



FISHERIES - MARICULTURE

A MARICULTURIST'S PERSPECTIVE

A Report Prepared by Aegis Consulting Services
for the Marine Resources Branch
Ministry of Environment
June, 1981



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BARRIERS TO DEVELOPMENT AND THEIR RELATIONSHIP TO FISHERIES MANAGEMENT

- competing for use of foreshore and deep water leases

The mariculturist recognizes that conflicting demands are made on the use of the water resource in B.C. Further, it is recognized that in the absence of coastal zone management legislation resolving these conflicts becomes a difficult task.

The mariculture industry is at the embryo stage and has difficulty protecting areas for future use because of the strength of the developed industries. However, consideration must be given at this time to the future potential of mariculture. For example, consider the productive capability of an acre of water:

<u>Location</u>	<u>Species</u>	<u>lbs. of meat/year/acre</u>
<u>Natural Fisheries</u>		
North Sea	Fish	25
Grand Banks (Newfoundland)	Fish	12
Pacific (Peru)	Anchovy	330
<u>Cultured Species</u>		
B.C.. Bottom Culture	Oysters	2,000
B.C. Off Bottom	Oysters	20,000

(D.B. Quayle - Pacific Oyster Raft Culture in British Columbia Fisheries Research Bulletin 178).

Rough calculations indicate that an acre of water in Japan can produce about 9,000 pounds of scallops in the shell per acre. In Spain mussel production is as high as 400,000 pounds in the shell per acre.

This productive capability of a culture system warrants the encouragement of a more intensive use of the water resource. Further, this indicates the necessity to identify areas for future use to protect these areas from pollution or other uses that would inhibit future development of aquaculture. Once areas have been identified, these should be made readily available to mariculturists. However, utilization of this productive capability is frustrated by old traditions and out-dated legislation such as riparian rights which ensure that the uplands owners must have right of access to the sea over the entire stretch of foreshore. Current oyster leases have restrictive clauses such as:

"Provided also that the Lessee shall not interfere with the operations within the Crown lands of fishermen who may be lawfully engaged in fishing for or catching any kind of fish other than oysters and other mullusks;"

This clause restricts the use of long lines in a culture system. Another example is the following clause:

"Provided also that the Lessee shall conform strictly with the provisions of any Fisheries Act now in force or which may hereafter come into effect".

Clauses such as the foregoing make it difficult for mariculturists and the financial institutions to feel that tenure has been granted and, consequently, a reluctance to commit capital exists. The mariculturist must have an exclusive priority use of his area to protect his investment and to operate on an economical and practical basis.

Note: A complete analysis of problems related to oyster leases has been done by S.J.E. Seale and A.R. Thompson in the Westwater Research Centre Publication, "The B.C. Oyster Industry: Policy Analysis for Coastal Resource Management, Volume IV Institutional Arrangements for Managing the Oyster Resources".

- competing for the use of broodstock

Seed sources, especially natural, are critical to the development of mariculture, consequently broodstocks should be protected. To illustrate, take the case of the weathervane scallop population in the Gulf Islands: attempts were made to import seed from Japan but the Pacific Biological Station said that native species should be tried first. Some research work was done and a trial seed program was set up. However, a local fisherman started fishing the scallops. The possibility exists that because of the lack of knowledge of the size of the stocks that they could be eliminated. Objections were raised by the Pacific Biological Station and mariculturists but Federal Fisheries refused to stop the fishing. Consequently, by allowing one fisherman to continue this could jeopardize the development of a multi-million dollar industry.

In the case of pen raised salmon the supply of eggs is obtained from a Federal salmon hatchery but because mariculture is of secondary priority to the salmon enhancement program insecurity of a source of eggs exists.

competing for the use of foodsources

In certain mariculture activities, foodsources are required that cause a conflict with fisheries related to habitat protection. An example is with abalone in that to grow abalone in a closed system, kelp would have to be harvested to feed the abalone. Therefore, before one could comfortably invest in an abalone venture, an assured source of food would have to be established, such as a quota for the future. However, because of the fickle nature of decisions related to habitat protection, the future food supply is in doubt.

Another example would be the use of zooplankton as a food source. Once again insecurity exists because of political pressures by groups such as recreational fishermen recommending that zooplankton fishing be stopped.

transportation of seed or broodstock

Industry is aware of examples of oyster cultch being moved from areas with oyster drill into Pendrell Sound without adequate precautions nor a transfer license. Further, it is known that oyster seed has been imported from the United States without approval. The industry feels that these practices should be stopped.

importation of new species

One group attempted to import some scallop seed from Japan but Federal Fisheries stated that they would not allow this to occur until native scallop species were tested for mariculture suitability. However, because of the lack of funding, the native species have never been tested for suitability. The industry feels that if regulations exist that block importation, at least funding should be arranged to assist in testing native species or alternatively attempting to overcome the objections to the importation of new species.

disease and predator control

As mariculture develops, new enthusiastic people are entering into the industry. Unless there is a better exchange of information to these new farmers then the industry is fearful that problems in the area of disease and predator control will result. Some attempts have been made through publications like the Marine Resources Branch publication "A Permit and Licence Guide for the Prospective Aquaculturist", but this does not emphasize the reasons for the various licences such as a transfer licence. It is important to ensure that new and, in some cases, existing mariculturists are aware that the entire industry can be affected if one individual does not comply.

transportation and identification of marketable product

In mariculture operations, the optimum economic size of a product may be smaller than size limitations put on wild stocks - for example, "baby clams" or small abalone. When these products go to market and are sold beside wild stocks, concern has been expressed that adequate policing of the wild fishery will be difficult. Consequently, recommendations are put forth that only legal size products can be sold. This may not be optimum for the mariculturist.

enforcement

With little activity currently existing in the mariculture industry, it is difficult to justify policing of the above areas. However, with the potential that seems to exist, a front end control in drafting workable legislation, education and enforcement would be a small price to pay to preserve the mariculture resource.

jurisdictional disputes

Jurisdictional disputes related to mariculture exist. (They are well outlined for oysters in the Westwater Report No. 22, Volume IV - Institutional Arrangements for Managing the Oyster Resources, by S.J.E. Seale and A.R. Thompson). As the legal problem is somewhat complex, suffice it to say that because of the potential for overlapping jurisdictions, the industry finds difficulty in deciding which is the responsible agency. Consequently, the industry finds itself frustrated by disputing government agencies, particularly when this results in duplication of licensing and reporting requirements placed on the industry. Where duplications have imposed unnecessary burdens on the industry, the two governments should quickly agree to a single source of administration. Many of the problem areas outlined earlier, such as competing for use of water, broodstock foodsources, transportation of seed, importation of new species, disease and predator control, enforcement and processing plant management; all appear to have some degree of overlapping responsibilities that are not clear in segments of the industry.

For instance, the Province issues a Mollusk Lease, however, the Province appears to have jurisdiction over oysters but not, say, mussels or clams, and a grower may want to produce both in a polyculture system. The mariculturist would thus have two agencies to whom to report. When going to process the product a Provincial Plant Permit is required, but the Federal government also conducts inspection. If the product is going to be sold within the Province then a Federal Plant Certificate is not required. However, for an exported product, a Federal Certificate is necessary. This becomes quite confusing to the new entrant.

product quality standards

A concern to the mariculturist is that if poor quality products get on the market, a negative reaction from consumers would damage the market for all producers. The industry would support any program that would ensure product quality.

co-ordination of research

Many dollars have been spent on research and development by both the Federal government and the Provincial government, with little visible result. The type of research that the industry is primarily interested in is in the area of development or applied research. Some of the research has been done without any establishment of priorities, but on an ad hoc basis. In some instances the Province has discovered that because of markets the economic viability of a species is low and, consequently, reduced funding. However, another Agency has continued funding. In order to get maximum benefit from any further research, there must be a co-ordinated effort to solve identified problems in an orderly fashion so as to reflect the immediate economic opportunities.

In addition, of course, the government has a responsibility to undertake research on longer term objectives such as research in genetics and disease. A percentage of research capability should be continually allocated to areas of this nature.

- the need for a consolidated information source

Every prospective mariculturist wants to find information related to the industry. In attempting to find information he finds himself going to many different agencies and regulatory groups that pass on information. The information is often conflicting and incomplete. The mariculturist leaves confused or often misled with visions of grandeur which has resulted in financial disaster.

- processing plant management

Federal Fisheries processing plant regulations are primarily geared for large-scale plants, and not specific plant requirements as mariculturists require. As it is necessary to get Federal certification for the export of product out of the province, most mariculturists will have to get Federal certification. However, because of the inflexibility of the Federal Regulations, certification becomes difficult. An example of this is that a small plant that was designed for a hand operation was required to have 9'6" ceilings as opposed to a cheaper 9' ceiling. The regulations prevailed and the roof was raised by 6". The reason that the regulations required a 9'6" ceiling was that a fork lift needed that height, even though a fork lift could not even get into the plant.

funding for mariculturists

The mariculture industry is in its infancy, consequently, the financial institutions do not have adequate histories in lending to the industry to enable them to provide funding because they are not in a position to assess the risks. As the industry progresses, and successful operations

develop, this may change. Current government funding programs, with the exception of the Oyster Seed Loan from B.C. Development Corporation to the Oyster Board, are not suited to mariculture because the major requirements of the mariculturist relate primarily to working capital and grow-out systems, whereas the existing programs relate primarily to capital loans. Mariculturists' accessibility to government programs has been for the most part "after thoughts" incorporated in programs designed for other purposes, or not provided at all.

In attempts to get funding for grow-out systems, much resistance is encountered because of the resale value of a single purpose system in a developing industry. The requirements of mariculturists differ from those of the more familiar and traditional fisheries industry, and are more akin to the requirements of the agriculture industry, but are still much different because of the time required to grow a crop. In mariculture the grow-out period is usually 2 to 5 years. This imposes more difficulty in trying to fit into existing financing programs.

People who are interested in mariculture are primarily a younger age group that have not had time to build an equity base. Consequently, although they have a desire they do not have borrowing capability and in seeking venture capital experience difficulties because of their lack of experience and the inherent risks in the industry.

HOW TO REMOVE THE BARRIERS TO INVESTMENT AND DEVELOPMENT OF THE MARICULTURE INDUSTRY

- Provide legislation and policy which enables the establishment of reserve status for selected mariculture sites;
- Modify legislation and policy so that leaseholders have tenure of their leases;
- Modify legislation and policy so that leaseholders can accommodate riparian rights and navigable water rights, but still have an optimum production process;
- Redraft the other terms of leases as outlined in the Westwater Seale Thompson report;
- Set policy to ensure that seed and broodstock are available on a secure basis for future production;
- Enforce regulations governing the transportation of seed and native stock from site to site;
- Set policy related to ensuring a quota on potential foodsources such as kelp and zooplankton;
- Simplify the permit and license procedures and eliminate duplication of requirements between governments;

- Set up funding programs that are specifically for the mariculture industry;
- Encourage the establishment of venture capital for mariculture;
- Provide tax incentives for mariculture such as has been done to promote research and development;

- Ensure that future changes in tax laws which have been beneficial to mariculture through spin-off, such as accelerated capital cost allowances for fishing vessels, continue for mariculture or are re-drafted specifically for mariculture;

- Co-ordinate the research and development in mariculture by ranking of species by considering the following:
 - (a) Farmability in B.C.
 - (b) Good food conversion
 - (c) Low energy demand
 - (d) Known technology
 - (e) Seed availability
 - (f) Markets
 - (g) Economic viability

The ranking of species should be an on-going evaluation because, as new species are considered and as new information is obtained, rankings may change. In addition to the ranking, problems with each species should be identified and evaluated for resolution because overcoming a single problem may change individual rankings greatly. These rankings should be made available to all research funding groups to co-ordinate the applied research funding on those species with greatest likelihood of success.

- Provide a consolidated information service for prospective entrants to the industry that makes the species ranking information available as well as all the regulations in the industry;
- Set up quality standards for the products and inform the consumer of the quality controls. (Specifically an 'Inform the Public' campaign on PSP controls);
- Review Federal Processing Plant Regulations to accommodate the small plant single product concept (possibly by having a clause allowing for ministerial discretion of a Special Review Committee);
- Set up industry associations for specific species such as the B.C.O.G.A. to provide a means of government access to the industry, and vice versa.

BENEFITS OF AN EXPANDED MARICULTURE INDUSTRY

use of existing over-capitalization

The fishing industry in British Columbia is currently over-capitalized in both fishing vessels and in processing plant capacity. Processors are going into receivership on a regular basis, and vessels are being re-possessed. The major problem is a limited resource. The Federal government is considering large buy-back programs which entail the expenditure of vast amounts of capital. With mariculture we have an opportunity to make use of the over-capitalization. For instance, if we were able to develop a program on a species similar to the Japanese experience with scallops, large numbers of the excess fishing vessels could be switched from fishing to mariculture. Further, as we have pointed out earlier, the productive capability of the ocean as a cultured basis far exceeds that of the natural fisheries, thus with success in the mariculture industry the excess processing plant capacity could be used.

The only remaining new capital requirements would be for the purchase of the grow-out systems.

enhancement of fish habitat

In the mariculture development in Japan a beneficial spin-off effect has resulted. It has been shown that in the areas of cultured species the fish habitat has improved, thus creating an opportunity for development of a greater fishing harvest.

low energy requirements

Mariculture has (in the format that is being proposed in British Columbia) a low energy requirement for the production of food.

replace imports

We are currently importing shellfish that could be produced locally, For instance, there is a ready market for \$3 to \$5 million annually in smoked and canned oysters alone.

increase exports

The forecasts for demands of shellfish indicate that an optimistic export potential exists.

employment creation

Mariculture, because of the nature and the location of the work, tends to attract people in the age bracket of 18 to 35 years. This age group is one of the higher unemployment categories. Employment could be created for people who are in the high unemployment areas such as the small centres along the coast north of the Lower Mainland. Fishermen who are being displaced could find employment. Fishermen could use mariculture to supplement low incomes by working on mariculture when fishing seasons are closed. In addition, there are numerous marine biologists that have difficulty finding employment in their chosen field, who could be employed. In Japan the number of operators in oysters, scallops and seaweeds alone totalled 87,542 in 1973. With proper development of the industry we can expect the creation of large numbers of jobs.

THE FOUNDATION OF A PLAN FOR STIMULATION OF THE GROWTH OF A
DIVERSIFIED MARICULTURE INDUSTRY IN BRITISH COLUMBIA

In the past industry studies have been undertaken which have outlined the problems that face the industry. (In particular, the report prepared in 1970 by Western Consultants on the oyster industry is a good example). The problems that were identified are in a great part the same problems that are identified in this report. This indicates that very little has been accomplished over the past ten years. We in the industry suspect that in order to get action to solve the problems positive steps must be undertaken. The people in the industry do not have extensive time available to individually try to solve the problems that exist. Further, we suspect that government people have specific responsibilities to carry out, and have little excess time to attempt to cure the overall problems. However, if a co-ordinating team was set up to work full time on identifying new problems and solving the existing ones, greater progress would be achieved. It is not anticipated that the co-ordinating team would be capable of doing the problem solving themselves, but rather would put priorities on the problems and assign to certain groups - whether they be government or industry representatives or consultants - problems to solve. This assignment of the problems and subsequent follow-up, we feel, would be the added stimulus required to make considerable progress.

The team should consist of Federal government, Provincial government and industry representatives. It is our feeling that, because of the overlapping jurisdictions of the problems, in order to have the maximum amount of co-operation from the two governments they must be represented on the team. Further, there should be strong industry representation

because too much in the past has been done without having full industry participation.

Without this co-ordinating team providing the impetus, development will likely be isolated and slow.

This group should be allowed to try to solve problems on a basis that is best for the industry, and not whether it is best for either government. This in a small part may overcome the jurisdictional problems that make progress difficult. The two governments would be able to delegate the management to a specific group without having to solve the jurisdictional problems.

RELEVANCE TO THE COMMISSION ON PACIFIC FISHERIES POLICY

Under the broad terms of reference of the Commission, it is relevant to consider the following relationships between Fisheries and mariculture. An expansion of the mariculture industry could provide part of the solution to excess harvesting capacity in traditional Fisheries, by providing an alternative job opportunity for fishermen.

Management of specific Fisheries can readily accommodate the requirements of mariculture by appropriate changes in policy.

Improved co-operation between the two levels of government can reduce the paper burden and duplication of requirements, and thereby facilitate development of the industry.

Improved environmental protection for mariculture automatically ensures an improved coastal habitat for traditional commercial fish species.

Recommendations from this Commission can promote the creation of a trilateral task force - Industry, Provincial and Federal representatives - that can pave the way for proper development of an industry that in the face of high demand and prices for product is ripe for expansion and diversification.

SUMMARY

World food production on a per capita basis is declining. World Fisheries production is likely to remain more or less static at approximately 70 million metric tons per year. A large potential for food production exists in the field of mariculture, especially in British Columbia, because large areas of well-protected relatively unpolluted waters exist. If a mariculture industry was developed, benefits such as the excess capitalization in the fishing industry could be productively employed, many thousands of jobs could be created, and the resulting products would replace food imports and develop an export business. However, deterrents exist that must be overcome. The recommended action is to set up a Co-ordinating Team for the Mariculture Industry, consisting of Provincial, Federal and Industry representatives, to co-ordinate the elimination of the existing barriers.

INTRODUCTION

At the 1981 World Mariculture Society meeting in Seattle, Washington, Mr. Roy Jackson, Ex-Deputy Director General of the F.A.O., Rome, reflected in a keynote address on the role of Aquaculture in the world. He outlined the sombre overall picture of an increasing world population, an annual growth rate of 1.9%, coupled with a deterioration in the growth rate of the world food production, resulting in a per capita decline in food production. The world fisheries production is predicted at a more or less static basis of approximately 70 million metric tons per year. Because of the inability of countries to manage, overfishing due to excess capitalization, high cost of harvesting, and an unmanageable species mix, there has been continued depletion of valued fish stocks resulting in the dire prediction that the fisheries will deplete themselves. However, he predicted some hope in the field of Aquaculture in that world aquaculture production in 1975 was approximately 6 million metric tons, and forecasted (although forecasting is difficult) a production of 12 million metric tons by 1985, and 30 million metric tons by the year 2000.

the potential for development of the resource base in British Columbia

The 17,000 miles of B.C. coastline, much of it in well-protected and relatively unpolluted waters, is well suited to mariculture. In oyster culture alone D.B. Quayle and D.W. Smith in "A Guide to Oyster Farming" provide a conservative estimate of production from raft culture in Georgia Strait of 3 million gallons a year (about \$60 million wholesale value) or approximately fifty times the current annual production. In spite of this productive capability, we in British Columbia are importing oysters for our own consumption far in excess of our own production. Other species may represent equivalent or greater potential. For instance, in Japan scallop culture has been developed over the last fifteen years. In 1967, there was a total production of cultured scallops of 1,743 tons, whereas in 1975 the production was 76,714 tons, a 4400% increase which represents revenues of over \$100 million per year, and employs in excess of 8,000 people. ("A Manual of Scallop Culture Methodology and Management" by K. Taguchi - 1977).

why so little progress to date in British Columbia?

New entrants to the mariculture industry are faced with a maze and sometimes a duplication of permits and licences from both Provincial and Federal governments. They face stiff competition from other established users of the marine habitat, such as the forestry industry, the mining industry and recreational boaters. The mariculturist is dependent on wild populations for a source of seed that is often exposed to over-fishing or pollution. In the case of salmon eggs, the source of supply is a secondary priority, dependent on the discretionary judgement of Fishery managers. The successful growth of the product is subject to the vagaries of weather, disease and predators. The delay between

commitment of capital and the time of marketing because of a three to five year grow out cycle, adds additional risk. When a mariculturist attempts to overcome these deterrents, without help it becomes a formidable task.