

INDICATIVE OUTLINES OF THE SUBJECTS SELECTED FOR
DISCUSSION AT THE FIFTYSECOND ANNUAL CONFERENCE
OF THE INDIAN SOCIETY OF AGRICULTURAL ECONOMICS

SUBJECT I

INPUT USE EFFICIENCY IN INDIAN AGRICULTURE

A. Conceptual problems: Factor Productivity, Total factor productivity. problems of Measurement. Efficiency: Concept and measurement. the focus of efficiency may be different from the private use efficiency in those inputs which are highly subsidised, e.g., surface irrigation. Alternative concepts of irrigation efficiency may be evolved/used.

B. Factors influencing input use efficiency

1. Role of complementary and supplementary inputs.
2. Role of Knowledge.
3. Institutional factors: Size of holding, production relations.
4. Extension and input use efficiency.
5. Delivery system: Role of Credit and availability of inputs.
6. Pricing of inputs and output.
7. Risk as a factor affecting use efficiency.

Besides a general discussion on these issues the analysis may focus on two of the critical inputs, viz., Fertilisers and irrigation.

Fertiliser Use Efficiency: Fertiliser use efficiency may be measured in terms of the fertiliser responses generated in a region. The norms for the fertiliser productivity are set by the scientific experiments under controlled conditions (Model Agronomic Trials). However the responses derived from the semi controlled 'Experiments on Cultivators Fields' (ECF) of the All India Coordinated Agronomic Project should better serve as the norm for measuring fertiliser use efficiency under the field conditions. One may analyse the divergence between responses derived under field conditions and those derived either from the Model Agronomic Trials or those derived from ECF. Data from various ICAR research projects including Operational Research Projects and lab to Land programmes; and the Cost of Cultivation surveys besides many state level surveys could be used to answer many of the questions concerning fertiliser use and its efficiency.

Concern has been voiced since the beginning of the eighties that high fertiliser consuming areas of Punjab, Haryana, Coastal Andhra Pradesh and Tamil Nadu are operating at a very low level of fertiliser productivity after reaching saturation in their consumption level. The overall use efficiency could therefore be

increased by shifting the fertiliser consumption pattern to areas of low consumption. This may not have happened and consumption in low consumption areas may have failed to pick up due to lower fertiliser responses even in irrigated conditions. On the other hand, high consumption areas could further expand fertiliser consumption by improving its use efficiency through accumulated knowledge on fertiliser application/package. Analysis in this context may be attempted on estimating (i) Fertiliser responses by crops/varieties under irrigated and unirrigated conditions in different agro-climatic regions and (ii) Factors influencing fertiliser responses. Besides such physical factors as soil, drainage and irrigation conditions, balanced application of fertilisers may be explored.

Manures contribute a sizable proportion of the nutrients' supply in India and are more balanced in its nutrient composition. The extent of complementarity/substitution between manures and chemical fertilisers may be studied.

Shifts in fertiliser response curves over time (trends in use efficiency in different agro-climatic regions, whether increasing, constant or declining). Role of knowledge. Role of Extension Services and Soil Testing facilities in improving fertiliser use efficiency.

Irrigation Efficiency: The Issues related to Irrigation may be addressed at the following levels.

- i. System level - large irrigation systems vs small and medium systems.
 - Gravity flow vs. lift irrigation systems -
The conjunctive use of water
- ii. Conveyance level - Conveyance, distribution and field application efficiencies.
- iii. Farm level: Efficiency issues related to Intensive vs extensive irrigation.
- iv. Distributive Efficiency (Equity) - Trade off between equity and productivity.

SUBJECT II

AGRICULTURAL POLICY IN THE LIGHT OF NEW TRADE AND INDUSTRIAL POLICY

The restructuring process in Indian economy broadly aims at two things; one, gradually opening up the economy both to global challenges as also to market forces at home; and two, restructure the policies that are financially unsustainable without government support. It is against this background that we must

reassess the significance of various policies prevailing in the agricultural sector, and examine the pros and cons of possible alternatives that would be compatible with the new trade and industrial policies. It necessitates an examination of agricultural policy at least on three fronts, and paper writers may keep these issues in mind while writing their papers:

1. The existing trade policy environment in agricultural sector, and its impact on domestic production, prices, farm incomes and investments, on government budgets, Balance of Payment account, etc. (The policy environment may include both domestic and external fronts, with focus on government controls/interventions in terms of monopoly procurement and levies on the one hand and import/export controls, minimum export quotas, minimum export prices, etc., on the other. One may look at these on commodity-specific basis, and even region-specific, depending upon the nature of policies being followed by Government of India.)

2. In the process of restructuring, if the role of government in agricultural trade is limited only to providing support prices and buffer stocking operations, what should be the level of these prices and stocks, and what sort of trade reforms one would like to usher in the agricultural sector? What institutional changes would be necessary for the success of these trade reforms, i.e., what would be the role of institutions like FCI, STC, various Commodity Boards, etc., in this restructuring process? What are the benefits and costs of public distribution system in its present form? Should it continue as it is or be drastically restructured, or even abandoned? What are the likely implications of these on the farm economy in terms of its structure, allocation of resources, growth, cropping patterns, capital formation, etc.? In particular, identification of the commodities that would be able to withstand and prosper in the global/market forces environment, i.e., where do we have comparative advantage so that those commodity sectors can be opened up first, while for others precautionary measures are taken up in advance.

3. Pricing of agricultural inputs, especially fertilisers, canal waters, electricity and credit. It is well known that there are sizable subsidies on these inputs. Interesting questions to explore on this front would be the relative distribution of these subsidies (across states and size-classes of farmers); their incidence, i.e., who finally benefit from these subsidies; their impact on efficiency in resource use, environment, budgetary finances and investment in agriculture; what would happen to growth in agriculture if these inputs are priced to recover their costs and increased resources with Government are ploughed back as direct investments in agricultural research and development, as also in rural infrastructure? What institutional arrangements would be necessary for better cost recovery of these inputs?

These are broadly the thrust areas in agricultural policy that need to be explored with high priority, especially at a time when the Indian economy is passing through a phase of transition. However, it would also be interesting to have papers that spell out the government policies that directly interfere with the farmers' freedom of choice to grow any commodity and thus make the production basket different from what it would be otherwise. The idea behind all these issues is to re-examine the role of the state in the agricultural sector as minutely as possible.

SUBJECT III

TRIBAL AND HILL ECONOMY

1. The tribal economy in India has been studied mainly by administrators, anthropologists and sociologists. While the administrators have described the evolution of institutional arrangements and rights on farm land and forests of the tribals, the anthropologists and sociologists have described and analysed the economic activities of the tribals in their respective ecological settings besides their family and social organisations and mores. These can be good starting points for economists examining tribal economy.

2. Tribals in India live in different ecological settings. Some are in the Himalayan hill ranges, some others in the Nilgiri hill areas. But the bulk lives in the Central Indian belt spreading from the east to the west. These live in different settings; some in hills with reasonable forest covers, other on hills and hill slopes which are to-day largely bare, and still others in settled agriculture in the plains. Some, in arid and semi-arid regions, are essentially dependent on grazing lands, which makes them nomadic in their socio-economic organisation. Differences in ecological setting and resource endowment result in different production organisations, employment patterns and earnings. It would be instructive to have papers relating to the economic organisation, production efficiency, allocation of labour and other resources amongst different productive activities and their rationale, relating to tribal households in one or more ecologically differentiable region. Such analysis may hold out pointers at the directions that policies for reorganisation might usefully take.

3. Shifting cultivation has been very widely practised by the tribals traditionally living in hilly regions with forest cover. The duration of the cycle over which land is first put to cultivation and then left for forest to grow before another round of cultivation starts on it, has become smaller over time. Empirical data for any specific region or village, showing how, over time, the cycle has shortened and the impact of this on productivity of the land, would be instructive. Similarly, it would be useful to know if the crop-pattern or crop-mix in the

shifting cultivation land has changed along with the shortening of the cycle, and, if so, to what effect. Furthermore, time disposition of the tribal household on the shifting cultivation land is necessary to understand what proportion of the total time devoted to such cultivation is during the main cropping season and how much in the non-cropping season for preparation of land for the crop. There may be a lesson there for an approach to wean tribals away from shifting cultivation.

Efforts have been made by state governments since the nineteen fifties to resettle tribals in settled cultivation away from shifting cultivation areas. Most such experiments have largely failed. Systematic examination of such experiments - the failures and the successes - would hold out lessons for the policy makers in this matter.

Attempts may be made to compare the productivity of land and labour in shifting cultivation, with the productivity of similar land put to silviculture like fuelwood, bamboo, timber, etc., and to some horticultural crops. If the latter are demonstrably more productive for the land and labour put in, it would raise questions about the available land with the tribal households, the land that may be or should be made available from the forest/revenue departments and the path to initiating the tribals into such type of plantation farming. Specific case studies would help empirically demonstrate the propositions. In this context, microstudies of successful and unsuccessful 'tree-patta' schemes in case of tribals would be welcome.

4. Any technologically improved crops and cropping practices suitable for tribal agriculture specific to a region, may be examined first on the basis of experimental results and next on the farmers' fields. The extent of their extension and the reasons for success or failure should be gone into.

5. The absence of the minimum infrastructure facility, like all-weather roads and an easily accessible market place is a distinguishing characteristic of many tribal villages compared to others. Comparison of both production pattern as well as prices received for produce sold in such villages with similarly endowed tribal villages having such infrastructure facilities will highlight the importance of such infrastructure facilities.

6. The most important source of exploitation of tribals is not land but marketing of produce and moneylending, the two often going together. Empirical studies showing the prices received by tribal producers for their own farm products as well as the minor forest produce collected by them, in the village or in the nearest 'hat', compared to the price of it in the market towns in a free market situation would be useful in examining the problem.

Many state governments have set up marketing organisations for purchase of tribals' products. Voluntary organisations and self-help groups have also been organising this activity in certain tribal pockets. The comparison of the costs of such marketing organisations including the subsidy, if any, and the returns to the tribal household in these different types of organisations would bring out the sources of strength and weakness of such agencies.

7. Most tribal villages have no proper credit institutions servicing them, except LAMPS in some areas. The effective interest rates charged by the local trader-cum-moneylender, the LAMPS or such other institutions and the local self-help groups or voluntary agencies, wherever functioning, would be necessary to bring out the requirements of successful credit institutions in tribal areas.

8. Certain tribal groups depend on animal husbandry, in which the animals are taken out for grazing over vast areas, leading to a nomadic existence. Their economy is different, and deserves separate analysis.

9. While in many parts of the Central tribal belt of India, land, whether legally or illegally, is under individual (or family) ownership/occupation, in the north-eastern region communal (village) ownership of land is still the system. A careful examination of the method of allocation of land to the village households, the nature and extent of investment in land, the pattern of technological improvement in the use of the household cultivated and the communally operated lands for crops and/or forest, requires serious attention. Empirical assessment of the strengths and weaknesses of such organisation should lead to propositions about improvements in it.

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BOOK REVIEW

World Hunger

by Porus Olpadwala

An End To Hunger? The Social Origins of Food Strategies

by Solon L. Barracrough

Zed Books Ltd. pp 284.

ISBN 0-86232-992-2 and 0-86232-993-0 pbk

Published November 1991

It is a sad reality that overwhelming numbers of people regularly go hungry in a world of agricultural abundance. The problem persists despite more than three decades of concerted efforts by countless highly knowledgeable, well trained, reasonably well financed, and exceedingly dedicated professionals from all over the world. Indeed, the Institute on Hunger and Development (Bread for the World) estimates in its *State of World Hunger* report for 1992 that "there are more hungry people in the world than ever before."

Who amongst us has not wondered about the reasons for such a calamity? And yet, genuinely satisfactory explanations are hard to find. Human destruction of such immense proportions necessarily has many causes. They stem partly from societal arrangements, partly from the natural world. They relate to a host of scientific disciplines. They occur singly and jointly. They arise within the boundaries of the societies concerned, and are imposed or influenced from outside. They vary with geography and with time. They are often closely tied to politics, and thus prone to ideological interpretation and

obfuscation. Sorting them out is a complicated task.

An End To Hunger? is a long overdue exception. It is the intellectual culmination of a lifetime of work on food and development. What Barracrough modestly terms his "biases" in the Preface are in reality the

impressive credentials of an agriculturist, activist, international civil servant, scholar, and above all, humanist.

Roots of Hunger

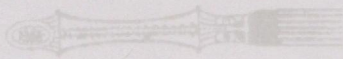
Barracrough argues that the problem of world hunger has two roots. One is the failure of public policy; the other, the destructive effect of regressive social structures. These twin shortcomings are present in both the Third World and in the Industrialized Countries. Detrimental policy and stifling social structures are not confined to agriculture and rural areas only, but extend to all parts of the national economy, including the urban-industrial sector, and international trade.

This deadly mixture of failed policies and biased social structure ensures the food insecurity of billions of people. Investments are diverted to non-priority and luxury expenditures in both the countryside and in cities (p. 34). Agricultural production is shifted to cash and export crops, instead of food crops (pp. 31-33, 239). Food crops, when grown, are often given over to animal feed and other non-human consumption. Business and public benefits are cornered and co-opted by

the privileged classes (pp. 30, 70). The rural poor are physically and psychologically brutalized.

Barracrough argues that the most important way to reduce hunger and food insecurity is to enlarge the numbers of people who are in control of their own economic destiny. This requires raising the levels of genuine participation in society, particularly amongst the least-privileged. The main barriers to this are found in social structure rather than in faulty policy. Eliminating or reducing structural roadblocks almost always involves some measure of agrarian reform, including changes in land tenure, although it may not be limited to that. Where land has been distributed more equitably, improvements have followed in food security and general physical well-being.

This is a complex argument, with many intricate weaves. Barracrough uses repetition effectively in making it. The theme is conveyed three times, in three successive sections of the book, each time with more information, detail and insight. Part One looks at food security issues through the lens of different types of agricultural production systems (which helpfully turn out to be geographically discrete as well). There is a chapter each on bi-modal agrarian structures (mainly Latin America), on communal land tenure systems (mostly Africa), on small-cultivator agrarian structures (Asia, mainly on the Indian subcontinent), and on China. Part Two has five chapters on national food strategy, such as policies for increasing production, improving distribution, and providing food security for



and open markets match with its own long history of subsidization and protection of agriculture (p. 74)? "What are the consequences for developing countries of the strangling presence of oligopoly in agricultural commodity trade, where "(t)ransnational corporations controlled two-thirds of world trade . . . in the early 1980s" (p. 200), or of the "unstable world monetary system," which keeps the Third World at a disadvantage no matter how good their foreign exchange technicians (p. 200)?

If improper policy were all that was at fault, the tragedy would be neither so large nor so persistent. Sooner or later most policy makers would be redeemed into the correct way of seeing and doing things. Unfortunately, policies are dependent upon, and subject to, the workings of deeper structural forces, substantially related to skewed asset and income distributions. For example, India has more than seventy percent of its population in the countryside, and half of it is landless. Needless to say, these lives are extremely tenuous. Further, even many of the people who own land are not much better off because it is not adequate in size and quality.

Role of Land Reform

A few countries have managed to break their structural constraints through agrarian reform. This is one of Barraclough's professional specializations, and Chapter 4 ("The Role of Agrarian Reform") is an excellent survey of land reform in some three dozen countries in Latin America, Africa and Asia. Not all were equally successful. Indeed, Barraclough singles out only six as being particularly effective in increasing the food security of the rural poor (China, North and South Korea, Taiwan, Cuba and Nicaragua). The Mexican and Bolivian reforms were effective "for a few decades" only, some of the others for even shorter periods (p. 250). Some movements changed the distribution of land only (Mexico, Bolivia), while others tried also to change property relations (mainly China and Cuba). The relative success of all depended upon the seriousness with

which they were pursued, and the "national and global processes of which [they were] only a small part" (p. 133).

Barraclough spares no one in this searching analysis of policy and structure. "Soft" do-gooders of whatever ideological variant are forced to confront the harsh and disciplining presence of economic laws, including the unavoidable necessity for economic growth. Es-

. . . policies are dependent upon, and subject to, the workings of deeper structural forces, substantially related to skewed asset and income distributions.

tablishment economists are upbraided and upended repeatedly in a series of crisp rebuttals of their favorite shibboleths (e.g., the popular doctrine of 'getting prices right' on page 80, and the various development "dilemmas" of pages 246 through 254). Uncritical proselytizers of the developmental methods of the currently Industrialized Countries are reminded at every turn of the vast differences between them and the Third World, in particular the unique and unreplicable advantages of many of the former. Analysts of more radical persuasion are brought to earth by practical accounts of miserable failures in attempts at food security even after revolutionary struggle and structural change. The short-term mentality, greed, and corruption of the private sector are exposed. So too are the ineptitude, sluggishness and corruption of the public sector. National and international bureaucracies are critiqued.

Why cannot more be done to stem the hunger on a purely humanitarian basis, even as we sort out its complex roots? We know the places where people are at risk. The food exists, and is often available nearby. We have the means to convey it. What holds back the effort to cut drastically the numbers of hungry people worldwide?

Barraclough offers political and techno-economic reasons. Much of the purpose of food aid has been and continues to be "strictly political" (p. 217). This reality is now so well established that it

brooks no argument, even from the aid-givers. Probably the most recent example is a speech given at the United Nations on September 21 this year by President Bush in which he categorized his own Agency for International Development as "a weapon in the Cold War." (For partisan and historical balance, here is a quote from — then soon to be —

President John F. Kennedy: "I would like to cut out foreign aid, it is unpopular. But this is a method by which the United States maintains a position of influence and control around the world . . ." N.Y. Herald Tribune, August 10, 1960). Politics therefore play a crucial role in this catastrophe.

On the economic side, the food aid process is as much driven by supply (the endemic surpluses that the book notes) as by demand. Since it serves the giver at least as much as the receiver, both the composition and the timing of the assistance are far from ideal. The composition is determined substantially by the donor's agricultural needs. Barraclough recalls instructions to him as an USAID official in 1958: "We should do everything possible to promote agricultural exports and to avoid encouraging local production that would directly compete with them" (p. 218-9). These goals are well-documented and apparently were achieved.

Food as a Commodity

Property rights are an important aspect of all societies. It matters very much who owns and controls the productive resources, in which way, and on what basis. It also matters for what purpose the assets are used. For example, in our own time, productive resources tend to be owned privately, and deployed for personal profit and unlimited individual accumulation. The rural and agricultural sector conforms to this arrangement in



the majority of places, though the commoditization of food is clearly much more advanced in the Industrialized Countries.

Making food a commodity like any other has had important consequences, both positive and negative. On the production side, a very big plus is the increased productivity and output of the sort associated with the Green Revolution. However, these gains often come at the cost of an overly intensive and wasteful use of farm inputs, especially scarce energy and water resources. Also, this method of production tends to reduce farm employment, destroy the land physically, and encourage concentration in ownership. These outcomes have been observed in both Industrialized and Third World countries. On the consumption side, the transformation of food into a commodity converts what was once an essentially social link between an important human need and its fulfillment, into a commercial one. One result has been that even the richest countries have never fully solved the problem of hunger; indeed, it is once again a serious and grow-

ing menace in many parts of the West. In the poor nations, this set of arrangements helps to keep in place the ironic situation questioned by Pierre Spitz, another UNRISD researcher, in the *International Social Science Journal* in 1978: "How is it that... the men and women who sowed the seeds, harvested the crops and minded the herds have perished for lack of food? How is it that they died of hunger in those parts of the world, whereas most of the people who do not produce foodstuffs were spared?"

Some Shortcomings

The book's major shortcoming is that it does not deal explicitly with such systemic influences, even though it touches upon them throughout. Indeed, Barraclough goes to the other extreme and eschews questions of private versus public property, market forces versus central planning, and capitalism versus socialism as "grossly misleading simplifications" (p.9), relegating them to the status of "pseudo-dilemmas" (pp.255-259). Here he does the wrong thing for the right reason. It is true, as he says, that

most societies are a mixture of private and public, of markets and planning, and that, as far as food security is concerned, differing combinations of all these attributes have been present in successful and unsuccessful countries. It is also true that there are very few, if any, clear variants of one or the other social system or mode of production (essentially capitalism and socialism in our day and age). And there is no doubt either that many debates formulated in these terms tend to be trite and dogmatic. But none of this is reason to warrant dismissing the distinctions themselves as spurious.

It is clear from Barraclough's treatment of the topic that the answer to the question posed in his title is a resounding no, at least for the indefinite future. It is a pity that he does not state as much clearly and unequivocally somewhere in the book.

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MESSAGE:

I enclose some materials which I hope you will find useful. These were prepared in connection with the International Conference on Nutrition in Rome.

Best personal regards.

B

Enclosures:

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MALNUTRITION INCREASING AMONG CHILDREN WORLDWIDE

Future Food Security at Risk for Developing Countries

ROME -- While the percentage of malnourished people in the world has dropped since the severe food shortages of the 1970s, the number of children suffering from malnutrition increased by 22 million in just 15 years, according to the director of a Washington, D.C.-based institute that studies food policy and agricultural development. He also projected new food shortages for the developing world by the end of this decade, and warned of a global food crisis if governments fail to invest in agricultural research and development.

The announcement from Dr. Per Pinstrup-Andersen, director general of the International Food Policy Research Institute (IFPRI), came in a speech at the U.N.-sponsored International Conference on Nutrition being held this week in Rome. Pinstrup-Andersen represented a consortium of 18 agricultural research centers worldwide known as the Consultative Group on International Agricultural Research (CGIAR).

Citing data from the World Health Organization and the Food and Agriculture Organization of the United Nations, Pinstrup-Andersen said that the number of malnourished children worldwide increased from 166 million in 1975 to 188 million in 1990. Even under the most optimistic projections, he said, the number of malnourished children would far exceed the targets set by the 1990 World Summit for Children and adopted by the International Conference on Nutrition.

The summit's goal was to reduce malnutrition among children by 50 percent by the year 2000.

"Children are extremely vulnerable to life-threatening diseases during the early years of their life. Bringing them into the world without adequate nutrition is like throwing them into a lion's den," said Pinstrup-Andersen. "Never has the world had so many well-fed adults and so many malnourished children at the same time. While we expect the prevalence of malnutrition overall to continue to decline, the number of malnourished children will increase, particularly in South Asia and Sub-Saharan Africa."

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Poor health care and a high rate of infectious diseases among children in developing countries contribute to child malnutrition, he said, because sick children cannot absorb adequate nutrients from the food they eat. He called for targeted health, education, and food programs to improve child nutrition.

Pinstrup-Andersen also projected a shortfall of 88 million tons in the amount of food available to the developing world by the end of the decade. As population growth outstrips food production in the developing world, he said, Africa will be particularly hard hit. Only Asia would see a food surplus, with an estimated 36 million tons in excess of its needs.

Declining investments in agricultural research and development--by both developed and developing countries--threaten the gains made in the agricultural "green revolution" of the 1960s and 70s that saved millions from starvation through scientifically improved crops, according to Pinstrup-Andersen. The growth of food production in many developing countries has slowed in the last decade.

"Food crops must increase by at least 40 percent in the next 20 years to keep up with demand," he said. "That will take major new investments in research and development, and new foresight on the part of policymakers in developed and developing countries."

"The world has become complacent about food. Governments tend to focus too much on short-lived crises while ignoring the long-term dangers to global food security," Pinstrup-Andersen said. "If we continue the current trend of reducing investment in agriculture, the global food situation is headed for disaster. There's no question about it."

Agriculture is the basis of the economy in most developing countries. Increasing agricultural production creates employment, which raises incomes of farmers and agricultural workers. Agricultural research has also produced technology that reduces the cost of producing food--a crucial development for the world's poor, who spend up to 80 percent of their income on food. As food prices drop, poor people have more money to spend on health care and other necessities.

Technological advances in agriculture have developed high-yielding strains of important food crops that flourish in poor soils and contain natural resistance to pests and disease. The result has been less pollution by agricultural chemicals and less pressure on sensitive environments in the developing world.

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Pinstrup-Andersen called for a new international approach to combatting starvation that combines investments in agriculture, nutrition and health care. In addition to renewed attention to agriculture by developing countries, he also envisioned a cooperative international research effort to develop new agricultural technologies and deliver them to farmers in the field.

IFPRI was established in 1975 to identify and analyze policies for meeting food needs of the developing world. IFPRI conducts research on ways to achieve sustainable food production, improve nutrition and income levels of the poor, enhance the links between agriculture and other sectors of the economy, and improve trade and macroeconomic conditions. It is a member of the CGIAR, an association of some 40 countries, international and regional organizations, and foundations, whose mission is to increase world food supply.

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DECEMBER 1992

The world's approach to the problems of hunger and malnutrition is very shortsighted. Governments and individuals tend to focus on crises at specific places and times rather than on the persistence of hunger in many parts of the globe.

In the mid-1970s, there were severe food shortages around the world, and famines plagued Sub-Saharan Africa. The developed world responded by increasing financial support for agricultural research and food shipments. But few developing-country governments acted to establish necessary policies to deal with future famines. These policies include incentives to expand production of subsistence and commercial food crops, improvement of rural infrastructure through job programs, and provision of basic health and sanitation services.

In the 1980s, agricultural aid was declining and African governments were again facing famine conditions. Not surprisingly, the 1992 crises in southern Africa have found some African countries less prepared and poor families more vulnerable to hunger and malnutrition than during the 1980s, while development and agricultural aid continue to decline.

Although notable progress has been made in reducing world malnutrition—the Food and Agriculture Organization of the United Nations and the World Health Organization find that the proportion of malnourished families in developing countries has actually decreased from 36 to 20 percent—research conducted at the International Food Policy Research Institute finds that the number of malnourished (underweight) children throughout the developing regions of the world increased from 166 million to 188 million between 1975 and 1990. Projections to the year 2000 suggest that although the prevalence of malnutrition will probably continue to decline world-

wide, the number of malnourished children will increase—particularly in Sub-Saharan Africa and South Asia.

Never has the world had so many well-fed people and so many malnourished children at the same time.

LOOMING CHALLENGES

Emerging problems pose substantial new risks to the nutritional well-being of families in developing countries.

Population growth. In the next two decades, two billion more persons—the equivalent of two Chinas—will be added to the world population. It will be the largest population increase ever during a 20-year period and will put extreme pressure on developing countries, where birthrates are generally high and resources stretched most thinly.

Limited farming land. Expanding food production by putting more land under cultivation has nearly reached its limit. Too much marginal land is already being cropped at the expense of the environment and the natural resource base. The impact of population on land resources is also taking its toll. The amount of cropland per person worldwide dropped 25 percent between 1950 and 1975, and will likely drop another 15 percent by the turn of the century. The loss of arable land through desertification each year is 6 million hectares, with another 400,000 hectares lost to waterlogging and salinity.

Technology development. Growth of food production in many developing countries slowed in the last decade. Developing countries produce three to four times as much food today as they did in 1950, but food-crop yields per hectare must increase by at least 40 percent in the next 20 years if the current level of food availability, unsatisfactory as it may be, is to be maintained. Given the current

trends, developing countries will be unable to meet the predicted demand over the next two decades. And the technologies necessary to increase and sustain food production will also have to preserve the natural resource base.

Urbanization. Unprecedented urban growth, especially in Africa, has increased the need for substantial investment in infrastructure, marketing, and processing facilities. At the same time, food quality and food safety concerns for the urban poor are growing due to increased crowding and deteriorating urban services in megacities.

SOLUTIONS

Meeting long-term food and nutrition goals and eliminating short-term crises will require:

1. A new approach that combines agriculture, nutrition, and health objectives in order to eliminate starvation and death caused by famine, accelerate reduction of severe energy and protein malnutrition, and eliminate severe vitamin and micronutrient deficiencies.

2. A new or renewed attention to agriculture by developing countries. This will be essential to provide the needed food and to

stimulate the employment and incomes necessary for equitable economic growth.

3. Stimulation of sustainable agricultural growth through a cooperative national and international research effort to develop new technologies, and the development of extension programs to transfer results to farmers.

4. Provision of more education programs, especially for women, and access to health services.

The International Conference on Nutrition (ICN) underscores the importance of this approach. The governments represented at ICN can create the momentum to achieve these goals through effective follow-up after the conference. In developing countries, nutrition objectives must be incorporated into food and development policies as part of broad-based economic and political reforms.

Eliminating hunger and malnutrition in the developing world is a long-term effort that links agricultural and health objectives to ensure food security and the alleviation of poverty. Trying to solve the problem by tackling these issues separately or in the short run will lead to the repetition of past mistakes.

DECEMBER 1992

Doomsday scenarios about population growth have been popular fare for the nearly 200 years since British economist Thomas Malthus's prediction that population would always tend to exceed the growth of food production and would be checked only by famine, war, and disease.

Although world population has continued to wax through the 1970s, 1980s, and into the 1990s, food output has kept pace with total need since the 1960s, with the exception of pockets of famine and starvation.

That most of today's five billion persons have escaped famine is credited in large part to the green revolution of the 1960s and 1970s and economic development in poor countries.

From the scientific work at the International Rice Research Institute (IRRI) in the Philippines and at the International Maize and Wheat Improvement Center (CIMMYT) in Mexico came new high-yielding varieties of rice and wheat that erased the specter of hunger in Asia, Latin America, and the Middle East. These centers became the foundation of the Consultative Group on International Agricultural Research (CGIAR), an association of 18 international research centers and 40 countries and global and regional organizations working to increase sustainable food production.

The green revolution continued as the CGIAR expanded research to cassava, maize, and wheat in the humid tropics of Africa; beans, cassava, and rice in the acid savanna areas of Latin America; cereals (sorghum and millet) and grain legumes (chick peas and pigeon peas) in the semiarid tropics of Asia and Africa; and potatoes in all regions of the developing world. During this period research was added on animals in agriculture.

Recognizing that the problem was more than increasing food supplies and developing better seeds and farming systems, the CGIAR added research on policies to promote agricultural growth and a center to assist national agricultural research institutions. A center was also added

to preserve biodiversity through fostering collection and conservation of plant varieties.

For almost all developing countries, agriculture is the basis of the economy. Bolstering agricultural production creates employment, which raises incomes of farmers and agricultural workers. Increased incomes foster food security as families are able to purchase what they need. Through the promotion of agriculture comes better nutrition.

As a result of the work of the CGIAR system, many poor developing countries, despite population growth, succeeded in cutting their food deficits or achieved surpluses—thereby reducing poverty by increasing productivity, raising farm family incomes, and lowering prices to consumers.

Since the late 1960s, cereal prices have continuously declined in developing countries, thus boosting the buying power of the poor, who spend up to 80 percent of their incomes on food. The resulting improvements in nutrition and health are perhaps among the most tangible benefits the CGIAR system has brought to the poorest.

CONTINUING ROLE FOR AGRICULTURAL RESEARCH

As developing countries have continued to expand their food supplies, new issues have emerged. Despite lower prices and greater availability of food, hunger has not been conquered. In the world today, between 700 million and 1 billion people are hungry. It is clear that

Adequate food supplies on a national level do not necessarily translate into adequate food for families. In countries where food supplies are sufficient to meet needs, it is not uncommon to have as much as 30 percent of the population getting only 80 percent of the calories necessary for a healthy life. Although enough food may be available, the poor may not have the income to purchase what they need.

- Adequate family food supplies do not always mean adequate food is made available to individual family members. How much food different members of the family receive often varies according to who is earning the family income, age, sex, order of birth, and other sociocultural factors. In the cultures of some South Asian countries, such as Pakistan and Bangladesh, boys tend to receive more food than girls. As in many developing countries, women and children in Bangladesh consume a disproportionately small share of available calories in comparison with adult males.
- Having enough to eat in terms of calories alone does not mean that individuals will not suffer from malnutrition. If malnutrition is to be avoided, diets must also contain vitamins and minerals. Studies by the International Food Policy Research Institute (IFPRI) have shown a strong correlation between vitamin A and health. The more vitamin A was consumed, the lower the rate of sickness among children.

Health is another factor affecting malnutrition. Research has found that individuals who are sick cannot adequately absorb nutrients. Solving the problem of malnutrition requires work not only in the areas of food and nutrition, but in health, sanitation, and education.

Agricultural practices themselves have been linked to health problems. Lessons have been learned about the negative effects of irrigation, pesticides, and fertilizers on the health of farmers and their families. This has led to research efforts in safe, alternative pest-control practices and techniques to increase soil productivity without chemicals.

New pest-management practices, including cultivation of a pest-resistant potato, have been developed by the International Potato Center (CIP) in Peru. Among the world's major food crops, potatoes require the heaviest application of pesticides. High insect resistance of the new potato and successful introduction of parasites of insect pests, such as tiny wasps and bacteria, are helping farmers to grow potatoes with fewer toxic chemicals.

Scientists at the International Institute for Tropical Agriculture (IITA) have neutralized a

pest of cassava, the mealybug, by finding a predator wasp and establishing it across the African cassava belt. An economist has calculated that for every dollar spent in the mealybug control program, African farmers have reaped US\$149 in increased food production.

At IIRRI, scientists and their national collaborators are studying the effects of pesticide use on farmers and their families. They have found that farmers face chronic health effects due to prolonged exposure to pesticides. Research at IIRRI suggests that integrated pest-management techniques not only reduce pesticide use, they make better economic sense as well.

More than 70 percent of the world's irrigated cropland is in developing countries. Poorly managed irrigation can affect farmers' health through the spread of epidemics caused by waterborne pests and diseases. Research at the International Irrigation Management Institute (IIMI) in Sri Lanka has found that managing these irrigation systems properly can not only increase crop yields in irrigated areas but can greatly improve health.

Global food security today is in a precarious condition. A doubling of world population in the next 40 years will put extreme pressure on developing countries, where birthrates are high and resources are low.

One of the challenges extending into the twenty-first century will be to safeguard the green revolution gains already made and extend its benefits to new areas and farming systems. Another will be to look beyond supply to the links between diet quality, health, and nutrition.

The CGIAR has recognized the complexity of these challenges. Recent additions to the mandate of the CGIAR system include research on banana and plantain, aquaculture, agroforestry, and forestry.

Meeting the food demands of the developing world requires not only producing more food by generating economic growth but doing so in a manner that maintains the natural resource base. This will require increasing the biological control of pests, finding better agronomic methods of farming to reduce soil erosion, advancing biotechnology, and better understanding the socioeconomic links between poverty and natural resource management.

DECEMBER 1992

The Food and Agriculture Organization of the United Nations (FAO) estimates that in the early 1970s, 36 percent of the world's population did not eat enough food to lead a healthy life. Despite rising population levels, the figure dropped to 20 percent in 1990.

Likewise, between 1975 and 1990, the number of malnourished children aged four or younger declined in Southeast Asia and Latin America. However, in Sub-Saharan Africa the number rose from 18 to 30 million, and in South Asia, consisting of India, Pakistan, Sri Lanka, Bangladesh, and Nepal, the number increased from 90 to 101 million.

The percentage of malnourished children declined in all Third World regions except Sub-Saharan Africa. But projections to the year 2000 suggest that while the prevalence of malnutrition will probably go down overall, the number of children who are underweight for their age will increase, particularly in Sub-Saharan Africa and South Asia.

In an effort to map future trends in the prevalence of malnutrition in children to the

year 2000, analysts used optimistic and pessimistic projections based on historical trends. These were compared with the goals set at the 1990 World Summit for Children, and adopted by the International Conference on Nutrition, of reducing by half the prevalence of malnutrition by year 2000 (Table 1). They do not account for possible breakthroughs in food production or for disasters such as uncontrolled spread of AIDS.

For South Asia, the optimistic scenario predicts there would be only a 9 percent reduction in the number of malnourished children by 2000—to 49 percent. The World Summit goal for South Asia is 20 points lower at 29 percent.

The optimistic scenario suggests that Southeast Asia is likely to be closer to the summit goals than South Asia. In both the optimistic and pessimistic scenarios for Southeast Asia, the numbers of underweight children will decline in the year 2000—a continuation of a 15-year trend.

In three regions—the Near East and North

Table 1—Projections of malnourished children by region, 2000

Region	Pessimistic Scenario	Optimistic Scenario (millions)	Target*
Sub-Saharan Africa	38	30	18
Near East/North Africa	5	3	2
South Asia	110	100	59
Southeast Asia	17	15	11
China	30	24	15
Middle America/Caribbean	4	2	2
South America	2	1	1

Source: Marito Garcia, IFPRI/ACC-SCN, 1992.

* Goals of the 1990 World Summit for Children and the International Conference on Nutrition.

CGIAR CENTERS

- CIAT**—Centro Internacional de Agricultura Tropical, Apartado Aéreo 6713, Cali, Colombia. Founded 1967. Focus on crop improvement and ecoregional approaches to developing agriculture in the lowland tropics of Latin America. Research covers rice, beans, cassava, forages, and pasture.
- CIFOR**—Center for International Forestry Research, Bogor, Indonesia. Founded 1992. Focus on forestry policy research in Asia, with some work in Latin America. Collaborates with ICRAF on some projects.
- CIMMYT**—Centro Internacional de Mejoramiento de Maíz y Trigo, P.O. Box 6-641, Mexico 06600, D.F. Mexico. Founded 1966. Focus on crop improvement. Research covers maize, wheat, barley, and triticale.
- CIP**—Centro Internacional de la Papa, Apartado 5969, Lima, Peru. Founded 1971. Focus on potato and sweet potato improvement; special attention paid to ecoregional aspects of mountain area agriculture.
- IBPGR**—International Board for Plant Genetic Resources, Via delle Sette Chiese, 142, 00145 Rome, Italy. Founded 1976. Focus on conserving gene pools of current and potential crops and forages.
- ICARDA**—International Center for Agricultural Research in the Dry Areas, P.O. Box 5466, Aleppo, Syria. Founded 1976. Focus on improving farming systems for North Africa and West Asia. Research covers wheat, barley, chick pea, lentils, pasture legumes, and small ruminants.
- ICLARM**—International Center for Living Aquatic Resources Management, MC P.O. Box 1501, Makati, Metro Manila, The Philippines. Founded 1977. Focus on research on all aspects of fisheries to improve efficiency and productivity of culture and capture fisheries.
- ICRAF**—International Centre for Research in Agroforestry, P.O. Box 30677, Nairobi, Kenya. Founded 1977. Focus on initiating and supporting research on integrating trees in land use systems in developing countries.
- ICRISAT**—International Crops Research Institute for the Semi-Arid Tropics, Patancheru P.O., Andhra Pradesh 502 324, India. Founded 1972. Focus on crop improvement; cropping systems. Research covers sorghum, millet, chick pea, pigeon pea, and groundnut.
- IFPRI**—International Food Policy Research Institute, 1200 17th Street, N.W., Washington, D.C., 10036-3006, U.S.A. Founded in 1975. Focus on food policy and socioeconomic research related to agricultural development. Provides policy research and institution-building assistance to developing countries.
- IIMI**—International Irrigation Management Institute, P.O. Box 2075, Colombo, Sri Lanka. Founded in 1984. Focus on performance of irrigation in developing countries. Research covers institutional conditions for managing irrigation systems and facilities; management of water resources, irrigation support to farmers.
- IITA**—International Institute of Tropical Agriculture, PMB 5320, Ibadan, Nigeria. Founded 1967. Focus on crop improvement and land management in humid and subhumid tropics; farming systems. Research covers maize, cassava, cowpea, plantain, soybean, rice, and yam.
- ILCA**—International Livestock Centre for Africa, P.O. Box 5689, Addis Ababa, Ethiopia. Founded 1974. Focus on farming systems to identify livestock production and marketing constraints in Sub-Saharan Africa. Research covers ruminants, livestock, and forages.
- ILRAD**—International Laboratory for Research on Animal Diseases, P.O. Box 30709, Nairobi, Kenya. Founded 1974. Focus on control of major livestock diseases in Sub-Saharan Africa. Research covers theileriosis (East Coast fever) and African animal trypanosomiasis.
- INIBAP**—International Network for the Improvement of Banana and Plantain, Parc Scientifique Agropolis, 34397 Montpellier Cedex 5, France. Founded in 1984. Focus on production on small-holdings. Documentation and information related to Musa varieties. Research covers germplasm exchange and breeding, testing, and pathology research.
- IRRI**—International Rice Research Institute, P.O. Box 933, Manila, The Philippines. Founded 1960. Focus on global rice improvement.
- ISNAR**—International Service for National Agricultural Research, P.O. Box 93376, 2509 AJ, The Hague, Netherlands. Founded 1978. Focus on strengthening and developing national agricultural research systems.
- WARDA**—West Africa Rice Development Association, 01 B.P. 2551, Bouake 01, Côte d'Ivoire. Founded 1971. Focus on rice improvement in West Africa. Research covers rice in mangrove swamps, inland swamps, upland conditions, and irrigated conditions.

	(1) **	(2) **	(3) **	(4)	(5)	(6) **	(7) **
	D	D	D	D	D	D	D
[TB 13]	TABLE 13 : FOOD SECURITY						
	Food production per capita index (1979-81=100)	Daily calorie supply per capita	Daily calorie supply per capita (as % of requirements)	Food import dependency ratio (%)	Cereal imports (1,000 metric tons)	Food aid in cereals (1,000 metric tons)	
HDI RANK	1988-90	1988-90	1988-90	1969-71 1988-88	1990	1989-90	
High human development							
1 Canada	108	3,242	122	.. ..	840	..	
2 Japan	101	2,921	125	.. ..	27,008	..	
3 Norway	100	3,221	120	.. ..	379	..	
4 Switzerland	101	3,508	130	.. ..	450	..	
5 Sweden	99	2,978	111	.. ..	116	..	
6 USA	92	3,642	138	.. ..	2,217	..	
7 Australia	95	3,302	124	.. ..	41	..	
8 France	103	3,593	143	.. ..	922	..	
9 Netherlands	111	3,078	114	.. ..	6,899	..	
10 United Kingdom	105	3,270	130	.. ..	3,084	..	
11 Iceland	..	3,473	..	.. ..	..	..
12 Germany	112	3,472	..	.. ..	5,389	..	
13 Denmark	126	3,639	135	.. ..	140	..	
14 Finland	105	3,066	113	.. ..	46	..	
15 Austria	106	3,486	133	.. ..	92	..	
16 Belgium	108	..	149	.. ..	4,597	..	
17 New Zealand	102	3,461	131	.. ..	279	..	
18 Israel	95	3,220	125	.. ..	1,802	..	
19 Luxembourg	..	..	..	.. ..	..	..
20 Barbados	..	3,217	128	73.7 74.0	..	..
21 Italy	94	3,498	139	.. ..	6,699	..	
22 Ireland	109	3,952	157	.. ..	367	..	
23 Spain	112	3,472	141	.. ..	3,020	..	
24 Hong Kong	80	2,860	125	105.7 120.3	754	..	
25 Cyprus	..	..	..	.. ..	498	..	
26 Greece	103	3,775	151	.. ..	588	..	
27 Czechoslovakia	119	3,574	145	.. ..	205	..	
28 Hungary	113	3,608	137	.. ..	503	..	
29 Uruguay	109	2,668	101	9.0 12.0	55	..	
30 Trinidad and Tobago	87	2,770	114	73.0 80.9	295	..	
31 Bahamas	..	2,777	..	74.9 60.1	..	..
32 Poland	109	3,426	131	.. ..	1,550	1,582	
34 Korea, Rep. of	..	2,826	120	28.4 49.5	9,087	..	
35 Bulgaria	96	3,695	148	.. ..	475	..	
36 Chile	113	2,484	102	23.6 9.0	247	4	
38 Malta	..	3,169	..	.. ..	..	..
39 Portugal	106	3,342	136	.. ..	1,725	..	
40 Singapore	69	3,121	136	221.6 309.4	737	..	
41 Brunei Darussalam	..	2,858	..	89.1 91.9	..	..
42 Costa Rica	91	2,711	121	24.3 22.9	326	60	
43 Argentina	93	3,068	131	1.2 0.5	4	..	
44 Venezuela	96	2,443	99	33.6 41.4	1,603	..	
45 Kuwait	..	3,043	130	116.9 89.7	427	..	
46 Mexico	102	3,062	131	3.2 16.7	7,648	341	

	(1) **	(2) **	(3) **	(4)	(5)	(6) **	(7) **
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HDI RANK	1988-90	1988-90	1988-90	1969-71	1985-88	1990	1989-90
47 Qatar
Medium human development Excluding China							
48 Mauritius	100	2,897	128	75.7	77.6	210	9
49 Albania	92	..	107	..	..	148	..
50 Bahrain	..	..	..	..	..	..	..
51 Malaysia	147	2,871	120	47.7	58.7	2,582	1
52 Dominica	..	2,911	100	49.8	56.7	..	..
53 Antigua & Barbuda	..	2,307	..	84.2	78.9	..	..
54 Grenada	..	2,400	..	..	..	..	..
55 Colombia	104	2,453	106	9.3	12.1	880	7
56 Suriname	..	2,436	..	35.3	32.5	..	..
57 United Arab Emirates	..	3,285	151	114.7	98.0	576	..
58 Seychelles	..	2,356	100	83.9	90.9	..	..
59 Brazil	115	2,730	114	4.6	5.1	3,421	20
60 Romania	..	3,081	116	..	..	..	..
61 Cuba	..	3,129	135	49.5	47.2	..	..
62 Panama	90	2,269	98	19.7	22.8	125	1
63 Jamaica	95	2,558	114	61.0	66.3	262	165
64 Fiji	..	2,769	108	..	..	..	..
65 Saint Lucia	..	2,424	102	50.6	67.1	..	..
66 Saint Vincent	..	2,460	99	58.4	88.0	..	..
67 Saudi Arabia	189	2,929	121	63.6	81.8	5,273	..
68 Saint Kitts & Nevis	..	2,435	..	60.9	50.6	..	..
69 Thailand	106	2,280	103	1.5	2.6	387	95
70 South Africa	87	3,133	128	6.9	9.0	876	..
71 Turkey	97	3,196	127	3.5	5.2	3,177	13
72 Syrian Arab Rep.	80	3,122	126	32.0	29.1	2,091	22
73 Belize	..	2,575	114	53.9	42.3	..	..
74 Libyan Arab Jamahiriya	78	3,293	140	68.2	72.7	2,290	..
75 Korea, Dem. Rep. of	108	2,843	121	7.1	3.5	..	..
76 Sri Lanka	87	2,246	101	40.3	26.7	996	231
77 Ecuador	100	2,399	105	7.2	12.1	474	38
78 Paraguay	116	2,684	116	6.1	1.5	2	3
79 China	133	2,641	112	1.7	3.8	13,719	84
80 Philippines	84	2,341	104	9.4	8.1	2,545	59
81 Peru	100	2,037	87	18.9	30.2	1,562	194
82 Oman	..	..	..	..	..	338	..
83 Dominican Rep.	90	2,310	102	17.4	36.4	662	6
84 Samoa	..	2,695	..	21.9	24.9	..	..
85 Iraq	92	..	128	..	..	2,834	..
86 Jordan	100	..	110	60.8	85.2	1,491	250
87 Tunisia	87	3,122	131	40.7	59.3	1,439	479
88 Mongolia	86	2,361	97	27.4	2.6	57	..

	(1) **	(2) **	(3) **	(4)	(5)	(6) **	(7) **
	D	D	D	D	D	D	D
[TB 13]	TABLE 13 : FOOD SECURITY						
	Food production per capita index (1979-81=100)	Daily calorie supply per capita	Daily calorie supply per capita (as % of requirements)	Food import dependency ratio (%)		Cereal imports (1,000 metric tons)	Food aid in cereals (1,000 metric tons)
HDI RANK	1988-90	1988-90	1988-90	1969-71 1986-88	1990	1989-90	
89 Lebanon	135	..	127	.. ..	356	16
90 Iran, Islamic Rep. of	104	..	125	.. ..	6,250	22
91 Gabon	84	..	104	19.9 34.0	57	..	
92 Guyana	..	2,495	108	.. ..	53	63
93 Vanuatu	..	2,736	..	29.9 20.2	..	..
94 Botswana	75	2,260	97	49.4 83.7	87	5	
95 Algeria	96	2,944	123	32.1 70.7	5,185	11	
Low human development Excluding India							
96 El Salvador	97	..	102	.. ..	176	249
97 Nicaragua	58	..	99	11.4 22.6	177	57	
98 Indonesia	123	2,605	121	4.6 5.4	1,828	39	
99 Maldives	..	..	80	64.8 79.9	..	..
100 Guatemala	91	2,254	103	11.2 15.5	383	155	
101 Honduras	83	2,210	98	11.5 14.6	162	134	
102 Viet Nam	127	..	103	19.7 3.4	204	72	
103 Swaziland	..	2,634	105	27.4 36.4	..	..
104 Cape Verde	..	2,778	125	80.0 66.2	..	..
105 Solomon Islands	..	2,278	84	.. ..	..	..
106 Morocco	128	3,031	125	18.2 28.1	1,578	219	
107 Lesotho	86	2,121	93	32.4 52.3	97	30	
108 Zimbabwe	94	2,256	94	5.5 4.7	83	13	
109 Bolivia	109	2,013	84	20.4 17.8	147	93	
110 Egypt	118	3,310	132	18.6 45.2	8,580	1,210	
111 Myanmar	93	2,454	114	1.0 0.4	..	..
112 Sao Tome & Principe	..	2,153	103	52.4 43.1	..	..
113 Congo	94	2,295	103	12.9 28.2	94	7	
114 Kenya	106	2,064	89	7.2 10.6	188	62	
115 Madagascar	88	2,156	95	4.6 7.4	183	31	
116 Papua New Guinea	103	..	114	19.6 25.5	222	0	
117 Zambia	103	2,016	87	22.1 14.1	100	3	
118 Cameroon	89	2,208	95	7.0 14.2	398	..	
119 Ghana	97	2,144	93	12.8 9.9	337	73	
120 Pakistan	101	2,280	99	3.6 13.7	2,048	428	
121 India	119	2,229	101	2.8 3.4	447	456	
122 Namibia	93	..	..	.. ..	..	4
123 Cote d'Ivoire	101	2,568	111	14.9 20.5	502	26	
124 Haiti	94	2,005	89	30.1 16.5	236	179	
125 Comoros	..	1,760	90	27.8 30.7	25	2	
126 Tanzania, U. Rep. of	88	2,195	95	4.6 4.4	73	22	
127 Zaire	97	2,130	96	4.8 5.7	336	107	
128 Nigeria	106	2,200	93	2.9 6.7	502	..	
129 Lao People's Dem. Rep.	114	..	111	54	29	
130 Yemen	28.7 62.1	2,001	..	

	(1) **	(2) **	(3) **	(4)	(5)	(6) **	(7) **
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HDI RANK	1988-90	1988-90	1988-90	1969-71	1986-88	1990	1989-90
131 Liberia	84	2,259	98	19.2	24.0	70	28
132 Togo	88	2,269	99	5.5	17.8	111	11
133 Uganda	95	2,178	93	2.3	1.4	7	35
134 Rwanda	77	1,913	82	2.2	6.6	21	7
135 Bangladesh	96	2,037	88	8.4	12.5	1,726	1,134
136 Cambodia	165	..	96	..	..	20	11
137 Senegal	102	2,322	98	31.7	30.2	534	61
138 Ethiopia	84	..	73	..	..	687	538
139 Angola	81	..	80	..	..	272	113
140 Nepal	115	2,205	100	0.3	3.0	21	6
141 Malawi	83	2,049	88	4.6	2.7	115	175
142 Burundi	92	1,948	84	1.8	3.8	17	2
143 Equatorial Guinea	..	..	..	..	..	11	1
144 Central African Rep.	91	1,846	82	6.1	7.7	37	4
145 Sudan	71	2,043	87	9.8	14.5	586	335
146 Mozambique	81	1,805	77	..	..	416	493
147 Bhutan	93	..	128	..	..	11	6
148 Mauritania	85	2,447	106	33.9	57.2	205	72
149 Benin	112	2,383	104	4.8	9.3	126	13
150 Chad	85	..	73	3.8	4.5	36	27
151 Somalia	94	1,874	81	13.1	23.7	194	90
152 Guinea-Bissau	..	..	97	24.4	18.2	52	14
153 Djibouti	..	..	..	..	..	44	6
154 Gambia	..	2,290	103	19.8	55.4	95	11
155 Mali	97	2,259	96	6.0	9.3	61	38
156 Niger	71	2,239	95	2.0	7.4	86	35
157 Burkina Faso	114	2,219	94	3.7	9.6	145	44
158 Afghanistan	85	..	72	..	..	322	145
159 Sierra Leone	89	1,899	83	16.1	20.1	146	37
160 Guinea	87	2,242	97	4.7	15.2	210	25
Armenia	..	..	..	..	..	..	..
Azerbaijan	..	..	..	..	..	..	..
Belarus	..	..	..	..	..	..	..
Estonia	..	..	..	..	..	..	..
Georgia	..	..	..	..	..	..	..
Kazakhstan	..	..	..	..	..	..	..
Kyrgyzstan	..	..	..	..	..	..	..
Latvia	..	..	..	..	..	..	..
Lithuania	..	..	..	..	..	..	..
Moldova	..	..	..	..	..	..	..
Russia	..	..	..	..	..	..	..
Tajikistan	..	..	..	..	..	..	..
Turkmenistan	..	..	..	..	..	..	..
Ukraine	..	..	..	..	..	..	..
Uzbekistan	..	..	..	..	..	..	..
Bosnia-Herzegovina	..	..	..	..	..	..	..

	(1) **	(2) **	(3) **	(4)	(5)	(6) **	(7) **
	D	D	D	D	D	D	D
[TB 13]	TABLE 13 : FOOD SECURITY						
	Food production per capita index (1979-81=100)	Daily calorie supply per capita	Daily calorie supply per capita (as % of requirements)	Food import dependency ratio (%)	Cereal imports (1,000 metric tons)	Food aid in cereals (1,000 metric tons)	
HDI RANK	1988-90	1988-90	1988-90	1969-71 1986-88	1990	1989-90	
Croatia	..	..	..	..	..	..	..
Macedonia	..	..	..	..	..	..	..
Montenegro	..	..	..	..	..	..	..
Serbia	..	..	..	..	..	..	..
Slovenia	..	..	..	..	..	..	..
Liechtenstein	..	..	..	..	..	..	..
San Marino	..	..	..	..	..	..	..
Marshall Islands	..	..	..	..	..	..	..
Micronesia, Fed. St. of	..	..	..	..	..	..	..

Sources:

- (1) WDR 92 Table 4 (disk)
- (2) FAO YB91 Table 106 (Germany =FRG)
- (3) SWC 93 Table 2 (disk).
- (4) FAO (calc?)
- (5) FAO (calc?)
- (6) WDR 92 Table 4 (disk) (C)/WBSDI 92 (disk).
- (7) WDR 92 Table 4 (disk) (C)/WBSDI 92 (disk).

State of the World's
Children. UNICEF

the disappearing forests

Tropical forests cover 23 percent of the Earth's land surface. But they are fast disappearing: closed forests at the rate of 7.5 million hectares a year, and open forests at 3.8 million hectares a year. The livelihoods of millions of the rural poor depend on forest resources— as does the genetic diversity on which many of the world's industries and agricultural crop strains are based. Better forest conservation and management is urgently required.

Key facts

- tropical forests cover 2998 million hectares of the Earth's surface but have been rapidly depleted over the past century;
- according to one estimate, at least 225 million hectares of these tropical forests will be cleared or degraded by the end of the century;
- at present rates, nine developing countries will have exhausted their broadleaved forests within 15 years and a further 13 within 40 years;
- the main cause of deforestation is the need to expand agricultural land—though logging often leads indirectly to deforestation by opening up previously inaccessible areas;
- temperate forests cover 18% of the Earth's surface. Although only a small part of the temperate forests can be characterized as natural forests, the temperate forests also play an important role in watershed protection, stabilization of the regional and global climate, conservation of biological diversity and in providing raw materials for industries;
- the temperate forests in developed countries are mainly threatened by air pollution and acid rain which are assumed to cause forest dieback in parts of Europe and North America;
- the destruction and degradation of forests has widespread implications for human society;
- although 33 developing countries are currently net exporters of forest products, only 10 are expected to be so by the year 2000;
- deforestation also threatens the natural balance of upland watersheds and deprives the world of the genetic diversity on which it ultimately depends;
- forests can store from 20 to 100 times more carbon than other vegetation on the same land area — or around 30 to 60 tons of carbon per hectare. The current destruction of forests may be contributing up to 30% of the carbon dioxide, nitrogen oxides, being released into the atmosphere. Conversely, large-scale reforestation could help to slow or halt the current trend in global warming caused by the release of carbon dioxide, methane and chlorofluorocarbons (CFCs) into the atmosphere;
- local attempts to protect and manage the forest and establish new plantations, have been successful in many countries—though not yet on a significant global scale;
- rural women—many of whose families depend heavily on forest or tree products—have proved to be powerful allies in conservation programmes; non-governmental organizations have proved most effective in implementing projects at the grassroots level.

How fast are the forests disappearing

The European countries have more forests now than they had a century ago. True, much of it consists of single species of conifers rather than the mixed deciduous forest that has been replaced; and it is also true that in many areas of Europe acid rain and air pollution are now threatening large areas of long-established woodlands. But the fact that many areas of Europe, once severely deforested, have been replanted proves that trees can be replaced, even if the original forest ecosystem cannot.

The situation in the developing countries, home to nearly all the world's tropical forests, a category that includes dry forest, rain forest, cloud forest, and swamp and mangrove forest, is unfortunately more gloomy.

Together, these closed forests cover some 1200 million hectares, an area about two-thirds the size of South America; they can also contain nearly half of the world's species of plants and animals.

Where the forests are

Tropical forests are very unevenly distributed among the developing

In brief

- the rate of destruction of tropical forest is equivalent to about 21.5 hectares a minute
- an area of closed forest the size of Sierra Leone disappears every year
- the area of open forest that is destroyed or degraded annually is nearly equivalent to the size of Bhutan

countries. If both closed and open tropical forests (those with a canopy that covers more than 10 percent of the ground) are included, Brazil has 26.8 percent, Zaire 9.2 percent and Indonesia 6.1 percent. Peru, Angola, Bolivia and India each has about 3 percent. The rest is distributed among some 120 other tropical countries and colonies.

Until the 1980s, no one knew with any accuracy how fast tropical forests were disappearing. One authority suggested 5.6 million hectares a year; another, the US National Academy of Sciences, suggested 20 million hectares a year. Finally, a joint effort by UNEP and the Food and Agriculture

Organization made a systematic study of the problem (see box below): their conclusions were that closed forest was disappearing at 7.5 million hectares a year and open forest at 3.8 million hectares a year. A new FAO assessment is currently being revised and is expected to be ready by 1992.

Where destruction is worst...

Tropical forests have already been greatly reduced in area, and the destruction continues. But the relative rate of destruction is still small. Furthermore, it varies greatly from country to country, though relatively little between the regions.

Globally, closed forests are being destroyed at a rate of about 0.6 annually. At this rate, it would take more than a century to halve the existing area of tropical closed forests. This conclusion is broadly true for Africa, Asia and the Americas. In this sense, the rate of destruction is less than had been feared. The World Bank has estimated that 12 percent of Brazil's forest area had been cleared by 1988, although by 1980 some of the neighbouring Amazonian countries,

THE FAO/UNEP TROPICAL FOREST RESOURCES ASSESSMENT

The most authoritative assessment of the state of tropical forests is a three-year investigation carried out jointly by the Food and Agriculture Organization and the United Nations Environment Programme, as part of the Global Environment Monitoring System. The results were published in 1981.

The assessment was carried out on a national basis for 76 countries, and a unique system of classifying the world's forest resources was developed for the assessment (see diagram).

The study revealed that 57 percent of the world total of closed tropical forest is in

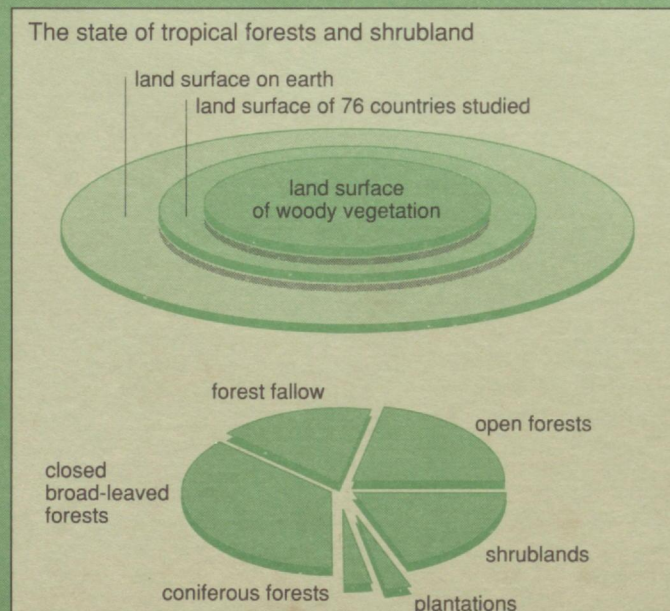
America. Africa, by contrast, contains 66 percent of the world's open forests and 71 percent of its shrublands. Just three countries - Brazil,

Indonesia and Zaire - contain 48 percent of the world's tropical closed forest.

The assessment showed that, though deforestation

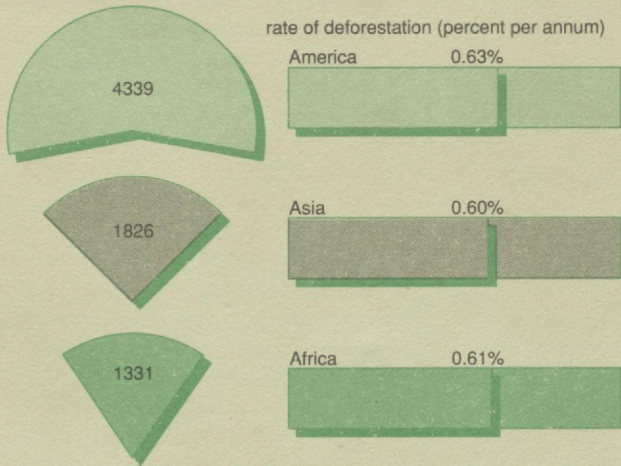
rates were high, they were not as high as had previously been feared. Only tropical coniferous forests are in immediate global danger. This conclusion, the assessment asserted, provides "an unexpected breathing space during which sound conservation and management strategies can be designed and implemented".

The assessment also found that clearing for agriculture, particularly shifting agriculture, was the most common cause of deforestation; extraction for fuelwood and charcoal, on the other hand, removes eight times more wood a year than industrial logging.

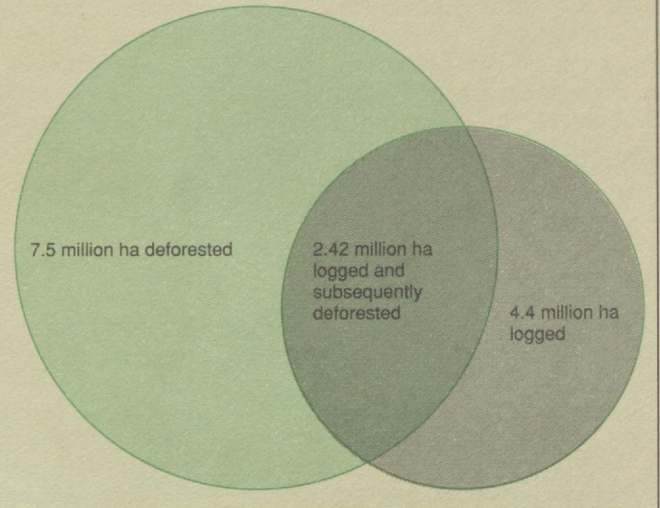


Where the damage is being done

area of closed forest destroyed annually (1000 ha)



How logging leads to deforestation



with far less forest, were losing it much more quickly. The story is much the same in Africa. In some areas, such as Zaire, deforestation rates are as low as 0.2 percent a year but in the Côte d'Ivoire they reach 7 percent.

Closed forests are expected to disappear altogether within 15 years in 4 countries in the Americas, 3 in Africa and 2 in Asia. Globally, a further 13 countries will lose all their closed forests within 40 years unless effective steps are taken to conserve them.

...and why

Many myths surround the causes of tropical deforestation. The need for fuelwood, for example, leads mainly to the degradation of open forests and plays little part in the destruction of closed forests. Even so, the amount of timber extracted for fuelwood and charcoal is large—roughly eight times as much as is extracted from logging.

Logging can be carried out in a sustainable manner; however, it rarely is. Even if only one tree in 100 is taken, cutting that one tree often damages others. Furthermore, logging often requires new roads to be made in previously inaccessible areas. This often leads to further, more serious degradation. New roads open up the forest to new settlers. Analysis of the data shows that as much as 55 percent of the forest that is logged over eventually becomes deforested.

The major cause of deforestation is the need to expand agricultural land. But blame should not be laid at the door of shifting agriculture itself. Small strips of forest can be cleared, burnt, planted and left to return to natural forest again, provided the fallow period is long enough. In many places, it no longer is.

The reasons for this are complicated. Often, as productive, cultivable land becomes scarce, due to population growth or unequal distribution of land, small-scale farmers are pushed into more marginal areas, and shifting agriculturalists onto fragile upland forest areas unable to support their practices. Fallow periods are then shortened as yields fall and populations increase. It is estimated that shifting agriculture now accounts for 70 percent of deforestation in Africa, 50 percent in Asia and 35 percent in the Americas.

New plantations can take the pressure off natural forest. But in most countries new plantations are not being established nearly fast enough. Introduction or revival of agro-forestry farming methods can improve the supply of fuelwood without compromising the production of food crops.

"Forest formations have been considered as an endless reserve of land, fruits, animals and wood. Recent history shows us that these resources, theoretically renewable, can also vanish if care is not taken to avoid using them beyond critical thresholds... there is a real ecological threat to the whole of Africa."

FAO/UNEP Tropical Forest Resources Assessment, 1981

Why does it matter...?

Protecting the world's tropical forests is not a matter of conservation for its own sake. Trees are one of the world's most vital resources, all the more valuable because they are renewable. In developing countries, they fulfil five vital functions:

- * they provide rural populations with many of their subsistence needs;
- * they are critically important to soil and water conservation;
- * they are an important source of industrial products, and hence foreign exchange;
- * they harbour vast but little known genetic resources; and
- * they fix carbon dioxide, one of the greenhouse gases, and thus contribute to the stabilization of the global climate.

Subsistence needs

Rural families depend on forests and trees for a long list of essential products: fuelwood, fodder, fruit, nuts, dyes, medicines, building materials, ropes, nets, fungi and honey are some of them. Fuelwood and fodder alone are in many societies two of the most essential ingredients for survival; without them, rural life would degenerate quickly into a mere struggle for existence.

Perhaps even more important, many rural families depend on tree products for income. Collecting, processing and selling forest products are often the only ways in which rural women can obtain cash income. In the past, these activities have been called 'minor forest industries.' But in no sense are they minor. In India, for example, they provide 25 percent of the value of total forest production, 63 percent of forest-based exports and 1.6 million of the 2.3 million jobs in the forestry sector. No less than 2.5 million people are involved, on a part-time basis, in using the leaves of the

tendu tree to make 'beedi' cigarettes. In Egypt's Fayoum province, 48 percent of women work in 'minor' forest industries.

When forests are depleted, rural families must survive without either the products on which they depend or the incomes which they need.

Stabilizing the ecology

Throughout the world, upland watersheds used to be heavily forested. In many areas, the trees have now gone, with disastrous consequences. Heavy lands wash

wastes that would normally be returned to the soil, providing both humus and fertility. Without vegetation, what rain does fall in these regions is quickly lost as runoff; less percolates the soil, water levels drop and wells dry up.

Industrial products

Forests provide pulp for paper, sawnwood, plywood, gums, oils, resins, pharmaceutical plants and many other badly needed materials. In many countries, these are important exports. Poor or exploitive

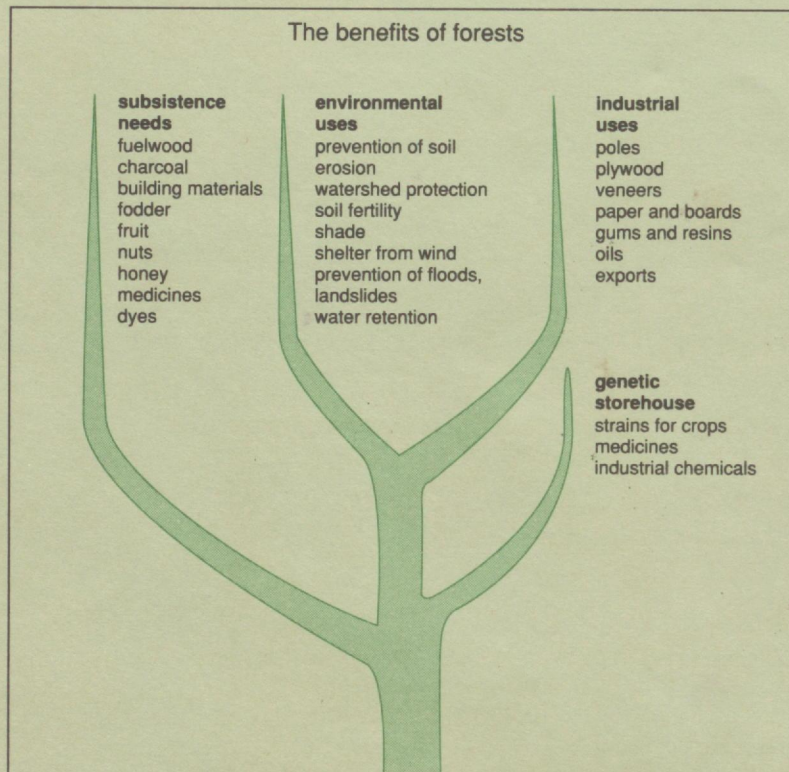
forest management inevitably reduces options, leading first to dwindling exports and then the need to pay for more and more imports. Although 33 developing countries are currently net exporters of forest products, only 10 are expected to be so by the year 2000; the value of developing countries exports is likely to drop from US\$7 million to only US\$2 million.

The genetic storehouse

Half the world's species are to be found in tropical forests. This genetic storehouse has

already provided many of the strains from which modern crops and medicines are derived; in India alone, more than 2500 plant species have been officially recognized for their medicinal uses. Even the birth control pill has its origins in the Mexican yam.

In 1989, the US *Global 2000* report estimated that as many as one million species found in tropical forests could become extinct by the end of the century. The point is well made: tropical forests contain a wealth of animal and plant material, much of it still unknown to man. Steps must be taken to ensure that this material is not heedlessly destroyed.



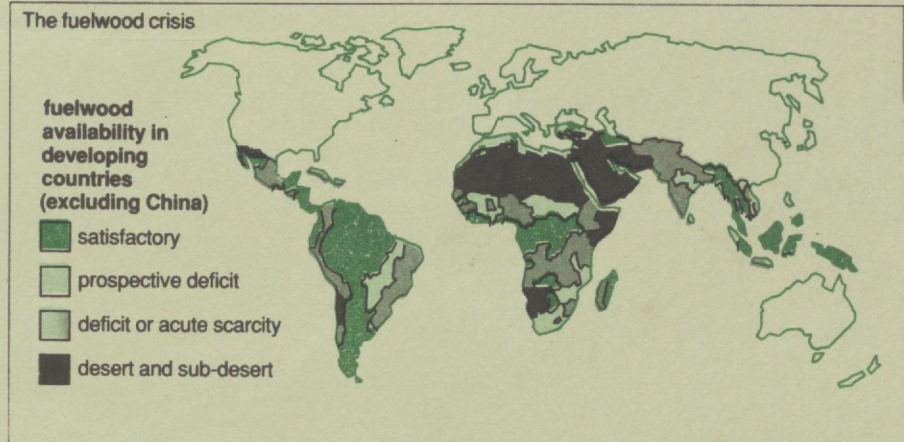
upland soil, together with any crops planted on them, down into the valleys below where riverbeds fill with silt, and flood. Man-made reservoirs and irrigation systems are ruined simply because deforestation has such a dramatic effect on a region's water balance.

In arid areas, trees are equally important, providing fertility to the soil and protecting it from the savage effects of the wind. Without tree roots to hold it together, arid soils turn all too easily into the dust bowls for which the United States became famous during the 1930s. And if fuelwood is in short supply, rural families must use crop wastes and animal dung for their cooking—

...because lives are threatened

About 2000 million people cook with fuelwood. About 96 million of them are already unable to provide even their minimum needs from wood; another 1052 million can meet their needs only by depleting wood reserves.

These are the stark statistics of the fuelwood crisis. Unhappily, this crisis is only the well publicized part of a far more serious crisis, one that for the most part defies statistical analysis. In the past, the ways in which rural people depend on trees and forests for their subsistence needs has been greatly undervalued. But recent field work has established that what could be called 'subsistence forestry' is of enormous importance. Tree foods, for example, enable many farming families to survive during the harvest when there is never enough time to cook; they also provide security against times of drought and famine, because trees bear their harvest at times of the year and under



conditions that other crops cannot match. In some countries, wildlife taken from the forest provides the bulk of the animal protein that is consumed.

Fodder, too, is a vital part of most family economies, where the women look after domestic stock round the homestead. The stock are fed largely from fodder collected from

homestead trees or gathered nearby. These trees thus provide, indirectly, milk, eggs and meat. Without them, many rural families could not survive.

...ecologies disrupted

More than 160 million hectares of land on upland watersheds in Africa, Asia and Latin America have already been seriously degraded. A far greater area is subject to some level of deforestation, potentially threatening fertile lowlands throughout the developing world. Some of the most serious problems are occurring in the foothills of the Himalayas and the Andes, and in East Africa, the Philippines, Jamaica and Panama.

A start has been made in repairing some of the damage, though so far only on a scale that is globally insignificant. Nevertheless, work in such countries as Nepal, China, Honduras and Ethiopia proves that it is possible to increase tree cover on degraded upland areas, and so improve conditions in the valleys below.

In Ethiopia, for example, soil conservation projects have been launched on 35 watersheds in the Central Highland Plateau, which supports 70 percent of the country's population. Food for Work Programmes have involved more than a million people in constructing bunds and terraces, building new roads, reforesting denuded land, and

The fate of the Himalayas

As a result of the deforestation of upland watersheds in Bangladesh, India and Pakistan:

- sedimentation causes flood damage, and the destruction of reservoirs and irrigation systems, estimated to cost US\$ 1,000 million a year;
- India spends US\$ 250 million a year in flood prevention and compensation; and
- further investment in hydropower and reservoirs has become uneconomic because of the threat of sedimentation.

improving water conservation with new ponds, dams and weirs.

In Honduras, projects to introduce settled farming techniques on terraced land in place of shifting agriculture were introduced after Hurricane Fifi wreaked extraordinary damage in 1974. Initially, there was strong resistance to change.

Success came only after local women took the lead, constructing their own terraces, and raising and marketing a series of highly successful vegetable crops on them.

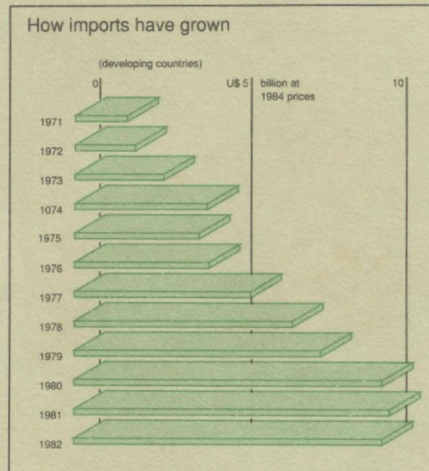
In Nepal, the government, the World Bank, UNDP and FAO have joined forces to mount one of the most successful watershed restoration programmes, comprising mainly reforestation, better management of existing forests and the introduction of 15,000 wood stoves. The US\$25 million project is expected to provide one-third of the fuelwood required by 570,000 people, and sufficient leaf fodder for 132,000 cattle. Because less dung and crop waste will be burnt as fuel, grain production in Nepal's hill region is expected to increase by one-third.

...Industrial uses curtailed

Forests are one of the most important natural resources that any country can possess. Furthermore, they are, to some extent, renewable. Of course, if a tropical forest is destroyed, it may take centuries to regenerate, if it ever does. But if forest products are extracted with care, the basic fabric can be left unharmed to supply more products in the future. Unhappily, in many developing countries, the forest fabric itself is being destroyed.

As a result, these countries are losing a valuable source of both exports and of industrial materials. During the 1970s, for example, Nigeria changed from being a net exporter to net importer of forest products, even though the country was once blessed with abundant natural forest and has climates and soils that would support fast-growing industrial plantations.

In 1983, the developing countries had to import some US\$10,000 million worth of forest products. In



terms of processed wood products, the developing countries are already net importers; in 1982 their exports of sawn wood, veneer and plywood earned them US\$3,100 million while their imports of pulp, paper and board cost more than US\$5,300 million. The prospects for the next

few years appear increasingly bleak. The value of forest exports from countries as diverse as Thailand, the Philippines, Côte d'Ivoire, Cameroon and Malaysia seems likely to fall sharply.

While neglect of forest management is hard to quantify, other critical parameters are not. In developing countries, 4.4 million hectares are logged and 7.5 million are deforested every year; only 1.1 million hectares are planted. And if developing countries exported processed forest products, rather than raw timber, they could increase their export earnings five times.

...and genetic resources destroyed

Most of the species that live in tropical forests have yet to be described or catalogued by scientists—although many of them are well known to local peoples. In African forests alone, more than 200 new plant species are recorded annually.

Preserving the gene pools found in tropical forests is vitally important; with only eight crops supplying 85 percent of the world's food, new types of crops could be essential to human survival. The winged bean, for example, was unknown outside southeast Asia in 1970. Yet it is now grown in more than 50 countries. How many more such crops are waiting to be found in tropical forests? Forests have already provided, among many other things, quinine, rubber and curare. What else might they have to offer?

The diversity of a tropical rain forest can be astounding. In an area of just 40 hectares have been found 1500 species of flowering plants, 750 tree species, 400 birds, 150 kinds of butterfly, 100 different reptiles and 60 species of amphibians—not to mention insect species too numerous to count.

How can these species best be protected? One solution is to

establish parks and wildlife reserves. According to the World Conservation Monitoring Centre, in 1988 there were 486 million hectares of nationally protected land, globally much of it tropical forest. Strict controls surround the removal of both animals and plants in such areas.

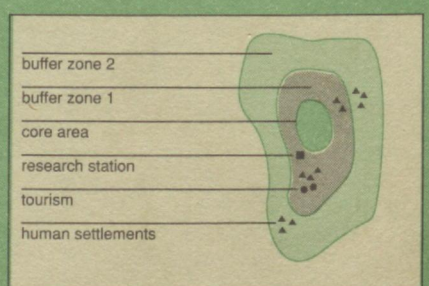
A second solution is to protect the species themselves, through agreements such as CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, which UNEP helped bring into force in 1975. Also, the Convention on Migratory Species

functions as an instrument for protection of wildlife. The Convention is prepared by UNEP and entered into force in 1983.

A third solution, which emerged from the World Conservation Strategy developed by IUCN, the World Wide Fund for Nature and UNEP, is to encourage nations to formulate their own national conservation strategies. More than 40 nations have prepared, or are preparing, such strategies, which are oriented towards attaining sustainable development.

Establishing biosphere reserves

Unesco began its biosphere protection programme in 1970. Each reserve is designed to protect a representative natural area, and different forms of land use are permitted within it; while the core is completely protected, activities such as farming and logging may be permitted further out. There are now 252 such reserves, covering 128 million hectares.



What can be done

Tropical forests are over-exploited but under-used. On this paradox depends their salvation.

Attempts to persuade the world's nations to act together to conserve the tropical forest have failed in the past, often because the issue was addressed as one of preservation alone. It is not. What is at issue is the wise management of tropical forests on a sustainable basis—one that will permit fuelwood and industrial timber to be extracted to the maximum benefit of the countries concerned, both now and in the future.

In countries all over the world, successful attempts have been made to establish woodlots, introduce wood stoves, reforest upland watersheds, improve logging techniques, protect undisturbed areas of forest and establish major industrial plantations on wasteland.

But there are two major problems: one is that the scale of the operation has so far been too small; and the other is that for every successful project, many more have failed. Why?

Success in brief

- In the Republic of Korea, fuelwood's share of energy consumption was reduced from 55 percent in 1966 to 19 percent in 1979—mainly through more efficient heating techniques.
- On the loess plateau in China, one county has planted 15 million trees in five years, halving sedimentation rates.
- Part of the foreign debts of Bolivia, Ecuador, Costa Rica and Madagascar have been defaulted and the equivalent sum of money used to support forest conservation activities in these countries.
- Over the past 14 years, officially protected areas of rainforest have more than trebled; both Brazil and Indonesia now protect as much as the whole world did in 1972.

One reason is that such projects have often to work against official government policies that favour agricultural development and rapid forest exploitation. Another is that, because many forestry schemes require extensive investment, projects have been planned on an enormous and, in the event, unworkable scale. Bogged down by bureaucracy and top-heavy management structures, projects like this have rarely fulfilled their promise.

On the other hand, small-scale projects in which local people—particularly women—implement the work and plan it with qualified foresters have been more successful.

Local non-governmental organizations (NGOs) have proved particularly effective in implementing projects of this kind. Worldwide, about 5,000 NGOs are now involved in forestry; progress may depend to a large degree on the support that can be found for these organizations in the future.

UNEP and tropical forests

The United Nations Environment Programme has a vital role to play in helping preserve the world's tropical forests. While many UN agencies have commercial interests in forestry, UNEP stresses the unique nature of the forest, one that cannot be recreated by industrial plantations.

Thus, for example, UNEP was able to introduce environmental issues into the International Tropical Timber Agreement (which is concerned with trade in tropical timber) before it came into action in 1985.

UNEP played a major role in preparing the World Conservation Strategy, and is now helping nations formulate their own national strategies. With UNESCO, it is helping to establish and support protected areas; with FAO, it is helping protect forest genetic resources; and with other organizations it is encouraging reforestation as

a protection against desertification. Other programmes stress the importance of proper management of mangrove forests—which are often key breeding areas for fish populations—and the need for training and demonstration in tropical forest management.

UNEP has a special responsibility for charting the way into unknown waters. A key issue—one that has yet to emerge from the realm of ideas into practical action—is how developing countries could be supported

financially for their role in protecting the world's tropical forests. Their forests cannot contain valuable timber which is an important potential source of income; and the land beneath them may harbour even more valuable mineral reserves. Developing countries need incentives not to develop these resources, and over the coming years means will have to be found of providing these incentives.

Sustainable use of forests could be promoted through increased awareness of the real value

of forests. Forests produce or store many valuable products in addition to timber, i.e. gums, resins, medicines, strains for agricultural crops, etc. However, these values have often been overlooked and not accounted for, due to the difficulties in pricing them and due to the traditional perception of professional foresters, who view forests just as suppliers of timber and firewood. In order to provide incentives for a more sustainable use of forests, UNEP is currently cooperating with the University of Minnesota in preparing a study on the assessment of the real value of forests.

What you can do

- support local organizations concerned with protecting forests;
- join in tree planting ceremonies wherever they occur;
- don't buy tropical wildlife, such as parrots and orchids, unless they have been legally approved;
- lobby governments and local authorities to protect the forest in your own country.

The future of forests

Alarming though the current rate of destruction is, the future of tropical forests—and the species they support—looks less bleak now than it did a few years ago.

In 1979, UNEP, in collaboration with FAO and UNESCO, initiated the preparation of a global plan to reverse the degradation of tropical forests and to encourage the rational management of this resource. The follow-up of this initiative was later on entrusted to the FAO Committee on Forest Development in the Tropics.

In 1985, UNDP, the World Bank and World Resources Institute released a report called *Tropical Forests: a call for action*, and FAO launched the Tropical Forestry Action Plan (TFAP) which has now received wide support from bilateral and multilateral donors. Over 65 tropical countries have requested the support of the TFAP.

The TFAP has, however, been criticized by several quarters for encouraging conventional forestry and neglecting the needs of the people in forest conservation. TFAP

has realized how important these needs are and has encouraged the participation of local communities and non-governmental groups. The significance of forests in the preservation of biological diversity and to counteract the effects of climate change will be taken under consideration to a greater extent in the future. It is expected that these areas will be the main focus in the future implementation of the TFAP initiatives at national levels.

A call for action

During 1985, the International Year of the Forest, FAO's Committee on Forest Development in the Tropics prepared a Tropical Forests Action Programme, with five priority areas:

- fuelwood;
- forestry's role in land use;
- forest industrial development
- conservation of tropical forests
- institution strengthening.

Since then, an international task force has proposed a five year action programme to lay the foundations for longer term investment. Investment profiles were prepared for 56 of the most seriously affected countries

Investments needed, 1987-91 (critical countries only)

fuelwood and agroforestry	\$1,899 million
land use on upland watersheds	\$1,231 million
management for industrial uses	\$1,640 million
conservation	\$ 548 million
TOTAL	\$5,318 million

To learn more...

More detailed accounts of the issues discussed in this publication can be found in:

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Second Edition, 1991