are not necessarily what small farmers produce;
- Second, the administrative capacity of most Third World countries is so limited that price policies, like many other government policies, simply fail to reach the small and poor farmers;
- And third, the experience of industrialized countries with pricing policies has shown that they cost huge amounts of money, and mostly benefit medium and large farmers.

Elsewhere the authors argue that the estimated 780 million people living in absolute poverty in the Third World need off-farm employment. No-one would argue with this. But one cannot help being amazed at the proposal that these impoverished masses "must be given the opportunity to save and invest in local industry"! This is only one of the many contradictory policy statements with which the authors battle throughout the report but which they simply fail to resolve. Other examples abound:

- World food production has increased, the study says, yet the number of malnourished has increased also. This does not deter the authors from stressing that "average per caput food availability for direct human consumption will rise" by the year 2000 or from rejoicing that food self-sufficiency ratios in the developing world will not fall [they will be virtually unchanged]. In both cases, FAO ignores its own oft-repeated argument that it is inadequate access to food



An FAO extension agent explains the economics of fertilizer use to Bolivian farmers. FAO has always emphasized the technical aspects of food production rather than the fundamental social, economic and political reasons for poverty and hunger. (Photo: FAO)

- (through production or purchasing power) which keeps people hungry, not its "average availability";
- The report complains of inadequate increases in cereal production, yet calls for increases in cereal-fed livestock;
- The study's central theme is the need to modernize Third World farming, a policy which has everywhere caused farm employment to fall. Yet at the same time, FAO stresses the need to create rural jobs;
- A call is made for a massive increase in investment of domestic resources in the rural areas, yet in deploring the limited financial resources available to Third World governments to achieve this, the study ignores the fact that it is the unashamed milking of the agricultural sector which provides governments with a sizeable slice of the domestically-generated resources available to them;
- Inadequate food supplies are pinpointed as a major problem for Third World countries in the coming years; but at the same time, the study calls for a reduction in production in the North so that world market prices can rise and stimulate exports of food from the South;
- Finally, while the study recognizes the instability of world markets and a sharp decline in agricultural terms of trade, exports remain a major theme: macro-economic policies must start from the right exchange rate, producer returns must be geared to world market prices, solving the debt crisis calls for increased exports and so on.

### What Makes FAO Tick?

The whole development machine — multilateral and bilateral alike — appears to be engaged in a frantic exercise to develop

# The Seductive Language of Development

The development industry has mastered the techniques of saying much and meaning nothing. Consider the following extract from a 1984 speech by the then Assistant Director-General for fisheries:

"This programme is based on an *integrated* approach to the *development* of small-scale fisheries and the improvement of the socio-economic conditions of communities of artisanal fishermen and their families. It will promote the skills, capacities and potentials of fishing communities, through the active *involvement* and *participation* of the fishing villagers in the *planning* and implementation of the management and *development* activities."

To the uninitiated it sounds wonderful. In reality none of it stands up to a critical analysis. It is merely a way of making people believe that the modernization of fishing is designed to help local fishing communities when, in fact, FAO want to modernize fishing to create a market for trawlers, radar and sonar equipment, nylon nets and modern warehouses, and, most importantly, for the expertise which FAO must provide to justify its own existence. The effects upon fisherfolk of modernization are the destruction of their communities, the export of the fish which once fed them, and the overfishing and eventual exhaustion of their local fish stocks.

The techniques used by the development industry's sophisticated propaganda machine have been analyzed by A.F. Robertson. He highlights the language used for selling its policies and stresses that much of its value rests in "its imprecision of meaning". He points out that the "buzz words" which it uses can be "combined into almost infinite permutations and still 'mean' something".

Robertson illustrates his point by listing the 56 words which occurred the most frequently in a planner's lexicon. These are arranged in four different columns of 14 words.

	A	B	C	D	
1	Centrally	Motivated	Grass-roots	Involvement	1
2	Rationally	Positive	Sectoral	Incentive	2
3	Systematically	Structured	Institutional	Participation	3
4	Formally	Controlled	Urban	Attack	4
5	Totally	Integrated	Organizational	Process	5
6	Strategically	Balanced	Rural	Package	6
7	Dynamically	Functional	Growth-Oriented	Dialogue	7
8	Democratically	Programmed	Development	Initiative	8
9	Situationally	Mobilized	Cooperative	Scheme	9
10	Moderately	Limited	On-Going	Approach	10
11	Intensively	Phased	Technical	Project	11
12	Comprehensively	Delegated	Leadership	Action	12
13	Radically	Maximized	Agrarian	Collaboration	13
14	Optimally	Consistent	Planning	Objective	14

One word can be selected at random from each column to compose a four word, typical development phrase. For example, A3, B6, C9 and D12 make "systematically balanced cooperative action." A12, B9, C6 and D3 construct another fine sounding phrase, "comprehensively mobilized rural participation." None of these phrases mean anything yet they are typical of the seductive language which fills the countless speeches, plans, project proposals and glossy pamphlets of the development industry.

Edward Goldsmith

project proposals and ship them out to "the field". Having convinced the North's political establishment that increased sums must be injected into development, the machine must then spend the money to justify its existence. Pressures also come from companies supplying everything from rotary harvesters to remote sensing equipment. Contracts awarded to such companies ensure that a sizeable share of the money provided to the Third World for development purposes never leaves the "donor" country.

When an agency receives lower resources than it asks for, it must complain loudly. But when it then receives an unexpected boost in resources (as happened with the International Fund for Agricultural Development's Special Programme for Sub-Saharan Africa in 1986 and FAO's Technical Cooperation Programme in 1989) the pressure is on to spend — or look silly. And so the mad rush for projects goes on.

The concept of "performance" is paramount. Efficiency is judged by the speed with which money is spent: nothing must remain in the kitty at the end of the financial period. As one economist from FAO's Development Department puts it: "The quality of projects is not the concern here. We are expected to process projects as quickly as possible. What counts is quantity, even if that means funding a badly conceived operation". Another, asked whether a better knowledge of the local people would not improve project design, commented: "We don't have too much time for sociologists and anthropologists around here. They ask too many questions and slow things up".

The disastrous effects of such attitudes is borne out by a candid and exceptionally self-critical staff paper by FAO's Investment Centre, whose job it is to prepare agricultural projects for funding by the multilateral development banks, IFAD and various other aid agencies.<sup>9</sup> With regard to project preparation, the report states:

"Most of the suggested approaches to improving the standards of project preparation require that some more time be assigned for the work. It is also likely that, if the additional analyses were made, they would lead to more cautious assessments of investment requirements and hence to fewer and certainly smaller projects.

"As long as the major financing institutions give greater weight in the evaluation of their performance and that of their staff to the number and size of loans advanced rather than to the ultimate results of the investments made, any proposal which increases administrative costs, contributes to delays in meeting loan processing target dates or reduces the size of justifiable loan commitments is not likely to attract the necessary management and financial support.

"... as long as emphasis is given to speed in preparing projects and the very tight manpower allocations prevail, this will inhibit the introduction of any improvements in project preparation techniques and hence continue to:

"• reduce the thoroughness with which

alternative options are reviewed prior to the hardening of most aspects of project design;

- preclude apparently necessary investigations and analyses;
- make it difficult to carry government and, still more, the beneficiaries along with a rapidly evolving project concept; and
- restrict the range of disciplines that can be represented in the project preparation team to one which precludes specialized treatment of all major components."

In this atmosphere of pressures for speed and volume, projects are pushed forward whether or not there is a real need for them. Often Third World governments know that the projects are inappropriate but accept them either because they bring certain prestige items — a Mercedes or equipment, for example — or because of the crying need for foreign exchange. In Nepal, for

---

*The FAO Director-General is renowned for his squabbling with the heads of the other UN agencies in order to expand the range of FAO's activities.*

---

instance, a country where over 40 per cent of the population lives below the poverty line, external assistance represents 70 per cent of the government budget. In many African countries the impact of "agricultural development projects" at village level is of marginal importance: their real role is to support the budget of the Ministry of Agriculture by providing salaries and equipment.

For UN agencies like FAO, there is the added attraction of gaining 13 per cent "support costs" on all projects they manage. This is a useful source of revenue. With the UN Development Programme spending some \$750 million annually via the agencies, the stakes are high to get as large a share as possible of the cake (however, this source of funding may now dry up, *see* Box, p.49). Small wonder that the FAO Director-General is renowned for his squabbling with the heads of the other UN agencies in order to expand the range of FAO's activities — principally by taking over any activity that can remotely be classified as "agricultural" or "rural", including rural poverty and rural industry.

### **The Myth of "Participation"**

FAO's preoccupation with speeding up the project cycle, and thus expanding its power and budget, helps explain why despite its rhetoric, it has consistently failed to involve local people in the evolution and management of its development projects.

In July 1979, FAO organized the World Conference on Agrarian Reform and Rural Development (WCARRD), which culminated in a "Declaration of Principles" adopted (with certain reservations) by 146 governments. In his statement at the end of the conference, Director-General Edouard Saouma called the Declaration, "a conceptual and moral orientation for future action", and described it as the "Peasants' Charter".<sup>10</sup>

FAO apparently thought that through this declaration it had broken the barriers to effective participation and that, together with an increased use of terms like "participatory" and "action-oriented" in documents, it would dampen demands for local people to participate effectively in projects. Yet the wording used by

FAO in its "Peasants' Charter" reflects its true colours. The chapter on "Objectives and Strategies", as drafted by FAO staff, incorporates a typical top-down approach: "promote people's organizations . . ." By contrast, the reference to public participation in the section "National Programmes of Action", drafted and sponsored by NGOs, uses a quite different language: "Remove all barriers to the free association of rural people . . ."

Perhaps predictably, the Charter has achieved little in the field of agrarian reform. On the contrary, the International Federation of Plantation, Agricultural and Allied Workers (IFPAAW) points to "an increasing landlessness, unequal distribution of wealth, violence against the rural poor and a general malaise in the informal rural sector".<sup>11</sup> IFPAAW also notes that, being conceived, adopted and applied by governments alone, the WCARRD Programme of Action "has implied government control" — thus denying the very principles of "people's participation".

A senior officer of IFPAAW states that her organization has virtually given up trying to change FAO's attitude towards participation, be it at a theoretical level in the annual meetings between FAO and the trade union organizations, or in the field. "We simply don't see eye-to-eye with them", she says, quoting an attempt at collaboration in the Honduras (a women's training activity) which was simply presented by FAO on a take-it-or-leave-it basis.

FAO's excuse for its failure effectively to involve peasants in projects is that it is governments who call the shots. Anisur Rahman, who has been involved in development issues for many years, recognizes that the problem exists: "Governments are mainly motivated by projects which will bring in foreign exchange". However, he points out that FAO could, if it wished, make use of international law to ensure participation, in particular the International Labour Organization Convention Clause 141, which addresses "Organizations of Rural Workers and their Role in Economic and Social Development". This view is supported by IFPAAW which, while agreeing that FAO must "recognize the national sovereignty of governments", states that, "it can nevertheless use its influence to promote the much wider participation of people in agriculture and rural development by firmly supporting the principles" of the ILO Convention.<sup>12</sup>

ILO was founded in 1919 with a tripartite structure in which

---

*Were FAO to permit effective local participation in its development projects, it is unlikely that its projects would ever get the go-ahead.*

---

workers have an official place alongside employer and government representatives. Such a structure has been mooted on various occasions for the agencies such as FAO which were created in the mid-1940s, but this has always been vigorously opposed. FAO has systematically refused to provide any facilities for NGOs to develop their relations with it (an "NGO room" for instance). Clearly, it is determined to adhere strictly to its mandate as an intergovernmental organization. It certainly does not see itself as an organization at the service of the world's peasants. Indeed, were FAO to permit effective local participation in its development projects, it is unlikely that they would ever get the go-ahead. Why, after all, should peasants actively participate in projects which are specifically aimed at transforming their whole way of life? Projects which, from experience, they know can only serve

to marginalize and impoverish them? Why, in effect, should they participate in their own annihilation?

## Promoting Industrial Interests

Indeed, reviewing FAO's record, it is hard to resist the conclusion that it is less concerned with supporting the efforts of small farmers in the Third World than with promoting the interests of national governments and multinational agribusiness corporations.

The close relationship between FAO and the agrochemical industry, for example, has been well-documented (see Barbara Dinham, *this issue*). From the early 1960s to 1978, the FAO-Industry Cooperative Programme was an official part of FAO's structures and among the most prominent industry participants in the programme were major chemical companies. According to a

recently-retired senior executive of the Swiss chemical giant Ciba-Geigy: "We always enjoyed very good relations with FAO. Sometimes there were a few problems but generally relations were excellent." In 1978, amidst growing criticisms of this special relationship, Director-General Saouma closed the Programme. This did not stop FAO from continuing to "market" pesticides through its advice and projects and it is only fairly recently that integrated pest management (the control of pests using largely biological methods and only small amounts of pesticides) has become part of its rhetoric.

The hand-in-glove relationship between FAO and the pesticide industry also explains the lax pesticide standards established by the Codex Alimentarius system — jointly administered by FAO and the World Health Organization. Codex standards are up to 40 times less stringent than those set by the US Environmental Protection Agency (see Mark Ritchie, 'GATT, Agriculture and the Environment', *The Ecologist*, Vol. 20, No. 6, 1990).

## A Lord of Poverty

Edouard Saouma's position as head of the UN's largest specialized agency confers upon him great responsibility. In the words of one observer: "He can, and often does, decide over life and death in the middle of famine".

Some extremely grave charges have been levelled against Saouma, and it is difficult to turn a blind eye to all of these. For example, it is alleged that in 1984, at the height of the Ethiopian famine, Saouma held back food aid for 20 days at a time when emergency consignments were urgently required. According to testimony from other FAO officials and the former Ethiopian Relief and Rehabilitation Commissioner Dawit Wolde-Giorgis, this delay occurred simply because Saouma disliked Tessema Negash, then Ethiopia's Assistant Delegate to FAO, and wanted him removed from office: only when Negash was recalled to Addis Ababa was the food released. In Dawit's own words:

"I went [to FAO Headquarters in Rome] and tried to brief [Saouma] on what was going on in Ethiopia . . . He interrupted the discussion and told me that our representative was not a very likeable person . . . that it would be difficult for him to really cooperate with the Ethiopian government as long as we had Tessema Negash as our FAO representative . . . There I was trying to brief a senior UN official about the impending disaster and the number of people dying every day and I was confronted with personal problems . . . that was sickening."

When I approached Saouma in 1989 for an interview to clarify this and other matters, he declared himself unable to receive me because of his "many commitments". I was, however, sent a duplicated press handout in which the accusations concerning Ethiopia were strenuously denied. I would have been more convinced if I had been given the opportunity to question Saouma face to face.

Edouard Saouma's third six-year term in office is worth a significant sum of money to him personally: \$813,276 excluding fringe benefits. Not even his most impassioned detractors suggest that his single-minded pursuit of reelection was motivated entirely — or even mainly — by an urge to keep his hands on the Director-General's fat pay packet; it has been pointed out by more than one, however,

that there is something rather anomalous about running a development agency and at the same time earning so much. This, as simply stated by Raymond Lloyd — who himself resigned from FAO in disgust after 20 years service — is the "paradox of working for the poor and underprivileged from a position of wealth and power."

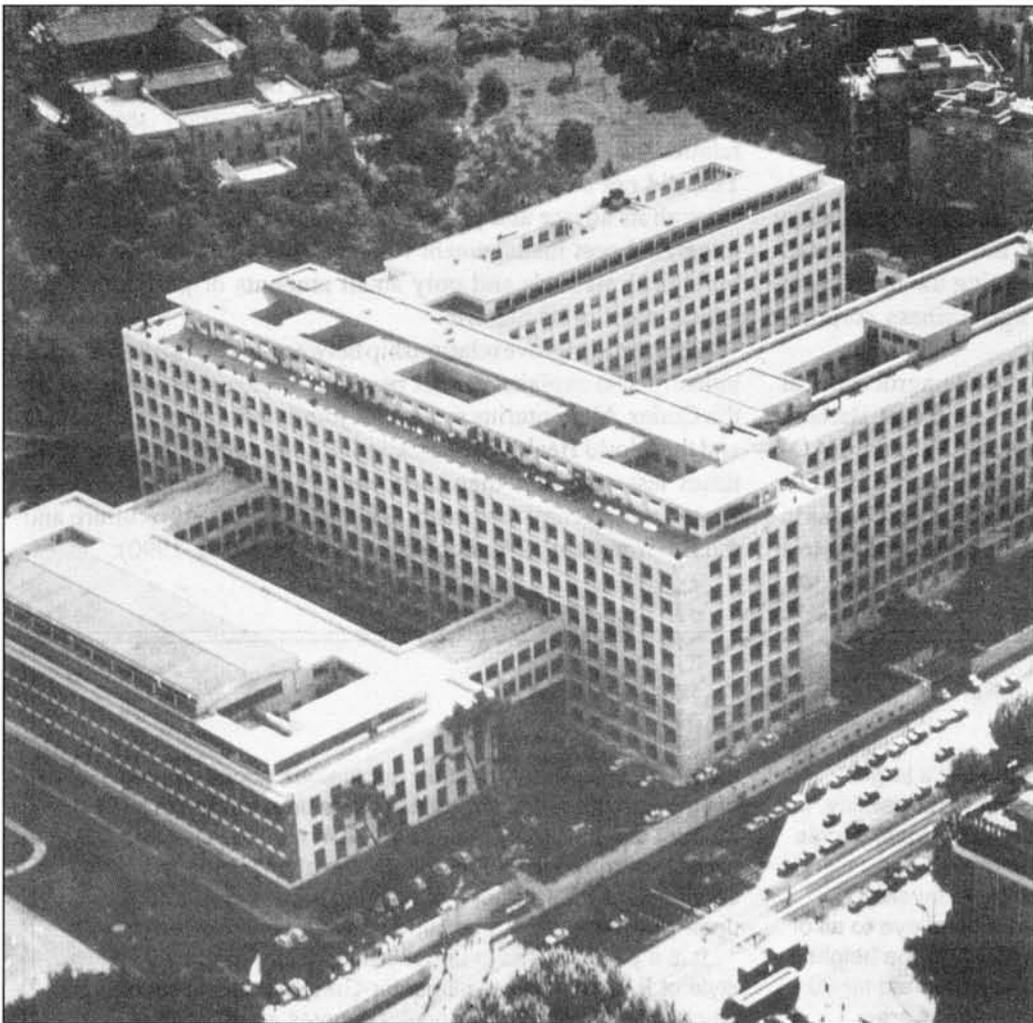
It is a paradox that is undoubtedly heightened by the style of FAO's autocratic Director-General. He insists on being called "Your Excellency", occupies an office that would do justice to an oriental potentate and makes full use of his annual "representation allowance" of \$32,000 to entertain visiting VIPs.

More generally, the way that business is conducted at the agency's Rome Headquarters seems to be an extension of the Director-General's dominant personality. Visitors to the six-story white marble building near the ancient Coliseum only get past the patrolling security guards if they can prove that they have appointments; once inside they are required to wear coloured tags indicating their destination. In the case of journalists an escort from the Press Room is provided — presumably to ensure that no "snooping" takes place and that officials talked to give the right answers to questions. Several senior members of staff have been suspended for making "unauthorized statements" to the press and Saouma maintains additional control over the flow of public information about FAO by denying his more outspoken critics any access to Headquarters. Meanwhile the agency's information division disposes of more than \$12 million a year producing lavish brochures and reports extolling — in full colour — the virtues of FAO's services to the dispossessed and disadvantaged.

One gets the sense from all this of an institution that has lost its way, departed from its original purely humanitarian and developmental mandate, become confused about its place in the world — about exactly what it is doing, and why.

Graham Hancock

This piece is extracted with permission from Graham Hancock's book *Lords of Poverty* (MacMillan, London, 1989 (hardback) and Mandarin, London, 1989 (paperback)).



FAO's headquarters on Rome's Circus Maximus. Many of the over 3100 staff who work here are reported to be demoralized with the constricting nature of the huge bureaucracy. (Photo: FAO)

A similar impression is given by FAO's support for the tobacco industry. In June 1989, FAO's Committee on Commodities held a special discussion on tobacco. An opening statement was made by a WHO observer, K.E. Stanley, who pointed to the two million deaths caused by smoking every year, and argued that "in the long term, tobacco consumption is not only a major health hazard but also a burden to national economies, due to associated health and social costs". He also stated that "economic analyses should not be the sole basis for determining government policy with respect to tobacco".<sup>13</sup>

Such arguments cut no ice with the committee. Although it recognized the concerns over health, it remained adamant that, "tobacco is of great socio-economic importance... a large number of people worldwide depend on tobacco cultivation for their livelihood". The role of tobacco in export earnings, government revenues and so on were also evoked in support of the industry. Arguing that "malnutrition and infectious diseases" were "more pressing health concerns" in Third World countries than smoking, the committee went on to request that FAO provide technical assistance to improve tobacco cultivation. Yet it is hard to see how expanding tobacco cultivation, which mines the soil and entails taking land out of food crop production, will help combat malnutrition.

FAO's bias towards industry also explains its support for the Tropical Forestry Action Plan (see George Marshall, *this issue*) and food irradiation. The latter is being promoted as a means of

reducing food losses during storage, its proponents claiming that it will allow chemical control methods to be reduced or eliminated. In December 1988, FAO co-sponsored a conference in Geneva with the International Atomic Energy Agency, WHO and the GATT/UNCTAD International Trade Centre, which gave the green light to the more widespread use of irradiation and the trade in irradiated foodstuffs.

FAO has remained impervious to the consumer advocates and others who have argued that there are still considerable doubts over the safety of food irradiation. They claim that FAO is putting its weight behind a "technology in search of an industry", which is irrelevant to the problem it is supposed to be handling. As in so many other instances, FAO has embraced a capital-intensive, high-technology "solution" which will further increase the dependence of Third World countries on the North.

### FAO's Power Structure

FAO is governed by a conference of all its member states held once every two years. A council, which meets twice a year, oversees the organization's activities between conferences.

Eight standing committees deal with: finance, programme, legal and constitutional affairs, commodities, fisheries, forestry, agriculture and food security. Finally, regional conferences meet in non-conference years.

Heading the secretariat is a Director-General who, in the absence of any effective checks and balances, is all-powerful. In effect, member governments have very little control over how FAO operates or how it spends the funds they place at its disposal. As has been pointed out by the late German journalist Otto Matzke, who made a detailed critique of FAO, the office responsible for auditing FAO's accounts is directly dependent on the office of the Director-General.<sup>14</sup> It is hardly likely to provide sincere and searching reports on FAO's use of funds. The external auditing of accounts is carried out by the United Kingdom's Comptroller and Auditor General, whose staff is too small to carry out substantial evaluations.

Neither is there any independent procedure for assessing FAO's operational effectiveness: the only evaluations are carried out by FAO itself. The service which deals with field programme evaluation and inspection is located within the office of the Director-General. Finally, the Finance and the Programme and Budget Committees are too large (over 30 members each) to perform detailed scrutiny of FAO's activities. In 1987, the FAO Conference reluctantly agreed to order a "Review of Certain Aspects of FAO's Goals and Operations".<sup>15</sup> However, this was top-heavy with representatives of member governments under secretariat influence and resulted in a virtual whitewash for

FAO's current activities and approach. Not a single totally new idea came out of the \$2 million exercise.

## The Director-General's Personal Ambitions

The policies and functioning of FAO depend critically on the management style of its Director-General. If the Director-General so chooses, he or she can use his or her considerable power constructively, selecting high-profile, competent close colleagues, delegating responsibility, interacting with member governments, developing relations with sister organizations and providing lead-

---

*Outsiders or former staff members who dare to question the system go on to a "black list": no question of their getting back in, even on short term contracts.*

---

ership in FAO's areas of competence. Alternatively, the Director-General can be secretive, scheming, eliminate "rivals", centralize to the extreme and be confrontational with governments and other agencies. Since 1976, and the rise to power of the current incumbent, Edouard Saouma, it is the second management style which has prevailed.

Typical is Saouma's decision to set up a network of special FAO ambassadors directly responsible to his office. By convention, the UN "resident representative" in any country is the most senior UN official. His or her office also houses the offices of the other UN agencies. Saouma decided that this was demeaning for FAO and in 1976 began setting up his own separate representatives (FAOR in the jargon). Today, there are over 70 such representatives covering 100 countries and costing FAO some \$22 million a year, excluding the salaries of the regular staff who work for each FAOR. Even countries as small as Cape Verde and Barbados have their own FAOR.

The system was presented as an important step in the decentralization of FAO; in practice, FAORs have no autonomy whatsoever — indeed, they often give the appearance of being mere election agents for Saouma. Though the 1989 conference decided that the country representative system should be strengthened, in private senior agriculture ministry officials in many countries ask why FAORs exist at all.<sup>16</sup>

Saouma was originally elected for a fixed term of six years. One reason for limiting the mandate to a single six-year term, starting with the 1975 election, was because previous Directors-General had spent too much of their first term (originally four years) seeking to secure re-election. This had led to what might be termed "electoral sclerosis" since the Directors-General preferred to avoid any new initiatives for fear of offending their "electorate".

No sooner was he elected, however, than Saouma convinced the Third World countries that it was in their interest to lift the restriction on the number of mandates. A constitutional amendment was duly passed and the way was open for Saouma to spend the rest of his life at the helm of FAO. Re-elected unopposed in 1981, Saouma was not expected by many observers to secure a third mandate against his charismatic opponent, Benin's Moise Mensah, to whom the Organization of African Unity (half the total

Third World vote) had pledged their unanimous support no less than three times. But political mistakes by Mensah, astutely exploited by Saouma and his allies, the unashamed use of the organization itself and of the carrots and sticks available to the incumbent, finally saw Saouma victorious by a wide majority.

Saouma's re-election in 1987 was met with despondency by FAO staff who in their vast but silent majority favoured a change at the top. Worse still, perhaps, Saouma had to pay the "debts" accumulated in gaining re-election. Already, he had systematically ousted anyone who, even unwittingly, might become a rival. A flood of wholly unsuitable political appointees to decision-making positions now followed.

When the new Assistant Director-General of the Development Department — which encompasses the whole of FAO's field programme — took over his post in 1988, he had no experience of agricultural development in the Third World. This might have been interpreted as an exciting and daring innovation by Saouma to inject new blood and a new approach. The reality is far more banal: the new ADG's appointment was a debt payment. He had been *chef-de-cabinet* to the Agriculture Minister in the right-wing French government which had campaigned actively for Saouma and had probably swung the African vote in his favour.

The other main department of FAO, the Economic and Social Policy Department, has also been headed since the 1987 election by someone of doubtful qualifications. Where an imaginative specialist with the ability to develop new ideas and give a real impetus to FAO's work in this field was needed, an FAO career bureaucrat was nominated.

All the staff are aware of cases of candidates — for both external and internal recruitment — who have gone successfully through the selection process and been short-listed with one or two others only to discover that a complete outsider is eventually taken on. Outsiders or former staff members who dare to question the system go on to an unofficial "black list": no question of their getting back in, even on short term contracts.

Saouma's political appointees are a major source of discontent

---

*A new approach is urgently needed:  
one that starts from peasant practices  
and seeks to solve problems as the  
cultivator sees them.*

---

and frustration within FAO today. One middle-ranking fisheries technician complains: "Sometimes I arrive home in the evening completely demoralized: the man above me is afraid to take the slightest decision. My work can be held up for weeks because of this." A very senior secretary of over 25 years' standing says: "The Director-General has only just begun to realize the huge damage done to the organization as a result of all the political appointments he has made in the framework of his re-election campaign. The trouble is, it is too late to do anything about it now and the organization is suffering tremendously as a result." Another secretary of similar rank and experience considers that FAO could save a million dollars a year simply by sacking incompetent managers: "We have secretaries here doing those people's work already; what little they do themselves has to be double checked, which creates even more work." A technical professional complains: "This organization is no longer being managed, it is being

administered. And the stronger the bureaucracy's hold becomes, the more paperwork we have to do, diverting our time away from technical work."

The staff at FAO are frustrated, cowed and resigned. Demoralization was compounded when, at the November 1989 conference, no less than seven major contributors voted against the budget (passed nonetheless by the Third World's built-in majority). At the end of September 1989, 107 of FAO's 158 members were in arrears; 80 had made no payment at all for the year.<sup>17</sup>

## FAO and the International Order

The problems of Third World agriculture are intimately linked to power politics. Any examination of FAO and its performance during the past 45 years, must take due account of the fact that it operates within a world system biased in favour of the well-off, the powerful, the North, the multinationals. Its primary clients are ministries of agriculture, which are orientated the world over towards large, commercial farms. In order to survive over and above its inadequate regular budgetary resources, FAO is permanently seeking funds: from rich country governments, from banks and from big transnational companies. This must never be forgotten when castigating FAO for the mischief it does. But it cannot excuse it for doing the opposite of what it was set up to do — in effect, for aiding and abetting the very system which keeps the poor, poor and the hungry, hungry.

FAO's 6000 staff do some sound technical work and its policy bodies also sometimes even adopt the right resolutions. But these are rarely reflected in action at field level, either by FAO itself or by Third World governments.

A massive overhaul of FAO's basic philosophy, as well as its structure and function, is clearly overdue. A new approach is urgently needed: one that starts from peasant practices and seeks to solve problems as the cultivator sees them. It must make the "experts" realize that peoples' aspirations are not necessarily purely material and that the solution to world hunger is not to be found in imposing Western agricultural technologies and practices on the South.

The author envisages developing this article into a book. Anyone with experience of FAO (former or current staff members, consultants,

field workers or farmers) wishing to contribute comments, documents or experience is invited to contact *The Ecologist*. All contributions will be treated in strictest confidence.

## References

1. Chambers, R., *Putting the Last First*, Third World Affairs, 1985.
2. As one of the UN "specialized agencies", FAO was created to be the technical body for the agricultural sector. Originally, it had clear-cut supremacy in its field of action but this has been seriously eroded since the mid-1970s. In addition to the World Food Programme, founded in 1961, there are two other agencies with complementary roles: the International Fund for Agricultural Development (IFAD) and the World Food Council (WFC), both, like FAO, based in Rome. IFAD, operational since 1978, is a bank which lends to Third World governments for projects aimed at relieving rural poverty, in a sense it is almost the antithesis of the World Bank, at least in its objectives. WFC, operational since 1975, has a particularly difficult role to play within the UN system. It is supposed to "review major problems and policy issues affecting the world food situation . . . recommend remedial action", and ensure, "successful co-ordination and follow-up of policies" by the UN agencies.
3. Pearce, A., *Seeds of Plenty, Seeds of Want*, UNRISD, 1980.
4. FAO, *Agriculture: Toward 2000*, (rev.ed.), Rome, 1987
5. FAO, 'Report of the Feasibility Study on Expanding Aid-in-Kind in Farm Inputs', Rome, October 1987, Doc. C 87/20.
6. International Foundation for Development Alternatives, *Special United Nations Service No. 1827*, 20 November, 1987.
7. George, S., 'Some Effects of Bilateral and Multilateral Aid Organisations on Food and Nutrition', World Food Assembly, Rome, 1984.
8. FAO, op. cit., 5.
9. FAO, 'Investment Centre Staff Paper: Problems in Agricultural Project Design', Rome, October 1988.
10. FAO, 'Report of the World Conference on Agrarian Reform and Rural Development', Rome, 1979.
11. IFPAAW, 'Statement on FAO/WCARRD Activities', 20 February, 1989.
12. Ibid.
13. FAO Committee on Commodity Problems, 'Report of the 57th Session', Rome, July 1989.
14. Matzke, O., *Insufficient Control of Efficiency and Development Impact in the UN System: The Example of FAO*, *Verfassung und Recht in Übersee*, 2 Heft, 1981.
15. FAO, 'Review of Certain Aspects of FAO's Goals and Operations: Report of the Programme and Finance Committees', Rome, October 1989.
16. The 1989 FAO Review lists the abilities which FAORs should (and by inference do not) have, including "economic and policy expertise", the ability to prepare "reliable and informative reports" and an ability to "command the respect of local ministers and senior officials."
17. Whether or not its criticisms of FAO and the way it operates are justified, the refusal by the US government to respect its constitutional obligations and pay its contributions was deplorable, and provided a bad example which many Third World countries have been only too willing to follow. It is ironic that the anti-US rhetoric at the political level which has cost the organization so dearly is matched by pro-US policies at the technical and operational levels.

## ▲ Sponsor a Subscription to *The Ecologist* ▲

Each week *The Ecologist* receives numerous requests from environmental and social activists throughout the Third World and Eastern Europe. They need *The Ecologist* to help them with their campaigns but cannot afford the cost of a subscription.

Help them by sponsoring a subscription at the special price of £15/\$25.

Send cheques payable to *The Ecologist* to our Editorial Office, Corner House, Station Road, Sturminster Newton, Dorset DT10 1BB, UK. State if you have any preferences with regards to the geographical location or the special interests of the group or groups which you want to sponsor.

If you wish to send your old copies of *The Ecologist* on to environmental groups contact our editorial office for addresses.



A wealthy Punjabi farmer standing in a field of one of the high-yielding varieties of wheat on which the Green Revolution is based. The introduction of the HYVs has led to increasing rural inequalities and landlessness, and has contributed to the ethnic and communal violence which has claimed thousands of lives in the Punjab. (Photo: Mark Edwards/Still Pictures)

# The Green Revolution in the Punjab

by  
Vandana Shiva

*The Green Revolution has been a failure. It has led to reduced genetic diversity, increased vulnerability to pests, soil erosion, water shortages, reduced soil fertility, micronutrient deficiencies, soil contamination, reduced availability of nutritious food crops for the local population, the displacement of vast numbers of small farmers from their land, rural impoverishment and increased tensions and conflicts. The beneficiaries have been the agrochemical industry, large petrochemical companies, manufacturers of agricultural machinery, dam builders and large landowners.*

In 1970, Norman Borlaug was awarded the Nobel Peace Prize for his work in developing high-yielding varieties (HYVs) of wheat. The "Green Revolution", launched by Borlaug's "miracle seeds", is often credited with having transformed India from "a begging bowl to a bread basket.", and the Punjab is frequently cited as the Green Revolution's most celebrated suc-

cess story.<sup>1</sup> Yet, far from bringing prosperity, two decades of the Green Revolution have left the Punjab riddled with discontent and violence. Instead of abundance, the Punjab is beset with diseased soils, pest-infested crops, waterlogged deserts and indebted and discontented farmers. Instead of peace, the Punjab has inherited conflict and violence.

## Origins

It has often been argued that the Green Revolution provided the only way in which

India (and, indeed, the rest of the Third World) could have increased food availability. Yet, until the 1960s, India was successfully pursuing an agricultural development policy based on strengthening the ecological base of agriculture and the self-reliance of peasants. Land reform was viewed as a political necessity and, following independence, most states initiated measures to secure tenure for tenant cultivators, to fix reasonable rents and to abolish the *zamindari* (landlord) system. Ceilings on land holdings were also introduced. In 1951, at a seminar organized by the Ministry of Agriculture, a detailed farming strat-

Vandana Shiva is director of the Research Foundation for Science, Technology and Natural Resource Policy, 105 Rajpur Road, Dehra Dun, 248001 India. Her latest book to be published in the West is *Staying Alive: Women, Ecology and Development* (Zed, London, 1989).

egy — the “land transformation” programme — was put forward. The strategy recognized the need to plan from the bottom, to consider every individual village and sometimes every individual field. The programme achieved major successes. Indeed, the rate of growth of total crop production was higher during this period than in the years following the introduction of the Green Revolution.

However, while Indian scientists and policy makers were working out self-reliant and ecologically-sound alternatives for the regeneration of agriculture in India, another vision of agricultural development was taking shape within the international aid agencies and large US foundations. Alarmed by growing peasant unrest in the newly independent countries of Asia, agencies like the World Bank, the Rockefeller and Ford Foundations, the US Agency for International Development and others looked towards the intensification of agriculture as a means of “stabilizing” the countryside — and in particular of defusing the call for a wider redistribution of land and other resources. Above all, the US wished to avoid other Asian countries’ following in the revolutionary footsteps of China. In 1961, the Ford Foundation thus launched its Intensive Agricultural Development Programme in India, intended to “release” Indian agriculture from “the shackles of the past” through the introduction of modern, intensive chemical farming.

Adding to the perceived geopolitical need to intensify agriculture was pressure from western agrochemical companies anxious to ensure higher fertilizer consumption overseas. Since the early 1950s, the Ford Foundation had been pushing for increased fertilizer use by Indian farmers, as had the World Bank and USAID — with some success. Whilst the government’s First Five Year Plan viewed artificial fertilizers as supplementary to organic manures, the second and subsequent plans gave a direct and crucial role to fertilizers. But native varieties of wheat tend to “lodge”, or fall over, when subject to intensive fertilizer applications. The new “dwarf” varieties developed by Borlaug, however, were specifically designed to overcome this problem: shorter and stiffer-stemmed, they could absorb chemical fertilizer, to which they were highly receptive, without lodging.

By the mid 1960s, India’s agricultural policies were geared to pushing the introduction of the new “miracle” seeds developed by Borlaug. The programme came to

be known as the New Agricultural Strategy. It concentrated on one-tenth of the arable land, and initially on only one crop — wheat. By 1968, nearly half the wheat planted came from Borlaug’s dwarf varieties.

A host of new institutions were established to provide the research required to develop further the Green Revolution, to disseminate the seeds, and to educate people in the appropriate agricultural techniques. By 1969, the Rockefeller Foundation, in co-operation with the Ford Foundation, had established the Centro Internacional de Agricultura Tropical (CIAT) in Colombia and the International Institute for Tropical Agriculture (IITA) in Nigeria. In 1971, at the initiative of Robert McNamara, the President of the World Bank, the Consultative Group on Interna-

---

*The “miracle” seeds of  
the Green Revolution  
have become  
mechanisms for  
breeding new pests and  
creating new diseases.*

---

tional Agricultural Research (CGIAR) was formed to finance the growing network of international agricultural centres (IARCs). Since 1971, nine more IARCs have been added to the CGIAR system. Over the last two decades, FAO has played a key role in promoting the Green Revolution package of “improved” seeds, agrochemicals and irrigation schemes.

### **The Myth of High Yields**

The term “high-yielding varieties” is a misnomer, because it implies that the new seeds are high yielding of themselves. The distinguishing feature of the seeds, however, is that they are highly responsive to certain key inputs such as fertilizers and irrigation water. The term “high-responsive varieties” is thus more appropriate.

In the absence of additional inputs of fertilizers and water, the new seeds perform worse than indigenous varieties. The gain in output is insignificant compared to the increase in inputs. The measurement of output is also biased by restricting it to the marketable elements of crops. But, in a country like India, crops have traditionally been bred to produce not just food for

humans, but fodder for animals and organic fertilizer for soils. In the breeding strategy for the Green Revolution, multiple uses of plant biomass seem to have been consciously sacrificed for a single use. An increase in the marketable output of grain has been achieved at the cost of a decrease in the biomass available for animals and soils from, for example, stems and leaves, and a decrease in ecosystem productivity due to the over-use of resources.

Significantly, much of the increased yield obtained by planting the new HYV varieties consists of water. Increasing the nitrogen uptake of plants through using artificial fertilizers upsets their carbon/nitrogen balance, causing metabolic problems to which the plant reacts primarily by taking up extra water.

India is a centre of genetic diversity of rice. Out of this diversity, Indian peasants and tribals have selected and improved many indigenous high yielding varieties (see Winin Pereira, *this issue*). Comparative studies of 22 rice growing systems have shown that indigenous systems are more efficient when inputs of labour and energy are taken into account.<sup>2</sup>

### **Loss of Diversity**

Diversity is a central principle of traditional agriculture in the Punjab, as in the rest of India. Such diversity contributed to ecological stability, and hence to ecosystem productivity. The lower the diversity in an ecosystem, the higher its vulnerability to pests and disease.

The Green Revolution package has reduced genetic diversity at two levels. First, it replaced mixtures and rotations of crops like wheat, maize, millets, pulses and oil seeds with monocultures of wheat and rice. Second, the introduced wheat and rice varieties came from a very narrow genetic base. Of the thousands of dwarf varieties bred by Borlaug, only three were eventually used in the Green Revolution. On this narrow and alien genetic base the food supplies of millions are precariously perched.

### **Increasing Pesticide Use**

Because of their narrow genetic base, HYVs are inherently vulnerable to major pests and diseases. As the Central Rice Research Institute, in Cuttack, India, notes of rice: “The introduction of high yielding varie-

## The Colonization of the Seed

The technological transformation of seeds is justified by scientists and industrialists in the language of "improvement" and increase of "economic value". However, "improvement" and "value" are not neutral terms. What is improvement in one context is often regression in another. What is value added from one perspective is value lost from another. The "improvement" of seeds is essentially a political process, shifting control over biological diversity from peasants to transnational corporations and changing a self-reproducing resource into a mere "input".

The ability of the seed to reproduce itself is an important barrier to the penetration of agriculture by the corporate sector. In planting each year's crop farmers also reproduce a necessary part of their means of production. Modern plant breeding is primarily an attempt to remove this biological obstacle to corporate control of the market in seeds. Self-reproducing seed is free, a common resource under the farmer's control. Corporate seed, however, has a cost and is under the control of the corporate sector or the agricultural research institutes. The cycle of regeneration of biodiversity is thus replaced by a linear flow of *free germplasm* from farms and forests into labs and research stations, and the flow of modified uniform products as *priced commodities* from corporations to farmers.



Winnowing wheat, Uttar Pradesh, India. Traditionally, farmers keep part of their grain harvest to plant the following year. "Improved" seeds, however, have to be bought for each harvest as their productivity decreases with successive generations, increasing dependency and debt in farming communities. (Photo: Mark Edwards/Still Pictures)

The new biotechnologies, and especially the development of crops resistant to brand-name herbicides, will increase farmers' reliance on technology. Whether a chemical is added externally or internally, it remains an external input in the ecological cycle of the reproduction of seed.

ties has brought about a marked change in the status of insect pests like gall midge, brown planthopper, leaf-folder, whorl maggot, etc. Most of the high-yielding varieties released so far are susceptible to major pests with a crop loss of 30-100 per cent."<sup>3</sup> Even where new varieties are specially bred for resistance to disease, "breakdown in resistance can occur rapidly and in some instances replacement varieties may be required every three years or so."<sup>4</sup> In the Punjab, the rice variety PR 106, which currently accounts for 80 per cent of the area under rice cultivation, was considered resistant to whitebacked planthopper and stem rot when it was introduced in 1976. It has since become susceptible to both diseases, in addition to succumbing to rice leaf-folder, hispa, stem-borer and several other insect pests.

The natural vulnerability of HYVs to pests has been exacerbated by other aspects of the Green Revolution package. Large-scale monoculture provides a large and often permanent niche for pests, turning minor diseases into epidemics; in addition, fertilizers have been found to lower plants' resistance to pests. The result has been a massive increase in the use of pesticides, in itself creating still further pest problems due to the emergence of pesticide-resistant

pests and a reduction in the natural checks on pest populations.

The "miracle" seeds of the Green Revolution have thus become mechanisms for breeding new pests and creating new diseases. Yet the costs of pesticides or of breeding new "resistant" varieties was never counted as part of the "miracle" of the new seeds.

### Soil Erosion

Over the centuries, the fertility of the Indo-Gangetic plains was preserved through treating the soil as a living system, with soil-depleting crops being rotated with soil-building legumes. Twenty years of "Farmers' Training and Education Schemes", however, have transformed the Punjab farmer into an efficient, if unwilling, "soil bandit".

Marginal land or forests have been cleared to make way for the expansion of agriculture; rotations have been abandoned; and cropland is now used to grow soil-depleting crops year-in, year-out. Since the start of the Green Revolution, the area under wheat, for example, has nearly doubled and the area under rice has increased five-fold. During the same period,

the area under legumes has been reduced by half. Today, 84 per cent of the Punjab is under cultivation, as against 42 per cent for India as a whole. Only four per cent of the Punjab is now "forest", most of this being plantations of *Eucalyptus*.<sup>5</sup>

The result of such agricultural intensification has been "a downward spiralling of agricultural land use — from legume to wheat to wasteland."<sup>6</sup> The removal of legumes from cropping patterns, for example, has removed a major source of free nitrogen from the soil. In addition, the new HYVs reduce the supply of fodder and organic fertilizer available to farmers. Traditional varieties of sorghum yield six pounds of straw per acre for every pound of grain. By contrast modern rice varieties produce equivalent amounts of grain and straw. This has contributed to the thirty-fold rise in fertilizer consumption in the state since the inception of the Green Revolution.

Increased fertilizer use, however, has not compensated for the over-use of the soil. High-yielding varieties rapidly deplete micronutrients from soils and chemical fertilizers (unlike organic manures which contain a wide range of trace elements) cannot compensate for the loss. Micronutrient deficiencies of zinc, iron, copper,

manganese, magnesium, molybdenum and boron are thus common. In recent surveys, over half of the 8706 soil samples from the Punjab exhibited zinc deficiency, reducing yields of rice, wheat and maize by up to 3.9 tonnes per hectare.

Partly as a result of soil deficiencies, the productivity of wheat and rice has declined in many districts in the Punjab, in spite of increasing levels of fertilizer application.

## Water Shortages

Traditionally, irrigation was only used in the Punjab as an insurance against crop failure in times of severe drought. The new seeds, however, need intensive irrigation as an essential input for crop yields. Although high-yielding varieties of wheat may yield over 40 per cent more than traditional varieties, they need about three times as much water. In terms of water use, therefore, they are less than half as productive.<sup>7</sup>

One result of the Green Revolution has therefore been to create conflicts over diminishing water resources. Where crops are dependent on groundwater for irrigation, the water table is declining at an estimated rate of one-third to half a metre per year. A recent survey by the Punjab Directorate of Water Resources, has shown that 60 out of the 118 development blocks in the state cannot sustain any further increase in the number of tubewells.

## Social Impact

Although the Green Revolution brought initial financial rewards to many farmers, especially the more prosperous ones, those rewards were closely linked to high subsidies and price support. Such subsidies could not be continued indefinitely and farmers in the Punjab are now facing increasing indebtedness. Indeed, there is evidence of a decline in farmers' real income per hectare from 1978-79 onwards.

The increased capital intensity of farming — in particular the need to purchase inputs — has generated new inequalities between those who could use the new technology profitably, and those for whom it turned into an instrument of dispossession. Small farmers — who make up nearly half of the farming population — have been particularly badly hit. A survey carried out between 1976 and 1978 indicates that small farmers' households were running into an annual average deficit of

around 1500 rupees. Between 1970 and 1980, the number of smallholdings in the Punjab declined by nearly a quarter due to their "economic non-viability".<sup>8</sup>

The prime beneficiaries have been larger farmers and agrochemical companies. As peasants have become more and more dependent on "off-farm" inputs, so they have become increasingly dependent on those companies that control the inputs. HYV seeds are illustrative. Unlike the traditional high yielding varieties which have co-evolved with local ecosystems, the Green Revolution HYVs have to be replaced frequently. After three to five years' life in the field, they become susceptible to diseases and pests. Obsolescence replaces sustainability. And the peasant becomes dependent on the seed merchants (*see* Box).

The further commercialization of seeds has been actively encouraged by the World Bank, despite widespread resistance from farmers who prefer to retain and exchange seeds among themselves, outside the market framework. Since 1969, the World Bank has made four loans to the National Seeds Project. The fourth loan — disbursed in 1988 — was specifically intended to encourage the involvement of the private sector, including multinational corporations, in seed production. Such involvement was considered necessary because "sustained demand for seeds did not expand as expected, constraining the development of the fledgling industry."

Intensive irrigation has led to the need for large-scale storage systems, centralizing control over water supplies and leading to both local and inter-state water conflicts. Despite a succession of water-sharing agreements between the Punjab, Rajasthan and Haryana, there is increasing conflict over both the availability of water and its quality. In the Punjab, farmers are actively campaigning to halt the construction of the Sutles-Yamuna Link Canal, which will take water to Haryana to irrigate 300,000 hectares for Green Revolution agriculture, whilst in Haryana, local politicians are lobbying hard for its completion. In 1986, irate farmers in the Ropar district of the Punjab, where the Link Canal begins, virtually forced the Irrigation Department to abandon work on the project. In May 1988, 30 labourers were killed at one of the construction sites.

The worsening lot of the peasantry in the Punjab, which is largely made up of Sikhs, has undoubtedly contributed to the development of Punjab nationalism. Many complain that the Punjab is being treated like a colony in order to provide cheap

food for urban élites elsewhere in India. A representative of a Punjab farming organization stated in 1984:

"For the past three years, we have increasingly lost money from sowing all our acreage with wheat. We have been held hostage to feed the rest of India. We are determined that this will change."<sup>9</sup>

## A Second Revolution

There are two options available for getting out of the crisis of food production in the Punjab. One is to continue down the road of further intensification; the other is to make food production economically and ecologically viable again, by reducing input costs. Sadly, the Indian government appears to have adopted the former strategy, seeking to solve the problems of the first Green Revolution by launching a second. The strategy and rhetoric are the same; farmers are being encouraged to replace the "old technologies" of the first revolution with the new biotechnologies of the second; and to substitute wheat and rice grown for domestic consumption with fruit and vegetables for the export market. The production of staple foods is being virtually ignored.

Like the first Green Revolution, the second is being promoted on the promise of "peace and prosperity". It is highly unlikely that the second revolution can succeed where the first failed.

This article is extracted from *The Violence of the Green Revolution: Ecological Degradation and Political Conflict in Punjab*, a book published by Vandana Shiva, Dehra Dun, 1989.

## References

1. Swaminathan, M.S., *Science and the Conquest of Hunger*, Concept, Delhi, 1983, p.409.
2. Bayliss-Smith, T.B. and Wanmali, S., 'The Green Revolution at Micro Scale', in *Understanding Green Revolutions*, Cambridge University Press, 1984.
3. Dogra, B., *Empty Stomachs and Packed Godowns*, New Delhi, 1984.
4. CGIAR, *Integrative Report*, Washington, DC, 1979.
5. Kang, D.S., 'Environmental Problems of the Green Revolution with a focus on Punjab, India', in Richard Barrett (ed.), *International Dimensions of the Environmental Crisis*, Westview, Boulder, Colorado, 1982.
6. Ibid.
7. Ibid.
8. Gill, S.S., 'Contradiction of Punjab Model of Growth and Search for an Alternative', *Economic and Political Weekly*, 15 October, 1988.
9. *Christian Science Monitor*, May 1984, p.10.



Spraying pesticides in India. Due to poverty, irresponsible employers and ignorance about their health effects, pesticides are frequently used without protective clothing in the Third World. (Photo: Mark Edwards/Still Pictures)

## FAO and Pesticides: Promotion or Proscription?

by  
Barbara Dinham

*FAO, influenced by its close links with the agrochemical industry, has since the late 1950s been committed to increasing pesticide use in developing countries. Recently, pressure from NGOs and overwhelming evidence for the massive health and environmental problems caused by pesticide use in the Third World has persuaded FAO to issue a code of conduct on the marketing and use of pesticides. The code is purely voluntary, however, and is widely broken. FAO should break free from corporate influence, promote alternative methods of pest control and support traditional agriculture.*

**"In a few years this worker will be trembling, perhaps go blind, and will certainly die young without even realizing why. Plantation owners spend a lot on pesticides, but if workers become ill, they sack them and hire others."**

**Paulo, a Brazilian trade union organizer, showing a photograph of a worker mixing pesticides with his bare hands.<sup>1</sup>**

It is widely recognized that the safe use of agrochemicals cannot be guaranteed under the conditions which operate in most

Barbara Dinham works for the Pesticides Trust, 23 Beehive Place, London SW9 7QN.

Third World countries. Products banned or restricted for health and safety reasons in industrialized countries, are exported in large quantities to poor countries which lack the resources for effective pesticide regulation. Ensuring that pesticides are used safely is extremely difficult, given high rates of illiteracy, poor rural medical facilities, poverty and the problems of obtaining or wearing protective clothing. Yet the pesticide trade is continually increasing. Between 1972 and 1985, imports of pesticides increased by 261 per cent in Asia, 95 per cent in Africa, and 48 per cent in Latin America.<sup>2</sup> In the next ten years, pesticide use in developing countries is expected to double.<sup>3</sup>

Globally, there are at least three million cases of acute pesticide poisoning, and 20,000 unintentional deaths each year, mostly in the Third World.<sup>4</sup> The true figures are thought to be much higher, as poisonings are common and widespread, but hard statistics are rare. No Third World country has a national programme for monitoring people who are regularly exposed to pesticides. Some local studies, however, indicate the scale of the problem. Alter Vida, a group in Paraguay, carried out a sample survey in a zone of the Department of Caaguazu, and found that "the large majority of people who are in contact with pesticides suffer some form of intoxication such as stomach aches, and head-

aches. The workers in the area reported that annual deaths had increased by 10 per cent recently and that there had been a large number of animal deaths in the area."<sup>5</sup>

A study carried out by the Pesticides Programme of the University of Costa Rica showed that an average of 471 poisonings (requiring hospitalization of more than one day) occurred in each year

---

*The political economy  
of food distribution  
remains a greater  
problem than  
increasing food  
production.*

---

between 1980 and 1986 — about 2709 cases over the six year period. About eight per cent were fatal. Further studies through the Costa Rican National Institute of Insurance showed that for every one case presented at a hospital, 40 incidents were reported to insurers. And even these figures do not take account of mild poisonings, or of cases involving poor farmers who are not covered by insurance schemes.<sup>6</sup>

Although there is also a growing body of documentation on the adverse environmental effects of pesticides in Third World countries, this is often either ignored by the authorities or set off against the "more important" aim of increasing production. In Egypt, for example, the widespread aerial and ground application of pesticides has led to increased resistance in cotton pests. The poisoning of livestock, poultry, wild birds and bees; fish kills in the Nile and in irrigation canals, lakes and coastal areas; the decline in useful pest predator and parasite populations; the contamination of surface and groundwater sources as well as vegetables and fruit, all bear witness to the damage done by these practices.<sup>7</sup>

### **FAO, Pesticides and Food Production**

FAO's commitment to the use of pesticides in agriculture goes back to 1959, when it began its first pesticides programme. Pests are generally said to destroy up to one-third of the world's food crops during growth, harvesting and storage, with higher crop losses in Third World countries. FAO promoted pesticides as the effective way to prevent these losses and to increase food production.

As with many development agencies and governments, FAO emphasizes increasing food production as the solution to world hunger. In fact, sufficient food is produced in most years to feed the planet, and the political economy of food distribution remains a greater problem than increasing food production. In any case, most pesticides in Third World countries are not applied to subsistence crops but to export crops such as cotton, tea, cocoa, coffee and palm oil. Moreover, good agricultural practices can reduce losses without recourse to pesticides.

Two years after its pesticide programme began, FAO did recognize some of the problems arising from pesticides, particularly in the Third World. It then established several committees, the work of which included harmonizing procedures for the registration and control of pesticides, establishing safety standards for pesticide residues and monitoring the development of pesticide resistance. However, alternative methods of pest control, or support for traditional agriculture, were not on the agenda.

In recent years, FAO has encouraged the development of biotechnology, breeding genetic resistance in crops, the use of "trap" crops to divert pests from the main harvest and integrated pest management (IPM). It held its first workshop on IPM in 1965, and has contributed to IPM projects, most notably a major programme in In-

onesia to fight the rice brown leafhopper after intensive pesticide use caused this pest to devastate rice paddies.<sup>8</sup>

But, FAO's belated recognition of the problems caused by chemical inputs did not alter its commitment to expanding their use. In 1974, as an essential part of its strategy for achieving a massive expansion in world food production, the World Food Conference pledged its support for huge increases in the use of fertilizers and pesticides. In 1985, FAO reiterated this in its guidelines for the registration and control of pesticides.<sup>9</sup>

### **FAO and the Agrochemical Industry**

FAO's policies on pesticides have been strongly influenced by its close links with the agrochemical industry. Although weaker than in the past, these links remain through the industry's presence at FAO workshops, industry observers at expert panels and committees and through common goals on issues such as pesticide registration and standards.

In the 1960s, the agrochemical industry formed a lobbying organization called the Groupement International des Associations Nationales de Pesticides (GIFAP). This group created a joint bureau within FAO called the Industry Cooperative Programme (ICP), in which GIFAP representatives,

## **The Pesticides Trust**

*The Pesticides Trust is a charitable foundation formed in 1987 to create awareness among those who make decisions over the use and regulation of pesticides. Those who wish to support our work are invited to affiliate.*

*Pesticides News* is published four times a year. Industry subscriptions £60, NGOs, non-profit making groups £30.

*The FAO Code: Missing Ingredients* is available from The Pesticides Trust for £10.50 including postage (£5.50 to NGOs/non-profit making organizations).

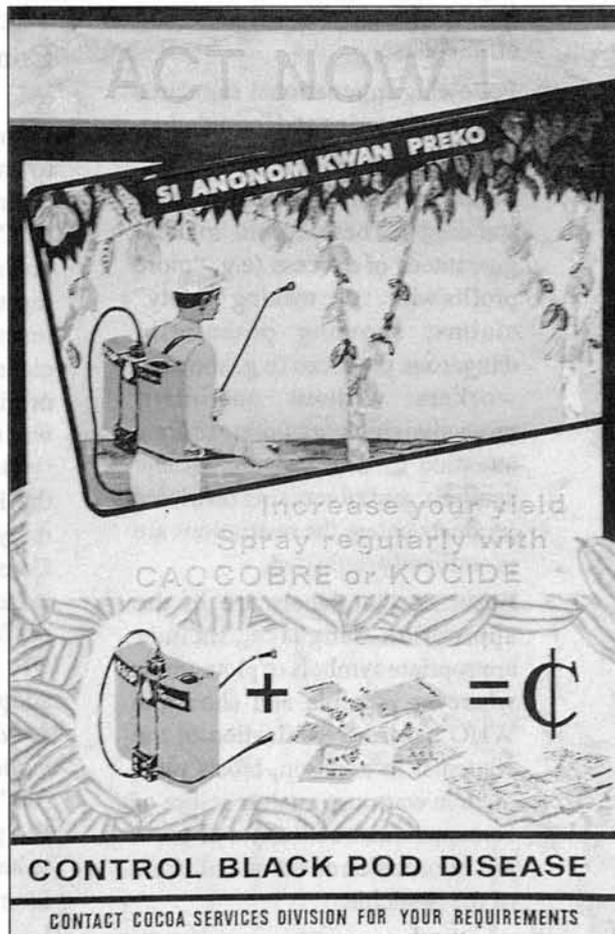
A new report *Pesticides, Policies and People* will be published shortly priced £10.

Cheques to The Pesticides Trust, 23 Beehive Place, London SW9 7QN

drawn from agrochemical companies, could work with FAO technicians. By the early 1970s, joint FAO-ICP seminars had been organized in various parts of the Third World to promote "new and better ways" of distributing agricultural pesticides.<sup>10</sup> Industry lobbyists openly dominated several of the sub-committees which were responsible for formulating United Nations policy on agriculture and the agrochemical corporations that made up the ICP came to enjoy a semi-official status in FAO. The chemical giant Hoechst, for example, was brought in to advise on a Tanzanian agricultural development project. The UN representative on one Bangladesh anti-malaria project was also a consultant to a large European company supplying the insecticide, malathion.<sup>11</sup>

Pressure from other sections of FAO, and from NGOs, eventually broke the direct link between FAO and the agrochemical industry, and the Industry Cooperative Programme left FAO in the mid-1970s. However, a cosy relationship still exists between GIFAP and FAO. While NGOs campaigning in FAO want to see priority given to sustainable and organic agricultural methods, FAO and GIFAP still share many objectives.

As an industry association, GIFAP recognizes that it helps the interests of the pesticide corporations to be seen to be "concerned" and "responsible". While profits may suffer on the small number of hazardous products which are withdrawn from the market, the industry benefits from access to seminars promoting the "safe" use of pesticides. Such workshops are held frequently; some are promoted by governments or local industry associations and some by FAO. GIFAP material is generally available, and "resource" people are always on hand. Involvement in FAO workshops on the operation of their Code of Conduct strengthens GIFAP's links with training structures in the Third World. In promoting the "safe" use of pesticides, these workshops provide credibility for the chemicals. For example, on a training course for plant protection and extension officers from the Ministry of Agriculture and local companies in Indonesia, the course programme used the GIFAP Farmer Trainer Manual. An FAO Workshop on pesticide management in West Africa in 1989 used a GIFAP resource person.<sup>12</sup>



*Pesticide advertising in Ghana. The FAO's guidelines on pesticide advertising are widely broken. Adverts have made false claims on pesticide safety, workers have been shown without appropriate protective clothing and warning symbols have been omitted.*

### "Harmonizing" Pesticide Laws

Pesticide reduction is not an FAO priority. Rather, its committees and panels are "devoted to such objectives as harmonizing methods and procedures for the registration and control of pesticides."<sup>13</sup> GIFAP shares the same objective: "GIFAP has expended considerable effort for many years, largely through FAO, but with national authorities as well, in trying to achieve harmonization of registration requirements."<sup>14</sup> For GIFAP, the harmonization of country laws and regulations will help its members sell pesticides: "The industry must work toward the development of rational and harmonized pesticide laws at national levels. Were the anti-pesticide lobby to be successful, the agrochemical industry worldwide would suffer — especially companies in smaller developing countries."<sup>15</sup>

FAO argues that registration is sufficiently stringent in industrialized countries to ensure that pesticides, when used according to registered label directions,

will be safe and efficient for the purposes claimed. Developing countries therefore:

"... need not introduce elaborate regulatory schemes in order to control pesticides effectively. . . Once evaluated (the) results are valid world-wide and may be considered transferable. Developing countries can therefore use such data as inputs, without having to produce them independently."<sup>16</sup>

This not only ignores the implications of FAO's own *International Code of Conduct on the Distribution and Use of Pesticides* — that the problems encountered in the use of pesticides in the industrialized world are considerably greater in the Third World — but also the possibility of good local practices and solutions which are lost when replaced with chemical alternatives.

GIFAP attends as an observer on a range of FAO and UN panels where its members' interests are discussed. One of these is the FAO/WHO Food Standards Programme, which has developed internationally agreed standards on pesticide residues. Part of the programme is designed to remove "non-tariff trade barriers caused by differing national food legislations, and [to protect] the consumer against health risks and fraud."<sup>17</sup> GIFAP's support for this work could almost appear in an FAO document:

"The scientific judgments of the FAO/WHO joint expert committee on pesticide residues and the Codex Committee on Pesticide Residues are essential to the free trade of agricultural produce around the world. Without universally acceptable residue limits, food crops treated with pesticides could not be exported with any assurance of acceptance by the authorities of the importing country."

It should be recognized that NGOs now increasingly take part as observers at FAO and other UN Experts' meetings, however compared with industry lobbying, representation, and the funds to attend (FAO does not pay for observers) the access is far from equal.

### The Code of Conduct

It was not until 1985, more than 25 years after FAO's pesticide programme began,

and after vigorous lobbying by a number of NGOs, that FAO introduced its *International Code of Conduct on the Distribution and Use of Pesticides*. This established voluntary standards of conduct to encourage responsible trade practices and the safe and efficient use of pesticides. It does not aim to reduce pesticide use. Governments are, among other measures, obliged to regulate pesticide marketing and use, to collect statistics and to educate pesticide users. Industry is supposed to implement a range of good practices which include:

- Halting the sale of products when safe use does not seem possible;
- Making available less toxic formulations;
- Using containers that are safe (e.g. childproof) and not attractive for subsequent re-use;
- Testing all pesticide products to evaluate their safety for humans and the environment;
- Ensuring that distributors are adequately trained to provide the

buyer with advice on safe and efficient use;

- Following international standards for manufacturing and formulating, packaging and storage;
- Following international advertising standards. These forbid making guarantees of success (e.g. "more profits with..."); making "safety" claims; showing potentially dangerous practices (e.g. showing workers without sufficient protective clothing); failing to draw attention to warning phrases and symbols; and advertising restricted products unless the restrictions are prominently indicated;
- Ensuring that labels are in the appropriate language, include appropriate symbols or pictograms wherever possible and show the WHO hazard classification of the contents. In addition, labels must include warnings against re-use of containers, instructions for disposal and information on the manufacture of the pesticide.

## The Principle of Prior Informed Consent

From the outset, NGOs pressurized FAO to include in the Code of Conduct the principle of "Prior Informed Consent" (PIC). The principle is simple: importing countries must be given information relating to certain hazardous pesticides, and must agree to their import before pesticides are exported. It was dropped from the original Code, with FAO arguing that it was unworkable.

But vigorous lobbying by members of the Pesticide Action Network (PAN) finally won acceptance for Prior Informed Consent, and at its 25th biennial conference in November 1989, FAO amended its Code of Conduct to include this principle. The UN Environment Programme (UNEP) adopted a broader Code, known as the *London Guidelines on Exchange of Information on Chemicals in International Trade* (the "London Guidelines") which included PIC provisions, and FAO and UNEP agreed to harmonize their PIC requirements. The International Register of Potentially Toxic

## TENTH ASSEMBLY OF THE FOURTH WORLD

Patrons include: Rudolf Bahro, Ivan Illich, Kirkpatrick Sale, John Seymour, Sir Richard Body MP, Edward Goldsmith

### NEIGHBOURHOOD AND BIOREGIONAL EMPOWERMENT

THE INTERNATIONAL STUDENT HOUSE  
229 Great Portland Street, London W1  
July 3rd - 6th 1991

#### \* Call for Forum Convenors

The denial of personal and community responsibilities and power has led directly to the horrendous crisis of uncontrolled and overcentralised power now threatening the demise of western civilisation. The Fourth World is the world of the individual and the community where power and responsibility are exercised in localised areas which, in turn, form organically structured bioregions. Development of the Fourth World is an essential part of the politics of the future if the excesses of giantism are to be avoided.

The purpose of the annual Fourth World Assemblies is to explore in a variety of Forums how communities, ethnic and cultural groups, and individuals, can achieve autonomy and independence.

#### The Assembly Forums are:

- |                       |                       |                               |                            |
|-----------------------|-----------------------|-------------------------------|----------------------------|
| 1. COMMUNITY CHARTER  | 5. ECONOMICS          | 9. ENERGY                     | 13. TECHNOLOGY & COMPUTERS |
| 2. INDIGENOUS PEOPLES | 6. ECOFEMINISM        | 10. TRANSPORT & COMMUNICATION | 14. ART & CULTURE          |
| 3. BIOREGIONALISM     | 7. AGRICULTURE & LAND | 11. HEALTH                    | 15. THE MEDIA              |
| 4. POPULATION         | 8. SOCIAL INVENTIONS  | 12. EDUCATION                 | 16. SPIRITUALITY           |

Forum Papers dealing with problems of achieving human scale in relation to all these subjects are now urgently sought.

Book now for the 10th Assembly at a reduced fee of £45.00

Enquiries to: **Fourth World Initiatives, Millbrook, Amptill, Beds MK45 2JB**

Tel: 0525 405084  
071 286 4366

Chemicals (IRPTC), a UNEP agency, was given the task of making PIC operational for both codes.

The structure emerging to administer PIC is the first attempt to give true substance to the Code of Conduct. An agreed list of "PIC" pesticides and other chemicals has been drawn up, and the International Register of Potentially Toxic Chemicals is to be responsible for notifying an appointed authority in each country of the nature of these chemicals. This au-

---

*Four years after the adoption of the FAO code unacceptable practices are still widespread, and the safe use of hazardous pesticides under Third World conditions is not possible.*

---

thority must register with IRPTC whether or not it agrees to allow the import of the chemical. Before exporting, a company must check whether the country of destination allows the import of the particular chemical, and should not export the chemical if it is prohibited.

The initial PIC list, which includes 33 pesticides, is made up of chemicals which have been banned or severely restricted for health or environmental reasons in five or more countries. Industrial and consumer chemicals will also be included on the PIC list. In future, a ban or severe restriction in any one country will be sufficient to trigger the "PIC Process". The experts' working group established to develop operating details of the PIC Process is open to invited observers from both industry and NGOs. At the latest such meeting, in October 1990, the IRPTC reported that 76 countries have appointed a pesticide registrar to operate the Prior Informed Consent system, and that the system should be operational by 1991.

PIC should provide a mechanism for ensuring that governments have sufficient information about the most dangerous pesticides to make an informed choice about whether to allow their import. The initial resistance to establishing PIC has largely disappeared, and IRPTC is developing what promises to be a simple and effective sys-

tem. PIC now receives widespread support from governments, international organizations and industry.

GIFAP has supported the scheme by making adherence to the Code of Conduct a condition of membership. However moral pressure is the only means of enforcement and it remains to be seen whether GIFAP would actually "expel" members which transgress the Code. To become legally binding, the Code would need to be converted into a Convention.

### Abuses of the Code of Conduct

In preparation for the 1989 FAO Conference, the Pesticides Trust coordinated a Pesticides Action Network project to analyze research findings from NGOs in 17 developing countries on widely used problem pesticides.<sup>18</sup> Published as *The FAO Code: Missing Ingredients, Prior Informed Consent in the International Code of Conduct on the Distribution and Use of Pesticides*, the report demonstrated that, four years after the adoption of the FAO Code, unacceptable practices are still widespread, and the safe use of particularly hazardous pesticides under Third World conditions is not possible. *Missing Ingredients* also indicates that acutely hazardous pesticides are widely available and cause extensive poisonings and environmental destruction. These transgressions of the Code of Conduct do not bode well for future industry compliance with the PIC provisions.

Over 130 advertisements breaking the Code of Conduct were collected by PAN groups for the *Missing Ingredients* study. For example, an advertisement in Indonesia for Chlordane 690 EC, a pesticide which is banned in 22 countries and severely restricted in 18, claims it is "much safer than other termiticides". An advertisement for Ambush 5 ULV (permethrin) produced by ICI Indonesia claims it is "safer for humans and the environment". In Malaysia, a country with one of the most active PAN groups, industry was promoting pesticides through a farmer's journal by offering gift vouchers for use at a major departmental store with the purchase of certain pesticides.<sup>19</sup> In the Philippines, an advertisement for Cymbush 5 EC (cypermethrin), an ICI product, showed a farmer spraying without appropriate protective clothing, and without warning phrases and symbols.

In Senegal in 1988 — three years after the introduction of the Code — a long list

of pesticide misuse was noted including: the frequent domestic use of agricultural pesticides; the storage of pesticides in soft drink bottles; empty pesticide containers used to store food or drinking water; retail outlets selling pesticides in weak plastic or paper packets or bottles without any useful information about the product; the mixing of pesticides with salt for dried fish; the use of agricultural pesticides against hair lice; and the use of pesticides in rice areas for fishing.<sup>20</sup>

Despite its failings, the FAO Code of Conduct is an advance, and the PIC provisions — achieved only after years of lobbying by NGOs — are especially encouraging. However, there is little evidence of FAO making a broader shift away from an agricultural policy based on pesticides. On the contrary, FAO's policy document *World Agriculture: Towards 2000* (see Edward Goldsmith and Nicholas Hildyard, *this issue*) calls for expenditure on pesticides to be increased by three per cent annually up to the year 2000.

### References

1. Report of International Conference on Pesticides and Cocoa Production, Amsterdam, September 1988, Transnational Information Exchange, Netherlands, 1988.
2. Postel, S., 'Defusing the Toxics Threat: Controlling Pesticides and Industrial Waste', *Worldwatch Paper 79*, Worldwatch Institute, Washington, DC, September 1987.
3. *Public Health Impact of Pesticides Used in Agriculture*, Joint WHO/UNEP Working Group Report, WHO 1989.
4. *Ibid.*
5. *The FAO Code: Missing Ingredients, Prior Informed Consent in the International Code of Conduct on the Distribution and Use of Pesticides, Final Report, October 1989*, prepared by the Pesticides Trust for PAN International, London, 1989.
6. *Ibid.*
7. *Ibid.*
8. *IPM in Rice in Indonesia*, FAO, Jakarta, May 1988.
9. *Guidelines for The Registration and Control of Pesticides*, FAO, Rome, March 1985.
10. George, S., *How the Other Half Dies*, Penguin, London, 1977.
11. *Ibid.*
12. *GIFAP Bulletin*, 15, 5, 1989; *GIFAP Bulletin*, 15, 3, 1989.
13. *FAO: The First 40 Years, 1945-1985*, FAO, Rome, 1985.
14. GIFAP promotional booklet.
15. *Ibid.*
16. FAO, op. cit., 9.
17. FAO, op. cit., 13.
18. Pesticides Trust, op. cit. 5.
19. *The Planter 757*, April 1989.
20. Evidence collected for Pesticides Trust, op. cit. 5, by Thiam and Dieng.

# FAO and Tropical Forestry

by

George Marshall

*FAO is extremely influential in deciding the forestry policies adopted by developing countries. This influence has been used over the past four decades to promote the commercial development of the forests, and thus to encourage the major forces which destroy tropical forests and impoverish the people who live in them. The much-criticized Tropical Forestry Action Plan, coordinated by FAO, is intended to halt rainforest destruction, but as it seeks to increase the industrialization of the forests it can only accelerate deforestation. FAO has now drafted a global forest convention which yet again fails to address adequately the conflicts between ecological and social requirements and those of the modern market.*

Despite growing concern for the fate of the tropical forests, successive studies show a startling acceleration in the rate of their destruction.<sup>1</sup> Deforestation is caused by a combination of factors and it would be grossly unfair, and misleading, to heap the blame for global forest loss on the shoulders of any single institution. Nonetheless, FAO, as the lead UN agency with responsibility for forests, has played a major part in encouraging the forces of destruction. On the one hand, its agricultural development policies have not only exacerbated the problems of landlessness — thus increasing the loss of forest to encroachment by the poor — but have also actively encouraged Third World governments to clear forest lands for agriculture (see p.83). On the other, its forestry policies have spearheaded the move to open up tropical forests to commercial exploitation.<sup>2</sup>

## The Influence of FAO

As an institution, FAO derives its power and influence not from the funds it controls, which by the standards of the international development community are trifling, but rather from the role it plays in providing technical advice and assistance. Although it portrays itself as “an information centre for farmers, fishermen and foresters”, its

main clients are governments and international development agencies. Through its Investment Support Programme, FAO not only draws up projects for Third World governments and multilateral lending institutions, but also helps developing countries find the external capital to finance them.<sup>3</sup> Moreover, because many civil servants within Third World countries receive their training in “project preparation” from FAO, projects prepared at the national level — without direct FAO assistance — are frequently cast in FAO’s mould. Not surprisingly, FAO has a major influence both on the pattern of development aid to the south, and on the pattern of private and state investment within developing countries. Between 1945 and 1983, FAO “helped to channel more than \$24,000 million of foreign and domestic capital” to the agricultural sector alone in some 90 developing countries.<sup>4</sup>

Inevitably, FAO’s role as a “project broker” has ensured that its technical assistance programmes — though themselves small in number and scale — have played a decisive part in catalyzing the adoption of FAO’s favoured technologies and, conversely, in discouraging or undermining the adoption of others. As FAO notes with regard to its overall programme: “Technical assistance projects can pave the way for large-scale capital investment in food and agricultural development. Investment consolidates the impact of technical assistance by enabling the new methods, processes and skills to spread over a far wider area than that covered by a single project.”<sup>5</sup>

In the forestry sector, those “methods, processes and skills” have involved, in the main, the development of industrial forestry.

## Industrializing the Forests

Since its inception, FAO has viewed forests as a *resource* (a key word in its literature) which is *underdeveloped* and which is best protected by commercial *management by foresters*.<sup>6,7</sup> In document after document, FAO calls for an extension of economic management to all forests, arguing that “economic inaccessibility is presently the main impediment to the management of these forests . . . the lack of local markets and local industries also constitutes a constraint to the incorporation of these lands in the national economy.”<sup>8</sup> Significantly, FAO has virtually ignored efforts to promote the more efficient use of wood — through recycling, for example, or through resource substitution.

The industry with which FAO’s forestry department has had “the longest and deepest involvement” is the pulp and paper industry.<sup>9</sup> Beginning in 1946, with the launch of a study to “facilitate long-range investment and production programmes in pulp and paper in such continents as Africa”, FAO has devoted a large part of its technical expertise to “building up” the paper and pulp capacity of Third World countries. Research facilities have been set up in Cuba, India, Pakistan and Peru; paper and pulp development plans drawn up for

George Marshall is coordinator of the London Rainforest Action Group, First Floor, 166 Whitecross Street, London EC1, England.



One of FAO's main justifications for promoting industrial logging is the employment which it creates. However, in many parts of the developing world timber workers are based in camps rather than permanent communities and so local people gain few social and economic benefits. A study in Kalimantan showed that only 12 per cent of the jobs provided in logging camps were taken up by locals. (Photo: FAO)

the ASEAN region and for Central America; and countries such as Brazil, Korea, India, Mexico, Chile and Argentina have been transformed into major producers of paper.

Between 1970 and 1985, paper production in developing countries trebled — from 9 million tonnes to 27 million tonnes — with exports quadrupling from 0.3 million tonnes to 1.4 million tonnes. FAO forecasts a further rise in production to 60 million tonnes by the year 2000, with exports rising to 6 million tonnes — and is actively seeking to encourage both trends.<sup>10</sup>

### Forestry's *Éminence Grise*

Within the international development community, FAO has long been the "senior partner" in formulating forestry development policy: its technical assistance programme, for example, is the largest of any agency. FAO's role in furthering the industrialization of the forests has thus been seminal.

At one level, FAO has played a decisive part in persuading Northern governments of the need to invest in forestry — largely by appealing to their self-interest. As Jack Westoby, FAO's Senior Director of Forestry in the 1960s and subsequently a major critic of its policies, recalls:

"Our efforts to convert the development agencies to forestry were doubtless helped by the fact that FAO's global studies had shown beyond a shadow of doubt that rising affluence in Europe, North America and Japan would require an increasing flow of timber from the underdeveloped world and that the foreign exchange these exports would generate could not but help the credit-worthiness of the underdeveloped exporting countries."<sup>11</sup>

Investment in the Third World paper and pulp industry rose significantly following the publication of an FAO study in 1962 predicting major paper and pulp shortages in the developed world and a massive expansion in the demand for paper in the Third World.

At another level, FAO has furthered commercial forestry simply because the projects it puts forward are, to use Westoby's description, "the kinds of projects that could pass through the eye of the World Bank's needle and into the heaven of implementation."<sup>12</sup> They are also the type of projects that commercial interests understand and are willing to invest in. Whether this explains why FAO promotes them is a moot point: what seems certain is that industry has seized the opportunities that FAO's research throws up, with the result that, in many circles, FAO's interests have become identified with industry's and vice versa. As Westoby puts it:

"The growing interest in, and acceptance of, forestry projects had little or nothing to do with the conversion of the development establishment to the idea that forestry and forest industries had a significant and many-sided contribution to make to overall economic and social development. It had everything to do with the fact that many of the rich, industrialized countries needed, and needed badly, new wood material resources, and their forest industries, their equipment manufacturers, together with miscellaneous agents and operators, scented golden opportunities for profit in those underdeveloped countries with forest resources."<sup>13</sup>

Elsewhere he notes:

"It can be argued, and not unfairly, that international aid in forestry has done a useful job in identifying for foreign capital those forest resources suitable for exploitation. In many cases, it has borne a substantial part of the cost of making inventories of those resources. In not a few cases, it has compiled the data, and helped provide the justification, for international financial agencies to provide loans to create some of the infrastructure needed to assist the penetration of the services of foreign enterprises, enabling them to economize on the use of expensive expatriate personnel. *De facto*, though this was not its intent, at least so far as the multilateral and some of the bilateral effort was concerned, it has assisted some irresponsible governments to alienate substantial parts of their forest resource endowment."<sup>14</sup>

A recent example illustrates Westoby's point — and FAO's direct involvement. In 1986, the government of Ivory Coast approached both FAO and the World Bank with a request to identify appropriate national forestry projects which the Bank

might fund. A joint FAO/World Bank mission subsequently recommended that no less than 700,000 hectares of primary forest be opened up for commercial logging. The project was approved by the Bank in 1988, with the UK Commonwealth Development Corporation and CIDA (the Canadian aid agency) jointly funding an industrial plantations component. The logging operations will be entirely in private hands.<sup>15</sup>

## Broken Promises

FAO justifies its promotion of commercial

forestry on the grounds that forest industries can play a significant part in promoting economic growth within the Third World.<sup>16</sup> But whatever the promise, the reality has been a progressive impoverishment of forest communities and the forests themselves.

The environmental destruction caused by logging (*see* Box) goes beyond the direct clearance of forests. The promotion of the pulp and paper industry, for example, has caused the severe pollution of many local waterways with toxic effluents from pulp mills, an average-sized mill generating between 30 and 80 tonnes of organo-

chlorines (many of them cancer-causing) every day.<sup>17</sup> In addition, pulp mills are a major cause of air pollution — notably sulphur dioxide (itself a forest-destroyer) — and, because they are heavy consumers of water and electricity, the mills have necessitated the building of hydroelectric dams and thermal power plants. In addition, the need for regular supplies of wood have led to the spread of commercial plantations, generally of fast-growing exotics. Frequently, the plantations have been established on land which has either been cleared from natural forest or which was previously exploited by local villagers for

## The Impact of Logging

The devastation caused by logging is well-documented. As US biologists Judith Gradwohl and Russell Greenberg note:

“... logging operations ... are often highly damaging, and this becomes more of a problem with increasing mechanization. Heavy machinery compacts the soil and ... up to two-thirds of the non-marketable trees in some areas are damaged or destroyed when marketable trees are extracted. Ultimately this can destroy young individuals of economic tree species and preclude the regeneration of the forest. Logging roads and skidder trails further contribute to soil compaction and erosion.”

In fact, the impact of logging has been much wider than this. Logging opens up previously isolated areas to colonists, land speculators and ranchers who move in and clear previously intact and inaccessible forests. Norman Myers has estimated that for every cubic metre of harvested timber, approximately one-fifth of a hectare of forest is destroyed by farmers who press in close behind the logger. FAO estimate that 70 per cent of forest cleared by landless settlers is made possible by logging roads. Indeed, such is the overall impact of logging that Robert Repetto of the World Resources Institute ranks commercial logging as the top agent of deforestation. Globally, states World Bank ecologist, Robert Goodland, “settlement along logging roads and peasant agriculture may be the main causes of tropical moist deforestation.”

The proportion of forest lost due to logging varies regionally and locally. In South East Asia and Africa, logging is pre-eminent as a cause of forest loss, while in Latin America the timber industry has not yet penetrated far into the Amazonian forests. These are being destroyed first and foremost from settlement along roads built to open up the forests to colonization and to promote “national integration” and “development”.

Many countries are exhausting their environmental capital at such a rate that the timber industry faces total closure. According to the World Bank, of the 33 countries which were net exporters of tropical timber in 1987, only ten will have any timber left to export by the year 2000. At present rates, Sarawak, the world's number one exporter of tropical sawlogs, will have logged out its primary forests within seven to eleven years.

But the negative effects of logging go much further than a squandering of biodiversity and the exhaustion of timber supplies. Logging often has direct and shattering effects on local people whose lands are taken over for logging. Yet, throughout the tropics, foresters and loggers show scant concern for the local people. Indonesian Forest Minister Hasrul Haraahap, for example, has stated that “in Indonesia the forests belong to the State not to the people”. According to Haraahap, the fact that these forests are their ancestral lands does not give people the right of ownership. “They have no right to compensation” when logging destroys the forests that they depend on.

Many foresters see their role as purely a technical one of managing forests in

splendid isolation from the prevailing realities outside the forests. For them, the invasion of lands, which have been set aside for logging as “Permanent Forest Estate”, is “not their department”. As Professor Hans Lamprecht of the University of Gottingen puts it, “no silvicultural system can be given the blame for inadequate protection.”

Particularly serious is the fact that foresters often ignore the impact of corruption upon their silvicultural systems. An unseemly public squabble within the ruling family in Sarawak, during the 1987 elections, revealed how senior politicians have persistently rewarded their political allies, families and friends with logging concessions. The practice of dealing out logging licenses to members of the State legislature to secure their allegiance is so commonplace in Sarawak that it has created a whole class of instant millionaires. A judicial inquiry in Papua New Guinea has revealed a similar decay in standards of public service due to the logging industry (*see* George Marshall, ‘The Political Economy of Logging’, *The Ecologist*, Vol. 20, No. 5, 1990). Corruption in the logging industry also formed a crucial component in the “crony capitalism” of the Philippines under Ferdinand Marcos and, in Indonesia, logging concessions are one of the perks enjoyed by the ruling military clique.

Marcus Colchester

growing food or other uses. The ecological impact has often been ruinous, depleting water tables, acidifying soils and reducing the habitat for wildlife.

Nonetheless, FAO plans to increase the extent of land in the tropics under commercial tree plantations by 1.5 million hectares a year from 1985 to the end of the century — a total area equivalent to a quarter of the current arable land in western Europe.<sup>18</sup> FAO notes with approval that “Several countries including Brazil and the Congo, have developed plantations with very high yields benefiting from modern genetics. Thus certain *Eucalyptus* plantations in Brazil are achieving yields exceeding 40m<sup>3</sup> per ha per annum — double that of the unimproved varieties. The spread of fast growing species, such as, for example, *Eucalyptus*, *Leucaena* and *Gmelina*, makes the prospect of new afforestation much more favorable.”<sup>19</sup>

Yet it is precisely these species that have caused the greatest ecological problems. Small wonder that several Third World countries — notably India and Thailand — have seen the growth of powerful local movements to resist the encroachment of commercial tree plantations — opposition that does little to support FAO’s claim that “the ultimate aim” of its forestry programmes is “not the development of trees, but the development of people.”<sup>20</sup>

## Employment Promises

Nor have the promised employment benefits of industrial logging been realized. FAO argues that “Forestry and forest industries generate employment, particularly in rural areas, and thereby facilitate the entry of rural people into the monetary economy.”<sup>21</sup> Indeed, according to FAO, the forest sector now employs some 35 million people in developing countries — equivalent to between 20 and 30 per cent of the rural labour force in many developing countries.<sup>22</sup> In fact, as Alexander S. Mather points out:

“On the national scale, the contribution of forests and forest-based industries to total employment is usually very much less. In many countries, it amounts to 2 per cent or less. It is under 5 per cent even in most countries with extensive forest resources and well developed forest industries. . . . In Chile, where there has been a rapid-growth of a plantation-based forest industry in recent years, forest-based activities (including transport)



*FAO’s technical reports on the benefits of plantations of fast-growing species such as Eucalyptus are often used by forestry departments and companies to refute the protests of environmental and social activists. As FAO does not lend funds to specific projects itself, but gives technical assistance and helps to channel funds from other agencies, the damage it does is due more to its influence than to its direct involvement. (Photo: FAO)*

employ 3 per cent of the active population. The overall proportion is similar in Malaysia, which has one of the most highly-developed forest industries in the developing world. Here the forest sector absorbs only 3 per cent of the total labour force, and logging accounts for less than one third of that proportion.”<sup>23</sup>

Others have pointed to the appalling working conditions within the forest sector and the high cost in lives. In Sarawak, for example, seven lives are lost for every million cubic metres logged, with one serious injury for every 7000 cubic metres. “The major causes of these deaths stem from the lack of precautions taken both by the workers and their employers. Much of the labour force is employed on a piece-work basis, with the inevitable result that corners are cut — and then limbs. No laws exist in Sarawak to enforce safety regulations . . . no steps have been taken to remedy the situation.”<sup>24</sup>

## Decades of Destruction

Outside FAO, many — and not only those within the environmental movement — have questioned the economic and other benefits that FAO claims for industrial forestry. As early as 1972, Jack Westoby, by then retired, expressed his own disenchantment, arguing that international forestry development policies were leading to

the underdevelopment of the Third World:

“Over the last two decades, massive tracts of virgin forest have come under exploitation . . . That exploitation, with a few honourable exceptions, has been reckless, wasteful, even devastating. Nearly all the operations have been enclavistic, that is to say, they have had no profound or durable impact on the economic and social life of the countries where they have taken place. Of the revenue which has accrued, a small part has remained in the countries to which the resource belonged. Of that fraction, a not insubstantial sum has gone to line the pockets of those empowered to secure or negotiate concessions. A little has gone to supplement the salaries and wages of underpaid foresters and forest workers charged with the task of controlling concessions. Of the revenues which have found their way back into the public purse, an inconsiderable fraction has been ploughed back into maintaining, improving or replacing the forest resource.

“Of the industrial development that has taken place, much is export-oriented. Local needs are not being met: the employment opportunities created are trifling. The secondary and tertiary activities which a primary industry ought to generate are largely absent. A significant part of exports, as logs and as processed timber, is exported ‘within the firm’, and transfer values are fixed to facilitate the accumulation of profits outside the country.”<sup>25</sup>

## Forests for People?

In 1979, FAO launched a "special action programme" intended to make forestry serve local community development. Priority was given to increasing fuelwood supplies, supporting agroforestry programmes and "increasing incomes from forest-based activities." Following FAO's lead, the World Bank signalled its intention to devote an increasing share of its investment in forestry to "social forestry" programmes.

At the time, Jack Westoby told delegates to the Eighth World Forestry Congress: "I think it would be prudent to wait until we set the victory bells ringing." His caution has proved justified. In all to many cases, the need to pay off loans has led to trees being diverted to industrial uses; the profits to be made have also encouraged private investors to make over

agricultural land to tree plantations, to the detriment of the local community.

A case in point is Karnataka, which is hailed by both FAO and the World Bank as an example where social forestry has brought major improvements for the poor. In fact, the main beneficiaries have been two highly polluting pulp mills. In Africa, "Trying to grow trees for fuel in the Sahel has become an international obsession over the last decade", notes Lloyd Timberlake in his 1988 book *Africa in Crisis*. "But most of these attempts have ended in failure. . . In 1982, some \$160 million had been spent to produce a total of about 25,000 hectares of fuelwood plantation, much of it was growing poorly."

Nicholas Hildyard

### Corporate Conservation: The Tropical Forestry Action Plan

FAO, however, has proved deaf to criticism of the logging industry, insisting that it is "the rural poor who are the primary agents of destruction."<sup>26</sup> It is a view that fits neatly with FAO's uncritical assumption that the forests cannot be protected without "development" — which in practice amounts to wresting control over the forest domain out of the hands of local people and placing it in the hands of commercial or state interests. Nowhere is this bias currently more apparent than in its *Tropical Forestry Action Plan* (TFAP), jointly drawn up by FAO, the World Resources Institute (WRI), the World Bank and the United Nations Development Programme (UNDP), and coordinated by FAO.

Although promoted by FAO as "an emergency action plan to arrest deforestation", TFAP's approach to the problem of tropical deforestation is resolutely "business-as-usual". Far from attempting to tackle the root causes of deforestation, TFAP focuses almost exclusively on promoting commercial forestry. In Cameroon, the national plan proposes opening up 14 million hectares of pristine forest to logging, with the aim of transforming the country into the largest tropical timber exporter in Africa in the 21st Century. In Peru, TFAP proposes an increase in logging in Amazonia of between 390 per cent and

590 per cent. In Tanzania, it calls for a 23-fold increase in sawnwood exports: in Nepal for a 250 per cent increase in timber production. In Ghana, TFAP makes the second tranche of its loan conditional on the lifting of a ban on the export of timber from 14 tree species.<sup>27</sup>

Whilst the original TFAP reports stressed the need for land reform, few of the national plans that have been drawn up address land ownership issues. On the contrary, rather than calling for reforms of inequitable land ownership, TFAP often requires alienation of traditional lands into government forestry estates.

### Exacerbating Deforestation

Criticism of TFAP is now widespread. The first major critique, published by the World Rainforest Movement (WRM) and *The Ecologist* in early 1990, concluded that "on balance, deforestation seems likely to accelerate under the TFAP" and called for a moratorium on international funding for the plan.<sup>28</sup>

Subsequently, a report from the World Resources Institute — one of the bodies originally responsible for TFAP — criticized the excessive focus on the forestry sector and highlighted a number of failures at a national level, especially with regards to NGO participation.<sup>29</sup>

Finally, an independent review, com-

missioned by FAO itself in 1989, reported in June 1990.<sup>30</sup> The review is remarkable for making scarcely any comment at all on the specific projects put forward under TFAP. Although the review team made field visits to Cameroon, Ghana, Indonesia, Nepal, the Philippines, Thailand, Bolivia, Costa Rica, Honduras and Columbia, in several of which countries environmentalist criticism of national-level TFAP exercises has reached a high pitch, it devotes not one line to the specific contents of any of the national plans.

### Deflecting Criticism

Despite the mounting criticism, the substantive international debate on TFAP has become submerged in a bureaucratic wrangle about the structure of high-level TFAP management. WRI's main recommendations are for a new management structure for the TFAP, and a clarification of TFAP's goals and objectives. Meanwhile, the independent review confines itself mainly to recommending that TFAP should be "country-driven and process-oriented" and that the four originators of TFAP should work out new "organizational arrangements". It also recommends that the name of TFAP be changed from the *Tropical Forestry Action Plan* to the *Tropical Forestry Action Programme*.

The limitation of the debate to administrative structures reflects two major interests in TFAP. The first is that of the donor and recipient governments, for which TFAP provides a framework within which a wide range of forestry aid and development loans can be coordinated, and in which national forestry plans can consolidate a number of projects into a single plan. Over the past two years, donor governments have responded to growing public concern over tropical deforestation by committing increasing sums to tropical forestry aid. The German aid agencies, for example, are obliged to spend DM300 million on tropical forest issues every year, rising to DM500 million by 1985. The British government has committed itself to spending £100 million over three years in tropical forestry aid. Clearly, it is in the interests of donor agencies that the TFAP should be efficient in providing them with a regular list of fundable projects. The same is true of recipient governments, for whom TFAP has the potential to provide badly needed foreign currency and aid.

The second major interest is that of FAO itself, which is insistent that TFAP

should remain under its control. The focus on the administrative failings of TFAP has enabled FAO to side-step the more substantive criticisms of TFAP's underlying policies made by WRM, *The Ecologist* and many groups in the South. Indeed, in an eight-page response to TFAP's critics, FAO's Director-General Edouard Saouma ignored the broader issues entirely and confined himself to rebutting what he saw as attacks on FAO's capacity to administer TFAP, rejecting the formation of an external steering committee and blaming past failure on a cash crisis within FAO.<sup>31</sup> Meanwhile, the FAO Committee on Forestry argues that "TFAP must be revitalized in order to demonstrate its effectiveness and achieve tangible results" and that TFAP "should be extended to all developing countries where forest resources play, or can play, an important role for socio-economic development and environmental stability."<sup>32</sup> Indeed, within FAO, it is clear that few question the "rightness" of TFAP as presently constituted.

### Institutionalized Deforestation

FAO is now making a major play to draft and administer a global Forest Convention, to be signed at the UN Conference on Environment and Development in Brazil in 1992. An FAO draft proposal for the convention, leaked to *The Ecologist*, reveals that FAO has learned little from its TFAP critics: although the rhetoric has changed, the approach is still top-down, commercially-orientated, and, if adopted, likely to exacerbate the deforestation crisis.<sup>33</sup>

The draft sets out three underlying "principles" on which forest policy should be based: sovereignty, stewardship and burden-sharing. The language used, however, opens the way for continued appropriation of local peoples' resources. "Stewardship", for example, is defined in terms of "ensuring the attainment and continued satisfaction of human needs for present and future generations" without specifying who is to determine these needs, this satisfaction and that attainment. Similarly, "sovereignty" of the "forest resource" is defined exclusively in terms of state sovereignty — this despite the role that governments continue to play in causing deforestation and the displacement of local peoples. The tendency to buttress state control of the forests is further encouraged by the proposal that "supreme authority" over the convention and its enforcement should be vested in a conference of governments. Worse, the relative power of member states is to be weighted according to "forest area, GNP or participation in international financial mechanisms" — a proposal that will disproportionately benefit the interests of the North.

Under a section headed "Main Obligations of Parties", the draft calls for governments to agree to an "optimal" forest land use pattern which reconciles "ecological, economic and social requirements". Beneath the rhetoric are two unsubstantiated assumptions. The first is that ecological and social requirements are compatible with the demands of the modern market. The second is that it is proper to leave to states decisions on the nature of this "optimal land use". The implications of the second assumption are made clear under a

section entitled "Integration of Forest Considerations into General Development Policy." The section stipulates that states should commit themselves to developing national policies "to achieve spatial patterns of settlement, economic activity and administrative services that will sustain investment in, and the productivity of, forest resources and provide the maintenance or establishment of a permanent forest base." In effect, decisions on where people are allowed to live must be subordinated to the requirements of companies who seek to invest in or produce goods from forests. The notion that this constitutes anything but an *imprimatur* for eviction and commercialization of the forests — and thus further deforestation — is fanciful in the extreme.

The draft explicitly promotes forest-based industrial development and assumes throughout its discussions that "sustainable" logging is both theoretically possible and politically achievable. While nothing is said about how to defend existing communities who are trying to protect their forests from logging or how to ensure land security, a page and a half, out of 15 pages, is devoted to laying down technical specifications for logging the forests on a "sustainable basis". This is despite overwhelming evidence that sustainable logging is little more than a myth (see Marcus Colchester, 'The ITTO and Rainforest Destruction', *The Ecologist*, Vol. 20, No. 5, 1990). In effect, if implemented as drafted, the convention would give a worldwide go-ahead to further catastrophic and unsustainable timber mining.

Although the draft makes repeated calls for "vigorous" and "aggressive" reforesta-

## Tropical Forestry Action Plan Campaign Resources

The *Ecologist* and the World Rainforest Movement have compiled a comprehensive 124 page dossier for activists campaigning against TFAP.

The dossier includes:

- ◆ Critical reviews of key TFAP documents and a bibliography of TFAP literature;
- ◆ Reprints of articles from *The Ecologist* and other journals on the tropical timber industry and the adverse effects of plantations;
- ◆ A paper from a World Bank consultant questioning the very notion of sustainable logging;
- ◆ An open letter to the World Bank calling for a halt to funding for projects that would entail logging of tropical forest.

The *TFAP Dossier* costs £4.50/\$9 to activists and £9/\$18 to institutions.

The second edition of the influential report, *The Tropical Forestry Action Plan: What Progress?* by Marcus Colchester and Larry Lohmann is available for £5/\$10 to activists and £10/\$20 to institutions.

Order both the dossier and the report and you receive a free copy of *The Greenpeace Guide to Paper*, a 56 page booklet on the environmental impact of the paper and pulp industries.

Payment by cheque or postal order to  
**WEC Books, Worthyvale Manor,  
 Camelford, Cornwall, PL32 9TT, UK.  
 Please add £1/\$2 for p.& p.**

tion in both North and South, such reforestation is linked throughout to "barren lands" and "low-productivity land." The draft does not specify, however, who is to determine what is "barren" or of "low productivity". This is a dangerous omission. Historically, colonial governments and forestry departments have classified as "barren" forests and farmland essential for local peoples' livelihoods simply because commercial extraction was not possible on these lands. If the convention promotes the replanting of these areas with commercial species useless for local people, then displacement and further deforestation elsewhere are inevitable, negating the whole purpose of the exercise.

Finally, the draft proposes two major goals: first, "no loss of global forested area"; and, second, "no net biotic emissions from forests". These goals seem attractive, but few governments are likely to undertake willingly the steps necessary to achieve them, including redistributing resources and curbing logging and agribusiness. The temptation will therefore be to try to achieve

these goals through repressive and counterproductive technical fixes such as "carbon-sink" plantations established to absorb industrial emissions from the North.

## Development as Expropriation

The thinking behind the draft forest convention is symptomatic of the thinking that has caused the massive loss of forests since the Second World War. That it should have emanated from FAO — the lead agency charged with protecting forests — is indicative of how misguided its policies continue to be.

As Marcus Colchester of the World Rainforest Movement points out:

"If the world forest crisis is to be addressed, then a very different approach is required. There is an urgent need to recognize that the prime causes of deforestation lie outside the forests themselves — and often even outside tropical forest countries. The problems are rooted in the intrusions of the

market — as expressed through logging, plantations, ranching, land speculation and mining — and in the displacement of landless poor into the forests. Deforestation is not an isolated technical problem but the symptom of an unbalanced, unjust and unsustainable development process. This development process has one single common characteristic — expropriation. Land and natural resources are being progressively removed from local ownership and control, from forest dwellers and rural peasants alike. The resources are being mobilized to meet industrial and urban needs, mainly in the North, but also in enclaves in the South."<sup>34</sup>

From this perspective, the question of *how* forest resources are to be best used cannot be answered without looking at the question of *who* will control their use, for *whose* benefit, and to serve *whose* interests. Only when FAO faces these questions squarely will it be able to begin developing a just and ecologically-sound forest policy.

## Notes and References

1. Myers, N., *Deforestation Rates in Tropical Forests and their Climatic Implications*, Friends of the Earth, London, 1989.
2. Whilst the FAO's forest department blames global deforestation on "shifting cultivation, permanent agriculture and built up areas", FAO's agriculture division is seeking to extend the amount of land under permanent agriculture — even though it admits that this will "involve expansion into tropical forest areas" and thus "further deforestation". It also promotes industrial development — a major cause of the loss of forests and other land to "built-up areas" (Alexandratos, N. (ed.), *World Agriculture: Toward 2000*, Belhaven Press, London/FAO, Rome, 1989, in particular see pp.128-129).
3. FAO, *FAO: What It Is, What It Does*, Rome, undated, p.5. A major source of funding has been the World Bank, which, in the early 1980s, was "the single most important financing institution for projects prepared by FAO".
4. *Ibid.*, p.5.
5. *Ibid.*, pp.4-5.
6. FAO, *FAO: The First Forty Years*, Rome, 1985, pp.55-56. At its inaugural conference in 1945, FAO argued that the main cause of forest destruction lay in a lack of expertise amongst Third World foresters and put forward a vigorous programme to modernize the forestry industry. Although the forestry department now prefers to talk of "forestry for development" rather than "forestry development", little but the rhetoric has changed in the last 45 years.
7. Reading FAO's literature, it is easy to gain the impression that, for FAO, forests are nothing more than a source of commercial revenue. The opening passage of the section on forestry in Alexandratos (op. cit. 2) is indicative of FAO's priorities: "The global value of the production of forestry and primary forest industries in 1985 (in 1980 prices) amounted to \$300 billion, around 2.5 per cent of world GDP. Exports of forest products in 1985 of \$50 billion represented 2 per cent of world merchandise exports." No mention is given of the value of forests for soil conservation, climatic stability, maintaining water resources, or of their value for local people. Just the bald figures of commercial exploitation.
8. FAO, *Tropical Forestry Action Plan*, Rome, 1985, p.12.
9. FAO, op. cit. 6, p.59.
10. Alexandratos, op. cit. 2, Tables 5.5 and 5.6, p.169.
11. Westoby, J., *The Purpose of Forests*, Blackwell, Oxford, 1987, p.247.
12. *Ibid.*, p.245.
13. *Ibid.*, p.248.
14. *Ibid.*, p.264.
15. World Bank, 'Staff Appraisal Report Republic of Côte D'Ivoire Forestry Sector Project', Occidental and Central Africa Department, Agriculture Division, Report No. 7421-RC1, February 23, 1990.
16. FAO, *The State of Food and Agriculture*, Rome, 1962, pp.88-128, reproduced in Westoby, op. cit. 11, states: "Forest industries . . . furnish a very wide range of products . . . the demand for these rises sharply with economic growth. The industries vary considerably in their raw material and other factor requirements. In most of them alternative technologies can be successfully employed. They are based on a renewable resource. This resource is intimately linked with agriculture. These features suggest that potentially forest industries can play a significant part in promoting economic growth in presently low-income countries." In 1962, FAO saw investment in firewood production as being less important than investment in industrial wood "since it is evident that firewood is secondary from the point of view of economic growth" (Westoby, op. cit. 11, p.8). However in Alexandratos, op. cit. 2, investment in firewood is advocated to reduce expensive oil imports (p.172). More generally, Alexandratos notes: "Forestry makes an important contribution to the world economy which will expand with the growth of population and wealth . . . Forest industries should be priority industries in the process of development . . ."
17. *The Greenpeace Guide to Paper*, Greenpeace, Vancouver, 1990, p.15.
18. Alexandratos, op. cit. 2, p.170.
19. *Ibid.*, p.171.
20. FAO, op. cit. 6, p.61.
21. Alexandratos, op. cit. 2, p.164.
22. *Ibid.* and 'Forest Industries in Socio-Economic Development', *Unasylya* 38, 153, pp.2-9, 1986, quoted in Mather, A.S., *Global Forest Resources*, Belhaven Press, London, 1990, p.276.
23. Mather, *ibid.*
24. Colchester, M., *Pirates, Squatters and Poachers: The Dispossession of the Native Peoples of Sarawak*, Survival International and INSAN, Kuala Lumpur, 1989, p.38.
25. Westoby, op. cit. 11, p.264.
26. FAO, op. cit. 7, p.2.
27. Colchester, M. and Lohmann, L., *Tropical Forestry Action Plan: What Progress?*, World Rainforest Movement and *The Ecologist*, Penang, Malaysia, 1990.
28. *Ibid.*, p.2.
29. Winterbottom, R., *Taking Stock: The Tropical Forestry Action Plan After Five Years*, World Resources Institute, Washington, 1990.
30. FAO, *The FAO Tropical Forestry Action Plan: Independent Review*, Kuala Lumpur, May 1990.
31. FAO, *Review of the Tropical Forestry Action Plan (TFAP)*, Committee on Forestry 10th Session, Rome, 24th-28th September, 1990, unpublished.
32. FAO, Extract from *Report of the 10th Session of the Committee on Forestry*, Rome, 24th-28th September, 1990.
33. *Possible Main Elements of an Instrument (Convention, Agreement, Protocol, Charter etc.) for the Conservation and Development of the World's Forests*, Rome, 1990, unpublished.
34. Personal communication.

# FAO and Aquaculture: Ponds and Politics in Africa

by  
Douglas Cross

*FAO and other aid agencies have promoted fish farming in the Third World as a key method of increasing the production of protein and earning foreign exchange. While traditional aquacultural methods have been ignored, FAO have established grandiose high-tech schemes totally unsuited to the needs and the capabilities of the poor people they are intended to help. The poor do not have the necessary capital to set up the fish farms, and cannot afford to eat the expensive fish produced. The politics behind the ill-conceived schemes show how agricultural development policies serve the needs of bureaucrats and politicians rather than the rural poor.*

During the 1970s, the science and art of growing fish in ponds and cages experienced a spectacular expansion, as governments around the world were drawn into what appeared to be a marvellous new opportunity to increase agricultural protein production. Here was a new technology which would enable the problems of degrading soils and increasing fertilizer requirements to be sidestepped by the simple expedient of flooding land — often so-called “worthless” land — and stocking it with hardy, easy to grow fish which everyone could afford.

As a result, fish farming — “aquaculture”, as it became fashionable to call it — proliferated around the world, spurred on by highly qualified, but all too often relatively inexperienced, biologists and others, and quite spectacular financial support from the big international development agencies. Fish farm engineers, fish disease specialists and fish reproduction experts seemed to appear from nowhere. Symposia and conferences were held, the research literature exploded with erudite papers, and the world’s governments sat up and took notice. A wonderful range of novel techniques, ranging from artificial induction of spawning and sex reversal to submerged marine cage culture systems came onto the market. The international agencies poured money into new, and usually ever-more spectacular projects, and

“aquaculture consultants” registered with FAO at the rate of over 200 per week.

Aquaculture was promoted as a means of providing extra fish to satisfy the demands of rapidly growing populations, and to help pay off national debts. Ever more schemes emerged from consultants’ proposals, were funded, and built; when they failed, yet more schemes replaced them, and so the roundabout continued.

It very quickly became obvious, however, that few of these grandiose development projects had any relevance to the lives of ordinary people. And yet, in quiet rural backwaters in some of the most inaccessible areas of the world, small groups of often ill-educated farmers were going about the business of growing fish in ponds, using simple and reliable systems of culture, as part of their traditional pattern of life. Almost no educated scholars had visited them, and their knowledge and techniques remained unrecorded by the new breed of scientific “specialists”.

## **Inappropriate Aquaculture**

Modern high-technology aquaculture systems cost a great deal of money to set up and run, and need well-trained staff and sophisticated inputs. To justify these costs, they need to produce high value products which often go for export. In developing countries, only the rich and secure can afford to set up complex fish farms, and only the relatively wealthy can afford to eat their products.

In poor communities, equipment such as pumps and tubewells is beyond the financial reach of the ordinary farmer, and the costs involved in building even a small pond are high. So fish ponds are most easily set up where there is an impermeable clay soil, a permanent water supply and enough surface gradient for the water to be led around a contour until it can be run into a pond which will also drain by gravity. Often such land is already in use by farmers who, understandably, are reluctant to flood it just to try some high-risk, untested system of rearing fish.

If fish farming is to be accepted by a rural community, it has to be on a scale which ordinary farmers are able to adopt. For individual families, a pond which is only a fraction of an acre in area will provide as much as the family needs for itself, and perhaps enough to sell a little in the local market. Quite apart from the high capital costs involved, there is little point in producing tonnes of fish, when local communities do not have the money to buy them. Small ponds, reliable if unspectacular species of fish, cheap fertilizers and easy breeding are the simple essentials for family systems. Communities can adopt fish farming on a larger scale, provided that an adequate capital investment fund is available allowing the less wealthy members of the community to get a foothold in the production process.

FAO has designed, planned or operated fish-farming projects in many countries. Some work well, but many others do not. In some cases, the schemes are such dismal

Douglas Cross is an independent environmental consultant. His address is Farthings, Payhembury, Honiton, Devon EX14 0HJ, UK.

failures that they have been conveniently forgotten and can only be found by asking persistent questions and carrying out a great deal of detective work. But in other cases, these monuments to incompetence are actually exhibited with pride by government officers, who totally fail to appreciate the costs and liabilities which their communities have inherited. The following three examples show how FAO has been responsible for disasters great and small.

## The Development of Aquaculture in Egypt

The Egyptian government's plans for massive new developments in aquaculture were triggered by a report prepared by an FAO consultant, Y.A. Tang.<sup>1</sup> On a 1976 FAO mission to Egypt, Tang was impressed by the vast number of "village fish ponds" which he saw throughout the northern Delta region. Because the soil was a stiff clay which he considered very suitable for building ponds, he proposed that the government should establish commercial fish farms using the classic Chinese deep-water polyculture techniques, in which up to six different species of fish are grown in two metre deep ponds.

This type of system was easily sold to the government officers who read the report, offering as it did the attractions of producing high yields of fish — up to ten tonnes per hectare per year were suggested — fed on recycled agricultural "wastes". Immediate plans for large scale units were drawn up which, using Tang's proposals, should have provided astounding quantities of fish at low cost.

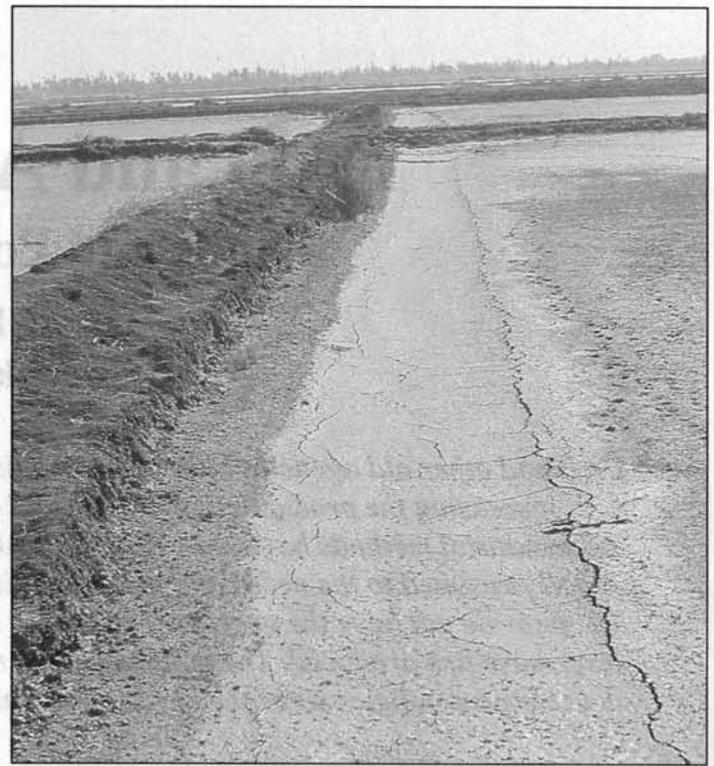
Exactly what Tang saw during his visit to Egypt is unclear. Certainly, only three years after his mission, there was not a single "village fish pond" in the whole of the Delta region, nor had any of the local farmers ever heard of such a thing (although, as described below, there were large privately-owned fish farms). And the strong clays which he claimed to be suitable for fish farm construction were in fact probably the worst material possible to try to make ponds from. They are almost pure sodic montmorillonite clay which, when dry, appears to act like other clays, but as soon as it is wet absorbs a great deal of water, turns into a semi-liquid slurry, and slides down any slope greater than about five degrees from the horizontal. In addition, the Chinese system relies heavily on the culture of common carp (*Cyprinus*

*carpio*), a fish which is extremely intolerant of salinity, and which few Egyptians will eat. The only available water supplies in much of the area selected for fish farm development were derived from irrigation drainage, and were already too saline for the survival of carp fry. Coupled with the high evaporation rates which further concentrate the salt in the water, and soil salinities which can reach 20 per cent by weight of dry soil, the probability of success was, to say the least, low.

## The Great Paper Pyramid of Tang

Shortly after Tang's visit, the US Agency for International Development did two studies which, although expressing some reservations about the soils in a few areas, strongly endorsed his recommendations.<sup>2,3</sup> FAO then commenced work on a 400 hectare demonstration fish farm at El Zawiyah, and USAID on the construction of a 720 hectare research and development fish farm at Abassa. Results obtained from the work at Abassa were used as guidelines for future expansion elsewhere in the Delta, despite the fact that the Abassa soils bore little resemblance to the dreadful clays found over the rest of the region. More and more technical reports appeared, none critical of Tang's work, and on the basis of this single document a great pyramid of new proposals and projects was erected which decided Egyptian policies on aquaculture for over a decade.

The Egyptian government set itself a goal of building 12,000 hectares of deep-water polyculture farms, to be operated by the Undersecretariat of Aquatic Resources on land (much of it already used by farmers) which it had selected for fish farm development. The first stage of this plan was put into operation in 1978, when a British firm was appointed to survey the



View along the bank of one of the production ponds at the FAO El Zawiyah Demonstration Fish Farm, Egypt. This shows the extreme erosion of this bank, which was only in use for a few weeks before the photograph was taken. The bank originally had a 1 in 3 slope from its top to the extreme left edge of the picture; the slope is now less than 1 in 20 where it had been covered in water. (Photo: D. Cross)

12,000 hectares of pre-selected land, and from this to select 4000 hectares for outline design proposals and 2000 hectares for the preparation of detailed designs, costings and management plans.

At the time that the company obtained this survey contract, it had no "in-house" aquaculture capability, so two independent specialists, P. Wardle and myself, were contracted to act as Senior Consultants in soils and aquaculture respectively. Within days, it was obvious to us that Tang's report was worthless, and that the pre-selected sites were in the worst possible soils. However, the FAO Project Officer remained adamant that the whole project should go ahead exactly as planned by Tang — who it later emerged was her immediate superior.

When the contract was put out for tender, it was already too late to make any effective reappraisal of the project's technical, economic and socio-political basis, or to call a halt to what was clearly set to be a massive waste of money. The Egyptian government, FAO and the World Bank had already established their terms of reference, and these were regarded as immutable. After the pointless planning and costing work was completed, the imple-

mentation of the first stage of construction was contracted to a French company, which lost over half a million dollars on the job.

## The El Zawiyah Demonstration Fish Farm

At the FAO El Zawiyah Demonstration Farm, huge ponds were built, far larger than any farmer would ever attempt to construct. The banks were over two metres high and at least ten metres wide between adjacent ponds. Only half of them held water, never more than a metre deep, and in all of these the banks eroded and collapsed at spectacular rates — often a massive bank would disappear entirely within three years. At harvest time, the ponds became filled with a liquid mud slurry which smothered the fry before they could be moved to growing ponds.

By 1981 it was clear that the farm was a disaster, yet four years later half a dozen Zawiyah-type farms were being planned by the Egyptian government, and the FAO officer in charge of the project still believed that an engineering solution could be found for its problems, despite overwhelming evidence to the contrary.

## Private Sector Fish Farming

Tang's report was made even more remarkable by his failure to recognize and investigate the large privately-owned fish farms on saline soils in the northern Delta. At the time of his visit, this activity covered no less than 40,000 hectares around Lake Manzalah. The farms produced around 27,000 tonnes of fish annually with a value of 10 million Egyptian pounds, and employed at least 12,000 people.<sup>4</sup> Yet official Egyptian government statistics for 1975-79 showed an annual aquaculture production totalling only 250 tonnes per year, all from the single government-owned farm at Manzalah. As far as the government was concerned, these private sector farms did not exist — indeed, they were barely tolerated, and defined as illegal activities. Visiting consultants were taken only to the disastrously inept Manzalah farm, and all visits to the private sector farms were strongly discouraged.

The government's attitude to the traditional sector was dismissive: "Do not bother to talk to these people, Mr Cross, they are uneducated — they know nothing!" In fact, the efficiency and relevance of the traditional system to the needs of the peo-

ple was impressive. Using a simple, low stocking density technique, farmers reared the annual freshwater-tolerant mullet *Liza ramada* in very shallow ponds, without any feeding or fertilization. The farmers were well aware that wet clay collapses easily, and rebuilt the very low pond banks every year.

The main aim of these fish ponds is to reclaim saline soil for agriculture. Within three years at most, land with up to 20 per cent by dry weight of salt was flushed clean enough to grow salt-tolerant crops such as *berseem*, a leguminous fodder. When this became possible the large, low productivity fish farms were converted to a much larger number of agricultural smallholdings. The farmers earned an in-

---

*The demonstration farm was situated next to a bird sanctuary with virtually every species of fish-eating bird native to Malawi. These were presented with a ready supply of food from the fish ponds.*

---

come from the land from their very first year, instead of having to wait for the up to 10-15 years taken by conventional soil reclamation techniques.<sup>5</sup>

## High Expectations in Mali

The problems of establishing fish farming in Mali are very different from those in the Egyptian Delta. The soils are highly permeable sands, and water supplies are often 10 metres below the ground. Drought has decimated food production, and capital for making ponds, buying feed and running pumps is unavailable. Physically, the country is totally unsuitable for any form of low cost aquaculture.

In 1985, the Malian Direction Nationale des Eaux et Forêts asked FAO to send a mission to assist it in planning an expansion of its (non-existent) fish farming activities. One of the objectives was to replace at least part of the fish stocks lost from the floodplain fishery of the Malian Inland Delta because of the fall in flows caused by the prolonged Sahelian drought.

Unfortunately, the government's expectations had been falsely raised by the inflated claims for fish farming potential made by several aquaculture consultants.<sup>6</sup>

From the start, the FAO mission (of which I was a member) was obstructed by Malian officials and extremely important technical reports prepared by previous consultants were concealed. Within a few days of setting off on a rigidly planned tour of the government's favourite sites, it was clear that it would be almost impossible to devise any viable system of aquaculture for the country, especially at the sites which were shown to the mission. However, the Malian officer accompanying the FAO team categorically refused to allow us to exercise our professional judgement and change the planned itinerary.<sup>7</sup>

During its abortive mission to Mali, the FAO team was taken to visit the government's demonstration fish farm at San. This semi-derelict unit covered about half a hectare, only half of which was actually used. It relied for its water on a massive diesel-powered pump 500 metres from the farm, on the bank of the River Niger, because the supposed supply canal next to the farm only carried water during the crop irrigation season. This extraordinary facility soaked up over US\$300,000 between 1981 and 1985 — making it, in terms of capital cost per hectare, probably the most expensive fish pond facility in the world. We calculated that the cost of fish production on this demonstration farm was in the region of \$4000 per kilogram.

The second "showcase" project to which the team were taken was a private farm where fish ponds had been integrated into a superbly designed complex agricultural unit, built at enormous capital cost and relying on a massive solar power unit for electricity to run the very expensive pumping system. A more inappropriate method of growing fish, in a country with an average annual per capita income of less than \$250, could not have been invented.

## Financial Disaster in Malawi

During a visit to Malawi in 1982, I visited a demonstration fish farm at Kasinthula, in the Lower Shire Valley, which had been constructed by FAO after a visit by one of its staff officers. At the time the site was chosen, the only water supply was a small canal supplying a smallholder rice project next to the site. A second canal which should have provided gravity-fed water to the fish farm was never built; consequently

the fish farm suffered from severe water shortages, and only 11 hectares of ponds could be maintained to about half their planned depth, relying (unwisely) on a pump to abstract water from the irrigation canal for the rice fields. Even worse, the demonstration farm was situated next to an important bird sanctuary with large populations of virtually every species of fish-eating bird native to Malawi, from small kingfishers and cormorants to giant herons and fish eagles, all of which were rigorously protected by wildlife officers. These birds were thus presented with a ready supply of food from the large areas of open shallow water in the fish ponds, and acrimonious quarrels took place between the fish farm staff and the sanctuary's bird warden over the former's use of guns to attempt to stop the birds stealing their fish.

Not surprisingly, the demonstration farm was a financial disaster, producing only half the returns obtained from the rice scheme in the adjacent fields. Staff salaries were so low that during harvesting the operators would abandon the fish left in the almost drained ponds to the attentions of the birds, in order to chase mice for their cooking pots. The Malawian government was fully aware of the shortcomings of Kasinthula, but sadly it was unwilling to take the decision to cut their obvious losses and close it down.

## The Role of Consultants

In analyzing the history of aquaculture in different countries, it is common to find that an entire long-term policy has been formulated on the basis of an initial survey carried out by an inexperienced expatriate. Often it is inexperienced volunteers from organizations such as the US Peace Corps who get drawn into these fiascoes, however even prominent specialists can, and often do, make astonishing errors due to a lack of width of vision and technical competence. Over more than a decade, I have followed the same FAO establishment consultants around the world, trying to minimize the damage that their enthusiasm has caused.

But it would be wrong to place all the blame on the consultants. The objectives and the terms of reference of almost any development scheme are established by the government of the country, together with the aid agency which will fund or direct the project. These objectives — such as attempting to maintain fish supplies in

the face of unrestrained population growth — frequently bear little relationship to what can realistically be achieved.<sup>8</sup> Often, a government's real but unstated objective is to bring the traditional fishing sector into the formal economy.

In many instances, fisheries departments embrace aquaculture projects primarily because they offer a large slice of development capital and thus the chance to increase a department's prestige, and improve the salaries and working conditions of its senior officers. It is no coincidence that almost every project in aquaculture specifies that a Landrover or similar vehicle should be provided, and not taken away when the project is completed. In Mali, the FAO team were confronted by an almost uncontrollable Director, who, when it was explained to him that aquaculture was not an appropriate or viable activity in his country, shouted from his desk, "*Je demande un projet!*"

## Economic Aid and Foreign Policies

International politics also have their part to play in pushing inappropriate projects. The apparently uncritical adoption of large scale aquaculture investment projects in the Middle East was undoubtedly associated with US foreign policy in the region.

During 1980, Egypt was allocated \$968.6 million and Israel \$786 million of US bilateral economic assistance — over 62 per cent of the total proposed for the top ten recipients of US aid — yet neither country was classified as having a Third World economy. The World Bank between 1979 and 1981 poured at least \$100 million into Egyptian fish farming projects which would inevitably fail on technical and financial grounds. In contrast, neither Mali nor Malawi has any strategic value or resources, so spending on aquaculture has been relatively meagre, and the main effort from FAO appears to have been an attempt to dispose of relatively small amounts of aid through the appropriate regional "desk" with a minimum of technical and administrative inputs.

## The Fad Ends

Until quite recently, FAO was wholehearted in its support of aquaculture in the developing countries. As a result of its technical advice — and with funds from the World Bank and other agencies —

huge areas of land which could have been used for farming, or even which were already in productive use, were confiscated and devastated under projects which were, from the very start, doomed to technical or financial disaster.

Three years ago, however, widespread criticism finally forced FAO to carry out a critical world-wide appraisal of its own aquaculture activities. The results of this internal report have not been released publicly, but there does appear to have been some recent change in emphasis. Within the wider development community too, there is a recognition that the record of aquaculture projects leaves a lot to be desired. The World Bank, for example, has completely withdrawn its support for large-scale aquaculture projects.

Nonetheless, the fad for aquaculture continues: whilst official support for aquaculture may be on the wane, massive fish farms are still being set up with private capital in countries such as Thailand, Ecuador and the Philippines. Yet, FAO has done nothing to discourage such projects. Meanwhile, the legacy of FAO's own disastrous flirtation with failure is all around and many countries are still paying the cost of failed projects.

## References

1. Tang, Y.A., 'Report on the Aquaculture Mission in Egypt, 2 October-28 November, 1976', Rept. No. W/K 5920, FAO, Rome, 1977.
2. USAID, 'A Report of the Fisheries Review Team to Egypt for USAID, December 19, 1976', USAID, Cairo, 1976.
3. USAID, 'Egyptian Aquaculture Feasibility Report', USAID, Cairo, 1977.
4. J.F. MacLaren Ltd., 'Lake Manzalah Study: Summary Report', Vol. 1, EGY/76/001-7, Ministry of Development and New Communities, Cairo, 1981.
5. Cross, D., 'Reclaiming Saline Soils using Aquaculture', *Appropriate Technology* 8, 3, 1981, pp.4-6.
6. Morrisson, J., 'Evaluation du Projet Piscicole en Rizières du Mali', Direction des Eaux et Forêts, Bamako, 1980; Morrisson, J., 'Une Etude de Factibilité du Potentiel de la Pisciculture sur les Périmètres Irrigués de l'Office du Niger', Dir. des Eaux et Forêts, Bamako, 1981; Rea et al., 'La Pêche à l'Intérieur des Terres', Dir. des Eaux et Forêts, Bamako, Mali, 1978.
7. Cross, D. and Ogradnik, W., 'A Technical and Financial Appraisal of Fish Farming Potential in the Niger River Delta of Mali', MLI/85/002, FAO, Rome, 1985.
8. In Egypt in 1979, only 12,000 hectares of land were notionally available for fish farm expansion. Even ignoring severe physical constraints on using such land, by the time that the whole area could have been brought into production — about four years — the population growth rate would already have outstripped the new production potential.



In 1946 the second FAO Conference concluded: "The fishing-grounds of the world are teeming with fish of all kinds . . . In underdeveloped areas, especially, the harvest awaits the reaper." Forty-five years later, many of these fishing-grounds are on the brink of exhaustion due to overfishing with the modern methods promoted by FAO. (Photo: FAO)

## FAO and Fisheries Development

by  
Patrick McCully

*FAO's policies of promoting modernization and the export of food to earn foreign exchange have had as disastrous effects on the Third World's fisherfolk as they have had on its peasants. Although fish stocks are now under threat worldwide, and less fish than ever is available to the poor, FAO insists in continuing to promote international trade and the "better management" of fisheries through the expansion of expensive Western technologies.*

FAO has an indirect yet powerful influence on the fisheries policies of member states.<sup>1</sup> According to an ex-Assistant Director-General of its fisheries sector, FAO plays a "key, catalytic role . . . in worldwide fisheries development".<sup>2</sup> In fishing, as in agriculture and forestry (*see* George Marshall, *this issue*), FAO provides technical assistance and advice and helps to channel funds from other agencies, rather than actually funding projects itself. The organization's main fisheries activities include gathering and publishing detailed statistics on fish catches, commodities and trade; disseminating "the skills and techniques required for the rational management of fishery resources"; and promoting

the transfer to developing countries of "necessary technologies", such as new types of nets, fishing vessels and processing methods.<sup>3</sup>

The belief that it is only through the spread of modern technologies that fisheries can be "rationally managed", has led to the progressive marginalization and impoverishment of traditional fishing communities around the Third World. John Kurien of the Centre for Development Studies in Trivandrum, Kerala, India, has studied the socio-economic and environmental effects of the modernization of the fisheries sector of the state of Kerala. He explains how this has created a "technological dualism" in the fish economy:

"Only a small minority — many of whom were not fishermen — had access to the more capital-intensive fishing craft and gear: a new class of non-worker owners emerged. The new technology . . . was introduced . . . without any change in the merchant-controlled marketing structure. This, coupled with the new and rising costs of production increased the dependence on merchant-financiers: a high level of productivity was realized but at much higher costs of production and at levels of indebtedness often leading to a gradual loss of control over the means of production."<sup>4</sup>

Income disparities in fishing communities were thus greatly increased and higher

capital and operating costs coupled with the increasing demand for fish, particularly for export, led to the rapid overfishing of the Kerala stocks. Fish, at one time considered to be "the poor man's protein", rapidly increased in price and declined in availability and quality. The amount of fish consumed locally declined from 19 kilograms per person in 1971-72 to around 9 kilograms in 1981-82. "Viewed from the perspective of the fish eating population of the state *more* investments for fisheries development yielded *less* fish for domestic consumption."<sup>5</sup> Nevertheless, FAO's 1989 policy document *World Agriculture: Toward 2000*, makes it clear that FAO intends to continue promoting its policy of "modernizing" the fisheries sector.<sup>6</sup>

## Production and Trade

Commercial fisheries production increased dramatically in the post-War period — from 18 to 75 million tonnes between 1950 and 1985 — with most of the increase taking place before 1970 and slowing down markedly thereafter.<sup>7</sup> Parallel to this, the international trade in fish and fishery products grew to 12.5 million tonnes by 1985 — about one-third of the global commer-

*FAO does not recognize the contradiction between its declared aims of both helping poor fisherfolk and promoting international trade.*

cial catch when converted from product weight to dry weight.<sup>8</sup> International trade, of course, largely benefits those with greater "buying power". As *Toward 2000* explains, the main trade flows consist of high value fish going from developing to developed countries, and low value fish going in the other direction. There is a substantial trade between developed countries, but trade in fish between developing countries is negligible.<sup>9</sup> In recent years, developing countries have become net exporters of fishery products.<sup>10</sup>

FAO, however, does not recognize the contradiction between its declared aims of both helping poor fisherfolk and promoting international trade. As in other sectors, the organization confuses satisfying "eff-

ective demand" (delivering food to those with the money to pay for it) with satisfying need. If Europeans are prepared to pay large amounts for cat food made with fish meal from the Gulf of Guinea, poor Africans may starve yet "demand" will be satisfied. Thus FAO's boast that it has "supported the expansion (in international trade in fish and fishery products) not only by assisting in the acquisition of knowledge concerning fish stocks but also by consistent efforts . . . to promote (technology) transfer", makes nonsense of its claim that it ensures "fishery resources are utilized so as to make the greatest possible contribution to food supplies for the benefit of the poorest and weakest sections of the community".<sup>11,12</sup>

## Meeting Demand

By the end of the next decade, according to *World Agriculture: Toward 2000*, world population will have increased to 6100 million, and the demand for fish will have grown to at least 100 million tonnes.<sup>13</sup> Previous FAO calculations suggest that this latter figure is the maximum commercial catch from current widely harvested species which can be sustained without critically depleting valuable species, like herring and cod.<sup>14</sup>

A serious limitation of FAO's food production statistics is that they neglect the output of the world's subsistence farmers, hunters and fishers. It is estimated that the 15-20 million "artisanal" fisherfolk worldwide catch 24 million tonnes per year.<sup>15</sup> This figure is unlikely to rise substantially, and may fall as the modern sector makes further inroads into traditional fishing communities and as modern boats and equipment further deplete fishing stocks. It does, however, represent a large proportion of world fishing production, and, if added to FAO's 1985 "official" production figures, indicates that the "sustainable limit" of 100 million tonnes is already being exceeded.

*World Agriculture: Toward 2000* admits that meeting the increases in demand it projects will not be easy. The fall in the rate of growth in fish catches worldwide in the 1970s was mostly due to what FAO terms "resource barriers";<sup>16</sup> in other words the depletion of many fish stocks due to overfishing with the new technologies which FAO has promoted. According to *Toward 2000*:

"Almost all important stocks of demersal species [those found on or



## SCHUMACHER COLLEGE

*A varied programme of residential study courses to help people of all ages, nationalities and backgrounds face the perils and opportunities of a new century. Scholars-in-Residence are chosen for the originality of their work and their accomplishment as communicators in the fields of ecology, science and religion, the arts, transformation and social development*

**Booking for 1991:**

March 29 - April 12

**Hazel Henderson**

LIFE BEYOND ECONOMICS  
*a component of which is the annual Dartington Conference*  
(April 3 - 7)

**TRANSFORMATION**

*with Nicholas Albery, Satish Kumar, Sara Parkin and Middle East diplomat Sir Anthony Parsons*

April 14 - May 17

**Rupert Sheldrake**

THE REBIRTH OF NATURE  
EXAMINING THE LIFE SCIENCES

May 19 - June 21

**Jonathon Porritt**

THE GREEN HERITAGE  
THE SEARCH FOR A TRADITION  
ON WHICH A SUSTAINABLE  
FUTURE CAN BE BUILT

June 23 - July 26

**Victor Papanek\***

DESIGN FOR THE REAL WORLD

August 25 - September 20

**Theodore Roszak\***

EARTH, SOUL & IMAGINATION

October 13 - November 15

**Reb Anderson**

ZEN OF MOUNTAINS & RIVERS

November 17 - December 20

**Manfred Max Neef\***

ECOLOGICAL ECONOMICS

*\*attendance at the first or second complementary parts of these courses will be possible.*

*Ask also for details of weekend course programme run in conjunction with The Dartington Centre. Leaders include many of above plus:*

June 14 - 16

**Edward Goldsmith**

*Write to: The Administrator, Schumacher College, The Old Postern, Dartington, Totnes, Devon TQ9 6EA. Tel (0803) 865934.*

	<u>Industrial</u>	<u>Artisanal</u>
Number of fishers employed	c.450,000	c.15,000,000
Catch for human consumption	c.25mt p.a.	c.20mt p.a.
Capital per fishworker	\$10-100,000	\$100-1,000
Catch for fish by-products	c.19mt p.a.	virtually nil
Fuel consumption	10-14mt p.a.	1-2mt p.a.
Catch per tonne of fuel	2-5 tonnes	10-20 tonnes
Jobs per \$million invested	10-100	1000-10,000

**Figure 1.** Comparison between industrial and artisanal fisheries.

(Source: Food Matters Worldwide 8, October 1990.)

near the sea bed] are either fully exploited or overfished. Many of the stocks of more highly valued species are depleted. Reef stocks and those estuarine/littoral zones are under special threat, from illegal fishing and environmental pollution . . . Crustacean species generally are heavily exploited and many, if not most, stocks are depleted."<sup>17</sup>

## Increasing Production

The production increases which FAO believes are required are slated to come from aquaculture (about 5-10 million tonnes — double current worldwide production), "better fisheries management" (about 10 million tonnes) and "improved utilization of resources" (15-20 million tonnes).<sup>18</sup> It is very unlikely that these increases will be achieved by the modernization policies espoused by FAO, and, if they are, they are likely to exacerbate overfishing and will mainly benefit the rich, not the poor.

FAO's experience with aquaculture has been disastrous (see Douglas Cross, *this issue*), and the agency now appears to be quietly distancing itself from aquaculture development. As is admitted in *Toward 2000*: "The development of commercial aquaculture . . . is likely to be largely involved with luxury species or those that fetch a price sufficiently high to permit recovery of the not inconsiderable cost of inputs".<sup>19</sup> FAO suggests measures to restrict the modern fishing methods which it promotes, for example by "legislating protected areas for use by specified fishing gears or fishermen."<sup>20</sup> But given the experience of the problems experienced in try-

ing to impose such management policies in the North Sea, where there is a huge amount of data on fish stocks, and the wealthy surrounding countries can easily afford fishery protection vessels as well as to compensate any losses to fishermen, it is extremely unrealistic to expect the modern fishing sector to be adequately regulated in the Third World. In fact *Toward 2000* itself is pessimistic about the prospects:

"Administrators as well as political leaders and donors often prefer an expansionist policy; the benefits of such a policy being perceived as immediate and tangible whereas those of good management often are long-term and hypothetical. As in the past, pressures of this kind may continue to frustrate a rational approach to fishery management."<sup>21</sup>

Given this political reality, it is hardly likely that the increased use of "fuel-efficient engines", "fish aggregating devices, spotter aircraft and satellite-generated imagery", will do anything to conserve fish stocks.<sup>22</sup> In any case, as so many fisheries are already being overexploited, "better management", if accomplished, would be more likely to lead to short-term reductions rather than increases in fish catches.

## Using Fish Efficiently

Three main priority areas are given in *Toward 2000* for "improvements in utilization practices": "rescuing discards from trawling operations, reduction in post-harvest losses, and better utilization of small-pelagics species [fish which live in the top layers of the open ocean]".<sup>23</sup> FAO estimate that between 5 and 16 million tonnes per

year are caught and discarded at sea by trawlers, of which between 20 and 70 per cent represent marketable species and sizes depending on the fishing area. From the wide range of these estimates, it is clear that the true figure is largely an unknown. It is assumed that this problem can mostly be overcome when increased demand creates a market for the currently discarded fish.<sup>24</sup> Again the question of who generates the demand is not addressed.

FAO also estimates that 10 per cent of food fish is lost due to "lack of facilities to preserve fish or from lack of technical knowledge". "To reduce these losses will require investment in better infrastructure for landing, storage and distribution and trained staff to operate it".<sup>25</sup>

The "better utilization" of small pelagic species, "has a greater potential but is perhaps more speculative".<sup>26</sup> At present only about one-third of world catches of these species is used for direct human consumption, the balance going to fish meal and fish oil. In addition, there is a further unexploited potential of up to 10 million tonnes. Most of these species are not eaten at present due to factors such as taste and appearance; however, FAO believes that they can be made acceptable if processed in certain ways. According to *Toward 2000*, the perceived health benefits of fish, and especially small pelagics which contain the highest concentrations of the oils which are supposed to be effective in preventing coronary heart diseases, "are expected to double per caput consumption in the USA".<sup>27</sup> This is hardly likely to make more fish available to the poor in the Third World.

The most obvious method of making better use of fish would be to try to reduce the 25 million tonnes which are presently converted to fish oil or meal. *World Agriculture: Toward 2000* does not state that this would be desirable although it predicts that demand for animal feed will decrease as other protein sources (such as soyabean) become more competitive. Increased use of fish meal in aquaculture, however, it is estimated, could cancel out this reduction so that demand stays more or less constant.<sup>28</sup> But the discussion on livestock in *Toward 2000* advocates "high growth rates" for livestock production over the next decade, largely to be achieved through further intensification and a greater use of feed concentrates. There may therefore be increased agricultural demand for fish meal, even if other protein supplements become more common.

There is also no evidence to suggest that

encouraging increased harvesting of pelagics would not lead to overfishing: fisheries of shoaling pelagics such as the Peruvian anchovy are especially vulnerable to large population collapses when intensively exploited.

## Helping Fishing Communities

If, as it claims, FAO really wants to improve the lot of poor fisherfolk and play a "leading role in promoting the self-reliance in fisheries of developing countries",<sup>29</sup> it could do so by actively supporting the demands of subsistence fishing communities against the depredations of modern trawling fleets and the inroads of capital into local marketing systems. According to the World Resources Institute: "Artisanal fisheries are the largest single supplier of animal protein for several hundred million people in developing countries. In the majority of tropical Asian countries, for example, artisanal fisheries contribute more than 50 per cent of the animal protein intake."<sup>30</sup> Besides providing fish for local consumers rather than the international market, artisanal fisheries are labour intensive, thus helping to alleviate chronic rural unemployment in many Third World countries; they require low amounts of capital; they are extremely fuel efficient; they have a direct interest in the sustainability of their fish stocks, not being able to just move their fleet or their capital elsewhere; and they discard virtually no useable fish. According to John Kurien, the artisanal sector:

"... gives rise to a decentralized settlement pattern and does not promote large income disparities. Small-

scale operations are ecologically appropriate to the tropical aquatic ecosystems characterized by numerous species in small quantities which are widely dispersed in the near shore waters. Small-scale fishermen are innovative and amenable to efficient improvements.

"The sector is also well integrated into small-scale marketing and distribution channels which are highly efficient and managed in many countries by women. The desirability of the small-scale fisheries sector to developing countries is therefore stressed not only on social and welfare grounds but more for economic, technical, ecological and organizational reasons."<sup>31</sup>

*World Agriculture: Toward 2000* does recognize the contribution of artisanal fisheries to providing fish for human consumption and states: "It is particularly important to protect and enhance small-scale fisheries... These are characterized by high labour involvement, low capital investment, low levels of mechanization and often the use of passive fishing methods".<sup>32</sup> The only method of "protecting" these fisheries cited in *Toward 2000*, however, is the establishment of protected areas for traditional fishing practices. While FAO is simultaneously promoting modern trawling methods, it is doubtful that they will be forceful in demanding restrictions to be placed on them. In Kerala, where a ban on trawling in inshore waters during the monsoon season was announced in 1989, it was aggressive lobbying from local fisherfolk rather than FAO which forced the state government's hand.<sup>33</sup> Moreover, where FAO applies its consultants to the "enhancement" of artisanal fisheries, the inevitable result is reductions in labour-intensity, and increases in capital investment and mechanization — in other words the fisherfolk cease to be artisans and are absorbed into the modern sector.

Perhaps luckily, FAO's attempts to do this are often marred by failures. In Senegal, for example, an ex-FAO press officer has described an attempt to equip the local pirogues with outboard motors. FAO's director of fisheries at that time demanded that the outboards be bought exclusively from his ex-employer, a large US company. As the director had been warned, the US motors were far too large and heavy for the frail Senegalese boats, and none of them were ever used. The only beneficiaries of the costly enterprise were the US outboard manufacturers and the FAO director who earned himself a handsome commission.<sup>34</sup>

Around the world, it is local fishing communities, not FAO's Rome-based bureaucracy which can achieve self-reliance for fisherfolk, and fish for poor people. In the northern Philippines, for example, CALARIZ, a small-scale fisherfolk's organization is struggling for aquarian reform, demanding that the trend towards privatization of local bays with fish-pens, curtailing the area of their common fishing grounds, be stopped. The South Indian Federation of Fishermen Societies (SIFFS), is helping its members to market their fish collectively and simultaneously ensuring that the bulk of the fish reaches local consumers.<sup>35</sup> If FAO, or governments, really wished to help these people they would be doing the opposite to what they are at present; they would be attempting to restrict the modern sector and would be discouraging international trade in fish.

## References

1. E.g. Kurien, J., 'Entry of Big Business into Fishing', *Economic and Political Weekly* (New Delhi), 9 September, 1978.
2. Carroz, J.E., 'The Way Forward for Fisheries', *Mazingira* 8, 4, 1985, p.14.
3. FAO, *FAO: The First 40 Years*, Rome, 1985, p.64
4. Kurien, J., 'Netting a Decent Living', *International Agricultural Development*, May/June 1986.
5. Kurien, J. and Thankappan Achari, T.R., 'Overfishing Along Kerala Coast: Causes and Consequences', *Economic and Political Weekly* (New Delhi), September 1-8, 1990.
6. Alexandratos, N. (ed.), *World Agriculture: Toward 2000*, Belhaven Press, London/FAO, Rome, 1989, pp.173-185.
7. *Ibid*, p.174.
8. *Ibid*, p.175.
9. *Ibid*.
10. *Ibid*, p.176.
11. FAO, loc. cit. 3.
12. Carroz, loc. cit. 2.
13. Alexandratos, op. cit. 6, p.177.
14. International Institute for Environment and Development and World Resources Institute, *World Resources 1987: An Assessment of the Resource Base that Supports the Global Economy*, Basic Books, New York, 1987, p.135.
15. *Ibid*.
16. Alexandratos, op. cit. 6, p.21.
17. *Ibid*, p.178.
18. *Ibid*, p.182.
19. *Ibid*.
20. *Ibid*, p.181.
21. *Ibid*.
22. *Ibid*.
23. *Ibid*, p.183.
24. *Ibid*.
25. *Ibid*.
26. *Ibid*.
27. *Ibid*.
28. *Ibid*, p.184.
29. Carroz, loc. cit. 2.
30. IIED/WRI, op. cit. 14, p.136.
31. Kurien, op. cit. 4, p.10
32. Alexandratos, op. cit. 6, p.181.
33. 'Fishing Victory in Kerala', *Food Matters Worldwide* 8, October 1990, p.14.
34. Vaughan, P., 'La Faim dans le Monde: Et Ceux qui en Vivent', manuscript, undated, p.123.
35. Kurien, op. cit. 4, p.11.

## MICRO-COSMOS

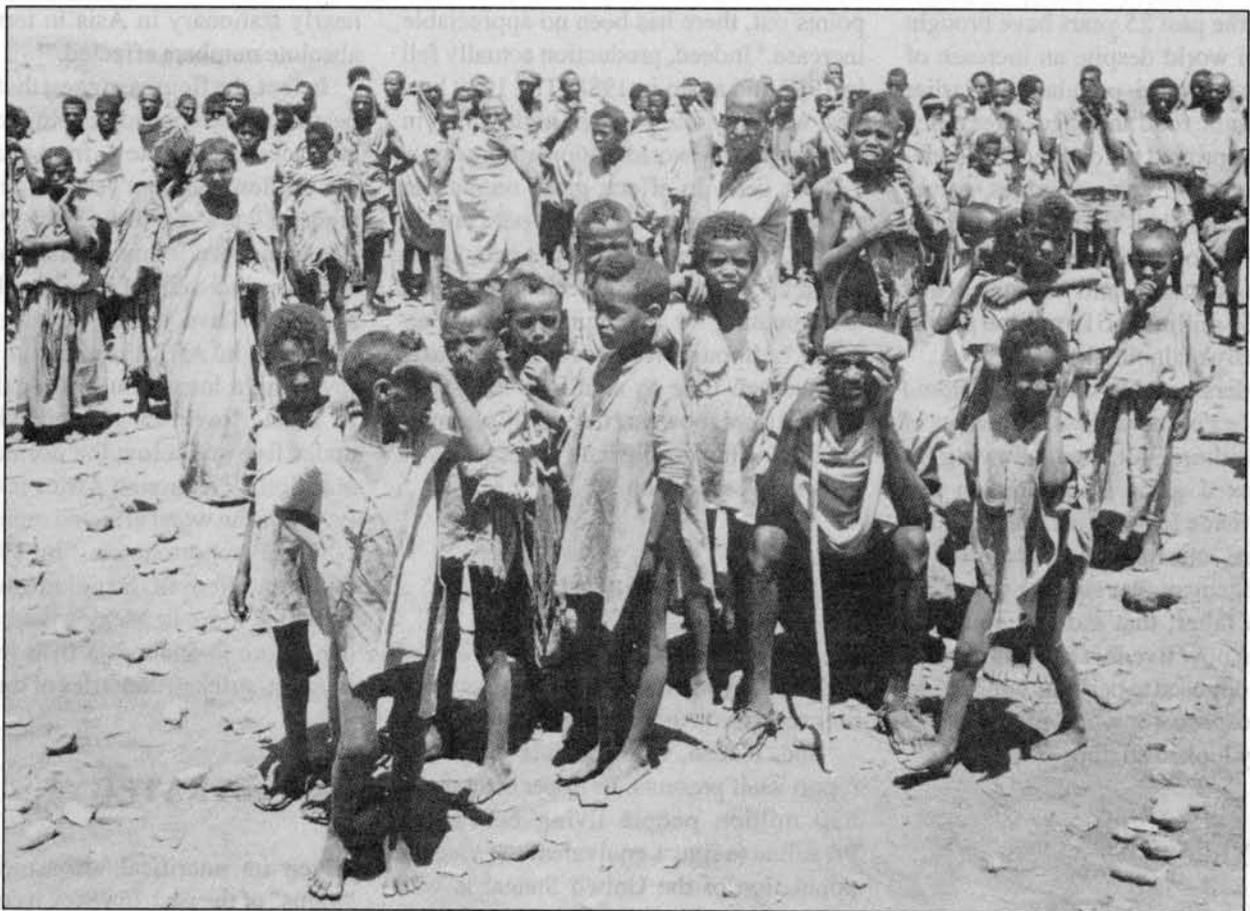
FOUR BILLION YEARS OF MICROBIAL EVOLUTION

BY LYNN MARGULIS AND DORION SAGAN

"Microcosmos is nothing less than the saga of the life of the planet. This extraordinary book, is unlike any treatment of evolution for a general readership that I have encountered before."

FROM THE FOREWORD BY DR. LEWIS THOMAS

Price was £12.95 now £7/\$14 plus £1.50 UK and £2/£4 overseas surface p&p. Cheques and orders to WEC Books, Camelford, Cornwall, PL32 9TT, UK.



*Famine refugees at Korem, northern Ethiopia, in early 1983. Eight years later, many areas of Africa are again in the grip of famine and across the world millions suffer chronic malnutrition. FAO, however, claims that agricultural policies over the past 25 years have largely been successful and should therefore be continued with only minor changes. (Photo: Save the Children/Mike Wells)*

## ***World Agriculture: Toward 2000***

### **FAO's Plan to Feed the World**

by

**Edward Goldsmith and Nicholas Hildyard**

*FAO's main policy document is full of contradictions, half-truths and fallacies. Most importantly, it concentrates on increasing world food production without adequately addressing how to make food available to those who need it. The document basically calls for a continuation of "business as usual" — the continuation of its promotion of unsuitable modern farming technologies, the conversion of tropical forests to farmland, the spread of hugely expensive irrigation schemes, and the export of the produce of the Third World to the well-fed of the North. The policies outlined would inevitably further indebtedness, impoverishment, environmental degradation and famine in the Third World.*

FAO's principle analysis of global agricultural production and trade is contained in *World Agriculture: Toward 2000*, a report issued for the 1987 FAO Conference.<sup>1</sup> The report "examines world agricultural perspectives and policy issues for the 15 years between the mid-1980s and 2000" and, according to its authors, it "represents a global assessment of possible future world

and country-group production, trade and nutrition."<sup>2</sup> Work on the report began in the mid-1970s, and it has gone through several drafts before reaching its present published form. As such, it may justifiably be seen as FAO's most definitive and considered statement on world food and agriculture — its "master plan" for feeding the world.

#### **A BETTER-FED WORLD?**

The report is defiantly optimistic. From the outset, it takes the view that, despite technical and political problems, the agricultural policies pursued by FAO and governments over the past quarter of a century have, by and large, been a success. "The outstanding fact in food and agricul-



Asia, 11 per cent. In the Near East and North Africa, there is no new land that can readily be brought into production without "major investments or new technologies for marginal rainfall areas and soils."<sup>16</sup>

• *Increasing cropping intensity.*

In addition to increasing the amount of arable land, the report argues for a six per cent increase in cropping intensity (the number of times an area is cropped in one year).<sup>17</sup> The amount of harvested land will thus effectively be increased by 115 million hectares.

• *Intensifying production through the use of off-farm inputs.*

According to the report, nearly two-thirds of the desired growth in output will be obtained through intensifying production. To achieve that goal, FAO argues for a doubling in the volume of fertilizers used by farmers, a doubling in the use of improved cereal seeds and a doubling in the number of tractors used in the Third World. Expenditure on "plant protection chemicals" — that is pesticides — is projected to increase at "somewhat less than three per cent a year."<sup>18</sup>

Figure 1 shows the relative contributions each strategy will make to the desired increases in yields. To pay for the programme, FAO argues for an increase in agricultural exports and economic development (see pp.88-89).

## THE EXTENSIVE SOLUTION

FAO's proposal to extend the land under cultivation suffers from two major flaws. First, there is little land left in the world that can advantageously be converted to agricultural use; and, second, water shortages place a major constraint on any programme of extensification. Though both problems are acknowledged in the report, neither are adequately addressed.

## No More Land

Since 1981, the world's agricultural base has actually fallen by some seven per cent, primarily due to environmental degradation and water shortages.<sup>19</sup> Indeed, much of the land brought into cultivation since the 1950s has proved quite unsuitable for permanent agriculture and large areas of agricultural land and rangeland are being abandoned every year:

- One-third of the world's cropland is already suffering from soil erosion.

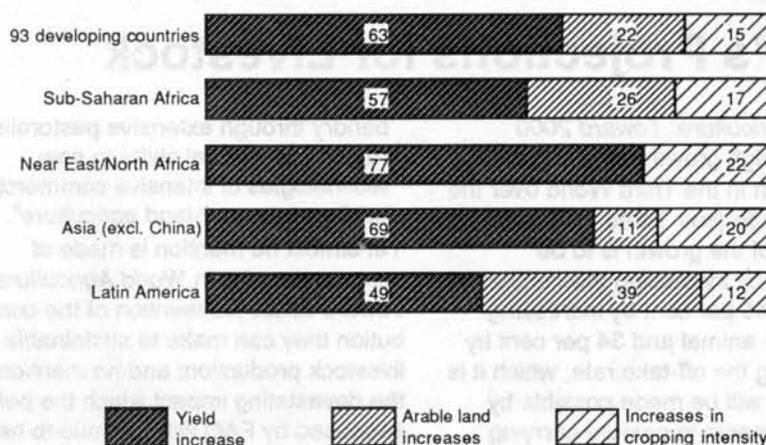


Figure 1: Relative contributions to crop production increases between 1982/4 and 2000. Numbers given are percentages.

Source: World Agriculture: Toward 2000.

In Africa, according to FAO, soil erosion could reduce agricultural production by a quarter between 1975 and 2000.<sup>20</sup> In India, an estimated 800,000 square kilometres are affected. In many areas, agricultural land is now so degraded that it is being transformed into scrub or desert. According to the Worldwatch Institute, some six million hectares a year — an area twice the size of Belgium — is being lost to such desertification.

- Deforestation is adding to the problems. In Indonesia, forest destruction has resulted in an estimated 8.6 million hectares being officially classified as "critical land" — that is, land which is so degraded that it is generally unable to sustain even subsistence agriculture.<sup>21</sup> Throughout the tropics, deforestation has rendered vast areas vulnerable to flooding: in India, the vulnerable area has risen from 19 million hectares in 1960 to 59 million in 1984.
- One-fifth of the world's irrigated land — some 40 million hectares — is conservatively estimated to be suffering from waterlogging or salinization.<sup>22</sup> In Egypt, 35 per cent of cultivated land is affected by salinity and 90 per cent by waterlogging. In China, more than 930,000 hectares of irrigated land has been abandoned since 1980.<sup>23</sup> In India, it is estimated that almost as much irrigated land is now being taken out of production due to salinization and waterlogging as new irrigated land is being brought into production.<sup>24</sup>
- Finally, agricultural land is being lost at an increasing rate to homes,

factories and roads. A 1980 UNESCO report estimates that in the developing world, "at least 3,000 square kilometres of prime agricultural lands are submerged every year under urban sprawl."<sup>25</sup> FAO itself admits that the "loss of good agricultural land to non-agricultural uses" now constitutes "a significant constraint to future expansion of food production."

One is thus bound to ask: Where will the 83 million hectares which FAO seeks to bring into production be found? *Toward 2000* is candid: "Most of this land will have to be transferred from tropical forests"<sup>26</sup> The implications for tropical deforestation are devastating. Rangelands, too, will be brought under production, despite their ecological fragility.<sup>27</sup>

Although FAO recognizes that the bulk of this new land is "only marginally suitable for annual crop production", it is adamant that adverse ecological effects can be avoided. Where tropical forest areas are to be opened up to agriculture, FAO recommends sites being "carefully selected, cleared and prepared."<sup>28</sup> The very scale of the intended expansion, however, makes it highly improbable that "careful site selection" will take place. The roads to the newly opened-up land would encourage forest encroachment by the landless, and the number of settlers who would be likely to gravitate to "specially selected sites" would make further expansion into surrounding forests almost inevitable. Significantly, *Toward 2000* does not even mention that much of the forest and rangeland that FAO seeks to open up for agriculture already belongs to forest or pastoral peoples who may be less than happy to see it developed for agriculture.

# FAO's Projections for Livestock

*World Agriculture: Toward 2000* projects high growth rates in meat production in the Third World over the next decade (see Table 1). Twenty per cent of the growth is to be achieved by increasing the number of animals, 46 per cent by increasing yields per animal and 34 per cent by increasing the off-take rate, which it is assumed will be made possible by "improvements in pasture carrying capacity, health and feed."

If this intensification of livestock production is achieved it will lead to severe environmental problems and will do little to help feed the poor. As *Toward 2000* admits: "The slow evolution from extensive to intensive production points to consequential increases in environmental degradation. Because in many countries livestock numbers are already in excesses of the carrying capacity of unimproved natural grassland, the greatest danger lies in overgrazing." Indeed, overgrazing is one of the most serious environmental problems in many parts of the world, a problem, which, in many cases, can be traced directly to the intervention of aid agencies such as FAO.

Between the late 1960s and the early 1980s, \$625 million was invested in African livestock development projects. Almost without exception these projects have totally failed to achieve their stated aims of raising the living standards of pastoral peoples and the productivity of their lands. The sinking of permanent wells to replace seasonal water sources, the privatization of communal lands and the appropriation of lands for huge commercial ranching schemes have greatly increased overgrazing and desertification. More seriously, they have accelerated the destruction of the elaborate socio-economic systems which have enabled nomadic pastoralists to raise their herds on Africa's fragile and drought-prone rangelands for thousands of years.

In 1980, an international conference on the future of nomadic peoples concluded that:

"A multitude of Western technologies have been tried in country after country with only the most limited success . . . Increasingly, it is being seen that the optimal use of semi-arid range resources may involve continuing animal hus-

bandry through extensive pastoralism, rather than radical shifts to new technologies of intensive commercial husbandry or dry-land agriculture".

Yet almost no mention is made of pastoral peoples in *World Agriculture: Toward 2000*. No mention of the contribution they can make to sustainable livestock production; and no mention of the devastating impact which the policies espoused by FAO will continue to have upon them.

FAO's projected increases in yields per animal are partly to be achieved by increasing veterinary inputs, so as to control "the major epizootics and various disease vectors, such as ticks and tse-tse fly." But there is little evidence that these diseases can be held in check; in fact, the further intensification of livestock raising would be likely to increase the problems of disease and the need for

In any case, if the programme had been successful, it would have resulted in the clearing of huge areas of forest and savannah, and the establishment of ranching schemes on totally unsuitable soils. Land degradation could only have been increased.

*Toward 2000* projects that the demand for cereals for animal feed will increase by 5.5 per cent annually up to 2000, diverting even more food to feeding animals rather than people. Intensive piggeries and poultry farms, the produce of which often cannot be afforded by the poor, can have especially damaging consequences on local nutrition. Pigs and chickens, unlike cattle and other grazing animals, eat very much the same food as humans and so compete with them for available supplies.

**Table 1. Projected meat production in developing countries (excluding China).**  
(Source: *World Agriculture: Toward 2000*)

	Meat Production				Livestock Numbers			
	Million Tonnes		Growth Rate		Million		Growth Rate	
	1983/5	2000	1961-85	1983/5 -2000	1983/5	2000	1961-85	1983/5 -2000
Cattle and buffaloes	13.3	20.4	2.1	2.7	884	1033	1.5	1.0
Sheep and goats	3.7	6.2	1.9	3.3	854	1077	1.2	1.5
Pigs	5.9	9.9	3.8	3.3	134	201	2.0	2.6
Poultry	7.7	16.5	7.9	4.9	3130	4873	4.3	2.8

expensive veterinary services and drugs such as antibiotics.

FAO's programme against the tse-tse fly, which transmits trypanosomiasis to both humans and cattle, has been extremely ineffective. The programme originally aimed to eradicate the fly from an area of nine million square kilometres in 37 different African countries. To achieve this end, huge amounts of lethal pesticides, such as DDT, lindane and dieldrin, were sprayed onto savannah and woodland, contaminating wildlife and water supplies and doubtless poisoning many people. However, there is little evidence that this had any effect upon trypanosomiasis, and mention of the hugely expensive spraying programme seems to have disappeared from FAO literature. FAO now concedes that, "in warm humid areas the best that can be hoped for . . . is restricted animal husbandry with drugs or breeds of trypanotolerant livestock."

In Latin America, the expansion of cattle ranching has often led to a reduction in local meat consumption. Between 1960 and 1974, expanding exports led to falls in per capita beef consumption in Bolivia, Colombia and Paraguay of 15.4, 19 and 44.7 per cent respectively, despite large increases in cattle numbers.

Increases in cattle numbers can also lead to less consumption of foods other than beef as the land taken over for ranching is often land previously used for producing food for local people. Good quality land can yield as much as 10 times more protein if used to grow root crops, pulses, cereals and green vegetables, than it can if used to support beef cattle.

Edward Goldsmith and  
Patrick McCully

## Water Shortages

Land shortages apart, a second constraint on the expansion of agricultural land is the growing shortage of water. As *Toward 2000* notes: "it is water rather than land which is the binding constraint for almost 600 million hectares of potentially suitable arable land. It is only when this water constraint is released that other technical constraints such as nutrients and pests become important."<sup>29</sup>

In many areas, natural water shortages have been exacerbated by the introduction of irrigation. In Tamil Nadu, India, water tables have dropped by up to 30 metres in a decade as a result of irrigation. In Maharashtra, some 23,000 villages are now without water, whilst in Gujarat, the figure is 64,500. Twenty per cent of the irrigated land in the US is irrigated by pumping water in excess of aquifer recharge. In Texas, for instance, water tables have been falling by some 15 centimetres a year on over one-and-a-half million hectares of irrigated land.

Nevertheless, *Toward 2000* calls for a 16 per cent increase in the area under irrigation, from 110 million to 170 million hectares, projecting that this should contribute 50 per cent of the desired increase in yields. In the Near East and North Africa, "Irrigation of rain-fed and desert lands will be the sole source of expansion of harvested land."<sup>30</sup>

Again, one is bound to ask: where will the water come from?<sup>31</sup> Leaving aside the overwhelming social and ecological arguments against building large-scale dams to provide irrigation reservoirs, the number of dams sites that can be economically and safely exploited is limited.<sup>32</sup> Dams are thus unlikely to provide the necessary water. Groundwaters too are already over-exploited and, given the rates of abstraction required for FAO's programme, would only provide a temporary solution.

The only other major source of water is that "saved" through the more efficient management of irrigation schemes. The report rightly notes that "water wastage in irrigation is a serious problem" but argues that such wastage can be reduced through "high technical and managerial skills," recommending in particular that higher water charges would discourage the over-use of water by farmers.<sup>33</sup> At no point, however, does the report address the social implications of raising water charges — notably squeezing small farmers out of production.<sup>34</sup> Nor does the report even attempt to respond to the growing consen-



*Farmers in Uttar Pradesh, India, using traditional irrigation method. Modern irrigation systems, which have been aggressively promoted by FAO, have exacerbated water shortages and caused the waterlogging and salinization of land. Their bureaucratic nature makes modern irrigation systems unresponsive to local needs, while those who benefit most are consultants, engineers, contractors and the politicians who often receive rake-offs from the huge sums involved in constructing large irrigation schemes. (Photo: Mark Edwards/Still Pictures)*

sus that the problems of water wastage are *intrinsic* to the bureaucratic nature of large-scale irrigation schemes — the rules governing water allocation are invariably designed to make life easier for government officials with no knowledge of local conditions, rather than to meet the needs of farmers.<sup>35</sup>

The net result of FAO's plan to extend the amount of land under cultivation is thus likely to be a massive increase in environmental degradation — principally as a result of deforestation — combined with increasing pressure on water resources. As a strategy for increasing food production, it is hopelessly flawed.

### INCREASING CROPPING INTENSITIES

Increasing cropping intensities — the second plank in FAO's strategy — is equally wrong-headed. *Toward 2000* acknowledges that the soils underlying tropical forests "are quite poor in structure and in plant nutrients" and explicitly recognizes that "long fallow periods during which natural vegetation can be re-established" have historically provided the key to successful forest farming in the tropics.<sup>36</sup> It goes on: "The danger is that pressure on land is causing the fallow periods to be shortened and natural vegetation is not being

reestablished for long enough to replace the nutrients removed during the cropping cycle."

Nonetheless, the report urgently recommends that fallow periods be *shortened* in order to obtain higher yields. Indeed, according to the report, "much of the increase in harvested land will stem from reduced fallow periods in areas of sedentary agriculture and of shifting cultivation." It admits that this could have "grave environmental consequences", but insists that the use of organic manures and mineral fertilizers would solve the problem.<sup>37</sup>

Even assuming that fertilizers could indeed compensate for the loss of nutrients due to reduced fallow periods — and this is far from proven — the long-term result of intensifying cropping patterns can only be the progressive degradation of the forest and eventually of the land itself. High rainfall is likely to cause the rapid run-off of fertilizers; moreover, the longer that an area is cropped, the greater the stress placed on the structure of the soil, reducing its capacity to store water and increasing the risk of erosion. Indeed, maintaining the productivity of the soils in bush-fallow systems has as much to do with the size of the plots cleared and the choice of crops grown as it has to do with the availability of nutrients. If soil cover is sparse or the plot too big, then the soil may be exposed to intense sunlight, which, in areas where

the soil has a high iron content, can lead to "laterization", the soil becoming brick-hard and totally unusable for agriculture. Similarly, inadequate soil cover will cause unacceptable erosion.<sup>38</sup>

FAO's recommendation that the cropping intensity on irrigated land be increased is similarly flawed. It is not irrigation *per se* that has been responsible for the vast areas of land lost to salinization but the intensive cropping of irrigated land in the absence of adequate drainage. On poorly drained soils, fallow periods are *essential* if water-tables are to be allowed to fall between cropping and the land is not to become waterlogged. Where irrigated land is cropped on a perennial basis, without adequate drainage, notes Victor Kovda of the University of Moscow, one of the world's foremost authorities on the subject, salinization is "practically universal."<sup>39</sup>

FAO does not deny this and calls for better management — in particular, the installation of proper drainage — to overcome the problem.<sup>40</sup> Yet again a pious exhortation is presented as a serious solution to an intractable problem. For, whilst proper drainage would indeed prevent salinization, its installation is extremely expensive and, in some cases, could double the cost of the irrigation project. Even without drainage, few irrigation schemes are economic, the revenue they raise typically covering less than 10 per cent of their construction, operation and maintenance costs.<sup>41</sup> Moreover, even where drainage is installed, the problem is not solved but simply transferred: once flushed out of the land, the saline irrigation water, sometimes highly contaminated with pesticides, invariably ends up in the nearest river, its salinity often rendering the river water unfit for agriculture downstream.

Once again, *Toward 2000* has opted for a strategy that can only exacerbate the problems of environmental degradation — and thus, ultimately, famine.

## INCREASING OFF-FARM INPUTS

The third component of FAO's strategy is further to intensify agriculture, primarily through the increased use of off-farm inputs and through mechanization. FAO does not discuss in any detail the social and economic impact of increased intensification for small farmers, limiting its discussion to the role that off-farm inputs will play in boosting yields. The claims made are questionable. The passage on fertilizers is illustrative.



*Ploughing with bullocks in India. FAO aims to continue the replacement of draught animals with tractors, especially in Latin America, the Near East and North Africa. Increasing mechanization, however, can only increase under-employment and indebtedness, two of the major problems of the rural Third World. (Photo: Mark Edwards/Still Pictures)*

In FAO's view, "Fertilizers have become a *sine qua non* of agricultural production over much of the developing countries and will become so in most other areas before the end of the century."<sup>42</sup> In the last 25 years, fertilizer consumption has increased worldwide from 14 million to 125 million tonnes, an increase of more than 11 per cent per year. Undoubtedly this has brought increased yields of wheat and rice, but, worldwide, farmers are now confronting diminishing returns on fertilizer use, with the result that yields have tended to fall not increase.

Twenty years ago, farmers in the US corn belt could have expected a tonne of

fertilizer to add 15 to 20 tonnes to their grain harvest. Today it can only increase production by about 5 to 10 tonnes. In the tropics, diminishing returns on fertilizer use have set in even faster, a problem attributed to the lower organic content of most tropical soils: In Indonesia, for example, the increased yield resulting from one kilogram of fertilizer nutrients fell from 10 to 5 kilograms of unmilled rice between 1972 and 1984.

The impressive yields initially gained through fertilizer applications result from nitrogen, potassium and phosphorous being made directly available to plants. But the long-term fertility of the soil depends

on more than the availability of these three elements: of critical importance are the levels of organic matter in the soil, the availability of essential trace elements such as magnesium, zinc and copper and the water-retaining capacity of the soil. By replacing organic manures, fertilizers lead to a marked deterioration in soil structure, leaving the land prone to erosion and compaction. Each inch of top-soil lost in the US reduces yields of wheat and corn by an average of six per cent, and the problem

---

*Toward 2000 is  
emphatic in its support  
for the proposals being  
put forward at the  
current Uruguay Round  
of GATT.*

---

is very much worse in tropical areas where the top-soil tends to be much thinner and more prone to erosion by wind and water.<sup>43</sup>

The choice of crops grown plays a critical role in determining erosion rates. Many of the most common export crops — on which the bulk of fertilizers used in the Third World are employed — are particularly ruinous to the soil.<sup>44</sup> Coffee plantations in Brazil have affected much of Brazil's soils to the point that they can hardly ever be restored to crop production.<sup>45</sup> Equally soil-depleting are tobacco and groundnuts.

FAO now seeks to extend the use of chemical fertilizers beyond the export economy. The long-term result is likely to be the progressive degradation of yet more land. Again, in the long term, it is a strategy that can only entail less food being available for the hungry.<sup>46</sup>

### **Mechanization**

Closely allied to FAO's plans to intensify off-farm inputs is its plan to increase the number of tractors in the Third World by four per cent per annum, bringing the world's total "tractor park" to 6.5 million by the year 2000.<sup>47</sup> However, it is by no means clear that mechanization can advantageously replace the bullock or the buffalo in traditional Third World agricultural systems. As Ranil Senanayake notes of Sri Lanka:

"The loss of the buffalo means the loss of nutrients to the farmer and his family, as the buffalo is a major source of milk and curd. It also means a loss of organic

fertilizer in the form of urine and dung. Further, it leads to the loss of job opportunities for the village youth who were employed as herdsmen."<sup>48</sup> (For a further discussion of the social implications of mechanization, see below, p.90).

On certain types of soil, compaction due to the use of tractors and other heavy machinery can reduce yields by up to 14 per cent. The many fragile soils of the tropics are especially prone to this problem. A greatly expanded use of tractors also has implications for farmers' self-sufficiency, making them reliant upon the supply of spare parts and fossil fuels.

### **SELF-SUFFICIENCY VS INTERNATIONAL TRADE**

Although FAO tells us that the "self-sufficiency objective remains at the centre of agricultural policies," this is difficult to reconcile with its commitment to world trade and hence to the export-orientated economy.<sup>49</sup> But for FAO, "national self-sufficiency" does not mean a country's ability to feed its population from its own resources, it merely means that a country is able to pay for its imports.<sup>50</sup> Hence *Toward 2000* can state that "the pursuit of improved self-sufficiency (in the deficit countries) as postulated in this study, is compatible with expanded trade in general, as well as among the developing countries."<sup>51</sup>

FAO admits that for "developing countries as a whole . . . the short term impact of trade balances would be negative, because of increased world prices they would have to pay for their imports."<sup>52</sup> Nevertheless, it insists that in the medium and long term "greater access to international markets would yield important benefits." In particular, it "would massively increase the market in sugar, vegetable oils, tobacco, pulses, tropical beverages, and forest products," in addition to the market in meat and dairy produce.

For this reason, *Toward 2000* is emphatic in its support for the proposals being put forward at the current Uruguay Round of the General Agreement on Tariffs and Trade (GATT). FAO is particularly impressed by a ministerial declaration that the negotiations "shall aim to achieve greater liberalization of trade in agriculture and bring all measures affecting imports, access and export competition under strengthened and more operationally effective GATT rules and disciplines."<sup>53</sup> This,

FAO insists, "points to the essence of what is required."

However, the current GATT proposals would be disastrous for small farmers, making it "GATT-illegal" to protect them from the dumping of cheap food imports (see 'Special GATT Issue', *The Ecologist*, Vol. 20, No. 6, 1990). If US proposals at the Uruguay Rounds are adopted, it would be illegal to restrict exports of food, even if a country's people are starving.

### **INCREASING INVESTMENT**

To attain the production levels it projects, *Toward 2000* estimates that "a cumulative gross total of nearly \$850 billion at prices of 1980 will need to be invested in primary agriculture and \$635 billion in supporting activities between 1982/84 and 2000."<sup>54</sup> These figures "do not include investments related to the industrial production and distribution of agricultural inputs (e.g. fertilizer plants)" nor investments in agricultural research or in forestry and fisheries.<sup>55</sup> The total investment required is thus likely to be well in excess of the projected \$1500 billion. FAO recognizes that this investment would require high rates of economic growth, something which is also promoted as a means of increasing "effective demand" — that is, the ability of people to pay for their food — which FAO sees as critical to combating hunger.

*Toward 2000* is rightly critical of past strategies for achieving economic growth in the Third World, arguing that the emphasis on industrialization as the engine of

---

*The rural poor of the  
Third World have  
increasing difficulty in  
financing their next  
meal, let alone a global  
agricultural  
programme.*

---

growth has been detrimental to agriculture. "Economic policies in most developing countries up to quite recently gave priority to industrialization as the core of development strategy, but without sufficient appreciation of the necessity for vigorous agricultural growth as an essential condition for industrialization to firmly take root. The consequences for agriculture were serious."<sup>56</sup>



*Rice terraces in Sri Lanka. The upkeep of elaborate systems of terraces requires substantial labour which is traditionally available because of community obligations. Mechanization leads to the deterioration of terraces not only because it undermines the community ties which regulate this labour, but also because tractors and other agricultural machinery cannot operate on the narrow fields. (Photo: Mark Edwards/Still Pictures)*

But can the required investment be achieved through increased production in the agricultural sector without jeopardizing food availability? The answer is emphatically "No". *Toward 2000* estimates, for example, that 16 per cent of the required investment — some \$240 billion — is required for irrigation. It is inconceivable that such a sum could be raised without the bulk of the newly-irrigated lands being used to grow high-value cash crops, primarily for export. In that respect, the future is likely to be no different from the past. Indeed, despite FAO's claim that "raising staple food production has been given higher priority [than export crops] in the 1970s and 1980s,"<sup>57</sup> much of the land already brought into irrigation has been given over to export crops. Even where the land has been specifically intended for peasant farmers, plantation agriculture has taken over — or the farmers have been persuaded to grow cash crops for local or foreign companies under contract.<sup>58</sup> Senegal's massive Manautali irrigation scheme, for example, was originally promoted as a "communal development programme": in fact, local farmers will re-

ceive less than 10 per cent of the 370,000 hectares of irrigated land — the rest going on large mechanized farms, including 30,000 hectares of rice plantations.<sup>59</sup>

The tendency for small farmers to be squeezed off their land — irrigated or otherwise — is likely to become still more pronounced if FAO persuades governments to adopt its proposal to raise a proportion (it does not give precise figures) of the necessary finance for its programme by taxing the agricultural community and by charging for veterinary services and irrigation water. The report argues:

"An agricultural-led development strategy implies that agriculture can become an important source of investment capital and government revenue. . . . A thriving agricultural community reaping the benefits of increasing productivity promoted in part from public expenditures on such activities as research, extension and transport, can and should sustain a tax load."<sup>60</sup>

In addition, *Toward 2000* urges "the mobilization of rural savings and their channeling to investment opportunities in rural areas."<sup>61</sup>

Here, FAO is clearly out of touch with reality. The rural poor of the Third World have increasing difficulty in financing their next meal, let alone a global agricultural programme. Further taxation, together with the removal of subsidies, can only exacerbate their plight. Nor, as FAO claims, is modernization likely to make them more affluent. On the contrary, it will increase indebtedness and further marginalize the vast mass of the rural poor. Indeed, in the North, farm bankruptcies and rural poverty are on the increase, with small family farms particularly badly hit. A major cause has been the massive borrowing by farmers in order to modernize their farms.

## INDUSTRIAL DEVELOPMENT

The truth is that if the projected \$1500 billion is to be raised, much of the investment will have to come through industrial development or through loans from multinational development banks, bilateral aid agencies and large commercial banks, further increasing the already crippling debt

of the Third World. In fact, *Toward 2000* recognizes that its projected irrigation schemes are unlikely to go ahead unless the dams that provide the water are also used to generate electricity for industry.<sup>62</sup>

Such industrial development, however, can only further reduce the availability of food to the hungry — thus defeating the overt aim of the irrigation projects. The most immediate consequence will be the diversion of land and water from agricultural to non-agricultural uses. The process has a momentum of its own, with one industrial project spawning further industrial and urban development. The result is that more and more land is taken out of production to build factories, motorways, administrative centres, power stations and the rest of the physical infrastructure of a modern industrial society.

Official figures frequently underplay the seriousness of such paving-over, not least because they indicate the *net* loss of land without giving any indication of its *quality*. Yet it is generally the best land that is lost to urbanization, while the land added to the agricultural inventory tends to be forest land or scrub-land that is usually of very much lower quality. In Egypt, for example, the 500,000 hectares of agricultural land lost to urbanization since the building of the high dam at Aswan is vastly superior to the 500,000 hectares of desert that has been opened up to irrigation as a result of the dam. Without vast inputs of fertilizer, which the country can ill afford,

---

*Where agriculture and industry are in competition for water, the water invariably goes to the urban and industrial sectors, since they are capable of paying the most for it.*

---

the "new" land can produce very little.

Industrial development also entails the diversion of water resources from agriculture to industry. In China, the demand for water in the cities has increased dramatically since the government embarked on its programme of industrial expansion. Beijing's water requirements are expected to increase by 50 per cent over the next 10 years, yet already, the water table around the capital is falling by 1.2 metres a year

and a third of local wells have dried up. Yet, Chinese planners are unconcerned: they have calculated that the water will provide 60 times more economic wealth when used by industry than when used in agriculture. Where agriculture and industry are in competition for water, the water invariably goes to the urban and industrial sectors, since they are capable of paying the most for it.<sup>63</sup>

## OMITTING EMISSIONS

The trade-off between economic growth and agricultural production is further exacerbated by pollution, leading to reduced crop yields, increased emissions of greenhouse gases and ozone depleting substances. Yet, in its 330 pages, *Toward 2000* devotes less than a page to discussing the threat posed by pollution to agricultural production:

- The threat to food production posed by increases in ultraviolet radiation due to stratospheric ozone depletion is acknowledged to be "of concern", but the report concludes: "Ozone depletion could decrease crop productivity but present evidence is inconclusive and *it is not known whether this phenomenon will have a negative impact in this century*".<sup>64</sup> The threat is thus apparently deemed irrelevant to the report's brief. The potential impact on fisheries is not even discussed, despite the evidence that increased levels of ultraviolet radiation could have a substantial effect on the productivity of plankton — the base of the marine food chain.<sup>65</sup>
- The discussion on atmospheric pollutants and their impact on crops is confined to a 14-line passage on acid rain. The impact of ground-level ozone pollution is ignored altogether, although this single pollutant probably reduces US crop yields by 5-10 per cent.<sup>66</sup> The impact of water pollution on agriculture is only discussed in passing — and then largely in the context of pollution by agricultural wastes. There is no discussion at all on the contamination of land by industrial wastes or by industrial accidents such as Chernobyl or Seveso.
- The impact of global warming, meanwhile, is given no more than six sentences. The report acknowledges that the impact of global warming on agriculture is potentially catastrophic, but it neither discusses remedial ac-

tion nor considers the implications of its proposed strategy on emissions of the gases which contribute to global warming.

## Global Warming: FAO's Blind Spot

As the UN agency with responsibility for world agriculture, FAO might reasonably have been expected to take a firm position

---

*Virtually all FAO's proposed measures to increase food production would increase emissions of greenhouse gases.*

---

on combating global warming. Yet, virtually all FAO's proposed measures to increase food production would increase emissions of greenhouse gases:

- According to FAO's own figures, total energy requirements in agriculture will increase by 30 per cent from 1982 to the year 2000.<sup>67</sup> Inevitably, much of this energy will come from fossil fuels, thus increasing emissions of carbon dioxide.
- The deforestation caused by the "transfer" of tropical forests to agricultural use will also increase emissions of carbon dioxide, the vegetation and soils of unmanaged forests holding 20 to 100 times more carbon per unit area than agricultural systems.<sup>68</sup> If, as is likely, much of this forest is cleared by burning, emissions of methane and nitrous oxide will also result. The ploughing up and burning of grasslands would also increase the release of carbon from soils.
- Although the sources for the increasing atmospheric concentration of nitrous oxide (N<sub>2</sub>O) — a greenhouse gas 270 times more powerful than carbon dioxide — have not been properly quantified, it is thought that a large proportion of the increase is due to fertilizer use, which of course FAO wants to expand still further.<sup>69</sup>
- Increasing numbers of ruminant livestock, especially cattle, will increase emissions of methane. The problem is likely to be exacerbated by the intensive production methods

advocated by FAO, which lead to much greater methane emissions.<sup>70</sup>

- Increased irrigation will also increase the production of methane. Again, intensive methods of production will add to the problem. Where rice paddies are fertilized with artificial fertilizers, emissions are up to four times higher than in non-fertilized rice paddies.<sup>71</sup>

## WHO WILL EAT?

Central to FAO's agriculture development policies has been the single-minded pursuit of increased production. Yet, as *Toward 2000* acknowledges, increased production does not necessarily translate into increased food availability for the poor. Indeed, the report provides ample evidence that, historically, the reverse has been the case:

"Household income/expenditure surveys in a number of countries . . . confirm that undernutrition is largely

concentrated among the landless, share croppers, small farm-holders and small-scale fishermen. Increases in domestic production of food may result in only limited improvement in food consumption of the poor, especially when production increases consist largely of items consumed mainly by middle- and high-income consumers and produced on large and medium-sized farms, especially those highly mechanized."<sup>72</sup>

*Toward 2000* blames the failure of increased output to reach the rural poor on "the institutional setting" in which agriculture takes place in the Third World. In particular, "very unequal distribution of assets and access to resources may result . . . in the benefits of growth in the agricultural sector as a whole bypassing small farmers and agricultural workers."<sup>73</sup> Few would argue with this, or with the statement that, "land redistribution and tenancy reforms are the most fundamental of direct anti-poverty measures in the rural sectors of developing countries."<sup>74</sup> What the re-

port singularly fails to address, however, is the role that the agricultural policies it seeks to promote have played — and continue to play — in creating the "institutional setting" for rural poverty.

The impact of agricultural intensification on farmers is illustrative of the problem:

- At the farm level, intensification removes control of agricultural inputs from individual farmers and places it in the hands of outside interests. Instead of planting seed saved from the previous crop, fertilizing the land with manure and compost from their own farm waste, or controlling pests and weeds through good husbandry, farmers must buy their inputs on the open market. Price hikes are common — in Senegal, for example, the cost of fertilizer rose some 60 per cent in the five years from 1975-1980;<sup>75</sup> in Korea, it rose 100 per cent in 1979 alone<sup>76</sup> — but the peasant has little choice but to pay up — or go under.

In Korea, often cited as an agricultural success story, the introduction of "miracle rice" in the early 1970s "left producers with escalating expenses and uncertain profit margins."<sup>77</sup> In just two years, from 1974 to 1976, pesticide use trebled, whilst fertilizer use doubled within a decade. Farm debt meanwhile rose 63 times between 1975 and 1985 — almost ten times the rate at which income and assets increased.<sup>78</sup>

Mechanization further exacerbates the problem, not least by increasing rural unemployment and underemployment. As Clarence Dias of the International Centre for Law in Development notes: "A World Bank study estimates that for each tractor purchased in Pakistan, between 7.5 and 11.8 full-time jobs are lost. After the purchase of a tractor the average farm size increased by 240 per cent within three years, mostly through the eviction of tenants. Employment per cultivated acre dropped by 40 per cent."<sup>79</sup> A World Bank report on Java warns that the introduction of large power tilling machines could eliminate more than a million jobs. The report quotes a Javanese worker: "The only people who like tractors are the ones who own them."<sup>80</sup>

The net impact is thus to marginalize farmers, divorcing them from their means of production and placing them at the mercy of market forces over which they have no control.

Available from Wadebridge Ecological Centre Books . . .

### **Green Warriors**

#### **THE PEOPLE AND THE POLITICS BEHIND THE ENVIRONMENTAL REVOLUTION**

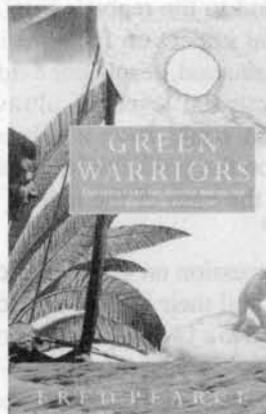
by Fred Pearce

Leading environmental journalist Fred Pearce probes the origins, philosophies and motivations of the campaigners whose activities increasingly dominate the political agenda.

He looks at the people behind the worldwide network of environmental groups: the lawyers and media professionals; the radical priests and their flocks fighting land barons in Amazonia; and the scientists who are driven to public platforms to explain their fears for the future of the planet.

Published by The Bodley Head, 1991, 331pp.

Price (hardback) £14.99/\$30 plus £2 (UK) or £2.50/\$5 (overseas surface) postage and packing.



### **World Rainforest Movement Publications . . .**

#### **The Battle for Sarawak's Forests**

A comprehensive collection of documents and articles examining the plight of the natives of Sarawak and their courageous fight to save their forests.

190pp. £6.50/\$14 plus £1.50 (UK) or £2/\$5 (overseas surface) postage and packing.

#### **Rainforest Destruction: Causes, Effects and False Solutions**

This 90 page book, written by Nicholas Hildyard, co-editor of *The Ecologist*, has been endorsed by the leading environmental groups involved in the defence of the forest and was submitted to the UN in September 1989 as part of the Save the Forests, Save the Planet campaign.

£3/\$6 plus £0.50 (UK) or £1/\$2 (overseas surface) postage and packing.

Send payment by cheque or postal order to:

WEC Books, Worthyvale Manor, Camelford, Cornwall, PL32 9TT, UK.

- At the community level, the impact is equally divisive. As individual farmers carry out more and more of the tasks in the production cycle by themselves without having to seek help from their wider family or their community, traditional systems of mutual support begin to atrophy.<sup>81</sup> Meanwhile, indebtedness, unemployment and widening differences in wealth further entrench existing inequalities and create new ones. As the poorest farmers go to the wall, their land holdings are bought up by richer farmers, leading to the concentration of land in fewer and fewer hands; money, rather than the fulfilment of communal obligations, becomes the currency of power and the poor begin to find themselves excluded from resources — water, land, forests — which were once open to all.
- At the national level, agricultural intensification has massively increased dependence on foreign imports. Within four years of the Green Revolution being launched in India, 20 per cent of the country's export earnings were being spent on fertilizer imports alone.<sup>82</sup> Oil imports have also risen, whilst the penetration of foreign multinationals into the agricultural sector has made many Third World countries little more than client states for agribusiness interests.<sup>83</sup> Mounting debts have brought IMF restructuring programmes, triggering off a further cycle of impoverishment as welfare programmes are cut and agricultural production is still further intensified to increase export income.

## Forced Intensification

In effect, by attempting to “transform agriculture into a dynamic productive sector”<sup>84</sup> by corralling peasants into the market and pushing for the “widespread diffusion of new technologies” to replace “backward agricultural technologies”<sup>85</sup>, FAO is promoting the systematic marginalization of rural people. In doing so, it is actively reinforcing the very “institutional setting” that deprives the poor of food, creating new power structures that are antithetical to the interests of farmers

It is no coincidence that the intensification of agriculture has met with resistance in many countries. In South Korea, for example, the “miracle” strains of rice met

with widespread opposition. “When official campaigns failed, local agricultural officials resorted to force to meet quotas. Rooting out rice fields planted to traditional rice was a common practice.”<sup>86</sup> In Senegal, Mohamed Gakou describes how, for a large rice project, the new farming methods “are applied under the supervision of supervisors. This supervision sometimes takes the form of draconian constraints. The least lack of respect for the new techniques being disseminated and the time-table for crops, leads to the peasant's expulsion from the project zone and the repossession of the plot.”<sup>87</sup>

In the context of such clear conflicts of interests between the needs of local people and the requirements of a “dynamic agricultural sector”, any programme of land redistribution is likely to be piecemeal and short-lived. FAO itself admits that the “history of land reform is . . . largely one of failures.”<sup>88</sup> Nor are the three “success” stories cited in *Toward 2000* — the Republic of Korea, Indonesian Transmigration and West Bengal — without critics. In Korea, the farmers have land — but intensification is crippling them with debt. In Indonesia, the Transmigration programme has deprived indigenous groups of land and destroyed vast areas of forest: many settlers have returned home to Java unable to earn a living from farming the outer islands of the archipelago. In West Bengal, “land reform and tenancy control laws were executed by a local bureaucracy largely indifferent, occasionally corrupt and biased in favour of the rural oligarchy . . . Quite frequently, protective tenancy legislation may have worsened the conditions of tenants.”<sup>89</sup>

The beneficiaries of agricultural intensification, meanwhile, have been local élites and the agribusiness interests of the North. For them, the programme outlined in *Toward 2000* represents a bonanza. It is no coincidence that FAO's Farm Mechanization Working Group includes Caterpillar Tractors, John Deere, Fiat, Massey Ferguson, Mitsui, British Petroleum and Shell.

## Food and Community First

In seeking to cast world hunger as an essentially technical problem — a lack of fertilizers, pesticides and modern know-how — *Toward 2000* sidesteps the root cause of the crisis in Third World agriculture. For the crisis stems not from “backward agricultural technologies” nor from

the “underproductiveness” of traditional farming practices, but rather from the growing separation between producers and the means of production and between producers and their produce.

Successive studies have highlighted the productivity and sustainability of traditional peasant farming in the Third World (see pp.93-106) — and indeed of organic methods in the North.<sup>90</sup> Yet, such studies are studiously ignored in *Toward 2000*. Similarly, the report downplays the inventiveness, dynamism and independence of local people. Instead, they are portrayed as in need of “educating”, of “training” and, above all, of being “managed”. But managed by whom? And in whose interests?

If the the poor are to be fed with justice, the way forward lies down a very different route. The need is for an agriculture that:

- Maximizes food availability rather than food production;
- Employs methods of farming that are not disruptive of the climate or of the environment;
- Keeps control of production within the hands of the farmer and the community;
- And maximizes co-operation between farmers, thus strengthening the community and providing support to farmers in times of hardship.

Such an agriculture exists and is widely practised throughout the Third World. The most urgent priority is thus to cease those policies that are *undermining* the viability of traditional peasant systems, and to create the wide economic and social change necessary to permit small farms to flourish. If that means a vastly reduced role for agencies such as FAO, then so be it. For there is little that a bloated and centralized bureaucracy in Rome can teach the peasants of Africa, India or South America in terms of agriculture: but, sadly, much that it can do to make their way of life unsupportable. In that respect, Leo Tolstoy's comment on the predicament of the peasant is as relevant today as when it was written over a century ago:

“I sit on a man's back, choking him and making him carry me, and yet assure myself and others that I am very sorry for him and wish to ease his lot by all possible means — except by getting off his back.”

It is a prescription that FAO, and the rest of the development industry, should heed.

1. Alexandratos, N., (ed.), *World Agriculture: Toward 2000, An FAO Study*, Belhaven Press by arrangement with FAO, London, 1988. This is a revised and updated version of *Agriculture: Toward 2000* which was submitted to the 1979 FAO Conference.
2. *Ibid.*, p.1.
3. *Ibid.*, p.3.
4. The report ascribes the "achievements" of the past 25 years to "the extension to all parts of the world of more productive farming systems" and, more generally, to the transformation of agriculture "into a dynamic productive sector, first in the developed market economies but increasingly in the developing countries also, where the use of biochemical technology in the 1960s was the watershed", (pp.6 and 3).
5. *Ibid.*, p.3.
6. Brown, L., 'The Illusion of Progress' in Lester R. Brown et al, *State of the World*, 1990, Norton, 1990, p.4.
7. Power, J., *International Herald Tribune*, 9th June 1987, quoted in *Environment Digest*, July 1987.
8. Alexandratos, op. cit. 1, p.28.
9. *Ibid.*
10. UNICEF, quoted in *Environment Digest*, July 1987.
11. Brown, op. cit. 6, p.8.
12. Kothari, S., 'Ecology vs. Development: The Struggle for Survival' in International Centre for Law in Development, *The International Context of Rural Poverty in the Third World*, Council on International and Public Affairs, New York, 1986, p.216.
13. Quoted in *Environment Digest*, July 1987.
14. *Ibid.*, pp.75 and 12.
15. *Ibid.*, p.120.
16. *Ibid.*, p.121.
17. *Ibid.*, pp.12 and 127.
18. *Ibid.*, pp.14-15.
19. Brown, L., 'The Changing World Food Prospect', *Worldwatch Paper* 85, Worldwatch Institute, Washington, DC, 1989.
20. FAO, *Protect and Produce: Soil Conservation for Development*, FAO, Rome, 1983. Quoted in Brown, op. cit. 6, p.60.
21. Secrett, C., 'The Environmental Impact of Transmigration', *The Ecologist*, Vol. 16, Nos. 2/3, 1986.
22. FAO puts the figure at 20 per cent. Lester Brown (op. cit. 6, p.60) estimates that "waterlogging and salinity are lowering the productivity of a fourth of the world's irrigated cropland." Unless irrigated land is well drained, the water table tends to rise, dissolving out natural salts in the soil and bringing them to the surface. In arid areas, the water then evaporates, leaving the ground encrusted with salt.
23. Postel, S., 'Water for Agriculture: Facing the Limits', *Worldwatch Paper*.93, Worldwatch Institute, Washington, DC, 1990.
24. Goldsmith, E. and Hildyard, N., *The Social and Environmental Effects of Large Dams*, Vol. 1, Wadebridge Ecological Centre, 1984.
25. *UNESCO Courier*, No. 4, 1980.
26. Alexandratos, op. cit. 1, p.257.
27. *Ibid.*, p.121.
28. *Ibid.*
29. *Ibid.*, p.132.
30. *Ibid.*, p.13.
31. Other aspects of the strategy proposed in *Toward 2000* will also exacerbate the problem. The clearing of tens of millions of hectares of tropical forests to provide more agricultural land will reduce soil moisture, drying up springs and streams and reducing the flow of rivers. In addition, deforestation will reduce evapotranspiration, one of the main sources of atmospheric moisture. By substituting plantation crops for food crops, FAO is also increasing water-
- consumption in agriculture, since the former are very much more water-intensive than the latter — commercial sugar-cane, for instance, requires about 10 times more water than wheat. In addition, hybrid strains of wheat and rice are very much more water-intensive than traditional varieties.
32. Goldsmith and Hildyard, op. cit. 24. Even where dams could be built to serve the water needs of one area, they would reduce water-availability downstream, both through the abstraction of water and through salt-water intrusion at the mouths of the rivers. In Bangladesh, salt-water has penetrated over 300 kilometres inland.
33. Alexandratos, op. cit. 1, p.132.
34. In 1988, South Korean farmers rioted in front of the National Assembly in protest at irrigation taxes which were seen as a major cause of increasing debt (Bello, W. and Rosenfeld, S., *Dragons in Distress: Asia's Miracle Economies in Crisis*, Institute for Food and Development Policy, San Francisco, 1990, p.86.
35. Sudan's Gezira scheme, where water is allocated according to what Carl Widstrand has called the "average" principle, illustrates the point: "The 'average' farmer gets an 'average' amount of water for an 'average' crop over the year. Everybody gets water over the year, but not necessarily at the precise or necessary moments. This concept is closely related to the idea of 'normal rainfall' and other peculiarities in the 'Folklore of the Normal' that simplifies administrative thought." (Goldsmith and Hildyard, op. cit. 24) The contrast with the management of traditional systems of irrigation (see Larry Lohmann, *this issue*), where water is allocated after prolonged discussion within the local community, could not be more pronounced.
36. Alexandratos, op. cit. 1, p.128.
37. *Ibid.*, pp.121 and 128.
38. In traditional bush-fallow systems, it is common to find small plots in which a wide variety of plants are intercropped, creating a multilayered garden which protects the soil from erosion and from direct sunlight.
39. Goldsmith and Hildyard, op. cit. 24.
40. Alexandratos, op. cit. 1, p.258.
41. Repetto, R., *Skimming the Water: Rent-Seeking and the Performance of Public Irrigation Systems*, World Resources Institute, Washington, DC, 1986.
42. Alexandratos, op. cit. 1, p.136.
43. Brown, L., 'Soil Erosion: Quiet Crisis in the World Economy', *Worldwatch Paper* 60, Worldwatch Institute, Washington, DC, 1984, p.24. In West Africa a loss of 3.9 inches of top-soil reduced corn yields by 52 per cent and the yield of cowpeas by 38 per cent. See also Dhua, S.P., 'Need for Organo-Mineral Fertilizer in Tropical Agriculture', *The Ecologist*, Vol. 5, No. 5, 1975.
44. Alexandratos, op. cit. 1, p.136.
45. Goldsmith and Hildyard, op. cit. 24.
46. Other environmental problems will be exacerbated by the proposed increase in fertilizer use, with adverse impacts on food supplies. Nitrate fertilizers change the physiology of the crops grown, elongating cells, thinning cell walls, lowering osmotic pressure and reducing the plant's sugar content. Fertilized plants are in fact sick plants and are thus more vulnerable to pests. The use of pesticides is therefore likely to increase, with attendant costs to the environment. Pesticide run-off has already caused fish kills in many Third World rivers whilst the increased use of fertilizers has led to the eutrophication of rivers and waterways, making them unsuitable for fish life. The result has been a reduction in the availability of fish, which plays an important part in the diet of people in many Third World areas.
47. A 1981 draft of *Toward 2000* proposed an 8 per cent increase in the number of tractors.
48. Senanayake, R., 'The Ecological, Energetic and Agronomic System of Ancient and Modern Sri Lanka', *The Ecologist*, Vol. 13, No. 4, 1983.
49. Alexandratos, op. cit. 1, p.12.
50. What other people refer to as self-sufficiency is referred to by FAO as "food Autarky" — something which they do not recommend at all. The reason given is that it is "too costly" — an unexpected criticism from an organization that is trying to persuade the Third World to invest \$1,500 billion on the expansion of agricultural policies that have already impoverished it.
51. Alexandratos, op. cit. 1, p.94.
52. *Ibid.*, p.15.
53. *Ibid.*
54. *Ibid.*, p.152.
55. *Ibid.*
56. *Ibid.*, p.41.
57. *Ibid.*, p.138.
58. Dias, C. 'Reaping the Whirlwind: Some Third World Perspectives on the Green Revolution and the 'Seed Revolution'', in International Centre for Law in Development, op. cit. 12, p.47.
59. Goldsmith and Hildyard, op. cit. 24.
60. Alexandratos, op. cit. 1, p.218.
61. *Ibid.*
62. *Ibid.*, p.152.
63. In Arizona and other areas of the USA, where water is becoming increasingly scarce, industrialists are "water-ranching" — buying up farms in order to have access to their water supplies, the farms then being taken out of production.
64. Alexandratos, op. cit. 1, p.251.
65. Häder, D.-P., Worrest, R.C. and Kumar, H.D., 'Aquatic Ecosystems', in *Environmental Effects Panel Report*, UNEP, Nairobi, 1989.
66. MacKenzie, J.J. and El-Ashry, M.T., *Ill Winds: Air Pollution's Toll on Trees and Crops*, World Resources Institute, Washington, DC, 1988, p.31.
67. Alexandratos, op. cit. 1, p.145.
68. Watson, R.T. et al., 'Greenhouse Gases and Aerosols', in Houghton et al. (ed.), *Climate Change: The IPCC Scientific Assessment*, Cambridge University Press, 1990.
69. *Ibid.*
70. Gibbs, J.G., et al., *Reducing Methane Emissions from Livestock: Opportunities and Issues*, EPA, Washington, DC, 1989.
71. Cicerone, R.J. and Schetter, J.D., 'Sources of Atmospheric Methane: Measurements in Rice Paddies and a Discussion', *J. Geophys. Res.* 86, 1981.
72. Alexandratos, op. cit. 1, p.223.
73. Alexandratos, op. cit. 1, p.225.
74. Alexandratos, op. cit. 1, p.227.
75. Gakou, M.L., *The Crisis in African Agriculture*, Zed/United Nations University, London, 1987, p.55.
76. Bello and Rosenfeld, op. cit. 34, p.83.
77. *Ibid.*, p.83.
78. *Ibid.*, p.86.
79. Dias, op. cit. 58.
80. Whittemore, C., *Land for People: Land Tenure and the Very Poor*, Oxfam Public Affairs Unit, Oxford, 1981.
81. Dias, op. cit. 58, p.51.
82. *Ibid.*, p.87.
83. See, for example, essays by Dias, C. and Espiritu, C., in International Centre for Law in Development, op. cit. 12.
84. Alexandratos, op. cit. 1, p.3.
85. Alexandratos, op. cit. 1, p.227.
86. Bello and Rosenfeld, op. cit. 34, p.83. The majority of South Korean farmers have now turned their backs on high-yielding varieties. "In 1979 land devoted to traditional rice accounted for less than one third of total paddy land; by 1985, it had gone up to nearly three-quarters."
87. Gakou, M.L., op. cit. 75, pp.49-50.
88. Alexandratos, op. cit. 1, p.228.
89. El-Ghomemy, M.R., *The Political Economy of Rural Poverty: The Case for Land Reform*, Routledge, London, 1990, p.273.
90. See, in particular, National Academy of Sciences, *Alternative Agriculture*, Washington, DC, 1989.

# Traditional Farming in Latin America

by  
Miguel A. Altieri

*Agricultural development in Latin America, as elsewhere, has concentrated on the transfer of high-input technology from the North. Local traditional farming techniques are assumed to be "primitive" and incapable of boosting productivity. But modern farming methods are totally inappropriate to environmental and social conditions in the tropics. It is now increasingly recognized that traditional techniques can produce high yields of varied crops, while maintaining soil fertility and reducing farmers' reliance on expensive chemical inputs and unstable markets.*

Traditional agricultural systems are the product of centuries of accumulated experience. By mimicking natural ecological processes, farmers have evolved complex "agroecosystems", the sustainability of which has stood the test of time.<sup>1</sup> Moreover, unlike modern monocultures, traditional agroecosystems reflect the priorities of peasant farmers; they produce a varied diet, achieve a diversity of sources of income, use locally available resources, minimize the risk to farmers from crop losses, protect against the incidence of pests and disease and make efficient use of available labour. Such multiple cropping methods are estimated to provide as much as 15-20 per cent of the world's food supply.<sup>2</sup> Throughout Latin America, farmers grow from 70-90 per cent of their beans with maize, potatoes and other crops. Maize is intercropped on 60 per cent of the region's maize-growing area.

The development of agroecosystems has not been a random process: on the contrary, intercropping (the growing of two or more crops on the same land at the same time), agroforestry (intercropping systems which include trees), shifting cultivation and other traditional farming methods are all based on a thorough understanding of the elements and the interactions between vegetation and soils, animals and climate. Indeed, the ethnobotanical knowledge of many traditional farmers is prodigious: the Tzeltals Mayans of Mexico, for example, can recognize more than 1200 species of plants, whilst the P'urepechas recognize more than 900 species and the Yucatan's Mayans some 500. Such knowledge enables peasants to assign specific crops to the areas where they will grow best.

Although traditional agroecosystems vary as a result of different historical and geographical circumstances, they share the following structural and functional features:<sup>3</sup>

- They contain high numbers of species;
- They exploit the full range of micro-environments differing in characteristics such as soil, water, temperature, altitude, slope or fertility, whether within a single field or a region;

- They maintain the cycles of materials and wastes through effective recycling practices;
- They rely on complex biological interdependencies resulting in some degree of biological pest suppression;
- They rely on local resources plus human and animal energy which utilize low levels of input technology;
- They rely on local varieties of crops and the use of wild plants and animals. Production is usually for local consumption.

## Diversity: The Key to Traditional Agriculture

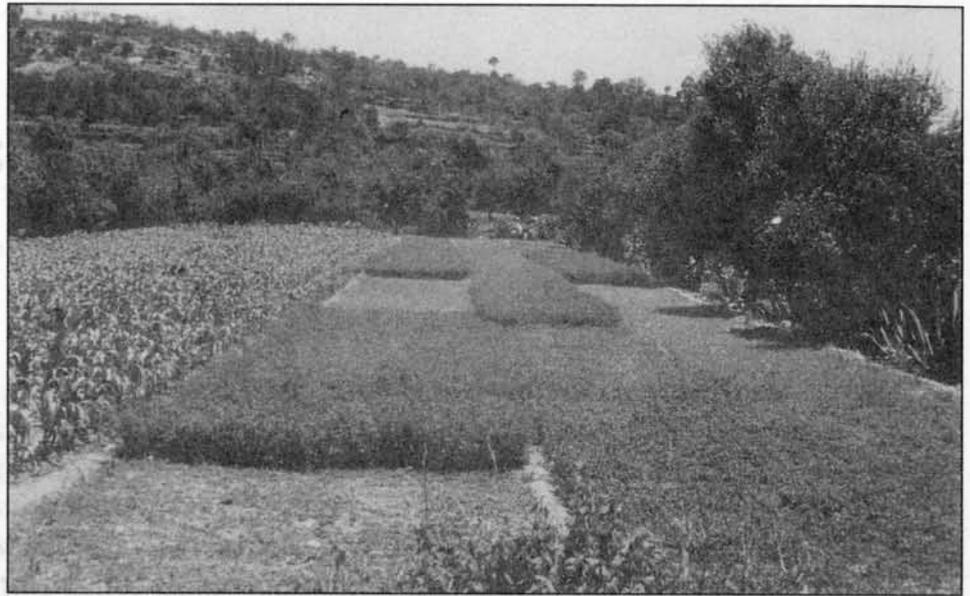
One of the most important features of traditional farming systems is the great diversity of plants used.<sup>4,5</sup> Throughout the tropics, traditional agroforestry systems commonly contain well over 100 annual and perennial plant species per field. It is not only food crops that are grown; the plants and trees also provide construction materials, tools, medicine and fodder.

Traditional agroecosystems are also genetically diverse, containing numerous varieties of domesticated crop species as well as their wild relatives. In the Andes, farmers cultivate as many as 50 potato varieties in their fields. Maintaining genetic diversity appears to be of even greater importance as land becomes more marginal, and hence farming more risky. In Peru, for example, the number of potato varieties cultivated increases with the altitude of the land farmed. Genetic diversity confers at least partial resistance to diseases that are specific to particular strains of crops and allows farmers to exploit different micro-climates for a variety of nutritional and other uses.

Diversity is not only maintained within the area cultivated. Many peasants maintain uncultivated areas (such as forests, lakes, grasslands, streams and swamps) in or adjacent to their fields, thus providing valuable products including food, construction materials, medicines, organic fertilizers, fuels and religious items. In humid, tropical conditions, collecting resources from primary and secondary forests is very intensive. In the Uxpanapa region of Veracruz, Mexico, peasants utilize about 435 wild plant and animal species, of which 229 are eaten.<sup>6</sup> In many semi-arid areas, gathering enables peasant and tribal groups to maintain their nutritional standards even when drought strikes.

Miguel A. Altieri is an Associate Professor at the Division of Biological Control, University of California at Berkeley, 1050 San Pablo, Albany, CA 94706, USA. He is also Research Coordinator of the Latin American Consortium on Agroecology and Development (CLADES) based in Santiago, Chile.

A traditional small farm system in Tlaxcala, Mexico. Maize and alfalfa are grown in strips and are surrounded by borders of Maguey and Capulin trees. A number of wild plants grow both within and around the crop area. (Photo: M.A. Altieri)



## Diversity and Nutrient Cycling

In traditional agroecosystems, soil fertility is maintained through a number of strategies. The most common way of replacing lost nutrients is by manuring the ground with animal dung or composted vegetation derived from crop residues, household wastes and leaves and other plant materials collected from nearby forests.

Farmers also take advantage of the ability of cropping systems to reuse their own stored nutrients. The tendency of some crops to deplete the soil is counteracted by interplanting other crops that enrich the soil with organic matter. Soil nitrogen, for example, can be increased by incorporating legumes in the crop mixture, and phosphorus assimilation can be enhanced by growing crops with mycorrhizal associations (fungi in a symbiotic relationship with plant roots which enable the latter to take up nutrients more effectively).<sup>7</sup>

A further strategy for maintaining fertility is to interplant shallow-rooted cereals, such as maize and sorghum, with deeper-rooted plants, such as cowpeas and rye grass. Because the plants exploit nutrients at different levels in the soil, the risk of exhausting the land is minimized. Root systems with large surface areas and an even distribution in the soil profile are especially desirable on the many tropical soils where soil-nutrient storage is low and leaching rates are high. Deep-rooted plants can act as "nutrient pumps", bringing up minerals from deep soil layers to counteract leaching.

Interplanting also promotes the conservation of water and nutrients. It reaches its most sophisticated form in agroforestry systems, the trees not only providing organic matter to enrich the soil but also shade for plants growing below. In addition, their canopy protects the soil from the erosive impact of rain. Successful traditional agroforestry systems in Latin America include those of the Amazonian Kayapó and Bora Indians (see Darrel Posey, 'Alternatives to Forest Destruction: Lessons from the Mëbêngôkre Indians', *The Ecologist*, Vol. 19, No. 6, 1989) and the gardens of the Huastec Indians in Mexico.<sup>8</sup>

## Diversity and Insect Pest Management

The complex structure of traditional agroecosystems minimizes crop loss to insect pests through a variety of biological mechanisms. The intercropping of diverse plant species helps provide habitats for the natural enemies of insect pests as well as alternative host plants for pests.<sup>9</sup> One crop may be planted as a diversionary host, protecting other more susceptible or more economically valuable crops from serious damage. Subsistence farmers can

therefore regulate pests without recourse to expensive and dangerous chemical insecticides.

The great diversity of crops grown simultaneously in polycultures helps prevent the build-up of pests on the comparatively isolated plants of each species. Where shifting cultivation is practised, the clearing of small plots from secondary forest vegetation also permits the easy migration of natural pest predators from the surrounding forest. Traditional farmers also know the potential value of weeds in controlling pests, chiefly by providing a habitat for beneficial insects. For example, in Colombia, grassweeds (*Elseusina indica* and *Leptochloa filiformis*) are grown around small bean fields to repel *Empoasca kraemeri* leafhoppers, a serious bean pest. In Tlaxcala, Mexico, farmers encourage the growth of *Lupinus* plants within their corn fields, as they attract the scarab beetle *Macrodactylus* away from the corn plants.

The use of the chemical properties of plants to suppress pests is widespread among small farmers. In Ecuador, peasants place castor leaves in recently planted corn fields to reduce populations of a nocturnal tenebrionid beetle. Although the beetle prefers eating castor leaves to corn, the leaves paralyze it. Unable to seek shade in the soil, the beetle dies through direct exposure to the sun. In southern Chile, peasants place branches of the shrub *Cestrum parqui* in potato fields to repel *Epicauta pilme* beetles. Herbal concoctions are also used in many systems to suppress pests.

## Diversity, Plant Disease and Nematodes

Increasing the species and/or genetic diversity of cropping systems so that several sources of resistance are used simultaneously is a key strategy to minimize losses from plant diseases and nematodes (types of roundworm which are among the most widespread and damaging of agricultural pests). Mixing different crop species or varieties can delay the onset of diseases, reduce the spread of disease-carrying spores and modify environmental conditions — such as humidity, light, temperature and air movement — so that they are less favourable to the spread of certain diseases.<sup>10</sup>

In Central America, the fungus *Ascochyta phaseolorum* is less prevalent in cowpea interplanted with maize than when cowpeas are grown alone. The total number of diseased plants, as well as the speed of dissemination of the pathogen, is apparently reduced because the maize plants act as a natural barrier to the free spread

of the fungus propagules. Studies have also shown that the number of plants infected with cowpea mosaic virus (CPMV) and chlorotic cowpea mosaic virus (CCMV) is lower when cowpea is intercropped with maize than when it is grown in monocultures, apparently because the mixed stands contain fewer chrysomelid beetles, which act as a vector for the diseases.

The planting of decoy and trap crops can significantly affect nematode populations. Decoy crops are non-host crops which control nematodes by activating their larvae in the absence of plant hosts. The larvae are thus unable to develop. Trap crops are sown to attract nematodes but are harvested or destroyed before the nematodes manage to hatch. In pineapple plantations, tomatoes used as trap crops are destroyed before root-knot nematodes can produce eggs.<sup>11</sup>

There is also evidence that some plants are toxic to nematodes. Several varieties of the marigold species *Tagetes erecta* and *T. patula* reduce the populations of root-infecting nematodes such as *Pratylenchus*, *Tylenchorchynchus* and *Rotylenchus*. The effect of marigolds on *Pratylenchus* eelworms appears to be due to the alpha-terthienyl which is exuded by the marigold roots. These two marigold species reduce *Pratylenchus coffeae* and *Meloidogyne javanica* populations in soils of tea plantations more quickly and more effectively than keeping the soil fallow.

## Diversity and Weed Control

Many intercropping systems prevent competition from weeds, chiefly because the large leaf areas of their complex canopies prevent sufficient sunlight from reaching sensitive weed species. In general, the extent to which weeds present a problem depends on the type of crops and the proportion of the different species grown, their density, where they are planted, the fertility of the soil and management practices.<sup>12</sup>

Weed suppression can be enhanced in intercrops by adding crop species that inhibit weed generation or growth. Crops such as rye, barley, wheat, tobacco and oats release toxic substances into the environment, either through their roots or from decaying plant material. Such toxins inhibit the germination and growth of some weed species such as wild mustard, *Brassica* species and poppy.

## Diversity, Productivity and Sustainability

Polycultures frequently produce higher yields than monocultures. In Mexico, 1.73 hectares of land have to be planted with maize to produce as much food as one hectare planted with a mixture of maize, squash and beans. In addition, a maize-bean polyculture can produce up to four tonnes per hectare of dry matter for ploughing into the soil, compared with two to three tonnes in a maize monoculture. Another advantage of these systems is that they minimize the risks associated with farming; when one crop is lost, the others usually produce an acceptable yield.

Although external inputs such as pesticides, fertilizers and irrigation water can increase the productivity of peasant agriculture, such inputs can only be maintained at a high financial and environmental cost. Moreover, they depend on the uninterrupted availability of commercial inputs — something which is simply not viable given the current level of impoverishment in rural Latin America. Conversely, an agricultural strategy based on traditional cropping systems can bring moderate to high levels of productivity using only local resources. Given favourable political and

ecological conditions, such systems are sustainable at a much lower cost and for a longer period of time.<sup>13</sup>

A number of non-governmental organizations, organized under the umbrella of the Latin American Consortium on Agroecology and Development (CLADES), are promoting agroecological techniques in a way which is sensitive to the complexities of local farming methods. Along with the goal of increased production, the importance of sustainability, food security, biological stability, resource conservation and equity are also recognized. The NGOs are attempting to build upon traditional farming knowledge, combining it with elements of modern agricultural science.

---

*An agricultural strategy based on traditional cropping systems can bring moderate to high levels of productivity using only local resources. Given favourable political and ecological conditions, such systems are sustainable at a low cost for a long period of time.*

---

In practical terms, the application of agroecological principles has translated into programmes that emphasize:

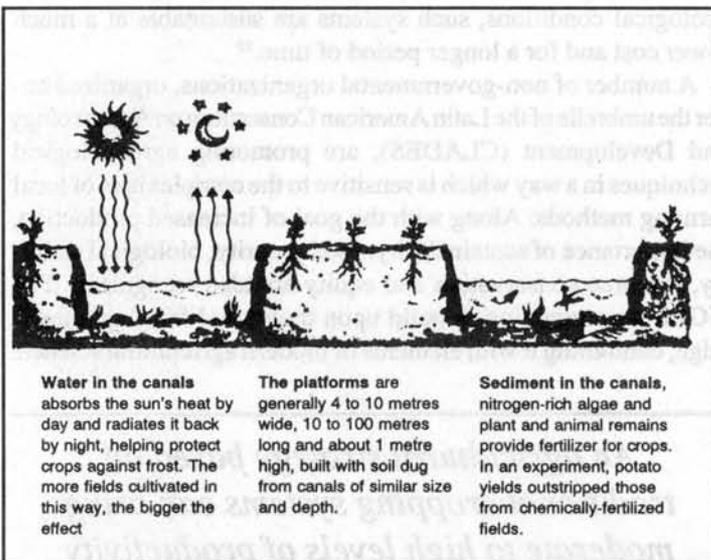
- Improving the production of basic foods, including the traditional food crops (*Amaranthus*, quinoa, lupine, etc.) and the conservation of native crop germplasm;
- Recovering and re-evaluating peasants' knowledge and technologies;
- Promoting the efficient use of local resources (land, labour, minor agricultural products, etc);
- Increasing crop and animal diversity to minimize risks;
- Improving the natural resource base through water and soil conservation and regeneration practices;
- Reducing the use of external chemical inputs, testing and implementing organic farming and other low-input techniques.

## Using Diversity to Conserve Soils

Perhaps the major agricultural challenge in Latin America is that of designing cropping systems in hilly areas in order to maintain yields while reducing erosion. Several NGOs have taken on this challenge. One of these is Loma Linda in Honduras, which has developed a simple no-till system for crop production on steep slopes.

Initially weeds in a fallow area are cut with a machete or another appropriate tool, without soil being removed. Using a hoe or a small plough, small furrows are opened following the contour every 50-60 cms. Crop seeds and compost and/or chicken manure are placed in the furrow and covered with soil. As the crop grows, weeds are kept mowed to avoid excessive competition, with the weed biomass left within the crop row as a mulch for cover and as an input of organic matter. Excellent yields can be obtained without the use of chemical fertilizers, and more importantly, without experiencing significant soil loss.

In a similar project in Guinope, Honduras, the private volun-



**Figure 1:** The ingenious system of raised bed agriculture practised by the Incas is now being rescued with very encouraging results. These waru-warus enable high-yields to be produced in the harsh conditions of the Peruvian altiplano without modern tools or fertilizers.

tary organization World Neighbours, began an agricultural development programme to control erosion and restore land fertility. The programme introduced soil conservation practices such as drainage and contour ditches, grass barriers and rock walls, and taught organic fertilization methods such as using chicken manure and intercropping leguminous plants. In the first year, yields tripled or quadrupled from 400 kilograms per hectare to 1,200-1,600 kilograms. In the next five years, 40 other villages requested training in the soil conservation practices.

## Recreating Incan Agriculture

Near Puno, Peru, the Centro de Investigacion, Educacion y Desarrollo (CIED), in collaboration with other institutions, is rescuing an ingenious system of raised fields that evolved on the high plains of the Peruvian Andes about 3,000 years ago. These "waru-warus", which consisted of platforms of soil surrounded by ditches filled with water, were able to produce bumper crops in the face of floods, droughts and the killing frosts common at altitudes of almost 4000 metres. Around Lake Titicaca, remnants of over 80,000 hectares of them can still be found.

CIED technicians have assisted local farmers in reconstructing some 10 hectares of the ancient farms, with encouraging results.<sup>14</sup> They have found, for instance, that yields of potatoes from waru-warus can outstrip those from chemically-fertilized fields. Recent measurements indicate yields from waru-warus of 10 tonnes per hectare compared with an average in the Puno region of 1-4 tonnes per hectare. The combination of raised beds and canals has proved to have remarkably sophisticated environmental effects (see Figure 1). During droughts, moisture from the canals slowly ascends to the roots by capillary action, and during floods, the furrows drain away excess runoff. Waru-warus also reduce the impact of extremes of temperature. Water in the canals absorbs the sun's heat by day and radiates it back by night, thereby helping protect crops against frost. On the raised beds, night-time temperatures can be several degrees higher than in the surrounding region. The system also maintains its own soil fertility. In the canals, silt, sediment,

algae and plant and animal remains decay into a nutrient-rich muck which can be dug out seasonally and added to the raised beds.

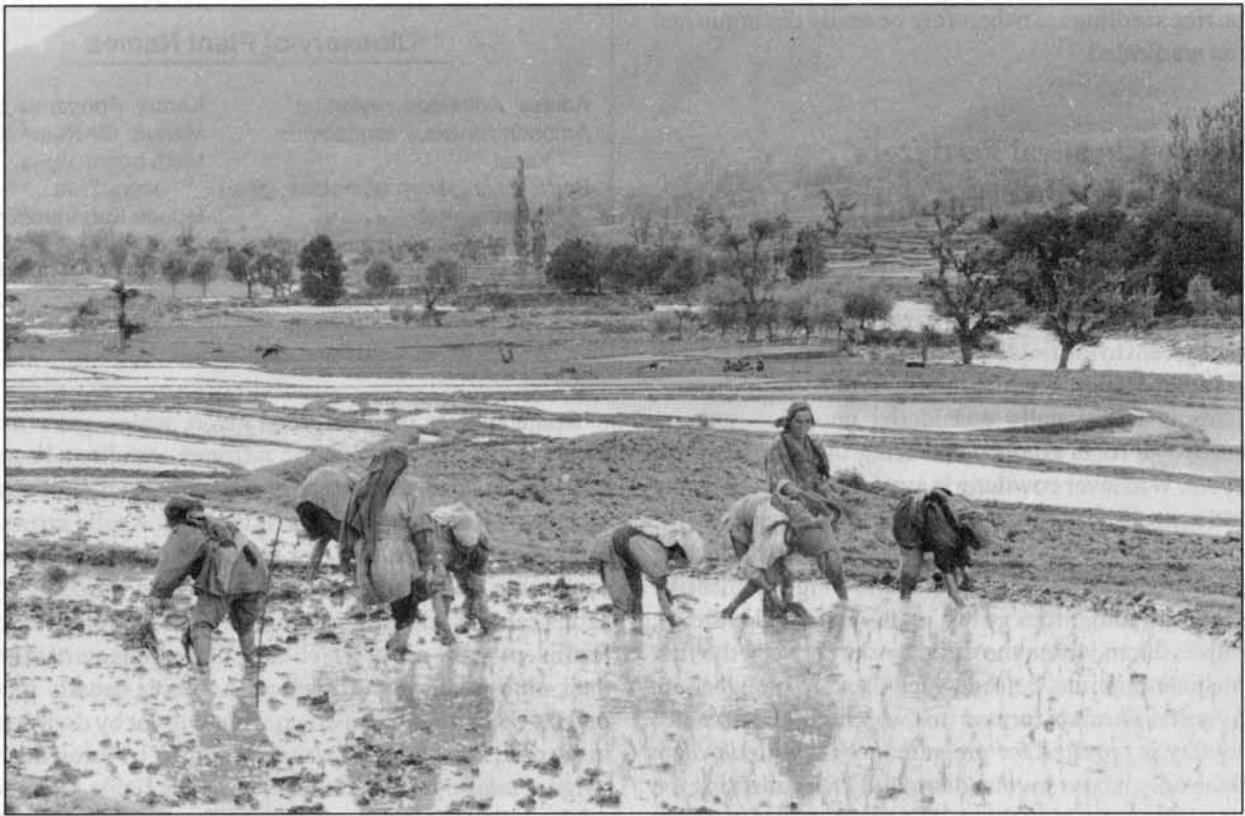
This ancient technology is proving so productive and inexpensive that it is actively being promoted throughout the Altiplano, in preference to modern agriculture. It requires no modern tools or fertilizers; the main expense is for labour to dig canals and build up the platforms.

## Conclusion

Peasant farmers do not seek to maximize yields through the use of external inputs but rather to achieve long-term stability through diversity. In this regard, traditional farming systems exemplify efficiency and the careful management of soil, water, nutrients and biological resources. Strengthening such systems — through village-based initiatives that actively involve local peasants — is the key to successful grassroots rural development programmes. Indeed, it is clear that the preservation of traditional agroecosystems cannot be achieved in isolation from the traditional scientific knowledge, culture and social organization of the local people. Cultural diversity is as crucial as biological diversity in agricultural development.

## References

1. Wilken, G.C., 'Integrated Forest and Small-Scale Farm Systems in Middle America', *Agroecosystems* 3, 1977, pp.291-302.
2. Harwood, R.R., *Small Farm Development: Understanding and Improving Farming Systems in the Humid Tropics*, Westview Press, Boulder, Colorado, 1979.
3. Ruthenberg, H., *Farming Systems in the Tropics*, Oxford University Press, London, 1971.
4. Chang, J.H., 'Tropical Agriculture: Crop Diversity and Crop Yields', *Econ. Geog.* 53, 1977, pp.241-254.
5. Clawson, D.L., 'Harvest Security and Intraspecific Diversity in Traditional Tropical Agriculture', *Economic Botany* 39, 1985, pp.56-67.
6. Toledo, V.M., Carabias, M.J., Mapes, C. and Toledo, C., *Ecologia y Autosuficiencia Alimentaria, Siglo Veintiuno*, Mexico, 1985. Although such gathering is normally associated with conditions of poverty, recent evidence suggests that it is closely associated with the persistence of strong cultural traditions. Gathering is especially prominent among shifting cultivators who collect wild plant food as they walk between their widely spaced fields. Wild plants are also important to the peasant subsistence economy during times of low agricultural production due to natural calamities or other circumstances.
7. Gliessman, S.R., Garcia, E.R. and Amador, A.M., 'The Ecological Basis for the Application of Traditional Agricultural Technology in the Management of Tropical Agro-Ecosystems', *Agroecosystems* 7, 1981, pp.173-185.
8. Alcorn, J.B., 'Development Policy, Forests and Peasant Farming: Reflections on Huastec-Managed Forests' Contributions to Commercial Production and Resource Conservation', *Economic Botany* 38, 1984, pp.384-406.
9. Altieri, M.A. and Letourneau, D.K., 'Vegetation Management and Biological Control in Agroecosystems', *Crop Protection* 1, 1982, pp.405-430.
10. Palti, J., *Cultural Practices and Infectious Crop Diseases*, Springer-Verlag, New York, 1981.
11. Ibid.
12. Bantilan, R.T. et al., 'Integrated Weed Management: Key Factor Effecting Crop-Weed Balance', *Philippine Weed Science Bull.* 1, 1974, pp.14-36.
13. Altieri, M.A. and Anderson, M.K., 'An Ecological Basis for the Development of Alternative Agricultural Systems for Small Farmers in the Third World', *American Journal of Alternative Agriculture* 1, 1986, pp.30-38.
14. Sanchez, J.B., *Conservacion de Recursos Naturales, Produccion de Alimentos y Organizacion Campesina*, CIED, Lima, Peru, 1989.



*Planting out rice seedlings in India. Traditional rice paddies form part of ecosystems containing algae, insects, fish, frogs, crabs, birds and plants. The resulting natural pest control and fertilizing mechanisms are fully exploited by farmers. The addition of agrochemicals or modern machinery can fatally disrupt these complex systems. (Photo: Mark Edwards/Still Pictures)*

# Traditional Rice Growing in India

by  
Winin Pereira

*Throughout the Indian sub-continent a multitude of local rice growing methods have survived the onslaught of colonialism and modernization, many of them still doubtless "unknown" except to those who use them. Those which have been recorded have several features in common: most notably, they aim to maximize food security rather than food production, and they maintain the fertility of the soil using renewable, local resources.*

Rice was first domesticated about 10,000 years ago south of the Himalayas. Over the centuries, tens of thousands of varieties and growing practices have developed, each suited to a particular ecological niche.

In the Konkan region around Bombay, rice farmers overcome the problem caused by the very short local monsoon by sowing paddy in small seed beds which can be carefully tended. Dung and vegetable matter from "waste" lands and forests provide manures which are collected for months before the paddy season and then spread on the surface of the seedling field, covered with a thin layer of soil and burned slowly, just before the monsoon starts, in a process called *rab*. Although in burning all the nitrogen in the

organic matter is lost, *rab* is a quick method of providing other nutrients, in particular potash, which is usually the limiting nutrient. Paddy varieties which would normally take a long time to mature thus get a vigorous start, compensating for the short monsoon period. Allowing organic matter to decay naturally would be too slow to help the seedlings and composting is made difficult due to the scarcity of water. The burning also helps to kill weeds and harmful organisms.

With the first rains, the farmer prepares the main fields, the soil of which is too hard to be ploughed when dry. This ploughing incorporates into the soil all the weeds that grew in the dry season. Just before the seedlings are transplanted, the weeds that come up with the rains are also ploughed into the soil. Flooding the rice fields at certain times also helps to control the weeds.

In Tamil Nadu, where farmers are troubled with grasses that look like rice, a purple-leaved rice variety is sown every five years, although its yield is much lower than that of the normal

*Winin Pereira is an ex-nuclear physicist. Twenty-five years ago he started a co-operative farm in a tribal area north of Bombay. He is co-author with Jeremy Seabrook of *Asking the Earth: Farms, Forestry and Survival in India* (Earthscan/WWF, London, 1990).*

varieties. The rice seedlings can therefore be easily distinguished and the weeds eradicated.

## Alternatives to Chemical Fertilizers

Traditional varieties and even some modern high-yielding varieties can obtain sufficient nutrients with organic manures, crop rotation and the natural nitrogen-fixers in paddy fields. The growth of leguminous weeds between harvests is encouraged by leaving areas adjacent to the fields to run wild. This provides seeds without any labour. *Mundi*, a non-leguminous dry season "weed" in paddy fields is traditionally considered good for manure, probably because its roots go deep and bring up nutrients from lower soil layers. Whatever cowdung is available is spread on the fields and cattle are allowed to graze on the herbs and grasses that come up with the first rains, converting them into nutrients in their dung and urine. Green manure crops of fast-growing legumes like *tag* and *dhedhar* are sometimes grown on the main paddy fields. These grow up to 20cm within the three weeks between the first rains and transplanting time, before which they are ploughed in. When thickly sown, *dhedhar* forms a mat which smothers weeds.

No cash outlay is required for green manuring with *dhedhar* and *tag*, and the only labour involved is mainly for collecting the seeds and for a little extra ploughing. The green matter in paddy fields helps in other ways. The carbon dioxide produced as it decays is used by the layer of blue-green algae on the soil surface. The algae, in turn, release oxygen which is taken up by the roots of the rice plants. The manure also improves the texture of the soil and helps it retain moisture during periods of drought.

## Glossary of Plant Names

Adulsa: <i>Adhatoda zeylanica</i>	Karanj: <i>Pongamia pinnata</i>
Ambadi: <i>Hibiscus cannabinus</i> , kenaf	Mahua: <i>Madhuca indica</i>
Bajra: <i>Pennisetum typhoides</i> , pearl millet	Math bean: <i>Vigna aconitifolia</i>
Bhilangani: <i>Polygonum glabrum</i>	Mundi: <i>Spheranthus indicus</i>
Chaoli: <i>Vigna unguiculata</i> , cowpea	Rui: <i>Calotropis gigantea</i>
Dhedhar: <i>Sesbania bispinosa</i>	Tag: <i>Crotalaria juncea</i> , sann hemp
Kachoo: <i>Colocasia esculenta</i>	

Some species of blue-green algae, which grow naturally in paddy fields, fix atmospheric nitrogen. Azolla, a beautiful, tiny fern that floats on the surface of stagnant water, grows in symbiosis with anabaena, a nitrogen-fixing alga. Azolla grows very fast, producing up to one tonne of green biomass per hectare per day, containing up to three kilograms of fixed nitrogen. The use of azolla can provide yields as high as those obtained from chemical fertilizers — the use of which can kill these plants or at least reduce their nitrogen-fixing efficiency. Azolla is usually incorporated into the soil by beating it down with twigs or by draining the field, in the past, however, this was done simply by throwing leaves and twigs of *adulsa* onto the surface of paddy fields. Chemicals in the *adulsa* killed the lower aquatic plants, allowing the azolla to sink to the soil surface. Duckweed (which is also rich in nitrogen and phosphorus) is also incorporated into the soil by this method.

In some places, paddy and *tag* seeds are sown together. When the plants have grown, the field is lightly ploughed and a kind of harrow is passed over it. The paddy plants mostly recover, but the tender *tag* is buried underground and dies. The few *tag* plants surviving are removed at the time of weeding and buried in the soil.

*Mahua* and other leguminous trees which can stand waterlogging are allowed to grow in fields so that bird and fruit bat droppings provide fertilizer. These trees are more advantageous than green manure crops since they leave the fields free for other crops, are productive throughout the year, bring up nutrients from deep underground, and provide fuel, fodder and other materials. Their elimination has been partly due to the use of tractors which require the removal of such "obstructions".

## Paddy Ecosystems

Paddy fields and their surroundings contain algae, azolla, insects, fish, frogs, crabs, birds and other creatures, "weeds" and trees, all living in webs of interdependence. As long as this microecosystem is not interfered with, the natural fertilizing and insect control processes enable a paddy field to yield steadily for thousands of years.

Fish eat small aquatic plants and insects, including mosquitoes and their larvae and other pests. Their droppings provide instant fertilizer. As they grow, some species swim away to *nallas* where they are caught and eaten. Further, when the water dries up, those that are not eaten or washed away into the *nallas*, die and provide additional fertilizer. Chemical pesticides kill fish and other important creatures.

There are about 80 species of insect parasites and predators in rice fields. A large variety of birds also live off paddy field insects. These are sufficient to take care of planthoppers and leafhoppers and most other pests. The most important brown planthopper

# NEW Farmer & Grower

BRITAIN'S JOURNAL FOR ORGANIC FOOD PRODUCTION

Quarterly magazine for organic farmers and growers and those interested in alternatives to conventional agriculture.

Subjects covered in recent issues include:

- ◆ bias in the agricultural press
- ◆ animal health ◆ supermarket specifications
- ◆ bio-dynamic agriculture ◆ Labour Party comment

Forthcoming articles include:

- ◆ bio-technology ◆ organic alcohol
- ◆ Conservative Party comment ◆ hedge laying
- ◆ humane vermin control

Subscribe now and receive a FREE copy of 'Organic Farming - an option for the nineties' published by BOF/OGA, price £2.50

I would like to receive NF&G and enclose a cheque/PO for £12.00

Name.....

Address.....

..... post code.....

Please return to Box E, NF&G, 86 Colston St. Bristol, BS1 5BB.

# Agriculture in Ladakh

Politically in the Indian state of Jammu and Kashmir, the Tibetan Buddhist enclave of Ladakh covers an area of 40,000 square kilometres on the westernmost edge of the Tibetan plateau. The region supports a population of just 120,000, most of whom live in isolated villages dotted among the mountains at elevations of over 3,500 metres.

In a Himalayan desert, where rainfall averages only 10 centimetres per annum and temperatures drop to as low as minus 40 degrees centigrade, Ladakhi households are almost entirely self-sufficient, dependent on trade for little more than luxuries and such items as salt and tea. Despite a growing season of less than four months, people manage to provide for themselves for the entire year.

## Cultivation

Landholdings in Ladakh typically consist of one or two hectares, divided into a number of small, terraced fields located wherever there is sufficient water for irrigation. Open irrigation canals stretch for many miles, the water being shared by all the farmers of the village according to well-established schedules. In most villages an individual serves on a rotational basis as a guardian of the watering process.

Barley is the staple crop, while wheat is also grown in all but the highest villages. Perennial hay crops grow around the edges of the fields. In some areas peas are common, and there are also a few root vegetables, principally turnips and potatoes. In the lower valleys apricots, apples and walnuts are grown. Willow and poplar trees, which are found throughout the region, serve as building materials and fodder.

Ploughing is done with a single-bladed plough, drawn by a pair of *dzo* (a cross between a cow and a yak). Fields are irrigated by periodic flooding, and weeded by hand. Peas are pulled by hand from dry soil, leaving the nitrogen-rich root nodules in the soil; barley and wheat are either pulled by hand from wet soil or — more commonly — cut with a sickle. The grain is threshed by a team of animals driven round a central pole, and winnowed by hand.

Over the centuries, crop strains have been selected for characteristics suited to the environment: fast growth, early ripening and high yields. Much of the barley has more grains per stalk than most European varieties, and is easier to thresh. Moreover, the crops are remarkably free of pests and disease.

Production of the major cereals probably averages around three tonnes per hectare, with individual fields reaching more than 10 tonnes per hectare. These figures compare extremely favourably with average yields for wheat and barley in India and Africa (1 t/ha), North America (2.2 t/ha) and the U.S.S.R. (1.5 t/ha).

## Animal Husbandry

Almost every family keeps at least some animals, which not only serve as beasts of burden but also provide dairy products, meat and wool. Donkeys and mules are widely used for carrying loads and, at harvest time, for threshing. There are, in addition, large numbers of sheep and goats, as well as yaks, cows and the *dzo*.

Ladakhi cattle give very little milk, and fertility rates are low. However, they are well adapted to the extreme climate.



Photo: Mark Edwards/Still Pictures

The yak forages as high as 5,500 metres, and is able to withstand the rigours of the long and bitterly cold winters.

## An Integrated System

A principal key to the success of Ladakhi agriculture has been the continuous cycling of nutrients. Naturally dissolved salts and fresh, unweathered minerals are contained in the glacial meltwater by which the fields are irrigated. In addition, the soil is amply fertilized by human nightsoil. Animal dung is not generally applied to the fields directly, but is saved instead as fuel for the kitchen stove. However in the long run it finds its way back to the land, as ashes from the stove are mixed with the nightsoil to provide potash and a little phosphate. Animal urine, which fertilizes the soil directly when the animals are grazing on the stubble, and indirectly when the scrapings from the stable floors are added to the compost, provides much-needed nitrogen. Nitrogen is also provided by the planting of peas, which have the ability to fix nitrogen directly from the atmosphere.

Agriculture in Ladakh is at the very heart of the social and economic frame-work; village life, major celebrations and religious ceremonies are intimately enmeshed with the agricultural cycle. As subsistence farmers, the Ladakhis are aware of the natural limits of their resources. Combined with polyandry (the practice of one woman having two or more husbands) and monastic celibacy, this awareness has helped to keep the population relatively stable, so the demands on the agricultural system have remained more or less the same from year to year.

Cooperation has always been an integral part of the agricultural system. Farm implements, labour and draught animals are routinely shared among groups of houses, as is the shepherding of animals in the high pastures. The division of water — the most precious resource — has only been possible through a very high level of social cohesion.

Conditions in Ladakh are extremely hard; the growing season is short, the winter severe. Nonetheless, the traditional system of agriculture has for centuries provided not only a bare subsistence but a considerable surplus available for trade. Through a combination of good husbandry and supportive social structures, the Ladakhis have managed to maintain a remarkably high standard of living.

This article is an edited extract from *Agriculture: Global Trends and Ladakh's Future, A Background Paper*, by Helena Norberg-Hodge, John Page and Peter Goering of the Ladakh Project, 21 Victoria Square, Clifton, Bristol BS8 4ES.

predators are water striders and spiders. A single wolf spider in a rice field can eliminate at least 20 brown planthoppers in a day. Leaf-folders are controlled by several insects, including predatory beetles. A tiny wasp parasite lays eggs inside leaf-folder larvae. Another wasp parasitizes the eggs of the black bug. Trees in or near fields provide perches, shelter and nesting sites for birds, as well as alternative sources of food outside of the rice season. Bamboos and other plants are staked in the fields for the same reason.

Crabs are a nuisance as they make holes in bunds through which water drains. Farmers pour a mixture of cowdung and water into the crab hole, forcing the crab to emerge. *Karanj* leaves, cut into small pieces, are sometimes added to the cowdung. In some areas ducks are allowed inside the fields after the harvest of the short term rice crops, to eat snails and insects in the stubble. When mealy bugs attack, the spot is burnt after the harvest to prevent recurrence of the pest. *Rui* leaves are used as green manure to control this pest.

## Pest Control Strategies

Farmers use many other methods to reduce pest damage. The smoke from *mahua* oilcake is used on paddy blight. Some pests are eliminated by flooding fields for a day or so. To control thrips, the rice nursery is irrigated so as to submerge plants for some time and then the land is drained to wash away the insects. Other pests are destroyed by putting the sap of particular plants, such as

*kachoo* and *bihlangani*, in the water inlets to the fields. Some are eliminated by using buffalo dung and urine diluted in water, or ash and water. The latex of *Euphorbia* species is used in a similar manner. Bamboo leaves are buried in inlets if paddy plants turn yellow and this restores them to health. Religious custom requires farmers to put up lamps at certain times of the year, killing nocturnal pests.

*Ambadi* seeds are sown intermixed with rice in upland dry paddy fields to control termite attack. In Tamil Nadu farmers plant, in every tenth row, a variety of rice which is highly susceptible to stem-borers. The insects feed only on these rows and leave the rest untouched.

Neem can be used for the control of several major pests of paddy. Stem borers will starve rather than eat plants treated with neem extracts. When paddy is sprayed with neem oil, the number of brown planthoppers is reduced and the pest fails to transmit the grassy and ragged stunt viral diseases. It also prevents the transmission of the rice tungro virus by green leafhoppers. Spraying with neem deforms the body appendages of the rice ear-cutting caterpillar. The rice leaf folder larvae develop abnormalities within 24 hours of treatment with neem. However, neem does not kill the natural enemies of plant hoppers and leaf hoppers. In fact, paddy fields treated with neem have shown a higher population of natural enemies than untreated fields.

## Traditional Irrigation and Dry Rice Growing

While most paddy is rainfed, irrigation from the numerous water tanks in the Indian countryside permit irrigation in case of monsoon failure. Unfortunately these small, local systems are dying out because of the official bias towards large scale systems and the replacement of local control by centralized bureaucracies.

Ingenious methods of obtaining multiple crops without irrigation have also been developed. In Tamil Nadu, mixtures of three month and six month duration paddy varieties are sown together. When the short duration variety is ready for harvesting, both are cut at ground level. A special plough is then used to split the tillers of the six-month variety, which grow rapidly and provide a "second crop". In another system, *math* beans and *bajra* are sown together. The *math* keeps down weeds while *bajra* is growing. After the *bajra* harvest, the *math* is left standing. Dry land rice is then scattered over the *math* after which the *math* plants are uprooted by hand and dropped on the soil as a mulch.

Cereals and vegetables are often grown on field bunds, protecting the bunds from being eroded in heavy rains. *Chaoli* is preferred because it forms an effective ground cover and also because it is ready for harvest before the main rice crop.

The use of these simple techniques can raise paddy yields considerably, at little cost and risk to farmers. Unlike modern intensive methods, they use renewable resources and maintain the fertility of the soil. If more food needs to be grown, it can be done by replacing such crops as tobacco with food crops, not by threatening the viability of future harvests. Many traditional practices deliberately sacrifice immediate gains for the sake of long-term sustainability. Such discipline and foresight is incomprehensible to those who practice western agribusiness: their depth of focus is limited to the next balance sheet.

This article is an edited extract from *Asking the Earth: Farms, Forestry and Survival in India*, by Winin Pereira and Jeremy Seabrook (Earthscan/WWF, London, 1990).



**RETURN TO THE GOOD EARTH**  
Damaging Effects of Modern Agriculture and The Case For Ecological Farming

A Third World Network Dossier

This new 570-page dossier from Third World Network is a collection of reprints of articles documenting the devastating effects of modern agriculture and the superiority of traditional and chemical-free agriculture based on ecologically-sound principles.

Price £17.50/\$35 plus £2.50/\$5 postage.

Payment by cheque or credit card to WEC Books, Worthyvale Manor, Camelford, Cornwall P32 9TT, UK. Tel. (0840) 212711. Fax. (0840) 212808.



Villagers build a traditional wooden water-barrier to hold back water in a muang faai reservoir. Muang faai water-management systems enable villagers to divert, store and divide swift streams so that they can be used in wet-rice agriculture. A study of these systems shows the many complex interrelationships between communities, technology, production and natural resources. (Photo: Chatchawan Tongdeelert)

# The Muang Faai Irrigation System of Northern Thailand

by  
Chatchawan Tongdeelert  
and  
Larry Lohmann

*For centuries rice-growing lowland villages in Northern Thailand have depended on a type of locally-controlled water management adapted to a landscape dominated by forested highlands and swiftly-flowing streams. The system they have developed is now under threat from modern patterns of resource management promoted by international and state agencies. The conflicts which have resulted hold important lessons for both aid organizations and environmentalists.*

Northern Thailand consists mainly of long mountain chains interspersed with valley bottoms where streams and rice fields dominate the landscape. Most of the remaining forests of the North are found at higher altitudes. The forests ensure regular seasonal rainfall for the whole area and at the same time moderate runoff, so that there is water throughout the year. Streams carry organic matter from decomposing vegetation through hill fields and rice paddies, ensuring fertility.

Until about 20 years ago, the mountains were occupied principally by various tribal groups who had settled there in the last few centuries and practised shifting or rotation swidden agriculture.

---

Chatchawan Tongdeelert worked in villages in Northern Thailand for many years as a member of the Northern Development Workers Association. He now lives in Chiang Mai. Larry Lohmann is a former staff member of the Project for Ecological Recovery, Thailand. He is an Associate Editor of *The Ecologist*.

More recently marginalized lowland Thais have migrated in huge numbers into the hills and now outnumber the hilltribe population by approximately six to one. The bulk of the region's people, however, remain settled in ethnic Thai farming communities along the relatively fertile and well-watered valleys, which cover less than 10 per cent of the region's land area.

The lowland communities have developed an agricultural system adapted to, and partially determining, the distinctive ecosystems of their areas. Practising wet-rice agriculture in the valley-bottoms, the lowlanders also raise pigs, ducks and chickens and cultivate vegetable gardens in their villages further up the slopes. Rice, beans, corn and native vegetables are planted in hill fields above the villages, and wild vegetables and herbal medicines are gathered and wild game hunted in the forests higher up the hillsides. The forests also serve as grazing grounds for cows and buffalo, and are a source of wood for household utensils,

cooking fuel, construction and farming tools. Fish are to be found in the streams and in the irrigation system and wet-rice fields, providing both food and pest control. These interrelated elements have constituted the basis for self-reliance among these communities for generations.

### A Traditional Water-Management System

At the centre of this traditional village livelihood lies the *muang faai* water-management system. *Muang faai* is an elegant response to a common requirement of Northern communities: the need to divert, store, divide and slow down the swift and heavy flow of streams running down from forested mountains so that it can be used in the delicate pursuit of transplanted wet-rice agriculture.<sup>1</sup> For between 700 and 1000 years, the prerequisite to opening rice paddies in the region has been the ability to construct such a system and adjust it year after year so that it remains optimally effective and suited to changing local social needs and the local ecosystem.

In its essentials, a *muang faai* system consists of a small reservoir which feeds an intricate, branching network of small channels carrying water in carefully calibrated quantities through clusters of rice terraces in valley bottoms. The system taps into a stream above the highest rice field and, when there is sufficient water, discharges back into the same stream at a point below the bottom field. The water in the reservoir at the top, which is diverted into a main channel (*lam muang*) and from there into the different fields, is slowed or held back not by an impervious dam, but by a series of barriers constructed of bunches of bamboo or saplings which allow silt, soil and sand to pass through. The tops

of the barriers are set at the level villagers determine is appropriate for a certain year, so that any excess water immediately passes over and through the barrier and downstream.<sup>2</sup>

Water from the *lam muang* is measured out among the farmers according to the extent of their rice fields and the amount of water available from the main channel. Also considered are the height of the fields, their distance from the main channel and their soil type. The size and depth of side-channels are then adjusted so that only the allocated amount of water flows into each farmer's field.

*Muang faai* systems come in a wide variety of shapes, sizes and degrees of complexity, from a five-family system watering one and a half hectares to a system which encompasses 25 separate

*Rituals and beliefs connected with muang faai reflect the villagers' submission to, respect for, and friendship with nature, rather than an attempt to master it.*

communities and irrigates 1100-1600 hectares of rice land. *Muang faai* communities are to be found along nearly every watercourse in Northern Thailand, even in the vicinity of quite small mountain streams, and can also be found in the central region.<sup>3</sup> In the mid-1980s, 2000 *muang faai* systems were benefiting about 96,000 hectares in Chiang Mai province, while four large government irrigation dams were providing water to only 52,000 hectares in this major northern province.<sup>4</sup> Across the entire upper North, *muang faai* is probably still dominant in as much as 80 per cent of



Subscribe to  
**BioScience**  
 The biologist's monthly magazine

**B**ioScience is the monthly magazine for professionals and students in every field of biology: You will find research and policy articles, features, news updates, book reviews, announcements, professional opportunities, letters, and a look at today's computer technologies and new products. Published by the American Institute of Biological Sciences.

Join AIBS and start your subscription today.

Name \_\_\_\_\_

Address \_\_\_\_\_

Charge my  MasterCard  VISA \_\_\_\_\_ Acct. # \_\_\_\_\_

Signature \_\_\_\_\_

1991 Rates:

- Individual @ \$45.00 per year
- Family @ \$62.00 per year
- Sustaining @ \$66.50 per year
- Emeritus @ \$29.00 per year.
- (These include \$27.50 per year for *BioScience*)
- Student @ \$25.00 per year
- (This includes \$15.50 per year for *BioScience*).

Please make check payable to AIBS. Remit US dollars only. Mail to: AIBS, P.O. Box 27417, Central Station, Washington, DC 20038-7417.



American Institute of Biological Sciences

agricultural areas, with the small remaining proportion under irrigation by the state.

Rituals and beliefs connected with *muang faai* reflect the villagers' submission to, respect for, and friendship with nature, rather than an attempt to master it. In mountains, forests, watersheds and water, villagers see things of great value and power. This power has a favourable aspect, and one that benefits humans. But at the same time, if certain boundaries are overstepped and nature is damaged, the spirits will punish humans. Therefore, when it is necessary to use nature for the necessities of life, villagers take care to inform the spirits what they intend to do, simultaneously begging pardon for their actions.

Such rituals help unify village society and enable the *muang faai* system to be passed on from generation to generation. At the beginning of every agricultural year, before villagers get together to repair the reservoir, redredge the main channel, and pull out any grass and small trees which are interfering with the flow of water, they meet to fête the spirits. Gathering at the tiny *faai* spirit house which is erected near every reservoir, the villagers offer food to the *faai* and forest spirits and lords of the water and give an incantation asking that water be plentiful and the harvest good during the coming growing year, that the water-users be happy and untroubled by disease, and that the *muang faai* repairs take place without injury to anyone. After a meal the villagers discuss problems which have arisen with the *muang faai* system during the previous year, the adjustments which must be made, amendments in regulations for the coming year, and other matters of mutual concern.

## Rights and Duties

Keeping a *muang faai* system going demands cooperation and collective management, sometimes within a single village, sometimes across three or four subdistricts including many villages. The rules or common agreements arrived at during the yearly meeting amount to a social contract. They govern how water is to be distributed, how flow is to be controlled according to seasonal schedules, how barriers are to be maintained and channels dredged, how conflicts over water use are to be settled, and how the forest around the reservoir is to be preserved as a guarantee of a steady water supply and a source of materials to repair the system. Despite this variety of tasks, management systems are generally simple, unbureaucratic and independent (sometimes defiantly so) of government authority.

The fundamental principle of water rights under *muang faai* is that everyone in the system must get enough to survive; while many patterns of distribution are possible, none can violate this basic tenet. On the whole, the systems also rest on the assumption that local water is common property. No one can take control of it by force, and it must be used in accord with the communal agreements. In dry years, for example, the side-channels of farmers occupying the upper part of some systems may be closed

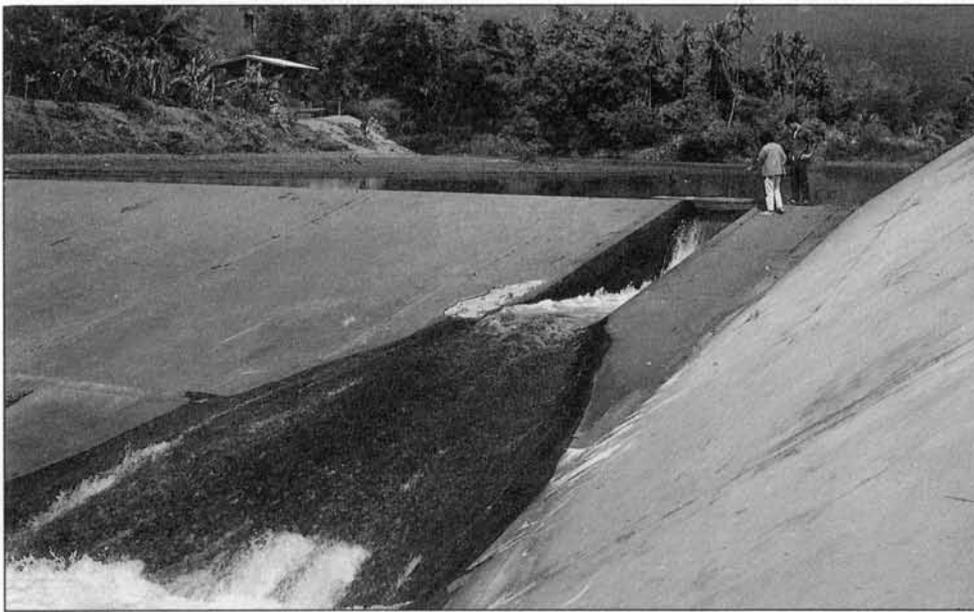


Rules posted by a village *muang faai* committee near a *muang faai* reservoir. The rules prohibit opening or closing the mouth of the main channel and fishing with dynamite, electricity or hook in the area. Many *muang faai* communities will also post prohibitions on the overuse of forest or vegetation on which the system depends. (Photo: Chatchawan Tongdeelert)

off for a time by mutual agreement to ensure that the needs of those lower down, whose supply is more uncertain, is met first. Although there are inequalities in landholding, no one has the right to an excessive amount of fertile land. The way in which many *muang faai* systems expand tends to reinforce further the claims of community security over those of individual entrepreneurship. In the gradual process of opening up new land and digging connecting channels, each local household often ends up with scattered holdings over the whole irrigation area. Unlike modern irrigation systems, under which the most powerful people generally end up closest to the sources of water, this arrangement encourages everyone to take care that no part of the system is unduly favoured or neglected.

In one larger *muang faai* system in Chom Thong District, Chiang Mai Province, however, it is generally agreed that those who arrived on the land first (and thus settled closer to the top or upstream end of the system) have priority in receiving benefits (as well as more responsibility in maintaining the system), at least in part because they helped build the original system. Groups who grow rice as opposed to those who raise cash crops or fruit are also accorded a privileged status, on the ground that rice is a subsistence crop for which the system was originally designed, and requires more frequent releases of water.<sup>5</sup>

After construction, the heaviest duty connected with membership in a *muang faai* system is maintenance. A large system such as the one in Chom Thong, which covers 800 hectares of fields and boasts 500 farmer-members, requires heavy seasonal and emergency maintenance and repairs. Canals silt up, banks collapse and channels have to be re-dug. Teams of workers equipped with hoes, baskets, axes, bamboo, sandbags and wood thus have to put in long hours and work has to be inspected and labour accounts kept. Cleaning out the main Chom Thong channel can require 150-400 workers, and the yearly cycle of regular repairs alone can require upwards of 5000 person-days. All this is in addition, of course, to emergency work and the work farmers need to put in on their own holdings to keep water flowing properly through the fields. A small system at a higher altitude, by contrast, may require much less maintenance once the original arduous task of digging its



A modern concrete muang faai dam. The concrete dams rapidly clog up with silt and debris, requiring special machinery to clean them out. The amount of labour and finance needed to maintain an "improved" muang faai system is often prohibitive and may cause the system to fall into disuse. (Photo: Chatchawan Tongdeelert)

channels out over sloping terrain is complete. Water flows through the steep channels swiftly, meaning less siltation and need for re-digging.<sup>6</sup>

How much farmers work depends on the size of their holdings and thus how much water their fields receive. A farmer who has 10 *rai* (1.6 hectares) may have to work 10 days per year; one with only one *rai*, one day. There may be other regulations as well; at Chom Thong, for instance, landowners but not tenants sometimes have to contribute cash for materials, and those at the downstream end of the system, who settled last on the land, have to contribute double the ordinary amount of labour. In all systems, not coming to work results in a penalty except in extenuating circumstances. On the other hand, there may be compensations for those who volunteer extra work — use of an extra quantity of water, exemption from having to cut bamboo or saplings for the water-barriers, or, if the work is hard, gifts of rice to show good feelings and thoughtfulness.

## Administration

In the *muang faai* system, each member is responsible for helping both to set and to enforce rules, and each person is regarded equally as a proprietor of the system. This mutual responsibility is encouraged by the fact that any shirking by one will mean others have to work harder, and any theft of water will lead to dearth elsewhere. Communal monitoring, meanwhile, is facilitated by the fact that everyone's side-channels are constantly open for inspection by people passing between village and fields. Any weed buildup in waterways or illicit forest cutting is also unlikely to escape notice for long.

Frequent meetings and face-to-face contact among villagers in the course of their tasks build a personalized, community-orientated web of information, commentary, teasing, jokes and indirect criticism which ensures that any problems with the system are widely discussed even without formal meetings. There may also be attempts to head off the need for punishment of wrongdoers: in Chom Thong, if a farmer steals water before it reaches the field below, a warning message may be pinned to a post at the mouth of the channel entering the fields of the party in question.

As a matter of procedure, however, every *muang faai* member

is obliged to report problems or violations to an elected irrigation committee, which has formal responsibility for monitoring water distribution and administering weir and channel maintenance.<sup>7</sup> This may be done either directly, or, in a large system, through written inquiries. The leader of the committee will then investigate and, if there has indeed been a violation, set a punishment strictly according to the regulations which have been laid down.

Small *muang faai* systems may be administered by a single official called a *kae faai*. In larger systems there will be a *laam faai* to communicate with all the members. Still larger systems may need assistant *kae faai* or additional *laam faai*. Every few years there is an election at which new officials are chosen. Those who have failed to fulfil their responsibilities can be thrown out then or at other times. The position of experienced leaders is likely to be secure, however, if they have done their job well and have the confidence of the other *muang faai* members. Top leaders may be compensated for their time by receiving a share of production or an exemption from having to supply labour.<sup>8</sup>

Theft of water is punished by fixed fines. When water is plentiful the fines may not be great, but when water is scarce in the dry season, they will be more severe. Penalties are often also handed down for misuse of the upland or highland forests whose streams feed the system. For example, under the written community laws Toong Yao village, in Lampoon province, has developed over the past 60 years, the local *muang faai* committee is empowered to levy a penalty on anyone cutting down trees for sale on the market or for unauthorized personal uses not connected with making tools or collecting materials to repair the *muang faai* system. Because all such penalties carry a significant social stigma, it is virtually impossible for them to be treated by aspiring village entrepreneurs as simple "costs of doing business" and weighed against the benefits to be derived from stolen water or wood.

## Challenge, Adaptation and Resistance

Both the technology and the administration of *muang faai* systems are homegrown, adaptable and open to continuous participation by all members. The materials and tools used are overwhelmingly local. Labour is provided by local members, who not only comprehend but also are able to build, control, regulate, repair and alter the technology themselves. Like the technology, the set of rules governing each area's *muang faai* system tends to be refined and elaborated over the years out of a few common basic princi-

ples through continuous discussion and trial and error, so that it takes full account of local ecological peculiarities, the habits and characters of the members and new developments.

This flexibility has helped ensure *muang faai*'s survival through a number of challenges over the centuries. Among these have been the administrative and tax changes which came with increased control from Bangkok in the period 1888-1932, population growth and the rush to modernization dating from the late 1950s. The first two led to the segmentation of communities, the colonization of new land and the construction of new *muang faai* systems, as villagers fled tax officials or responded to the pressure of increasing numbers.<sup>9</sup>

The challenges posed by modernization have proved more difficult to handle. Government-sanctioned logging, particularly following the opening of new areas by modern roads, has resulted in depleted forests in dozens of *muang faai* areas in the last three decades. Mountain slopes have been increasingly cultivated with cash crops such as ginger, baby corn, soybeans, cabbage, carrots and potatoes, which encourage extensive forest clearance, the use of pesticides and social conflict between lowlanders and uplanders.<sup>10</sup> The promotion of modern cash crops and the cash economy by the state and its foreign advisers has also driven farmers into debt and thus into forest cutting or colonization. At the same time, *muang faai* is regarded in official circles as being "behind the times". A special programme creating jobs in the countryside has led to many wooden *muang faai* water-barriers' being replaced with modern concrete structures.

Closer links with state and market have meanwhile led to growing gaps between rich and poor in rural areas and a loosening of ties of community interdependence. Commercial success has become an important criterion for village leadership, and government bodies have attempted, often successfully, to assimilate *muang faai* committees into the official apparatus, thereby changing their power base, accountability and functions. In at least one village the agricultural year now begins with a meeting with the government bank for agriculture rather than with a ceremony for the *faai* spirit.<sup>11</sup>

Many of these changes, especially the ecological ones, have hit the *muang faai* system hard. Increased runoff due to deforestation has stripped soil off slopes and deposited it downstream, where it accumulates in the beds of streams and behind the new concrete dams. One result is an increased work load for villagers, who have to try to clear out channels and reservoirs filling with an unprecedented load of silt and debris. Another is reduced storage in *muang faai* reservoirs, particularly those behind the new dams. The more forest is destroyed, meanwhile, the less steady the water supply becomes. Silt-ridden streams begin to dry up during the dry season and flood during the rainy season. As one villager whose *muang faai* system was affected by upslope logging expresses it: "At the place where we took our buffalos to bathe in the river, the water which used to cover their backs came up only to their knees. Soil and sand got into our rice paddies. What was the good of trying to plant anything?"<sup>12</sup>

When the silt and debris clogging the *muang faai* reservoir reaches the top of a concrete dam, special machinery has to be hired to clean it out. In the end the amount of labour and finance needed to maintain a system already ravaged by the effects of deforestation often becomes prohibitive, and the system falls into disuse. Some *muang faai* communities have not planted wet rice for several years for lack of assistance in repairing the "improved" systems. The result is that villagers are increasingly forced to seek income through illegally cutting wood in the forest or clearing

new land — both of which undermine the traditional system further.

As water supplies falter, meanwhile, demand increases, in part due to the new cash crops many villagers are now planting in their paddy fields in the idle periods between rice harvests. These crops — soybeans, onions, garlic, tobacco, Japanese cucumbers, watermelons and others — require less water than rice but still constitute a burden on the system during the dry season.

Yet the tightly-knit social organization which *muang faai* both requires and makes possible has enabled many communities to weather such developments with some degree of success. By necessitating vigilant and well-developed systems of local forest-management, for example, *muang faai* communities have sometimes been able to prevent the intrusion of loggers. Even in areas where other aspects of community life have been taken over by the state (including roads, schools, temple design and forest management), water management often remains in the hands of villagers, through their *muang faai* systems. And some *muang faai* leaders

---

## BULLETIN

### OF CONCERNED ASIAN SCHOLARS



If you care about the future of Asia, read the *Bulletin of Concerned Asian Scholars*

—an independent voice on modern and contemporary Asia, for more than twenty years exposing injustices and exploring social change

—a 72-page, illustrated, readable quarterly that welcomes unsolicited articles, reviews, interviews, translations, and photo essays; refereed by specialists; international in editors, authors, and readers

**INTRODUCTORY OFFER!**  
**One year for \$18**

Subscriptions: \$22.00  
Free index and guide to back issues;  
guidelines for BCAS authors  
BCAS, 3239 9th Street, Boulder, CO 80304-2112 U.S.A.  
Telephone: (303) 449-7439

---

are able to turn the state's new recognition of their status to their communities' advantage, by requesting special assistance or opportunities.

Where attempts at adjusting to or sidestepping the pitfalls of modernization have failed, moreover, *muang faai* villagers have often been at the forefront of creative resistance, leading efforts to restore damaged ecosystems. The local movements which joined conservationists in the successful national campaign to ban timber harvesting in the late 1980s were disproportionately from *muang faai* areas. It was *muang faai* villagers as well who embarked on a battle in 1989 against a Member of Parliament who had degraded forest and blocked a stream in Chiang Mai province in order to

---

*From a muang faai perspective, it is impossible to view forests, water, land and agriculture as separate entities.*

---

build a resort. Following petitions, legal actions, marches and blockades to force the MP's workers off the land, a local leader was assassinated, but in the face of unyielding protests the government finally suspended the rental agreement and admitted the right of the villagers to look after the forest themselves — the first official recognition of the rights of local communities to forests on state land.

Where *muang faai* systems have been completely replaced by modern irrigation systems constructed with state or foreign aid funds, however, such responses become more difficult. Large "multipurpose" dams often displace and disrupt the structure of communities by flooding out river valleys, villages and *muang faai* systems alike for the sake of electricity-hungry urban industries and limited numbers of farmers elsewhere. Designed to supply water to extensive areas, they lack the flexibility and responsiveness to local needs of *muang faai*. For example, they can release water to each locality for only one or two weeks at a time. The gap between these releases is often so great that some of the rice crop dies in the fields.

Distribution of water within local areas, meanwhile, is placed in the hands of leaders who are not accountable to others in the community and who therefore tend to try to shunt the benefits to themselves and to relatives. Using their connections with local officials, the wealthy often pressure villagers to sell land which is to be watered by new irrigation systems, further undermining community management incentives. Displaced villagers are cheated out of compensation and whole river valleys endangered by shoddily-built dams, much of the necessary construction budget for which has been embezzled.<sup>13</sup> In the end, the bulk of the benefits of modern irrigation systems go to business, large landowners and state bureaucracies (including the army). Golf courses, resorts, housing developments, cattle ranches, and agribusiness plantations have been among the more notable beneficiaries of recent state irrigation projects in the North. Even from a strictly economic point of view such projects have been a waste of money, if intended to boost agricultural production, but if ecological side effects are taken account of, the damage has been severe indeed.<sup>14</sup>

### Lessons From Muang Faai

Several lessons can be drawn from a study of *muang faai* and the problems facing it today.

First, *muang faai* is not a system for solving "water problems". Rather, it is a system that villagers use to manage water to meet local needs in wet-rice agriculture. Its small size allows villagers to control and manage water in a way which fits the ways of life of various communities. In all this, *muang faai* is more successful than modern state systems dominated by big dams.

Second, solving water problems which have recently arisen requires restoring the entire ecosystem. From a *muang faai* perspective, it is impossible to view forests, water, land and agriculture as separate entities. A consideration of *muang faai* helps bring into perspective the mutually supportive relationships between communities, technology, production and natural resources.

Third, solutions to such problems demand that support be given to village efforts to maintain power over local resources through community-administered forests, the *muang faai* system proper, and ecological agriculture. The failure of any one of these pillars of village livelihood will threaten the others. The state should not be allowed to monopolize the management of resources for the benefit of capital.

Fourth, it is important that we learn from *muang faai* villagers how to live together with nature in friendship and submission rather than trying to master it.

Community systems such as *muang faai* are likely to be found in many countries. Seeking solutions to environmental problems requires a belief in the abilities of villagers who have consistently struggled to preserve their local resources.

### Notes and References

1. For a pithy exposition of the technical intricacies involved in this type of agriculture, and a comparison with the very different but equally intricate adaptation involved in traditional swidden systems, see Clifford Geertz's classic *Agricultural Involution* (University of California Press, 1963), pp.28ff.
2. A similar method is known from the period of Khmer dominance in the last millennium, when farmers in what is now Thailand "raised runoff in streams at the beginning of the rainy season by means of bamboo stakes so that they could be assured of earlier seed beds and, on part of the fields, earlier transplanting". (Van Liere, W. J., 'Mon-Khmer Approaches to the Environment', in Siam Society (ed.), *Culture and Environment in Thailand*, Siam Society, Bangkok, 1989, p.154.)
3. Hirsch, P., *Development Dilemmas in Rural Thailand*, Oxford, 1990, p.98.
4. Uraiwan Tan Kim Yong, 'Ongkorn sangkhom nai rabob chonprathaan muang faai lae karn radom sapayakorn: priap thiap rawaang choomchone bone thii soong lae choomchone phuen raab nai phaak nuaa khong pratheet thai', *Sangkomsaat* (Chiang Mai University), Vol. 7, No. 1-2 (1984-5), pp.158-194.
5. Ibid.
6. Ibid.
7. Hirsch, op. cit. 3, p.154.
8. Uraiwan, op. cit. 4; Hirsch, loc. cit. 7.
9. Uraiwan, op. cit. 4.
10. An ill-conceived 'development' project funded by Norwegian Church Aid attempting to wean upland tribal farmers off opium and onto cabbages has led to extensive forest clearance in Chom Thong District, Chiang Mai. Erosion, drought and pesticide contamination of water supplies downstream has led to conflicts between uplanders and lowlanders. Significantly, it is a *muang faai* committee which has formed the nucleus of a lowlanders' association to protect and restore the degraded watershed forest.
11. Moerman, M. and Miller, P.L., 'Changes in a Village's Relations with Its Environment', in Siam Society (ed.), op. cit. 2, p.310.
12. Witoon Permpongsacharoen, 'Widerstand gegen Waldzerstörung: Lektionen aus den Dorfen Thailands', in *Arbeitsgemeinschaft Regenwald und Artenschutz (ARA), Naaturerbe Regenwald*, Focus Verlag, Gießen, 1990.
13. *Private Eye*, 21 December 1990, p. 15.
14. Dr Prakorb Wirotnikoot, 'Khuen kap karn cholprathaan', presentation at a seminar on dams, their effects and energy solutions, Chulalongkorn University, 10 June, 1990.

# FROM GLOBAL CRISIS TOWARDS ECOLOGICAL AGRICULTURE

## Declaration of the International Movement for Ecological Agriculture

*The history of hunger is a history of unjust social and economic systems which, frequently in combination with ecological degradation, have marginalized the poor and deprived them of the means to eat.*

*Current agricultural development policies, in particular those implemented under the Green Revolution, have singularly failed to address these primary causes of hunger. On the contrary, they have intensified and extended their grip.*

*Moreover, by undermining ecologically sound systems of agriculture, many of them with ancient traditions, environmental degradation has been aggravated to the point where the capacity of many regions to grow food is now seriously threatened. To continue with such policies would thus be to condemn the bulk of humanity to increasing impoverishment, hunger and mass starvation.*

*A radically different approach is required: one that seeks the regeneration of ecosystems through ecological agriculture, and which brings about the wider social, economic and political changes necessary to ensure food security and social justice for all.*

### THE CURRENT FOOD CRISIS

**1. Agriculture is not only a food production system but a holistic system which includes humans, their work and their environment. Today, despite several decades of intensive agricultural development programmes, promoted in the Third World through the Green Revolution, malnutrition, starvation and famine are on the increase:**

- \* In Africa, we are now witnessing famine on a near continental scale, with two out of three countries affected;
- \* In many regions, starvation is no longer a periodic phenomenon. It is a daily fact of life;
- \* Over the last 500 years, the Third World has developed according to models imposed on it by the Northern countries. Industrialization led to the rapid transformation of largely autonomous rural populations into cheap, dependent urban factory labourers. The increasing demand for food from the fast-growing urban areas could not be met by peasant farmers working the land left over after the best land had been appropriated for plantations for export crops. The Green Revolution was thus promoted as the solution.

**2. Food scarcity is generally blamed on a failure to spread the Green Revolution widely enough and fast enough, with the result that poorer farmers are "denied" the benefits of modernization:**

- \* In fact, the very technologies and policies intrinsic to the Green Revolution are a major cause of food scarcity and famine;
- \* In many regions, they have already degraded or destroyed the ecological basis for agriculture;
- \* They have entrenched and extended the political, social and economic forces that historically have denied food to the poor.

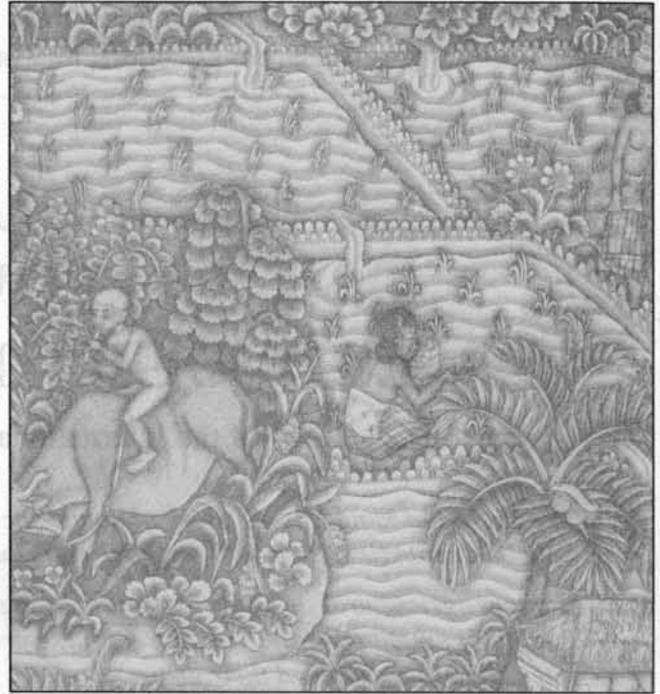
### DESTROYING ECOLOGICAL AGRICULTURE

**3. Recent history, beginning with the colonial period and continuing to the present day, has seen the neglect, erosion and destruction of ecological systems of agriculture, many of which have an ancient, sustained tradition.**

Although they differ from region to region, such systems share certain common characteristics:

- \* By cultivating a wide range of crop varieties adapted to differing growing conditions, they maintain genetic diversity and safeguard farmers against the vagaries of the weather, etc;
- \* Through the use of polyculture, they reduce the vulnerability of crops to pest infestations and disease;
- \* They are prudent and efficient in their use of energy, water and other resources;
- \* They minimize the use of toxic substances;

- \* They maintain, and in some cases improve, soil fertility through such practices as fallowing, terracing, crop rotation, etc;
- \* They provide efficient and non-toxic methods of food storage;
- \* They grow a wide range of crops and provide a great diversity of food for consumption. In addition, the provision of fodder, fuel, fibre and fertilizer is an integral part of the agricultural system.



## THE PROCESS OF MODERNIZATION

4. Development programmes, formulated within an economic and social framework carried over from colonialism, have sought to “modernize” ecological systems of agriculture in the Third World by imposing policies and practices that have:

- \* Introduced agricultural technologies and production methods aimed at maximizing short-term yields without regard for the environmental consequences;
- \* Denied traditional communal rights of peoples over land and land-based resources. Indigenous and peasant communities have been marginalized, and often they have been dispossessed and thrown into the unorganized urban sectors;
- \* Promoted and extended a cash-crop economy at the expense of food production for local consumption;
- \* Maximized the growth of urban-based, non-agricultural sectors at the expense of food production and rural communities;
- \* Increased the unemployment of women and simultaneously undervalued their work;
- \* Displaced and made destitute rural artisans.

At the farm level, such practices and policies have involved;

- \* Mechanizing production;
- \* Abandoning fallow-based systems in favour of perennial monocultures, a move that has led to particular problems in irrigated areas;
- \* Abandoning polycultures in favour of monocultures;
- \* Abandoning ecological methods of ensuring soil fertility in favour of chemical fertilizers;
- \* Abandoning ecological methods of pest control in favour of chemical pesticides;
- \* Replacing traditional local varieties of crops with modern “high-yielding” varieties that are more vulnerable to pests and disease, and the yields of which have not matched the claims made for them (see below).

## THE FAILURE OF THE GREEN REVOLUTION

5. Modern intensive agriculture has conspicuously failed to increase food production and to meet global food and nutrition needs.

- The claim that the Green Revolution has led to higher crop yields is highly exaggerated and does not

reflect a fair and complex comparison with more ecologically sound systems:

- \* These claims are usually based on the measurement of yield as defined per acre or hectare of land. However, if one takes into account the hidden costs of input subsidies and non-renewable resources, and the costs of ecological damage (leading to lower yields after some time) and furthermore, measure yield against high fertilizer and water costs, then the Green Revolution techniques are highly inefficient. In contrast, the economic soundness of traditional and ecologically better varieties is striking;
- \* Even more seriously, the Green Revolution measurement of output is flawed because it only accounts for a single crop (e.g. rice) and even then only a single component of that crop (e.g. grain) whilst neglecting the uses of straw for fodder and fertilizer. Thus it neglects to take into account that there were many other biological resources (e.g. other crops, other non-grain uses of the measured crop and fish) within the same land in the traditional system that were reduced or wiped out with the Green Revolution;
- \* If output is measured in terms of total biomass, a more realistic picture of the performance of the Green Revolution will emerge.
- Although yields of food crops in total have increased, less food is available to local populations. There are several reasons for this:
  - \* There has been an increase in a few cereals (a large volume of which is fed to cattle in the North) at the expense of pulses and other crops;
  - \* The increased dependency of Third World farmers and countries on intensive inputs has led to indebtedness and the breakdown of self-sufficiency;
  - \* Much of the increased food production is exported, thus denying the food to local people;

- \* Many areas planted with "high-yielding varieties" (which are actually "high-response varieties" to the applied inputs, including chemical fertilizers and pesticides) are now experiencing diminishing returns;
- \* Ecological degradation (see below) is leading to reduced yields and to the abandonment of many areas of agricultural land;
- \* Losses during storage have increased markedly in many areas;
- \* The low prices paid for farm produce and the high prices charged for food in the shops, combined with increased levels of indebtedness, ensure that many farmers cannot afford to buy sufficient food for their families.

## THE IMPACT OF MODERNIZATION

### 6. The global ecological, social, economic and nutritional consequences of modern intensive agriculture — and the development policies that underlie and encourage its promotion — have been devastating.

- \* It is noted that the Northern countries are primarily responsible for these consequences, since most modern agriculture is located there; whilst institutions controlled by them were responsible for spreading the Green Revolution to the Third World.

#### ● The ecological impacts include:

- \* The breakdown of those ecological processes that maintain soil fertility;
- \* The degradation of agricultural lands through erosion, desertification, salinization, waterlogging and compaction etc., and the loss of land to industrial development projects, infrastructure programmes, water development projects etc;
- \* The depletion of groundwater and other water sources due to over-use (notably through the planting of water-intensive crops and crop varieties), and to the disruption of those hydrological regimes that ensure the recharge of water sources;
- \* The contamination of land and water supplies through chemical pollution;
- \* The eutrophication of waterways;
- \* The destruction of fisheries through pollution and erosion;
- \* The loss of habitat for wildlife;
- \* The erosion of genetic resources;
- \* An increase in the virulence of pest infestations and plant diseases, partly due to the increased resistance of pests to chemical pesticides;
- \* The raising of animals in disease and stress-ridden conditions through factory farming, requiring massive amounts of pesticides, antibiotics, hormones and energy;
- \* The dumping of dangerous agricultural chemicals forbidden in the North, in the Third World;
- \* The generation, in the manufacturing process of

pesticides and fertilizers, of highly toxic wastes which are dumped in the poorest among Third World countries;

- \* A growing increase in emissions of greenhouse gases. Such emissions from agriculture and industry are greatest in the North, but are increasing in the Third World as agriculture becomes more dependent on fossil fuel-based inputs (chemical fertilizers, for example, are an important source of nitrous oxide) and as irrigated rice production is intensified (paddies are an important source of atmospheric methane).

#### ● Although they vary from region to region, the social impacts of modernizing agriculture include:

- \* Undermining the confidence of farmers in their own abilities and in the value of their traditional knowledge, causing them to become increasingly dependent on outside expertise;
- \* The break-up of family farms and farming communities, impoverishing the social life of millions and fermenting growing social alienation;
- \* Increased rural unemployment;
- \* Increased rural-urban migration and rural depopulation;
- \* Increased landlessness;
- \* Increased indebtedness, due in part to the increasing dependence of farmers on purchased inputs;
- \* Increasing the burden on women. In many cultures, women have been displaced from their central role in food production. The access they previously enjoyed to land and other needed resources has been undermined and their participation in decision-making eroded;
- \* The transformation of independent farmers into often poorly paid and overworked plantation and industrial workers;
- \* The displacement of tribal and indigenous people from their traditional homelands, often due to the construction of large dams located on their lands, without adequate and fair alternative arrangements for their livelihood.

#### ● The economic impacts of modernizing agriculture include:

- \* Increasing poverty in rural areas where farmers have been encouraged to adopt farming methods which have increased their dependence on external inputs and credit, and that have now proven to be uneconomic and non-sustainable;
- \* Increasing national indebtedness in the Third World, leading to the imposition of structural adjustment programmes that further exacerbate the plight of the poor and dispossessed;
- \* Large spendings by Third World countries on subsidies for agricultural inputs, mainly imported from the industrialized countries, which hide the increasingly uneconomic returns of modern agriculture;
- \* Increasing the vulnerability of national economies, many of which are ever more dependent for their income on a small number of export crops;

- \* Increasing the domination of agriculture by a few international and national corporations, and increasing their control over inputs, marketing, seeds and land;
- \* Increasing the dependence of agriculture on imported non-renewable fossil fuels, chemicals, seeds and machines.

● **The nutritional and public health impacts of modern agriculture include:**

- \* A reduction in the range of foods consumed, to the detriment of nutrition;
- \* An increasing incidence of pesticide poisonings, some of them fatal, on farms;
- \* Increasing cancer rates and other health problems, due to exposure to pesticide residues in food, water and air;
- \* A reduction in the nutritional quality of food;
- \* An increase in the consumption of devitalized processed foods, a pattern that is encouraged by aggressive advertising and marketing;
- \* An increase in waterborne diseases in areas of intensive irrigation and associated water projects;
- \* The creation of new strains of bacteria which are resistant to antibiotics thereby increasing the threat of human infectious diseases;
- \* An increase in the number of accidental and intentional poisonings due to the ready availability of agricultural poisons in the home.

**7. The adverse impacts of modern agriculture in the Third World are likely to be exacerbated still further by current moves to:**

- \* Further curtail proposals for equitable treatment of trade in agriculture under the General Agreement on Tariffs and Trade (GATT) and international patenting agreements;
- \* To implement a new regime on the use of patent and other intellectual property rights to tighten the control of corporations over resources and products.

**This shift from common property use in traditional cultures to private ownership further reduces the access and control of ordinary farmers.**

- \* Millennia of innovations and experience of farmers are turned into private property rights. This trend is most evident in the field of biotechnology.

**OFFICIAL SOLUTIONS: MORE OF THE SAME**

**8. Despite the clear link between current agricultural development policies and growing social and ecological impoverishment for the majority of the Third World, the agencies charged with addressing the world food crisis continue to propose "solutions" that can only further intensify the very processes which are responsible for the destruction in the first place.**

These policies, as promoted by such agencies as the international agricultural research centres which are members of the Consultative Group for International Agricultural Research (CGIAR), the UN Food and Agriculture Organization, the World Bank and the UN Development Programme, include:

- **Extending the amount of land under cultivation.**

**Agriculture at the Crossroads**

**FOOD MATTERS**  
Worldwide

*For all interested in the future of farming and food production*

Recent 8-page features include:

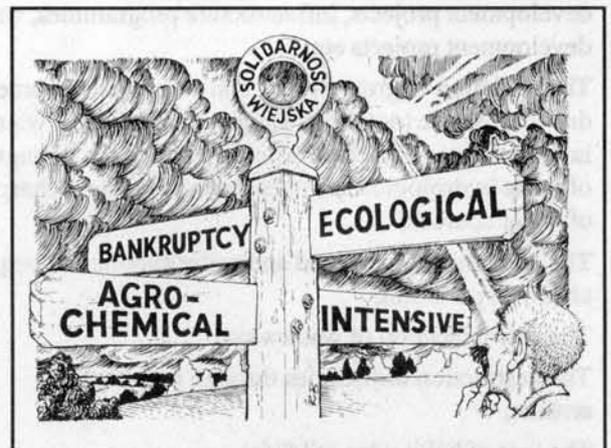
- \* TOWARDS SUSTAINABLE EUROPEAN AGRICULTURE?
- \* AGROECOLOGY: FROM THE GROUND UP
- \* NEW SCIENCE FOR OLD AGRICULTURE
- \* BIOTECHNOLOGIES WILL CHANGE THE WORLD!
- \* GATT SECRETS ARE UNSUSTAINABLE
- \* ETHIOPIA: FERTILITY OR FUTILITY?
- \* GLOBAL WARMING AND FARMING
- \* INDIAN FARMING TOWARDS 2000

**SUBSCRIBE NOW — WIDEN THE DEBATE TODAY**

UK individual	£10.00 (5 issues)
UK organization	£15
Non-UK	£18.25
Third World Sponsorship (plus your own copy)	£25.00

... and join the network. Contact: **FWN-FM, ARC, NAC, STONELEIGH, WARKS CV8 2LZ, UNITED KINGDOM** Co-published by Farmers Link-NEAD and Farmers' World Network

**GUARANTEED MINIMAL ADVERTISING!**



**A Bumper Crop of Information and Debate!**  
*Five times a year*

**TRIAL OFFER**  
For Ecologist Readers Only  
— First Issue Free —

Yet much of the land earmarked for potential agricultural development is at present covered with forests or is marginal land vulnerable to erosion. On the basis of past experience, with the proposed techniques, such lands can only be cultivated at great ecological cost and will eventually have to be abandoned. At best, therefore, such a policy can only bring short-term respite to the detriment of long-term ecological security.

- **Further intensifying agricultural production by massively increasing inputs of fertilizer, hybrid seeds, pesticides, irrigation water and farm machinery.**

Pursuing such a policy, however, would simply be to repeat the mistakes of the past, causing still greater social and ecological devastation and increasing Third World indebtedness.

- **Further intensify export-led development strategies through further agricultural and industrial development in order to provide Third World populations with sufficient incomes to buy the food which at present they cannot afford.**

Fundamental to such a strategy is the development of export-oriented economies through which national governments can earn the foreign exchange necessary to build up their industrial and agricultural base. Yet, with few exceptions, the principle commodities available for export are crops. In effect, the strategy involves the Third World exporting the food that its population so desperately requires.

- **In addition, there is a move to promote the use of new biotechnologies (specifically genetic engineering) to develop new life-forms and "improve" existing ones in order to increase agricultural output. Such biotechnologies are essentially engineering solutions disguised as biological alternatives which are ecologically safe. Their use threatens to:**

- \* Strengthen the North's control over Third World agriculture and genetic resources;
- \* Undermine the already shaky economies of many Third World countries by rendering many primary crops now grown in the Third World unmarketable through competition with genetically-engineered substitutes;
- \* Increase the use of herbicides and other chemical inputs through the promotion of herbicide-resistant crops;
- \* Increase the vulnerability of crops to damage, particularly where cloning has been used to create genetically-uniform crops;
- \* Endanger life processes throughout the planet through the release of genetically-engineered organisms.

**9. A radically different development strategy is clearly of utmost priority if:**

- \* The Earth's ecological base is not to be rendered increasingly unfit for agriculture;
- \* The vast bulk of humanity is not to be condemned to starvation, malnutrition and impoverishment.

## ALTERNATIVES EXIST

**10. Numerous well-proven systems of ecological agriculture exist throughout the world, many of them combining the**

**insights of modern holistic science with the wisdom of traditional practices.**

They include:

- \* Permaculture;
- \* No tillage systems of grain cultivation, as developed in Japan;
- \* Conventional organic farming systems;
- \* Bio-intensive agriculture (the "double digging" method);
- \* Bio-dynamic farming;
- \* Sustainable systems using perennial varieties;
- \* Systems employing companion planting; etc.

**Such systems are economically viable and productive:**

- \* In Nepal, the cumulative yield of well-developed permaculture systems are higher than conventional systems;
- \* In California, double-digging systems have been capable of feeding a family of six on a area of 1100 square feet;
- \* In Japan, the yields of rice and wheat under no tillage systems compare with high-tech modern systems.

In addition, because their success depends in large part on co-operation at the farm level and beyond, such systems have the potential to provide individual farmers and their families with a cohesive and supportive community. **This will however depend critically on addressing the wider social, economic and political forces that underlie hunger.** One should not forget that the slave plantations of the past used non-chemical systems of agriculture.

## STRATEGIES

**11. A coordinated strategy is thus required, the broad features of which would include:**

- \* Reviving the holistic practices that ensured the durability and success of traditional systems of agriculture instead of resource-intensive, capital-intensive and chemical-intensive agriculture;
- \* A move towards political, economic and social structures that empower local communities and foster greater local self-determination in place of structures that place decision-making in the hands of central governments and international agencies;
- \* A move towards policies that put the satisfaction of local needs first and away from export-oriented development policies;
- \* A move towards trading patterns that encourage local self-reliance through the strengthening of local markets instead of patterns that favour the developed countries at the expense of the poor, and which are dominated by international corporations and Northern governments;
- \* A move towards policies that give priority to fostering social and ecological security instead of economic policies that promote growth through increased output and consumption, regardless of environmental and social costs;

- \* A move towards lifestyles that are consistent with the development of sustainable livelihoods throughout the globe, and the satisfaction of the ecological, spiritual, social and aesthetic needs of people everywhere, and away from consumer-oriented lifestyles that encourage overconsumption and the waste of resources, primarily for the benefit of the world's privileged groups.

**Specifically such a strategy will require action at the national level:**

- \* To work out a comprehensive plan of action that having the features mentioned above, leads the way to an ecological way for agricultural production, and accommodates different local priorities and possibilities. This plan must lead to policies that are genuinely rooted in Third World practices and insights;
- \* To halt those projects and programmes at present in the planning stage which would set existing traditional agricultural communities on the path to chemical- and resource-intensive agriculture, or which would further tighten the grip of such agriculture on rural communities;
- \* To empower local peoples with the right to a decisive voice in formulating policies for their areas;
- \* To achieve land security for rural peoples, both through revising land tenure legislation and through land reform;
- \* To regenerate degraded lands, through the agency of local peoples, with the aim of restoring those ecological processes that ensure biological diversity, soil fertility, water availability, water purity and climatic stability, and of providing local people with biomass for fodder and compostable materials;
- \* To ensure that the price of energy-intensive chemical

inputs accurately reflects their environmental and social costs, thus encouraging their phasing out;

- \* To curtail those subsidies which encourage the continuation of chemical- and resource-intensive modern agriculture, as well as those promoting an agribusiness-oriented economy which is the main cause of export dumping;
- \* To remove the subsidies, both direct and indirect, on non-organic produce in order to enable organic produce to compete in the market place.

**At the farm and community level, action is required:**

- \* To make available the range of seed and seedlings preferred by farm families, many of which are now not easily available;
- \* To provide subsidies, for a few years, to enable farmers to wean their land off chemicals and to revitalize the soil;
- \* To provide support to enable farmers to exchange information and experience.

**A UNITED MOVEMENT**

**12. To implement the changes necessary to avert disaster, it is vital both to strengthen and expand those existing movements that share our concerns and support the broad goals of the policies outlined above.**

To that end, we are seeking the co-operation of such movements in establishing a global alliance for ecological agriculture to build up the popular base through which change will eventually be achieved.

This statement has been endorsed by the following groups. Should any other groups wish to endorse it, they should contact the International Movement for Ecological Agriculture, 87 Cantonment Road, 10250 Penang, Malaysia.

Land's Movement Institute, IBIRAPITA, Uruguay  
 Appropriate Technology Association (ATA), Thailand.  
 BUKO — agrar, Germany  
 People's Action Network to Monitor Japanese TNCs, Japan.  
 Center for Alternative Development Initiatives (CADI), Philippines  
 Community Development, Bangladesh.  
 Gen-Ethisches Network, Germany  
 Japan Tropical Forest Action Network (JATAN), Japan.  
 Local Initiatives in Science and Technology (LIST), Philippines  
 National Federation of Farmers' Union, Japan.  
 Indian Institute of Management, India  
 The Ecologist, UK.  
 Ecoropa, France  
 Sri Lanka Environment Congress, Sri Lanka.  
 Project for Ecological Recovery (PER), Thailand  
 Institute for Sustainable Agriculture Nepal (INSAN), Nepal.  
 The Development GAP, USA  
 Asia Pacific Peoples' Environment Network (APPEN), Malaysia.

Third World Network  
 IBASE, Brazil.  
 Bank Information Centre, USA  
 Research Foundation for Science and Ecology, India.  
 Amigos da Terra, Brazil  
 Union for Natural Environment Protection (UPAN), Brazil  
 Energy Environment Group, India  
 Lumad Mindanao, Philippines  
 Die Grünen/Buchnis 90, Germany  
 Lawyers for Human Rights and Development, Sri Lanka  
 National Development Foundation, Sri Lanka  
 Rural Women's Organizations Network, Sri Lanka  
 Alternativa Verda, Catalonia  
 Promundo International, Argentina  
 Sheikh Baddin Welfare Organization, Pakistan  
 Service Civil International, Bangladesh  
 CODECAL, Colombia  
 Organization of Rural Associations for Progress (ORAP), Zimbabwe  
 Sahabat Alam Malaysia (SAM), Malaysia  
 ORIENT, Sierra Leone

# Classified

## PUBLICATIONS

WORLDWATCH PAPER SERIES. Recently published in this series—No. 98. Alternatives to the Automobile: Transport for Livable Cities. No. 99. Green Revolutions: Environmental Reconstruction in Eastern Europe and the Soviet Union. No. 100. Beyond the Petroleum Age: Designing a Solar Economy. No. 101. Discarding the Throwaway Society. All papers are available for £2.75 each plus 50p p+p from WEC Book Service, Worthyvale Manor, Camelford, Cornwall PL32 9TT.

NEW from the Department  
of the Environment

### The Potential Effects of Climate Change in the United Kingdom

Available now from HMSO  
Bookshops, Agents (see  
Yellow Pages) and through  
all good booksellers at  
£8.50.

ISBN 0 11 752359 3,  
paperback, 124 pages.



## DIARY DATES

IWEM CONFERENCE: Water and the Environment. Held from 30th April to 2nd May 1991 at the International Convention Centre, Birmingham. For further details contact Conference Manager, 15 John Street, London WC1N 2EB. Tel 071 831 3110.

15-19 APRIL 1991 MANAGEMENT OF ENVIRONMENTAL CONFLICTS and Impact Assessment. Module III. This is the last of three meetings at Bologna, Italy. Further information from Secretariat L. Vincenzi, Ervat Spa, Via Morgagni 6, 40122 Bologna, Italy. Tel 051 230567.

INTRODUCTION TO INDUSTRIAL WASTE WATER TREATMENT 4-6 June 1991.

ADVANCED INDUSTRIAL WASTE WATER TREATMENT 18-20 June 1991.

The Centre of Continuing Vocational Education at The University of Sheffield is organising two short courses to deal with the ongoing problems associated with industrial waste water treatment and pollution control. The introductory course is to be held on 4-6 June and is intended for staff with limited knowledge, while the advanced course from 18-20 June is designed as a follow-on, or as a stand-alone course for more experienced staff.

Both courses will cover legal, technical and financial management issues and are suitable for engineering, management and scientific staff. For further information tel 0742-768653.

## MISCELLANEOUS

INSPIRED BY SCOTT PECK? Author of Road Less Travelled/Different Drum. Announcing two community building workshops. London 25/26/27 May, Edinburgh 1/2 June. Enquiries to Wendy Payne, tel 0458-6293.

APPLIED RURAL ALTERNATIVES: FARM WALKS ON "ALTERNATIVE FARMS"! 1991 Programme of visits/events on organic/alternative husbandry, rural/environmental practices and issues obtainable by s.a.e. to ARA, 10 Highfield Close, Wokingham, Berks., RG11 1DG. Also a day on "Green Parenting"!

## HOLIDAYS

SPEYSIDE. Discover the unspoilt countryside of Moray. Fully equipped self-catering accommodation in listed building in quiet rural location. Sleep 6. Tel 03403-355 after 5pm and at weekends.

DORDOGNE. 2 cottages on edge of quiet village, unspoilt wooded country, well equipped, linen and cycles included. Available March to October. Information 0968 60167.

**CLASSIFIED ADVERTS RING: THE ECOLOGIST ON 0840 212711 AND ASK FOR MARIA**

## I N S E A D

Fontainebleau, France

### CALL FOR NOMINATIONS

for the

### SANDOZ CHAIR IN MANAGEMENT AND THE ENVIRONMENT

INSEAD is seeking nominations for the newly established Sandoz Chair in Management and the Environment. Nominees should be distinguished academics with strong research records. They should be able to contribute to INSEAD's growing reputation in this field not only by their own continuing work but as catalysts to stimulate the research and interest of others on the Institute's faculty. Nominations are sought from a variety of disciplines (e.g., economics, environmental science, public policy analysis, organizational behaviour, law, etc.). Applicants should have an international perspective and a keen interest in the managerial relevance of their work.

INSEAD is one of Europe's leading business schools. Its main characteristics are an international outlook, close links with the business community, and a belief in the synergy between research and teaching. Convinced that the roots of excellence in its teaching programmes reside in a base of solid research, the Institute has embarked on an effort to underwrite its research activities with the endowment of a number of chairs, of which the Sandoz Chair in Management and the Environment is the latest. The chair is the result of the school's early recognition of the environment as a crucial issue for the international business community and thus a priority for management education. The Institute is most grateful to Sandoz for recognizing its efforts in this way.

The school's 80 full-time faculty members (representing 24 nationalities) and the 450 MBAs and 2,500 executives attending the school annually from around the world provide an exciting international atmosphere that is ideal for exchanging and testing ideas and for establishing contacts for applied research.

INSEAD is located 60 km south of Paris. The working language is English. Educational programmes exist at the MBA, executive, and PhD levels.

Nominations and applications should include a curriculum vitae and three references. Nominations or requests for further information should be addressed to:

Prof. H. Landis Gabel, Chairman of the Sandoz Chair Search Committee, INSEAD, Boulevard de Constance, 77305 Fontainebleau Cedex, France.

Fax: 33.1. 6072.4242 Bitnet: "Gabel@FREIBA51"

*A New Book from the Editors of  
The Ecologist*

5000 DAYS  
— TO SAVE —  
THE PLANET



Edward Goldsmith · Nicholas Hildyard  
Peter Bunyard · Patrick McCully

We live in a fragile and beautiful world which we are busy destroying and polluting. If radical action is not taken now, then the future of our planet hangs in the balance.

*5000 Days to Save the Planet* has been written by the editors of *The Ecologist* magazine, one of the oldest and most respected international environmental journals.

Illustrated with 250 stunning photographs, it is a plea on behalf of the planet, an explanation of what humanity is doing to the planet and a manifesto of what needs to be done to save the planet.

Available from WEC Books, Worthyvale Manor, Camelford, Cornwall PL32 9TT, UK.  
Price £17.95/\$35.95. Please add £2 per copy UK and £2.50/\$5 overseas surface p&p.