

(1985)

FISHERIES AND UNDERNUTRITION

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(Received May 17, 1984)

People eat fish directly, and they also consume it indirectly in the form of feed for livestock such as pigs and poultry. Despite widespread malnutrition in developing countries, the data indicate that on a per capita basis people in developed countries use about four times as much fish as people in less developed countries. Nevertheless, people in developing countries tend to be far more dependant on fish because it accounts for a far higher proportion of their animal protein intake.

The high levels of fish consumption in developed countries is partly due to their high levels of imports of fish products from developing countries. The export of large quantities of fish (and other food) from poor countries may help to account for the malnutrition in poor countries.

With adaptations in the production, processing, and distribution phases of operations, fisheries could be managed so as to help alleviate malnutrition. The potential was recognized by the World Conference on Fisheries Management and Development held in Rome in the summer of 1984 when it approved a new "Action Programme on the Promotion of the Role of Fisheries in Alleviating Malnutrition."

KEYWORDS: Fish, fisheries, food, malnutrition, undernutrition, trade.

CHRONIC UNDERNUTRITION

The purpose of this study is to examine the role of fisheries in relation to the problem of chronic undernutrition.

Chronic undernutrition here refers to the debilitating malnutrition which is prevalent as a more or less steady state for substantial segments of the less developed world, and also for smaller segments of developed societies.

The Food and Agriculture Organization of the United Nations (FAO) had estimated that 300 to 500 million people in the poor countries did not get enough food, and that one and a half billion people did not receive an adequately balanced diet. Out of 97 developing countries, 61 had a deficit in food energy supplies in 1970 (United Nations World Food Conference, 1974).

The *Fourth World Food Survey* of FAO offers "an order of magnitude of about 400 million as a conservative estimate of the number of persons undernourished in the developing countries, excluding the Asian centrally planned economies (FAO, 1977, p. 51). If the undernourished in the Asian centrally planned economies (China, Kampuchea, North Korea, Mongolia, Viet Nam) and the undernourished in developed countries are included, it can be estimated that there are around 500 million undernourished people in the world.

Malnutrition strikes children especially hard. According to the United Nations Children's Fund (UNICEF), in 1981 about 17 million children died, and malnutrition was probably a contributing factor in a majority of these cases (Grant, 1982).

Most observers seem to conclude that, in the world at present, there are at least a half billion people who are significantly malnourished.

FAO estimates of the numbers who are undernourished are calculated on the

TABLE I
Daily protein supplies, in developed and developing countries *per capita* (in grams)

	1961-63	Total protein		
		1964-66	1969-71	1972-74
Developed market economies	90	91	94	95
Developing market economies	53	53	55	53
		Animal protein		
	1961-63	1964-66	1969-71	1972-74
Developed market economies	48	50	55	56
Developing market economies	11	11	12	11

Source: FAO (1977), p. 18.

basis of calorie deficiencies. Protein deficiencies tend to be closely correlated with calorie deficiencies. The differences in protein supplies between developed and developing countries are indicated in Table I. As the data indicate, people in developing countries obtain considerably smaller daily rations of protein, especially from animal sources.

PATTERNS OF FISH CONSUMPTION

Fish constitutes an unusually good source of protein, even better than meat in that fish generally provides more usable protein.

The distribution of fishery products is shown in Table II. This table shows the major categories of fisheries resources, the four major consuming nations for each, and the percentage of the world total weight consumed by these nations. As Bell observes (1978, p. 68), it is evident here that "the major consumers are affluent, not developing countries.

The pattern may be seen in another way in Table III. These data refer to total supplies of fish products for any given country, comprised of its production, plus its imports, minus its exports. Direct use refers to direct human consumption, while indirect use refers primarily to the use of fish as feed for livestock. As the table shows, the developed countries together use much more fish than the developing countries — 58 percent versus 42 percent of the overall supply.

The developed countries taken together have only about a third of the population of the less developed countries. Thus the differences in their consumption levels are much more marked when per capita measures are used. Table III shows that on a per capita basis people in developed countries use four times as much fish as people in developing countries — 37 kilograms versus 9 kilograms. This estimate may be exaggerated because of underreporting of domestic production for local use, but it seems evidence that the disparity is substantial.

TABLE II
Leading countries in the consumption of selected fish products, 1973

Species	Country	Consumption as % of world total
1. Groundfish	U.S.S.R.	30
	Japan	27
	U.S.A.	8
	U.K.	6
2. Tuna	U.S.A.	37
	Japan	22
	S. Korea	7
	France	3
3. Salmon	Japan	36
	U.S.S.R.	17
	U.S.A.	17
	Canada	12
4. Halibut	U.S.S.R.	31
	U.S.A.	15
	Japan	12
	Canada	10
5. Sardines/Herring	U.S.S.R.	16
	Denmark	10
	Japan	9
	S. Africa	8
6. Shrimp	U.S.A.	29
	India	15
	Thailand	8
	Japan	8
7. Lobster	U.S.A.	48
	Chile	13
	U.K.	8
	France	7
8. Crabs	U.S.A.	30
	Japan	21
	France	5
	S. Korea	4
9. Clams	U.S.A.	47
	Japan	33
	Malaysia	6
	S. Korea	6
10. Scallops	U.S.A.	51
	Japan	27
	France	15
	U.K.	4
11. Oysters	U.S.A.	53
	Japan	16
	France	13
	S. Korea	11
12. Fish Meal	Japan	21
	U.S.S.R.	12
	U.S.A.	10
	U.K.	7

Source: Bell (1978), p. 24.

TABLE III
Distribution of food originating from fish and shellfish resources in 1980

	Country shares		<i>Per capita</i> shares	
	Direct use (% of world total)	Direct and indirect use	Direct use (kilograms/capita/year, live weight equivalent)	Direct and indirect use
Developed countries	49	58	28	37
Less developed countries	51	42	8	9

Source: Fisheries Department, Food and Agriculture, Organization of the United Nations (personal communication).

These data on distribution among countries do not show the further skew which results from the uneven distribution of resources within countries.

People in developed countries consume more fish, but they consume more of everything, so they cannot be said to rely on that fish. People of less developed countries, however, tend to be far more dependent on fish because it accounts for a far higher proportion of their animal protein intake. As the former Assistant Director General for Fisheries of the Food and Agriculture Organization has pointed out:

Fish makes up roughly twenty percent of the world's total supply of animal protein — and for people of the developing world, it counts for much more than that. For over half of these people, fish supplies one third of the relatively meagre amount of animal protein they do get. In Africa it accounts for 24 percent of animal protein intake; in populous South East Asia 55 percent (Lucas, 1979, p. 743).

Fish contributes a large share of animal protein, as Lucas indicates, but in poor countries animal protein contributes a relatively small amount to overall protein supplies. The question then is whether even this small amount should be judged to be critically important.

Protein-energy malnutrition usually results from a lack of energy foods, not protein. The apparent protein deficit commonly observed in cases of severe malnutrition results from the fact that the protein that is obtained is diverted to fulfilling immediate energy needs, and thus is not available for the body building and maintenance functions normally fulfilled by protein. In many circumstances needs can be fulfilled with cheap energy foods rather than with more expensive animal protein (McLaren, 1974).

In some cases, however, there is a genuine protein deficit, particularly where diets consist almost exclusively of cereals, and little animal or vegetable protein. Where the variety of vegetable sources is not sufficient to provide an adequate intake of all essential amino acids, animal protein supplies (including dairy products) may be of critical importance.

FISH TRADE

The basic pattern of international trade in food is that most of the trade is among developed countries; there is little trade among the less-developed countries; and in the trade between the two groups, on balance, food tends to flow from the less

TABLE IV
International fish trade, 1980

	Imports		Exports	
	Quantity (millions of metric tons)	Value (millions of U.S. dollars)	Quantity (millions of metric tons)	Value (millions of U.S. dollars)
Developed countries				
Total:	7.37	13,514	6.39	9,155
Share:	80.2%	88.3%	63.6%	61.5%
Developing countries				
Total:	1.82	1,800	3.66	5,736
Share:	19.8%	11.7%	36.4%	38.5%
World				
Total:	9.20	15,294	10.04	14,891
Share:	100%	100%	100%	100%

Source: Food and Agriculture Organization, 1981, pp. 36-37.

developed to the more highly developed countries. The net flow is upward, not downward (Kent, 1982).

The same pattern holds with respect to fish. As Table IV shows, in 1980 developed countries exported 63.6% of the total quantity of fish in international trade, but imported 80.2%, thus taking out more than they put in. Developing countries exported 36.4% and imported 19.8% of the total quantity, putting in more than they took out.

The pattern of fish trade may be seen from the perspective of individual countries. For the United States, fish imports have greatly exceeded exports, both by value and by weight, in every year since 1930. In 1981, for example, the United States exported 669,261,000 pounds of edible fish, valued at \$1,072,765,000. In the same year the United States imported 2,272,011,000 pounds of edible fish, worth \$3,033,780,000. In addition, in 1981 the United States exported \$84,230,000 worth of nonedible fish products, and imported \$1,139,559,000 worth of nonedible fish products (NMFS, 1982, p. 10). The United States imports more fish than meat. Overall, "the United States alone imports about twice as much fish, primarily in the form of feed for livestock, as do all the poor countries combined (Simon, 1975, p. 20).

Fish imports constitute a large and steadily increasing share of the United States fish supplies. The increasing dependency of the United States on imported fish is demonstrated in Table V. As these data show, fish imports rose from less than 20% of the United States catch in the 1950's to more than 40% in the 1970s. The limited importance of commercial production is suggested by the fact that the recreational fishing industry "is by all measures economically more important in the United States than domestic commercial fishing for food!" (Bell, 1978, p. xxii).

As Table VI shows, Japan too has been importing increasingly large quantities of fish:

Japan used to be a fish-consuming nation and a major fish exporter at the same time. In 1971 Japan became a net importer in terms of value, and in 1975 it became a net importer in terms of volume. Since then, the excess of imports over exports has been rapidly increasing (Japan Information Service, 1980).

TABLE V
United States fish supply (in billions of pounds)

Year	Catch	Imports	Imports as Share of Catch
1950	4.85	0.64	13.2%
1951	4.41	0.65	14.7%
1952	4.41	0.71	16.1%
1953	4.41	0.73	16.6%
1954	4.85	0.80	16.5%
1955	4.48	0.78	17.4%
1956	5.29	0.80	15.1%
1957	4.85	0.90	18.6%
1958	4.85	1.02	21.0%
1959	5.07	1.14	22.5%
1960	4.85	1.10	22.7%
1961	5.29	1.10	20.8%
1962	5.29	1.26	23.8%
1963	4.85	1.20	24.7%
1964	4.63	1.32	28.5%
1965	4.85	1.40	28.9%
1966	4.19	1.60	38.2%
1967	3.97	1.47	37.0%
1968	4.19	1.74	41.5%
1969	4.19	1.71	40.8%
1970	4.85	1.87	38.6%
1971	5.07	1.79	35.3%
1972	4.85	2.34	48.2%
1973	4.85	2.42	49.9%
1974	5.07	2.27	44.8%
1975	4.85	1.91	39.4%
1976	5.29	2.23	42.2%
1977	5.29	2.18	41.2%
1978	5.95	2.40	40.3%

Source: National Marine Fisheries Services (1980a) p. 24; (1980b) p. 8.

The rapid rise of imports to Japan began well before the widespread extension of fisheries jurisdictions in the mid-1970s.

The share of American fish consumption accounted for by imports would be even larger if the imports of nonedible fishery products were included as well. The determination of what is edible is not a simple technical question. Products that may be regarded as nonedible when they reach developed countries, and thus relegated to feed, frequently are regarded as edible at the point of origin. A case from Africa illustrates this:

In Senegal ... there exists a factory for the production of fish meal. ... This factory, Sopesine, owned by two French companies ... treats 2800 tonnes of sardines each year (fish fit for human consumption) in order to produce ... fish meal and oil.

Ninety-five percent of the fish meal is destined for consumption by French livestock. ... One hundred kilometers from /the landing area/, peasants don't eat fish because it is not available or it is too expensive (CIDEPA, 1980).

Products regarded as substantial food resources by the poor may be used for feed for pigs and poultry for the rich, or may be used to feed their pets:

TABLE VI
Japanese fish trade

Year	Exports		Imports	
	Volume (thousand tons)	Value (million yen)	Volume (thousand tons)	Value (million yen)
1960	—	84,212	47	5,523
1965	565	118,997	279	37,422
1970	579	140,718	375	114,628
1975	603	168,696	710	385,529
1977	591	184,180	1046	657,714
1978	754	171,250	1018	676,455
1979	728	196,363	1151	930,764

Source: JETRO (Japanese External Trade Organization) (1981), p. 33.

... a cheap Moroccan canned fish, developed for the Middle East markets, primarily Egypt, brought a higher price when sold to the United States as cat food. One third of the canned fish of the United States is in effect pet food. An equally large portion of the British output of canned fish is devoted to the same purpose. In most instances this constitutes food which would be very much in demand if offered to the protein-needy and malnourished around the globe (Borgstrom, 1969, pp. 229-230).

The argument that the product is not suitable for direct human consumption has been used to defend the export of anchoveta from Latin America to western Europe and Japan to feed pigs and poultry. Actually, instead of being converted to fishmeal for animal feed the anchoveta technically could be converted to fish protein concentrate for human consumption. Even if livestock feed were the only possible use for these sardines or anchoveta, there would still remain the question of why the feed should be consumed by livestock used by Europeans rather than by Africans or Latin Americans.

The fact that fish in the international market tends to flow from less developed to more highly developed countries is indicated by the fact that most countries purchase their fish imports from countries which are poorer (in terms of gross national product *per capita*) than those to which they send their fish exports (Kent, 1980a, pp. 87-92).

Another indication that the flow tends to be from the poor to the rich is that, in the trade in simply preserved fish (for example, frozen) among the market economies of the world, developed countries export around 70%, but import 90% of the total value of fish traded.

The Organisation for Economic Co-operation and Development (OECD) plainly acknowledges the pattern:

Statistics of world trade in sea products show the very strong preponderance of OECD countries, which in value terms account for 85 per cent of imports and 59 per cent of exports. That is to say, the main flow of exported fish and fish products is, irrespective of country of origin, towards more advanced and better nourished nations (Organisation for Economic Co-operation and Development, 1982, p. 7).

Thus fish continue to migrate after they are caught. They tend to flow from the more needy to the less needy. One very clear illustration is provided by the fact that 56 million pounds of fish were exported from the famine stricken Sahel region of Africa in 1971 alone.

It is sometimes suggested that if anchoveta or shrimp or some other product

were not exported it would not be used at all, and thus would be wasted. This argument fails to acknowledge that the raw resource is only one of many inputs into food production. Export-oriented production often diverts labor, capital and other resources away from production for local consumption.

Sometimes it is argued that certain products must be exported because local people have no taste for the product. For example, it is said that Pacific Islanders prefer imported canned mackerel to the tuna that is caught and canned on their own shores. There is some truth to this — but the argument is commonly overstated. The tuna sold in local markets in the Pacific Islands is generally of the lowest grade — tuna flakes which would be sold as pet food in the United States — and it appears in the local markets at perhaps twice the price of mackerel. The higher grades of tuna are exported, not because there is no taste for them locally, but because rich countries are willing and able to pay more for them.

The fish and other food which moves in international trade is only a small share of the total amount of food produced and consumed. But the pattern of the poor feeding the rich is found within as well as among nations. The thesis that the poor feed the rich is not only about international relations; it is about social structures based on the market system wherever they occur. This regular flow of food toward the top, within countries as well as among countries, helps to account for the chronic undernutrition at the bottom.

THE PROBLEMS

On balance there is a net flow of fish from poor countries to rich countries. But why should this be viewed as problematic? The rich countries do pay for the fish they get. Obviously both sides benefit from the transactions, for otherwise either of them could simply refuse to participate.

There are three major concerns, all of which require further research.

The first concern is that in the fisheries trade (as in other kinds of trade) the richer trading partners are likely to get a larger share of benefits than the poorer trading partners. In the tuna and shrimp industries, for example, the processors and marketers in the rich countries are likely to obtain far higher benefits than the suppliers in the poor countries (Kent, 1980b). Thus, while both sides gain some benefit, the relationship contributes to the widening of the gap between rich and poor, with the poor lagging further and further behind.

Devoting local resources to production for export requires increased dependence on imports. The net result can be that apparent gains are dissipated by inflation and by disadvantageous terms of trade, and there can be a great buildup of external debt. The Philippines appears to be facing this problem:

The Philippine government is currently pursuing a policy of production for export. With reference to Japan, this policy is particularly urgent in order to offset the record \$355 million total trade deficit the Philippines incurred in 1976. In the fishing industry, such a policy is questionable as local demand for fish has yet to be met, and most Filipinos have been made to do with a diet of low quality fish as the better kinds are now beyond their means (Third World Studies, 1978).

The problem seems to be continuing, particularly with the great emphasis on tuna production for export in the late 1970's and early 1980's (Magno, 1982).

This raises the second concern: The foreign exchange that is earned from the export of fisheries products from poor countries may not be used where it is needed most. The point is illustrated by a group of Indian fishermen:

To add to our country's misery, the developed world is now making strident demands for our other varieties of fish, like sardines, tuna, mackerels and pomphrets which have also been promoted as delicacies in their countries. If this trend continues the Indian population will have to do without fish since the foreign buyers are ready to pay ten times the amount of money a poor Indian could hardly afford. Can we allow our fish which is our vital food resources to be exported at the cost of the protein-starved population of our country; even if the principle involved is the highly questionable foreign-exchange earnings? (National Forum, 1980)

Often there is some compensation for increasing exports by the increasing imports of food. Typically, however, the foreign exchange earned from the export of food is not devoted to purchasing low cost nutritive foods for the needy, but is diverted to the purchase of luxury foods and other products in demand by local elites.

In many less developed countries the volume of fisheries imports is small relative to the volume of fisheries exports. Thus the fisheries trade balance may be very favorable monetarily, but quite unfavorable nutritionally. A favorable balance of trade in money certainly can compensate for an unfavorable nutritional balance. But whether it can compensate and whether it does in fact compensate are two different questions. Further research on the question is needed, but on the basis of the high levels of undernutrition and on the basis of the composition and magnitudes of imports in many less developed countries, it appears that foreign exchange earnings frequently are not used to meet basic nutritional needs.

The third concern is that in a world in which there are more than 500 million people who are significantly malnourished, it simply does not make sense to export major food supplies away from those who do not have enough.

Rich countries use more fish than they produce, with the difference made up by imports. Georg Borgstrom has commented:

No doubt everyone realizes how preposterous it is that the two most protein-needy continents, Africa and South America, are the main suppliers of the largest quantities of animal protein feed moving in the world trade — and they provide those who already have plenty. ... The Peruvian catches alone would suffice to raise the nutritional standard with respect to protein for the undernourished on the entire South American continent to southern European level. The amount of protein extracted (1966-68) exceeds by one half the meat protein produced in South America and is three times the milk protein raised. The corresponding fish meal coming from Africa would be enough to reduce by at least 50 per cent the present protein shortage of that continent (Borgstrom, 1969, p. 237).

An FAO expert has observed that

... there is a disturbing trend in fish consumption. Increases in fish production have gone primarily to those countries that could afford to pay. The average *per caput* consumption in developing market economies has increased but by only 600 g since 1960, while in Eastern Europe and the USSR *per caput* consumption rose about 12 kg and, in other developed countries, by 3.5 kg. This trend is alarming because it indicates the potential danger that an increasing share of world catch will be siphoned off to the higher purchasing power in developed areas and by the centrally planned economies, leaving less fish where it is much needed — in the developing regions (Lunven, 1982).

Many poor countries export food despite their suffering serious malnutrition at home. Brazil, Chile, Ecuador, India, Mauritania, Morocco, Peru, Senegal and Thailand, for example, all suffer widespread undernutrition but at the same time are net exporters of fish. Of course it is possible that the foreign exchange that is earned from exporting fish is used to help alleviate what might be even worse conditions of undernutrition in these countries. Nevertheless, this pattern of export of fish from countries which suffer significant undernutrition warrants further investigation.

In Thailand, Malaysia and the Philippines, seafood exports have expanded sharply while at the same time local consumption of this major protein source has declined. In Malaysia the quantity of fish available per person in 1975 was 30% lower than the 1967 level, despite the fact that the total catch increased substantially. Most of the increase in production has been exported. The situation in Thailand is similar:

In 1972, the total fish catch in Thailand was 1.55 million tons. It fell slightly in the next few years and returned to 1.6 million tons by 1977. Yet seafood exports boomed, though the local catch had barely changed in five years and the population had grown (Ho Kwon Ping, 1980).

Thailand is certainly not exporting only the surplus which remains after domestic needs are fulfilled. The indications are that local consumption is sacrificed for exports.

To see what is problematic about the upstream trade in fish one should go beyond the merely economic and acknowledge that it is important to fulfill needs as well as to meet market demand.

REMEDIES

Scientists often voice the hope that fisheries products may someday make an important contribution toward meeting the problems of malnutrition in the world. Agencies like the Food and Agriculture Organization of the United Nations or the United States National Academy of Sciences urge the development of new technologies and the opening of new and exotic fisheries (NAS, 1977, pp. 251-318). Their recommendations make sense with respect to the conventional motivation of maximizing revenues, and perhaps as a means of maximizing total quantities produced. But what are the prospects that the approaches they recommend will result in an effective response to the problem of world hunger?

Those who press for the opening of new stocks or for research and development leading to new technological breakthroughs have missed the message already very clearly established in the history of agriculture. It is in the nature of the prevailing modes of management that any newly developed resources or new breakthroughs are likely to be used to the advantage of the already advantaged.

Moreover, it should be recognized that the research agenda traditionally has been skewed to favor the development of revenue-producing products and not to promote the development of products distinguished for their nutritional importance. For example, reef fishing and the gleaning of shellfish from drying reefs have received little attention because they are not of great commercial importance, despite the fact that often they are significant for local nutrition. Prevailing research priorities are suggested by the fact that in the bibliographic section of fisheries newsletters, the section on nutrition is about the feeding of aquaculture species, not about human nutrition. Whether in connection with agriculture or aquaculture, far more of the world's nutrition research is about the feeding of livestock than about human nutrition. Of that research which is about human nutrition, very little is about malnutrition.

Fisheries could be managed to be increasingly responsive to the problem of chronic undernutrition in several different ways.

The most common approach is to recognize that often fishermen and their families themselves are among the most seriously impoverished. Many different strate-

gies have been suggested to improve the lot of such small-scale (or artisanal, or subsistence) fishermen. Programs can be undertaken to provide training, improved infrastructural support, improved access to markets, and so on. Over the past decade they have reached increasing attention from national and international development agencies.

At the same time, however, it is being recognized that the prospects for development of small-scale fishermen may be quite bleak. Frequently they are eclipsed by larger-scale fishermen who are better able to take advantage of the opportunities that are offered (Emmerson, 1980; Neal, 1982; Galtung, 1974).

It is striking that in small-scale or large-scale fisheries development efforts, full attention is given to the money value of the product, but almost no attention is given to its nutritive value. The attention that is given to the needs of small-scale fishermen is related to income, and not directly to their nutritional requirements. Problems of malnutrition outside the fishing communities are not addressed.

One remedy would be to strengthen the institutional linkages between agencies responsible for health and nutrition and agencies responsible for fisheries management, and to produce food items particularly suited for populations most vulnerable to malnutrition.

International agencies concerned with fisheries development should give more attention to the potentials of fisheries for addressing problems of undernutrition. In supporting fisheries development projects, one of the Asian Development Bank's principal aims is "to increase the availability of fish and fish products for domestic consumption" (Asian Development Bank, 1979). But providing fish for general consumption is quite different from responding to the particular problems of those who are seriously undernourished. The lack of focus on this point is suggested by the fact that the ADB lists a wide range of "Issues for Fisheries Development," but the problem of undernutrition is not among them.

The World Bank also has been insensitive to the problem. The Bank acknowledges that "small-scale fisheries provide most of the fish consumed by people in developing countries," and at the same time reports that in the twenty-seven fishing projects funded between 1964 and 1981, "the major objective has been to increase production for export. Nearly 60% of the loans were utilized for large-scale fishery development" (World Bank, 1982). Recently, however, the Bank has been giving increasing attention to small-scale fisheries.

The South China Sea Project in Manila, the Pacific Tuna Development Foundation in Honolulu and other fisheries development agencies, having focused on large-scale operations for export, have been subjected to similar criticisms. Many of these agencies, including the World Bank, are now giving more attention to small-scale inshore fisheries. But there is still very little attention being given to the problem of chronic undernutrition as such.

Although it may not guarantee that supplies go to those most in need, increasing food self-reliance at the regional, national and community levels can be very helpful. Increasingly, emphasis should be placed on local production for local consumption. Trading loops should be shortened so that fisheries become more responsive to local rather than alien interests. To the extent that they promote trade among less developed countries, INFOPESCA and INFOFISH, recently created by the FAO to promote fisheries trade, could be very helpful. Similarly, programs of Technical Cooperation Between Developing Countries (TCDC) such as the Bay of Bengal Program deserve support (Nichols, 1982).

Increasing self-reliance among developed countries would help as well. Rich countries could help poor countries to become more self-reliant by increasing their

own food self-reliance — that is, by reducing the amount of food they import.

The export orientation of local fisheries can be reduced through the imposition of export taxes. The outflow of fish can also be limited to other ways. In Malaysia, in order to increase supplies to local consumers, trucks have been required to unload ten percent of their load in Johore before going on to Singapore. Import duties can be used to reduce the inflow of fish from outside. For example, instead of continuing to import large quantities of canned mackerel from Japan, Papua New Guinea could place duties on imports and support the creation of its own domestic mackerel processing industry, based on the ample stocks found off its own shores.

So long as the Japanese are able to deliver mackerel extraordinarily cheaply, the creation of a domestic mackerel industry might not be commercially warranted. But there may be other justifications for launching such an enterprise. Food security might be a major consideration. This is, it might be wise to expand the domestic fish supply in a form that is highly independent of the vagaries of outside markets and outside forces. The industry might be used to create jobs in production, processing and marketing. Moreover, the product might be used not only for regular commercial marketing but also for subsidized programs specifically directed to the seriously undernourished.

The argument here is not that nations should undertake projects that are uneconomic, but rather that they should broaden the range of values taken into consideration in designing fisheries development projects, taking particular account of basic nutritional needs. If fisheries projects are judged exclusively by narrow market standards they will not be responsive to the problem of chronic undernutrition. Capital can be invested in, and generate a profit in, the production of foods especially for the poor, but generally that capital is likely to generate an even larger return when invested in production for the middle or upper classes. Thus, in any enterprise designed to produce food for the poor one must be willing to forego the maximization of profit and instead optimize, taking other values into account as well.

There are several plausible strategies for dealing with the systematic outflow of food from poor countries, but all have a common prerequisite: There should be a clear understanding that this is in fact a situation which needs to be remedied.

Increasing overall fish supplies in itself is unlikely to help very much in alleviating undernutrition because, in the absence of special measures, most of the product is likely to go to those who already have enough. And it needs to be recognized that while trade can indeed be beneficial to all trading partners, it is likely to be much more beneficial to the richer partner. As a result, if it is pursued indiscriminately, increasing trade can promote the widening of the gap between rich and poor, and thus help to promote rather than alleviate chronic undernutrition in the world.

The issues raised here are now beginning to draw international attention. In 1983 a consultation was organized by the Government of Norway with the cooperation of the FAO to address the question, "How can fisheries be managed and developed to be more effective in alleviating undernutrition?" A broad variety of possibilities were outlined, including actions by national governments, fishing communities, producers, research agencies, food assistance agencies and development agencies. The consultation recommended that "the role of fisheries in alleviating undernutrition be proposed as a specific action programme for fisheries development" at the 1983-1984 World Fisheries Conference" (FAO, 1983). In October, 1983, the FAO's Committee on Fisheries supported this recommendation and incorporated it into the *Draft Strategy for Fisheries Management and Development*

and Associated Programs of Action (FAO, 1984) which was prepared for consideration by the FAO World Conference on Fisheries Management and Development held in Rome in the summer of 1984. The conference endorsed the "Action Programme on the Promotion of the Role of Fisheries in Alleviating Undernutrition" without dissent. The program is now being managed jointly by the FAO's Fisheries Division, Food Policy and Nutrition Division, and World Food Programme.

No one is advocating that fisheries should be wholly devoted to alleviating undernutrition. There are several other valid social purposes such as generation of incomes, foreign exchange and employment, which fisheries can and should serve as well. The question is, how might some redirection be achieved?

Despite the strong evidence of the pervasive nature of undernutrition, few countries undertake systematic monitoring of nutritional status. The problem is easy to minimize. If the problem is taken to be serious, however, there are several things which could be done. Appropriate strategies would be different in different contexts. Before detailed strategies are designed, however, there must be a recognition of both the problems and the opportunities which lie in the interrelationships between fisheries and chronic undernutrition. Thus, rather than prescribe particular strategies, it may be enough here to say that fisheries development plans should increasingly take account of the need to address the problem of malnutrition. Methods and techniques would vary according to circumstances, but there will be no action in this direction at all if there is no motivation for it.

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