Renewable Resources in the Pacific

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Contents

Foreword 5

Preface 6

Introduction 7

General Studies
Intensive, Extensive, and Optimal Development of Forestlands
Anthony Scott 13

Optimizing the Use of Ocean Fish Resources in the Context of Extended National Jurisdictions Parzival Copes 33
Discussion Peter Drysdale, Narongchai Akrasanee, John Bene, Wontack Hong, Francis T. Christy Jr 48
Trade and Investment in Fish Products among Pacific-Area Countries
Biing-Hwan Lin, Rebecca J. Lent, and Richard S. Johnston 57
Discussion Hak Yong Rhee, Yoshiaki Matsuda 71
Pacific Trade and Investment in Forest Products K.L. Aird and W.A.J. Calow 73
Discussion Kenji Takeuchi 81
The Northeast-Asian Market Economies’ Response to Tighter Controls on Fish and Forest Resources Sueo Sekiguchi 83
Discussion Helen Hughes 89
Resources of the Eastern USSR Jan J. Solecki 91

Forestry Case Studies
Forest Plantations, Production, and Trade in the Pacific Basin
Roger A. Sedjo 97
Discussion K. Hemmi 102
Pacific Northwest Timberlands David R. Darr 103
Discussion Wontack Hong 115
Development Prospects for Forestry in Indonesia A.T. Birowo 117
Discussion R.N. Byron 120
Tree Crops in Malaysia Francis K. Chan 123
Discussion Mohamed Ariff 133

Fisheries Case Studies
The Economic Future of Alaska Groundfish under Extended Jurisdiction
R.L. Stokes 137
Discussion Yoshiaki Matsuda 142
Canadian Regulation of Pacific Fisheries David G. Moloney 144
Discussion Yoshiaki Matsuda 154
The Developing Skipjack Tuna Fishery of the Central and Western Pacific Ocean David J. Doulman 156
Discussion Theodore Panayotou 163
Fisheries Development in the South China Sea Teruji Sakiyama 165
Discussion Aida R. Librero, Norman J. Wilimovsky, Theodore Panayotou 171
The Squid Fishery in New Zealand: the Role of Joint Ventures and Foreign Fleets C.C. Wallace 178
Export Potential of Coastal Shrimp Cultured in Thailand Kamphol Adulavidhay and Thanwa Jitsanguan 188
Discussion Hugh Patrick 193

Renewable Substitutes for Fossil Fuels
Substitution of Nonexhaustible Resources for Fossil Fuel Energy and Industrial Raw Material Resources Ben Smith and Hugh Saddler 197
Discussion Miguel S. Wionczek 207
Prospects for Renewable Energy Resources in South Korea Hoesung Lee and Jee Dong Kim 209
Discussion Romeo M. Bautista 219
Energy Constraints and the Open Economic Strategy in China’s Modernization Li Guong-on and Luo Yuanzheng 221
Discussion Jan J. Solecki, Lawrence B. Krause 227

Policy Issues
Location of Mechanical Processing of Tropical Hardwood K. Takeuchi 233
Discussion Alhambra Rachman 245
Cooperative Fisheries Arrangements between Pacific Coastal States and Distant-Water Nations Gordon R. Munro 247
Discussion K. Hemmi 254
Fiscal Policies and Resource Rents in the Extraterritorial Oceans Ross Garnaut 256
Discussion T.K. Shoyama, Hugh Patrick 267

Summary Keith A.J. Hay 271

References 279

Participants 291

Official Hosts and Observers 293
Trade and Investment in Fish Products among Pacific-Area Countries

Biing-Hwan Lin, Rebecca J. Lent, and Richard S. Johnston

Department of Agricultural and Resource Economics, Oregon State University, Corvallis, USA

What effects, if any, have the new exclusive economic zones (EEZs), dramatic changes in exchange rates, higher fuel costs, and changes in the price of alternative protein sources had on trade and investment in fisheries? Although world harvests of seafoods have increased since 1967, fish landings among Pacific-area countries, taken in total, have increased even more over the period. Furthermore, trading patterns have changed: Japan, the world’s leading seafood exporter in 1965, has been a net importer since 1972. Canada and the U.S. have experienced declines in their shares of world exports, and developing Asian countries have increased theirs. On the investment side, a variety of joint-venture arrangements have emerged. Thus, fishing patterns have changed with respect to areas and species fished as well as vessel type. Preliminary results from two general econometric models suggest that relative prices, while important, account for a small percentage of the varieties in export-market shares; that, on the demand side, such shares are relatively inelastic with respect to relative prices; that the income (food expenditure) elasticity of demand for shrimp in Japan has been decreasing over time (price elasticities of demand are relatively low); and that the exchange rate may serve as a separate explanatory variable. Although certain insights can be gained if one looks at broad aggregates (countries and species), the more interesting questions should be addressed through a detailed investigation of the role that fisheries play in particular countries and of the market characteristics for particular species.

Les nouvelles zones économiques exclusives (ZEE), les fluctuations brutales des taux de change, la hausse du prix du pétrole et l’évolution du coût des nouvelles sources de protéines ont-ils influencé ou non les investissements et le commerce des pêcheries? Le volume mondial des pêcheries a augmenté depuis 1967 mais encore plus les captures des pays des côtes du Pacifique. Le commerce lui-même a évolué : le Japon, premier exportateur de produits de la mer en 1965 est devenu un importateur net depuis 1972. Les exportations du Canada et des États-Unis ont diminué et celles des pays en développement asiatiques ont augmenté. Au niveau des investissements, de nombreuses conventions ont été signées. Par conséquent, le modèle des pêcheries a aussi changé, qu’il s’agisse de zones, d’espèces ou de sortes de chalets. Les premiers résultats de deux modèles économétriques généraux indiquent : que les prix relatifs n’influencent, malgré leur importance, que sur un faible pourcentage de la variation dans la répartition des marchés d’exportation; que du côté de la demande, ces proportions sont relativement stables; que l’élasticité du revenu des crevettes a diminué au Japon (l’élasticité des prix à la demande étant relativement faible); que les taux de change peuvent constituer une variable explicative séparée. L’analyse d’agrégats globaux (pays et espèces) permet de dégager quelques indices, mais les points les plus importants devraient être étudiés au moyen d’une enquête détaillée sur le rôle que les pêcheries jouent dans divers pays et les caractéristiques du marché de certaines espèces.

For the purposes of this paper, Pacific-area countries are considered to be those of the Middle East, South Asia (bordering on the Indian Ocean), Oceania, Asian countries bordering on the Pacific Ocean, the United States, and Canada. Central and South American countries have been excluded, except for Mexico in the case of shrimp, although their role in Pacific-area seafood trade may soon increase. Country-by-country descriptions of seafood trade in 15 Pacific-area countries reveal general trends, affected perhaps most significantly by the
proclamation of 200-mile exclusive economic zones (EEZs). Since the EEZs were widely accepted, the fishing activities of many fleets have been subjected to controls — joint ventures, special quotas, and permits. The new patterns of activities are profoundly influencing international trade in seafood. For example, countries that now allow foreign nations to harvest underutilized species within their EEZs may develop their own capacities in future. Such shifts in access to fish resources are bound to influence the flow of seafood between countries. The country that eventually takes over the foreign-fishing activities will have reduced imports for that species; likewise, exports by the foreign nation will decline.

The emergence of 200-mile EEZs has resulted in new patterns of fishing activities, in terms of areas and species fished as well as vessel types, and has affected investment patterns in the fishing and seafood processing industries. Whereas fleets currently fishing in foreign EEZs are generally scaling down their vessel and equipment investments, coastal states are attempting to expand their domestic industry (both in vessels and processing facilities) to begin focusing on foreign-harvested or underutilized species within their EEZs. Some of this domestic investment comes through governmental channels or international organizations, although investment by foreign private enterprises is playing an increasing role. Japanese private investment in various countries' shrimp processing facilities and Norwegian private investment in Indonesian tuna industries are but two examples of attempts to satisfy domestic demand previously met by distant-water fishing activities.

The general trend in the Pacific area during the past 10 years has been increased total catches and values. Except for the U.S., Japan, Singapore, and Hong Kong, all the countries in the Pacific were net exporters (by value) of seafood in 1977. In fact, in Singapore and Hong Kong, the presence of imports for resale abroad may mask a true, net-exporting status.

Between 1967 and 1978, total world harvest of fish, crustaceans, and molluscs increased from 60.4 to 72.3 Mt, an increase that pales beside the nearly 200% during 1950-67. The Food and Agriculture Organization (FAO) of the United Nations has estimated that, in 1967, international trade accounted for 42% of the total catch. This figure fell to 31% in 1973 but has been increasing since. Among the Pacific-area countries, the role of Japan and Israel (the developed market economies of Asia) as seafood exporters declined in relative terms during 1967-79, whereas that of Asia's developing-market economies increased substantially. The shares of exports from Oceania, Canada, and the United States fluctuated.

As importers, the developed markets of Asia and North America showed opposite trends. Between 1967 and 1979, the former's share tripled for fresh and frozen seafood, whereas the latter's fell by one-third. The relative positions of Canada, the United States, Australia, and New Zealand as importers of prepared seafoods — especially in the canned form — also declined. Asia's developed economies increased their combined shares of world imports of prepared seafoods from less than 1.5% to almost 8%.

Thus, the general picture is that of an expanded total world harvest (of both marine and freshwater species) with a recent increase in the relative importance of international trade to its pre-1973 level (Table 1). In addition, the developing economies of Asia have increased their share of the world's seafood exports, at the expense of most of the developed economies for products requiring little processing and at the expense of Japan for the more processed products.

Between 1967 and 1978, nominal catches for Pacific rim regions increased: U.S. and Canada 33%; Japan 37%; Australia and New Zealand 37%; USSR 55%; Asia's developing countries (including China but not Taiwan) 52%. Harvests from all these regions have expanded more rapidly than the world totals, an important factor underlying some of the international trade patterns. These larger harvests are the result, in large part, of expanded investments in fishing effort — especially vessels — and, to a lesser extent, of changes in fishery jurisdictions.

Increases in population and incomes as well as reductions in tariffs have contributed to increases in imports. The degree to which seafoods substitute for other protein sources has not been explored on a global basis. However, the Asian countries' share of world trade in meat, both imports and exports, more than doubled between 1970 and 1979.

Data for 1973 and 1978 for fresh and frozen seafood (UN 1978) indicate the value of Japan's exports declined. Japan's exports to the United States fell dramatically, whereas, on a percentage basis, shares to other markets expanded. Canada's total exports increased, with sales to Europe growing at the expense of Japan and the U.S. The value of U.S. exports also increased, with Japan's share showing a large increase and Europe's share a large decrease. (Preliminary data for 1979...
Table 1. Shares of Pacific-area countries in world seafood trade, 1967–79.

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* na = not available.

Source: Various issues of the UN Yearbook of international trade statistics, New York, USA, UN.
Table 2. Distribution of seafood (fresh and frozen), percentage of exports from selected Pacific-area countries to listed world markets, 1973 and 1978.

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</thead>
<tbody>
<tr>
<td>1973</td>
<td>14.7</td>
<td>12.7</td>
<td>30.1</td>
<td>71.0</td>
<td>47.1</td>
<td>10.3</td>
<td>8.5</td>
<td>2.5</td>
<td>0.2</td>
<td>3.6</td>
</tr>
<tr>
<td>1978</td>
<td>60.4</td>
<td>17.1</td>
<td>29.7</td>
<td>7.4</td>
<td>4.4</td>
<td>1.8</td>
<td>0.6</td>
<td>0.1</td>
<td>0.2</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Source: Various issues of the UN Yearbook of international trade statistics, New York, USA, U.N.

suggest that increasing volumes may be moving to Europe.) The values of exports from the other Pacific-area countries for which data are readily available (Hong Kong, Indonesia, Thailand, Australia, and South Korea) were all larger in 1978 than in 1973 (Tables 2 and 3). On a percentage basis, Japan is the largest market for these countries, although Australian exports to the U.S. exceeded those to Japan in 1973. Japan's imports from South Korea fell during the period and increased for Australia. The U.S. and Europe are also major markets for the seafood products of these countries.

In general, the developed countries continue to be the primary importers of seafoods, even partially processed forms. Some changes may be occurring, however; for example, Japan's share of annual exports to "other" countries increased by more than 60% over the period.

For processed products, Japan is the primary supplier, suggesting that it imports raw materials for processing and subsequent export. Nonetheless, Japan continues to be a major market for the processed seafoods of South Korea and, beginning in 1978, of Canada.

Japan

Between 1950 and 1978, Japan's harvest of fish and shellfish increased more than threefold, making that country the leading fishing nation in the world. Indeed, Japan's 1979 harvest exceeded the combined catches of the United States, Canada, Mexico, and China. In 1965, Japan was the world's primary exporter of seafood and ranked sixth as an importer. A net exporter of seafood in 1958, Japan has been a net importer since 1972.

Japan's fishing industry includes both domestic and local fleets, as well as aquaculture operations. Despite massive destruction during World War II, the fishing fleet and industry infrastructure have made remarkable recoveries. Much of the increase in harvest came from expansions of the catching capacity in both offshore and distant waters, particularly for species such as Alaska pollack and mackerel. In 1964, these two species, together with the tuna species, led all others in terms of volume, whereas the tunas had the highest exvessel value followed by squid (including cuttlefish). By 1978, sardines had replaced tuna in the top three, by volume, and Alaska pollack had joined tuna, salmon, and squid as a leading income generator.

The United States is Japan's principal market for exports, although six other Pacific-area countries accounted for 21% of Japanese exports in
200-mile fishing economic and development programs, trade fishing common tages,\textsuperscript{1} nation of domestic ing \textsuperscript{50-fold} sardines and anchovies demand, expanded domestic processing (canned from leading domestic fresh and frozen, tuna. \textsuperscript{2}

Indonesia countries. \textsuperscript{3} When expressed relative to those of other industrial nations. The government's response has been increased involvement in domestic fisheries, including encouragement of aquaculture, water-purification projects, plans for exploiting new fishing grounds, participation in investment activities abroad, and the pursuit of other fishing resources, such as the Antarctic krill. Japan's investments in developing countries include the provision of technical expertise and capital to encourage shrimp production, some of which it later imports. It also participates in joint ventures ranging from tuna, squid, and shrimp production in Africa to salmon marketing in Chile. A substantial number of joint ventures are in Eastern Asia, and major investments have been made in American and Canadian fisheries.

The composition of the domestic fleet has changed somewhat, in step with expanded attention to the coastal areas of Japan. In 1961 there were 379,187 fishing boats, of which 1168 were 100 t or larger. In 1974, there were 372,151 vessels, of which 3196 were 100 t or larger. However, in 1978, when the total number of vessels had increased to 412,423, the figures for 100-t plus boats had grown by only 92.

\textbf{China}

The People's Republic of China is one of the world's greatest producers of fishery items. Its output of aquatic animals and plants has consistently ranked among the top four countries of the world. Yet the fishing industry in the country remains somewhat of a mystery to the rest of the world, and only recently has detailed information been made available.

The 1978 marine fish yield in China comprised 605,900 t from the South China Sea (19\% of total

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\textbf{Table 3. Distribution of seafoods (prepared)\textsuperscript{4} percentage of exports from selected Pacific-area countries to listed world markets, 1973 and 1978.}

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<td>18.0</td>
<td>8.8</td>
<td>70.9</td>
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<td></td>
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<td>24.2</td>
<td>1.1</td>
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<td>4.2</td>
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<td>2.0</td>
<td>4.2</td>
</tr>
<tr>
<td>Philippines</td>
<td>7.5</td>
<td>3.9</td>
<td>na\textsuperscript{2}</td>
<td>0.1</td>
<td>0.9</td>
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<td>&lt;0.1</td>
<td>na</td>
</tr>
<tr>
<td>Singapore</td>
<td>4.1</td>
<td>3.4</td>
<td>0.1</td>
<td>&lt;0.1</td>
<td>0.8</td>
<td>1.5</td>
<td>0.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Europe\textsuperscript{3}</td>
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<td>13.1</td>
<td>63.6</td>
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<td>51.0</td>
<td>37.0</td>
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<td>6.3</td>
</tr>
<tr>
<td>Other</td>
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<td>54.6</td>
<td>15.9</td>
<td>7.1</td>
<td>7.6</td>
<td>18.8</td>
<td>1.8</td>
<td>5.5</td>
</tr>
</tbody>
</table>

\textsuperscript{4}Corresponds to SITC 032.

\textsuperscript{3}France, U.K., West Germany, Belgium, Luxembourg, Sweden, Netherlands, Denmark, Switzerland, Italy, Austria.

\textsuperscript{2}na = not available.

Source: Various issues of the UN Yearbook of international trade statistics, New York, USA, UN.

1978 (up from 17\% in 1970). Pacific-area countries also play a significant role as suppliers of seafood to Japan. South Korea supplied between 11\% and 22\% of Japan's imports during the 1970s, and Taiwan accounted for about 10\%. Indonesia increased its share of the Japanese market substantially during the 1970s, largely through exports of shrimp. Japan imports fresh and frozen tuna and exports canned, as well as fresh and frozen, tuna. South Korea and Taiwan are Japan's major tuna suppliers (aside from its domestic fleet), whereas the United States is the leading importer of Japanese tuna.

Among the factors underlying Japan's switch from net exporter to net importer are relaxation in its trade restrictions, increased domestic demand, expanded domestic processing (canned sardines and anchovies production alone increasing 50-fold between 1970 and 1978), and changes in supply conditions, such as restrictions on fishing operations in foreign fishing grounds, pollution of domestic fishing grounds, labour shortages,\textsuperscript{1} appreciation of the Japanese yen, and, in common with other fishing nations, increased fuel costs.

The Japanese government is involved in the fishing industry in several ways, from restrictions on efforts for certain species, through research and development programs, trade policies (including import controls on selected fishery products), to management of Japan's 200-mile economic zone. Japan's large distant-water fleet was adversely affected by the introduction of the 200-mile fishing jurisdictions claimed by other

\textsuperscript{1}The International Marketing Fund reports that labour costs in Japan rose 28\% between 1975 and 1978 when expressed relative to those of other industrial countries.
marine fish yield) and 2.54 Mt from the East China, Yellow, and Pohai seas (81% of total yield). The latter fishing region increased in yield by 62% during 1970–78, whereas yield from the South China Sea increased only 14% for the same period.

Marine and freshwater aquaculture form a significant portion of China's annual output of aquatic products. In 1978, total output of aquatic products reached 5953 Mt, and aquaculture accounted for 41% of this production (including kelp). Moreover, aquaculture yields more than doubled during 1970–78, whereas catch increased by less than 50%. China's catches have been mainly sold at home. Exports in 1970, for example, represented only 1.5% of China's nominal catch in that year. Total exports averaged 96 000 t during 1970–78.

Although detailed data for China's seafood trade are scarce, available information does provide some insights. A 1966 study cites the USSR as one of China's most important fish export markets. Britain and Czechoslovakia were importing fish meal from China by 1955. An effort to expand exports by 50% began in 1956. In 1962, eels in tomato sauce, spiced hairtail fish, croakers in oil, and braised cuttlefish were identified as important canned export products for China. A 1978 study points to Hong Kong and Macao as China's primary buyers of fresh and frozen fish, whereas Japan and Southeast Asia purchased most of China's jellyfish and frozen prawn exports.

Import tariffs for the fishery products as published by the International Customs Tariff Bureau are high, ranging from 30% to 250% ad valorem. A supplement to the customs journal for China stated "...the Embassy of the PRC [has advised the International Customs Tariff Bureau] that until further notice, no export duty is leviable on commodities exported from the PRC."

**Thailand**

Thailand's fishery products reached 2.3 Mt in 1978, an astounding increase of 1055% over the volume landed 20 years earlier. Major species for Thailand in 1978 included sardinellas, sead, and natantian decapods. The country has long been a great fish-producing nation of the South China Sea countries (second to China), although this may change as the result of the establishment of EEZs in numerous countries.

Thailand's 1974 fleet consisted of about 40000 vessels, primarily small boats with outboard engines for inshore fishing. In the early 1960s, a Thai-German bilateral project to introduce trawl fishing led to overfishing in nearby waters and sent the Thai fleet to distant fishing grounds. Fishing operations employed about 64 000 in 1978.

Thailand's fishing fleet, already dependent upon distant fishing grounds for its trawlers, faced considerable problems as various countries established 200-mile jurisdictions. In 1978, estimates were that newly established fishing limits would cut Thailand's fishing grounds by 780 000 km² and reduce catch by 30%. Thailand, thus, made special efforts to become involved in joint ventures and to obtain foreign fishing permits. One joint venture reported in early 1979 involved trawling in the waters of Bangladesh.

Thailand was a net exporter of fishery products during 1963–78; indeed, the value of 1978 exports was more than 37 times the value of imports in 1978. Crustaceans and molluscs — fresh, frozen, dried, and salted — are Thailand's most important fishery export, accounting for more than 60% of the total value of exports. Primary importers of Thailand's seafood products in 1966 included Japan (crustaceans), the United States (crustaceans), and Malaysia (fish).

Thai 1978 imports were also headed by crustaceans and molluscs, although they were only 2% (by value) of the exports. Imports from Malaysia were the greatest (in value) of all Thailand's fishery imports, but those from Japan and South Korea were also important.

**USSR**

Fish and fishery products in the USSR were 8.93 Mt in 1978, representing a decline for the second year in a row. However, the Soviet Union's production remains among the top five countries of the world in terms of total catch. The recent decline is said to be due to the USSR's exclusion from various countries' 200-mile limits, as well as other factors.

The species landed in greatest volumes in the USSR in 1978 included Alaska pollack, chub mackerel, elupeonella, cunene horse mackerel, and blue whiting. Japanese pilchard was also an important fish for the USSR that year, apparently a previously underutilized species.

In 1970, the Soviet Union's fishing fleet included trawlers (58.8%), drift-net vessels (6%), purse seiners (9.2%), and passive-method vessels (10.1%), and the share of trawlers in the fleet was said to be expanding.

With the imposition of 200-mile EEZs around the world, the Soviet vessels were excluded from
important fishing grounds. Thus, the late 1970s brought in a new era for Soviet fisheries, with joint ventures and international negotiations for permits and quotas playing a greater role. The Soviets began fishing for hake in a joint venture in the late 1970s off the west coast of the U.S. In 1979, another joint venture began off the coast of Alaska, with 136 t harvested in the first year. In 1978, two Soviet factory ships were purchasing and processing more than 2000 t of mackerel a month, provided by the U.K. vessels in a joint venture off the English southwest coast. The Soviet Union has also been allocated quotas of unused fishery resources in several countries' EEZs, such as those of New Zealand and Australia.

In addition, the USSR announced in 1978 its involvement in a U.S.$12 million venture in Singapore. The project was to build a processing and storage complex in Jurong that would convert trawler catches into convenience foods. The company engaging in the venture was founded in 1975 by Straits Fisheries and V/O Sovrybflot.

Exports of seafood products from the USSR grew from 316 400 t in 1970 to 516 230 t in 1978, a 63.2% increase. The total value of these exports increased by 163% during the same period. The share of fresh and frozen fish exports, as well as those for fish products and preparations and fish meal, all increased during 1966–78. Exports in 1978 were dominated by fresh and frozen fish and fish products and preparations. The country exported 5.8% by volume of its total catch in 1978 (the comparable figure in Japan was 6.9%).

As export data by country for the USSR are unavailable, we attempted to locate the Soviet markets for seafood products from the import data for various countries. European Economic Community (EEC) imports from the USSR in 1978 were approximately 4.5% of the volume of USSR exports for that year, whereas the value of imports reached 21.1% of the total value of USSR exports. The 1966 import figures for the EEC showed a lower volume and share of Soviet fishery products, although Denmark, the U.K., and Ireland were not EEC members at the time. Important fishery exports from the Soviet Union to the EEC include frozen fish, shrimps, and prepared and preserved salmonids.

Japan, the world's greatest importer of seafood products, imported 31 720 t of seafood products from the USSR in 1979. Alaska pollack and fish fillets were the top Soviet exports to South Korea in 1978, whereas fresh and frozen marine fish were Singapore's major import from the USSR in 1977. India and Malaysia data for 1978 and 1974, respectively, showed no imports of seafood products from the USSR. Small amounts of USSR fishery imports were found for Hong Kong, Australia (mostly canned salmon), and New Zealand.

**Taiwan**

Taiwan's fishery products reached 675 025 t in 1976 at a total value of U.S.$383.7 million. Top-valued landings in 1976 were Spanish mackerel, sharks, and squids, together accounting for more than 15% of the total value of production in that year. Taiwan's output has been rising, with 1976 landings nearly 250% of those in 1956 (by volume). One major factor in the expansion of Taiwan's fishing industry has been the availability of government and World Bank loans for vessel construction.

Taiwan's fishing fleet included 11 997 powered vessels in 1974, almost a fivefold increase over the number in 1954. Fishing personnel in 1976 were more than 300 000, of whom 63% were full-time employees of the fishery.

In September 1979, the government of Taiwan announced the establishment of its 200-mile EEZ. The Philippines had earlier declared the 200-mile limit, excluding Taiwanese vessels from the water of the Bashi Channel — fishing grounds that had once provided annual catches of 50 000 t for the Taiwan fleet. Taiwan's establishment of an EEZ affected fishing activities of the Japanese fleet, which had been harvesting about 30 000 t annually in Taiwan's waters.

Taiwan's fishing fleet was adversely affected by the emergence of the EEZs as well as the rising cost of fuel; in 1976, nearly 300 Taiwanese longliners were not able to fish. The government of Taiwan began several projects to boost the fishing industry, by providing loans of U.S.$70 million to improve port facilities, technology, and training.

In addition to developing underutilized species in its own waters, Taiwan has been involved in international negotiations to gain access to fishing grounds in other countries' EEZs. In early 1980, for example, Taiwan had been granted fishing rights in Australia's zone for squid jigging as well as trawling and gill netting for certain demersal and pelagic finfish and sharks.

Before efforts were made to expand the fishing industry, Taiwan was a net importer of fishery products, particularly salt-dried and canned products. Exports began rising in 1959 as frozen tuna began to be marketed internationally. In 1963, large volumes of frozen shrimp exports further expanded Taiwan's total value of fishery exports. In 1976, the total value of Taiwan's
fishery exports was U.S.$340 million, more than seven times that of imports.

Fishery exports generating the most revenue for Taiwan in 1977 included fresh and frozen saury, fresh and frozen eel, and dried and smoked stone bream and eel. Japan was clearly the major market for Taiwan's seafood exports in 1977, although Hong Kong and France were also important buyers.

Major imports for 1977 were salted and dried squid and cuttlefish, fresh and frozen squid, and salted and dried sea blubber. A large share of the imports were from South Korea, Japan, and Argentina.

Taiwan's domestic fish market has been well protected by a system of heavy import tariffs on fishery products. In 1976, tariffs ranged from 65% of value (roes, salted herring, dried squid, fresh and frozen shrimp, prawns, and lobsters) to 130% (sharks' fins, bicho de mar). We do not know whether these have been reduced since that year. Fishery products imported by Taiwan for processing and resale are duty free.

Singapore

Singapore's role in the international seafood market is apparent from the basic data each year. For example, in 1978, total landings of fishery products were 16,124 t; total exports in that same year were 57,271 t and imports were 104,273 t. Given that the volume of exports was more than 3.5 times that of landings, importing for resale abroad (perhaps after processing) appears to be an important activity for Singapore.

Although the country's 1978 landings were larger than those of the previous year, total landings have been declining gradually since 1973. Major species for Singapore in 1978 included fusiliers, natantian decapods, and threadfin breams.

In 1968, Singapore's fleet numbered about 1,700 licenced vessels, of which about 85% operated in coastal waters either without power or with outboard engines. The remaining 15% of inboard-engine powered boats harvested 75% of Singapore's total catch.

Joint ventures and foreign investment in Singapore's fishery include a Soviet investment of U.S.$12 million for a processing and storage complex in Jurong.

Singapore's top-valued export in 1977 was freshwater aquarium fish, the bulk of which was domestically produced (96%) and destined primarily for the U.S., West Germany, the U.K., and Australia. The second-highest export by value was fresh and frozen prawns, and 55% of the total value was domestically produced. Japan was the major purchaser of these prawns, with the U.S. and Australia also being important markets. Marine fish exports (excluding tuna) went primarily to Japan in 1977, as was the case for fresh and frozen molluscs (excluding oysters).

Singapore's four top-valued imports in 1974 were: fresh and frozen marine fish (excluding tuna), canned horse mackerels, canned sardines, and dried and salted sharks' fins. The USSR and Malaysia supplied 60% of Singapore's total value of imports of marine fish (excluding tuna). Japan's share of horse mackerel imports was 94% of the total value. Major suppliers of Singapore's salted and dried sharks' fins included Japan, India, Korea, and Sri Lanka in 1974. Japan was also the primary country of origin for Singapore's imports of canned sardines in that year.

Malaysia

Total landings of fishery products in Malaysia in 1978 were 685,107 t, of which 83% were harvested on the Malaysian Peninsula, 6% from Sabah, and 11.3% from Sarawak. Major species for the country in terms of volume included blood cockles, Indian mackerels, and russell's scad. Although Malaysia's total production fell in 1975, the 1978 landings represented a 194% increase over those of 1967.

In 1974, there were about 29,000 fishing vessels in Malaysia, of which 61% were powered with inboard engines, 18% had outboard engines, and 21% were nonpowered. The fishing industry of Malaysia employed some 81,000 in that same year, about 23% of the country's total labour force.

The country's total value of fishery exports fell in 1977 from the previous year's level; however, the amount represented a 156% increase over the value of exports in 1970. Exports by species for 1974 reveal that fresh and frozen prawns were the number one export that year in terms of total value. Tuna and other marine fish were also leading exports for Malaysia that year. The major markets for these products included Singapore, Japan, the United Kingdom, and the U.S. During 1965, Singapore was clearly the major market for Malaysia's fishery exports, whereas Japanese and U.K. imports of Malaysian seafood products were growing in value.

Except for 1967, Malaysia has been a net exporter of seafood for 1965–77. Japan and Thailand accounted for a large share of the total value of Malaysian imports during 1965–74, although
Taiwan’s increasing exports to Malaysia exceeded those from other countries for 1971–73. China began exporting seafood to Malaysia in 1972, although the total from China is a small share of Malaysia’s imports.

The top-valued imports for 1974 were fresh and frozen tuna, fresh and frozen marine fish (other than tuna and sauries), prepared and preserved horse mackerel, and fresh and chilled prawns. Taiwan was the source of the largest share of tuna, whereas Thailand supplied 90% of the total value of fresh and frozen marine fish (other than tuna and sauries). Japan’s share of Malaysia’s imports of horse mackerel was more than 95% of the total value, and fresh and chilled prawns originated primarily in Thailand.

Malaysia’s three top-valued exports were also its top-valued imports. This suggests the possibility that imports are processed for export, although no data on resale abroad are available to verify this hypothesis.

**Indonesia**

Indonesia’s total fish and fishery products were 1.7 Mt in 1978, having followed an increasing trend over the past 10 years. Freshwater species from inland waters (including aquaculture) accounted for 21% of this total production. The species landed in greatest volume in 1978 included scads, natantian decapods, Indian mackerels, and anchovies.

The Indonesian fleet consisted of 284,707 vessels in 1972, of which only 2.6% were powered. The number of powered vessels has been increasing, however, through various domestic and international fishery modernization projects. Employment in the fishing fleet was nearly 900,000 workers in 1971, with an additional 350,000 persons employed in inland fisheries.

Indonesia’s underutilized fishery resources present a significant potential for development, thus attracting domestic and foreign public aid, as well as private foreign investment. In 1972, 13 fishing and processing ventures involved private foreign companies; 11 of these were backed by Japanese firms (total investment, more than U.S.$13.5 million). In November 1980, a Norwegian consortium of firms announced plans to establish a large Indonesian tuna venture. More than U.S.$200 million was invested in Indonesia’s fishing industry during 1969–75, 48% coming from the government, 35% from foreign sources, and 17% from private domestic enterprises.

Indonesian imports increased by 322% in volume and 845% in value from 1970 to 1977, and exports increased by 300% and 2704% in volume and value, respectively. The average price of imports was U.S.$0.574/kg in 1977, whereas the average price of exports in that same year was U.S.$3.16.

In 1958–77, crustaceans and molluscs clearly took the lead, in both value and quantity terms, in Indonesia’s exports of fishery products. The top-valued exports for 1978 were shrimp and prawns, which constituted 88.2% of the total value of exports in that year, and were primarily shipped to Japan. In contrast, tuna exports, second-highest in value, were primarily destined for the U.S. and Singapore. U.S. imports of fishery products from Indonesia in 1978 were more than 36 times the volume imported in 1970.

Indonesia’s imports of fishery products in 1977 were 15,630 t, valued at U.S.$8.98 million. These imports were 32.3% of the volume and 5.9% of the value of exports for that same year. Fresh and frozen saltwater fish and dried, salted whole fish were the seafood products imported at the greatest volumes in 1978. The major suppliers of these products were Singapore, Japan, Thailand, and the U.S.

**Hong Kong**

Total production from fisheries for Hong Kong reached 162,498 t in 1978, rising steadily for the previous 8 years. The major species landed in 1978 included threadfin breams, natantian decapods, scads, and pike congers. The small country’s access to distant fishing grounds, particularly the South China Sea, has been curtailed by the imposition of 200-mile EEZs in these waters.

In 1967, its fishing fleet consisted of 6814 vessels, with about 56,000 persons actively engaged in fishing. The composition of the vessels in the fleet was 865 long liners (13% of total fleet), 826 purse seiners (12%), 1913 trawlers (28%), 2142 gill netters (31%), and 1068 miscellaneous fishing vessels (16%).

Hong Kong’s 1978 exports of fishery products were more than four times those of 1970 by volume, and the value increased more than eightfold over the same period. The highest-valued exports, in 1979, were marine fish, prawns and shrimp, cuttlefish, other crustaceans, and aquarium fish. Japan is clearly the major destination for Hong Kong’s fishery products, although the U.S. and Canada also account for large shares of exports.
Whereas exports represent Hong Kong's sale of domestically produced fishery products, resales abroad are seafood products that are imported, sometimes processed, and then exported. The country's total resales abroad of fishery products in 1978 were nearly 80% by value of total exports. Average price/kg of resales for that year was U.S.$5.55, the corresponding figure for exports being U.S.$3.75. The difference indicates resales were processed fishery products. The four top categories for resales in 1978 in terms of total value were prawns and shrimp; dried, salted cuttlefish; dried, salted shark fins; and dried, salted abalone. Japan and the U.S. were major purchasers of Hong Kong's exports and resales, although a large share of the salted and dried products was sold to Taiwan and Singapore.

A significant portion of imports into Hong Kong is destined for processing and export. Of the 89,438 t of fishery products imported by Hong Kong in 1978, 11,826 t (or 13%) were exported. Its imports of seafood products have followed an upward trend. However, they are not rising as rapidly as exports. The average price/kg for imported fishery products was U.S.$2.85, considerably lower than that for exports.

**Philippines**

The total catch of the Philippines has risen steadily since 1955. The 1978 harvest of 1588 t represented a 65% increase over the volume of production 10 years earlier. Major species landed in 1978 included scads, milkfish (aquaculture), ponyfishes, anchovies, and freshwater molluscs.

The Philippines' fishing fleet in 1978 consisted of 214,797 vessels, of which 62% were nonpowered. The total number of fishing personnel in that year was 365,388.

The government of the Philippines declared its 200-mile limit 11 June 1978, causing considerable conflict with its neighbour to the north, Taiwan. Several areas and species within the Philippines' jurisdiction are believed currently to be underexploited, and, thus, with investment, the total production may increase.

The fishing industry in the Philippines has been enhanced by domestic and foreign investment projects, both public and private. In early 1979, the government announced plans to establish five additional fishing port and market complexes with a loan from Japan of U.S. $180 million. A joint project financed with local funds as well as Norwegian aid and export credits was planned in 1979. The goal of the project was the establishment of a processing plant and landing jetty in Leyte province. The Asian Development Bank lent U.S.$18 million to continue a project aimed at developing the small-scale fisheries sector in late 1979.

During 1961–76, the country was a net importer of fish. This trend was finally reversed in 1977, exports growing by 18% in volume from those in 1961 and imports falling by 40% in volume. Canned seafoods were the most popular imported fishery product, accounting for 91% of the total value of imports in 1970. Mackerel is the major imported canned seafood. Japan being the primary supplier during 1964–70. Fish meal was also an important import for the Philippines over these years, originating primarily in Peru.

Shrimp and lobster were the top-valued seafood export for the Philippines in 1970, amounting to 62% of the total value of exports in that year. Fresh, chilled, and frozen tuna were also important.

Japan's share of shrimp exports from the Philippines in 1970 was, at 65%, the largest of all importing countries. The greatest share of tuna exports went to the United States — 70% of the total value.

**South Korea**

South Korean landings of Alaska pollack were 361,871 t in 1978. Other important species included Japanese anchovies, threadsail filefish, the Pacific cupped oyster, and groundfish.

Total production of South Korean fisheries hovered around 250,000 t, during postwar 1944–55. Since then, catch has risen steadily, enhanced since the early 1960s by efforts to modernize and expand the industry. South Korea's 1978 total catch was 2.4 Mt, nearly 3% less than that in 1977, yet representing more than 2.5 times the catch 10 years ago.

The South Korean supply of pollack was curtailed when the USSR extended its fishery jurisdiction to 200 miles, ending South Korea's harvest along the Kamchatka Peninsula. The Korean Marine Industrial Development Corporation negotiated a joint venture with the U.S. to supplement its pollack catch by harvests from the Bering Sea. Fishing finally began in 1979, with a total processed product of nearly 1.4 million kg/year. Other joint ventures have been with Ghana and Australia.

South Korea's fishing fleet varies from small, unpowered wooden vessels to large, modern distant-water vessels with steel hulls. In 1973, the high-seas fleet comprised 552 vessels. These ves-
sels produced 382,800 t of fish in 1973, 31% operating in the Atlantic Ocean (primarily off the western coast of Africa), 20% in the Indian Ocean, and 48% in the Pacific.

The country's deep-sea catch fell by 18.6% in 1977, as its fishing grounds were curtailed by the newly declared American and Soviet 200-mile EEZs. The deep-sea fleet, which in 1978 was composed of 860 vessels, has been pursuing other fishing grounds through joint ventures.

South Korea was a net exporter of seafood products during 1970–78, as the total value of exports rose by 1423% over those years. Its top-valued fishery exports in 1978 were frozen tuna, frozen fish fillets, frozen cuttlefish, frozen hard clams, and fresh chub mackerel. Japan was the greatest buyer of the products other than the frozen fillets and, along with the United States, has always been a major market for South Korean fishery exports.

The Middle East appears to be a new and growing market for South Korea's fishery exports. In 1967, Syria and Iran were the only significant importers of South Korea's seafood products. By 1978, Oman, Bahrain, Kuwait, Jordan, United Arab Emirates, Saudi Arabia, Qatar, North Yemen, Sudan, Libya, and Iraq were also importing large shares of South Korea's dried, salted, and in-brine fish, crustaceans, and molluscs. South Korea has also expanded its markets in Africa. In 1967, export schedules noted South Africa and Ghana as importers of South Korean seafoods, but, in 1978, African buyers included Kenya, Mauritania, Senegal, Central African Republic, and Guinea.

South Korea protects its domestic seafood market through tariff and nontariff barriers to trade. Nontariff barriers are similar to those in Japan, with certain products subject to government approval. The government considers domestic supply and demand for the seafood item, and its import price, before deciding whether or not to allow imports. The country also uses export barriers designed to stabilize its domestic seafood market by restricting exports of domestically consumed species. In late 1978, the Office of Fisheries relaxed export restrictions on 10 kinds of fish.

**Australia**

Australian landings of fishery products in 1978 were 122,947 t, down slightly from the previous year's level. Major species included natantian decapods, southern bluefin tuna, and Australian spiny lobster. Crustaceans, particularly prawns and rock lobsters, are important to Australia's fisheries; for the year ending June 1979, crustacean landings accounted for 67% of the total exvessel value of landings.

Australia's 1978 fishing fleet consisted of 10,920 vessels (an increase of 23% over the 1970 level), of which 51% were less than 6 m long, 40% between 6 and 15 m, 9% between 15 and 26 m, and less than 1% more than 26 m. The total number of fishing personnel reported in 1978 was 20,272, up 30% over the 1970 level.

The government of Australia imposed a 200-mile EEZ on 1 November 1979, establishing the world's largest exclusive fishing zone at that time. Numerous foreign licences, joint ventures, and foreign stock-assessment projects have been allowed in Australian waters. In 1980, Japanese, Korean, Taiwanese, Polish, Soviet, and American vessels were involved in squid jigging, trawling, and tuna purse seining in the Australian EEZ.

During 1970–78, Australia was a net exporter of fish in all but 2 years. Total exports in 1978 reached 25,262 t valued at U.S.$165,743, an increase of 44% in volume and 274% in value over exports in 1970. Imports approached 125 t in 1972, followed by a sudden drop of 50% the next year. The 1978 level of imports was the lowest volume for 1970–78, but the value was the highest.

Data on imports by species reveal that the import of greatest total value in 1978 was fish fillets in packages larger than 1 kg; these were primarily from Japan, although New Zealand and South Africa were also major suppliers. Canned salmon imports represented the second-highest value in 1978, 88% (by value) of those originating in the U.S. and Canada. China supplied nearly 50% of Australia's imports of shrimp and prawns. New Zealand is an important supplier of fresh and frozen fish for Australia, and a great share of canned and prepared crustaceans and molluscs originates in the South China Sea countries.

The top-valued seafood export for Australia in 1978–79 was rock lobster tails, of which more than 97% (by value) were shipped to the U.S. Headless prawns and shrimp, another important export, were primarily destined for Japan (97% by value of total sales), and, in general, Japan is Australia's major customer for seafood products.

A comparison of 1969–70 export data for Australia with those for 1978–79 reveals interesting trends. The Middle Eastern countries — particularly Saudi Arabia — are increasing their seafood
imports from Australia, and the volume of imports into Pacific-area countries (excluding the U.S. and Japan) from Australia does not appear to be declining.

**New Zealand**

New Zealand's total seafood production reached 98,000 t in 1978 at a value of nearly U.S.$51 million. Rock-lobster landings were up 7% over the previous year and accounted for 28.3% of the total exvessel value of New Zealand fishery production. Snappers were also important species for New Zealand in 1978, with catch up 41% over the 1977 level and exvessel value amounting to 19% of total landings.

The total number of fishing vessels in New Zealand's fleet was 5,430 in 1978, up 63% since 1972. The fleet was composed in this year of 88% vessels less than 12 m long; 11%, 12-27 m long; and 1%, greater than 27 m. The number of personnel rose by 79% from levels in 1972 to 9,928.

The government of New Zealand declared a 200-mile EEZ on 1 April 1978, establishing exclusive fishing rights over an area more than 3.6 x 10^6 km^2. In 1979, New Zealand's domestic fleet had the capacity to harvest an estimated 25% of the "safe biologic yield" of wet fish in the EEZ. The remainder was allocated to joint ventures and foreign fleets. By 1979, Korea, the Soviet Union, and Japan had signed agreements with the government of New Zealand.

Foreign catch allocations announced 30 November 1979 covered finfish, squid, and tuna. Japan's fleet in New Zealand's EEZ amounted to 202 vessels in 1979, whereas Korea had 31 and the USSR 30. Total quotas were 90,900 t for Japan, 82,800 t for the USSR, and 21,200 t for Korea. Twenty-eight cooperative fishing ventures were approved by the end of 1979, directed at squid, southern bluefin, skipjack tuna, and various finfish species.

New Zealand was a net exporter of fishery products during 1970-79, as exports grew by nearly 400% in value and imports grew by 154%, with a brief peak in 1974. Rock-lobsters accounted for 27% (by value) of total seafood exports in 1979, down from its 40% share in 1978. Most of the increase in export sales in 1979 over the previous year reflected the growth in landings and value of wet fish. Snappers were the most important of these, their sales amounting to 10% of total exports. Australia and Japan are the primary importers of New Zealand's fresh and frozen fish, whereas Japan and the U.S. take a large share of New Zealand's molluscs and crustaceans. Australia is also an important buyer of dried, salted, smoked, and brined fish.

New Zealand's imports of seafood products rose slightly in 1979, with most increases in frozen fish, canned salmon, herrings and pilchards, and canned and frozen crustaceans and molluscs. Fresh, chilled, and frozen fishery product imports in 1974 came primarily from Australia and the United Kingdom, canned and prepared fish originating largely in Canada, Japan, and Malaysia.

**Canada**

Canada's fisheries can be divided into the Pacific, the Atlantic, and the freshwater areas. In both volume and value of catch, the fisheries of the Atlantic coast contribute the largest share by far. Major species harvested there include cod, herring, other groundfish, and pelagic species. Lobsters and scallops also generate substantial revenues at the exvessel level.

On the Pacific coast, landings have fluctuated in the past 25 years. In value, salmon has been dominant, accounting for 48% of landed value in 1979 and for more than 60% in 18 of the 25 years to 1979. Herring, especially the roe, experienced substantial growth during the 1970s.

Canada is a net exporter of seafoods, with the United States being the principal market. Japan's share of Canadian exports increased significantly during the 1970s and, in 1978, surpassed that of the European community. The role of the Caribbean countries has declined on a relative basis. Australia and New Zealand are importers of Canadian products and, since 1972, so is South Korea.

In 1955, Canada's import-export ratio for seafoods, in value terms, was 1:10. By 1970, it was 2:10, and, in 1975, it was up to 3:10. Since then, it has declined somewhat, but Canada continues to import substantial volumes of both finfish and shellfish, in canned, fresh, and frozen forms. The United States is the major supplier, with Japan in second place. In 1978, other Pacific-area suppliers accounted for 8% of Canada's seafood imports, in excess of supplies from all of Europe and greater than 60% of Japan's share. Shellfish is the primary import from these countries.

The Canadian government has, especially since World War II, provided technical and financial assistance to both its harvesting and its processing sectors to encourage new product lines and new species' exploitation. This assistance has ranged from price supports to vessel
programs. In 1964, there were 47,508 fishing vessels in Canada's fleet, of which 157 were 150 t or more. By 1978, the total had declined to 37,992, but the number of large vessels had increased by almost 100%. During the same period, personnel (saltwater fishing) increased by about 5%, whereas between 1964 and 1977, the number of persons working in fish processing plants increased by more than 45%.

The Canadian fleet does not engage in distant-water fishing, except for tuna. However, Canada is involved in fishing projects abroad, including at least one joint venture in the South Pacific.

Fishing by foreign fleets is substantial off both Canadian coasts. Since Canada's EEZ took effect in 1977, this activity has declined, but the decline has been accompanied by increased investment in both harvesting (for example, through joint ventures) and processing. In 1978, Japan was the source of most foreign investment in the British Columbia processing industry, with U.S. companies also having substantial interests.

The Canadian government has a history of involvement in the management of its fisheries. The 95% decline in the Pacific herring catch between 1965 and 1968, for example, resulted from a ban on herring fishing, although, initially, the decline was offset by increased catches of Atlantic coast herring. Management of Pacific salmon has involved agreements with the U.S., Japan, and the USSR, programs restricting fishing efforts, and a massive enhancement program.

In summary, Canada, with active government participation in investment and management, remains one of the world's leading seafood exporters but has also expanded its role as an importer.

USA2

The U.S. has fish resources along its west coast, the Gulf of Mexico, the Atlantic coast, and in fresh water. Tuna is the primary species harvested by a distant-water fleet.

In 1950, the U.S. commercial catch was 2.2 Mt. In 1975, the figure was also 2.2. During the next 4 years, it rose to 2.8 but was only 4% of world commercial catch, compared with 10% in 1950. The 1979 catch was dominated by menhaden (41% of total landings, by weight), which is used largely for industrial purposes. In terms of value, the most important seafood species groups are salmon, tuna, shrimp, and crab. Because the major tuna species are distributed throughout the tropical and temperate regions of the Pacific, Atlantic, and Indian oceans, most tuna fishing is done outside the U.S. EEZ.

The U.S. is a net importer of seafoods, with Canada being the major supplier. South America and Europe have increased their roles as suppliers of edible seafoods over the past decade. Asian countries accounted for 26% of U.S. imports (edible) in 1967 and 23% in 1980, with Japan being the major Asian exporter. Import growth has occurred most prominently in frozen ground-fish products, tuna products, and shrimp.

The U.S. also exports seafood products, especially high-valued species (salmon, crab, and, recently, roe). Japan is the largest buyer of fish and shellfish, having recently replaced Canada. Asia, excluding Japan, accounted for 3.5% of the U.S. seafood exports in 1967; by 1980, this figure had risen to 15.6%.

Although the U.S. does not have any explicit seafood quota system for any country, there is a general quota on some product forms of fresh, chilled, and frozen white fish and some canned tuna. With respect to tariffs, the U.S. recognizes favoured country status for developing countries, as do other parties to the General Agreement on Treaties and Tariffs (GATT).

With respect to investment, the U.S. increased its fleet size from 72,000 fishing craft in 1955 to almost 104,000 in 1979, with substantial growth occurring on the Pacific coast. During that period, the number of fishing personnel increased from 144,359 to 184,000, whereas the average number of individuals employed in processing facilities declined from 97,825 to 93,100. This comparison conceals the upward trend in processing plant employment since 1970.

Several countries participate in joint ventures for access to resources within the U.S. EEZ and for U.S. access to fish meal in Angola, shrimp trawling off Nigeria and Cameroon, tuna off Ghana, shrimp in Indonesia, tuna off the Philippines and Korea, tuna ventures off Australia, New Zealand, French Polynesia, and Papua New Guinea, and tuna and shrimp in South America. In short, the U.S. is an active fishing nation, involved in international trade.

Conceptual Issues

To our knowledge, there is little empirical work on international trade in seafoods. On the basis of our examination of fishing, investment, and trade patterns in Pacific-area countries, we developed models appropriate to the testing of

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2The material in this section draws heavily on an unpublished manuscript by James R. Wilson.
hypotheses regarding relationships between trade flows and resource availability and competitive relationships among suppliers.

The first examines factors affecting the shares of a country's, or region's, imports coming from competing exporters. This market-shares model is a modified, distributed lag version of a model used by Hickman et al. (1977) and Mikesell and Farah (1980); it incorporates relative price variables and catch ratios. The second model is a more standard treatment of supply-and-demand relationships in a system of equations. As in the shares model, emphasis is on a particular importing country's demand for a specific product or group of closely related products. This approach uses a somewhat difficult set of data, including measures of market conditions in the importing country and, on the demand side, does not necessarily differentiate among suppliers. Such a result generates estimates of the price elasticities of import demand and export supply, substitutional relationships among competing commodities, and income elasticities of import demand. It also permits explicit treatment of exchange rates and of other factors believed to influence import and export behaviour, including tariffs, nontariff trade barriers, and transportation costs. In addition, estimated relationships lend themselves to employment in spatial equilibrium models, which permit examination of trade flows among particular countries and regions.

In both models, expenditures for food were found to be highly significant — a finding in earlier empirical studies (Batie 1974; Doll 1972). The models worked satisfactorily, but their usefulness can be improved, and we are attempting this work.

Refinements Needed

Although there may be substantial price competition among seafood-trading nations, our econometric analysis suggests that traditional methods for testing the existence of price competition need to be augmented by more in-depth investigations of the institutional environments within which seafoods are traded. The roles of long-term contractual arrangements, the trade offs emerging from agreements to permit cooperative investment opportunities, and details on product form are among factors needing additional investigation. It appears that these and other factors are more influential in explaining trade patterns than are relative prices.

In the case of shrimp, a test of the hypothesis that the exchange rate is an important variable accounting for export-supply decisions was inconclusive. We are not prepared to reject the hypothesis, but, rather, we suggest that multicollinearity problems disguise causal relationships. Furthermore, a test of the hypothesis that exchange rates are important on the import-demand side was not conducted here.

Trade-Pattern Changes

Trade-pattern changes are occurring among Pacific-area countries. These are intimately linked with investment decisions. Batie (1974) has argued that foreign investments in natural-resource development will occur under conditions of relatively price-inelastic domestic supply conditions. This seems to be occurring with respect to shrimp, where the price elasticity conditions are associated with the conditions of the stocks. It also seems to be occurring where such conditions result from political constraints on availability (e.g., Alaska pollack). Preliminary empirical results suggest that changes in harvesting opportunities are affecting trade patterns.

Pacific-area countries are increasing trade among themselves. There is evidence to suggest that some specialization is taking place, with importation being undertaken for purposes of processing and resale abroad. However, the present phase seems to be one of transition, as adjustments are made to new political arrangements and economic conditions.

For shrimp, changes in expenditures for food (including away-from-home food expenditures) appear to be an important factor in the demand for imports, at least in Japan. This finding is consistent with the hypothesis that, with increased leisure time, families tend to dine out more and, as a result, increase their purchase of seafoods (this tends to confirm a similar finding by Paez, 1980, with respect to U.S. markets).

Competition

The developed economies of Japan, Europe, and North America compete in their demands for certain seafoods. A complete model should take this into account, but should also recognize the growing role of the developing countries. Additional empirical work is crucial to an understanding of the workings of international seafood markets. We hope the present paper has provided a preliminary — if modest — introduction to the subject. Interested readers should contact us for additional information on the models.