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POTENTIAL FOR DEVELOPING OYSTERCULTURE IN TROPICAL COUNTRIES

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Some Administrative and Organisational Aspects

It has been recognised since 1965 in a report of the world food congress, that the production of protein from molluscs can be very considerably increased by culture systems with particularly significant possibilities in suitable tropical waters. The development of sub-tidal, or completely submersed culture systems, have shown impressive results.

The fisheries program of the International Development Research Centre has sought to develop such shellfish potential through projects which are now established in seven countries where such resources are recognized as providing good opportunity for food and employment. Accordingly, IDRC provides support to oysterculture projects in Sabah (Malaysia), Sierra Leone, Jamaica, Colombia and Sudan; with musselculture in Singapore and culture for various bi-valves in Peru.

Funding

Depending on the specific circumstances, about $100,000 to $200,000 are provided to match government counterpart expenditure and services over a 3 to 4-year period. Thus, the total investigational and developmental costs may be perhaps double IDRC's inputs to get the program to a stage of development where it can be demonstrated as a viable system. This includes laboratory and field equipment, staff costs, training, advisory services and operational expenses. Naturally, there are considerable variations in costs of counterpart services in different countries where distinctly different conditions prevail. While these figures may seem high for the establishment of an enterprise over a 4-year period, it must be appreciated that its cost would be considerably reduced once the basic ecological facts, biological cycles and simplest procedures are established.

Training

Since all the projects are self-managed, the project leaders require relevant experience in these investigations. The systems which are most applicable for the given species and the area have to be determined. Such investigators have to be trained, elsewhere, in applicable and relevant systems so that the principles can be applied locally to the species being cultured. Because of the variety of ecological conditions and possible culture systems, it has been felt that in Maritime Canada such in-service training can be provided in the practical methods. Instruction in laboratory procedures for larval identification and ecological data collection can also be provided through on-the-job training at federal or provincial laboratories or universities. However, the basic difference is in the contrast of rates of completion of the life cycles in tropical, as compared with, temperate conditions. Where the water temperatures are constantly between 25^{o} C to 32^{o} C and with surface extremes of 37^{o} C breeding is virtually year-round. In some cases, the salinity variation due to seasonal rains, which may also bring about a 5^{o} C reduction in temperature, is a trigger for cessation of breeding and colder currents along the coast are also said, in Peru, to arrest breeding.

Training programs which seem most relevant for tropical workers concern: life cycle studies; effectiveness of spat collection systems; growth rate studies; best growing systems; ecological data monitoring and studies on control systems of competitive and predatory organisms. No emphasis needs to be placed on taxonomic identification of the species. The recognition of the spat of the particular species at its smallest visible size is more important than the particular identification of the veligers in plankton collections.

Institutional Arrangements

The establishment of an oysterculture program depends on both investigational as well as developmental activities. In most of the countries in which our projects operate these two functions are carried out by different organisations whose roles are both essential in the establishment of a rural enterprise for

oyster farming. Investigations are undertaken by university or research institutions which gather the basic data at field sites through the customary shellfish investigation procedures. They assess such data and interpret it as a basis both for teaching (in case of universities), and development (in case of government research institutions).

Development to the pilot demonstration stage is undertaken by the research institution, but in close collaboration with the fisheries extension services who will take-up the promotion of the program among private fishermen and villagers concurrently.

The following arrangements, detailed on page 3a, exist among the projects currently operating.

Organisational Problems

In the establishment of these projects, some particular matters of concern were of particular importance to their success.

To gather adequate data, it was necessary to have large numbers of replicates from which observations can be made at study sites so that sufficiently representative samples can be gathered for data interpretation, despite interference, natural losses and navigational or other hazards. Investigators need advice on competent analysis and data interpretation, but tend to devote more attention to taxonomic or larval identification matters. The precise and simplified system for cultivating the bivalves need continuous attention to develop and perfect a practical system using the cheapest available local material. The investigations of this aspect, once conceived and carried out by biologists, were not always effective. Extension, community involvement, traditional fishing or other field operations still present organisational problems to make them suitably efficacious.

Priorities - Food for Rural Poor

In less developed countries, oysters are not a luxury food. From the sanitation

ORGANISATIONAL RESPONSIBILITIES IN SHELLFISH PROJECTS SPONSORED BY IDRC

Country	Coordination	Direction	Research	Extension
Colombia (1978) Oysters	Colciencias	INVEMAR	INVEMAR	Fisheries Dept.
Jamaica (1977) Mangrove oysters	Agriculture Ministry	University W.I. Zoology Dept.	University	Fisheries Dept.
Peru (1979) Mussels, clams, scallops	University National Agraria, La Molina	Zoology Dept.	Universities	Fisheries Dept. & Universities
Sabah (Malaysia 1975) Oysters	Agriculture Ministry	Fisheries Dept.	Fisheries Dept.	Fisheries Dept.
Singapore (1977) Mussels	Agriculture Ministry	Fisheries Res. Unit	Fisheries Dept.	Fisheries Dept.
Sierra Leone (1974) Oysters	Agriculture Ministry	Fisheries Dept.	University Fisheries Dept.	Fisheries Dept.
Sudan (1977) Pearl oysters	Agriculture Ministry	Agriculture Research Corp.	University Fisheries Dept.	Fisheries Dept.

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viewpoint, it is dangerous to eat them raw, and thus they do not enjoy the customary gourmet market of temperate climates. Tropical oysters are generally cooked, boiled and dried before sales, and are mostly for village and subsistance consumption of poorer rural communities. Because depuration methods will still be in the future when such bulk cleansing operations will be possible through widespread production, our projects in general, devote more time to effective production and safe processing for rural low cost consumption.

Benefits

These systems of culture provide an opportunity to fishermen to obtain a worthwhile harvest, even when capture fisheries are un-remunerative, in off-seasons, or bad weather. They also provide an opportunity for continuous breeding, several populations can be reared in different localities and year-round harvesting is possible. This is particularly useful for rural fishing villages. The impact of the oysterculture opportunities in the Sudan, Sabah and Sierra Leone indicate that it is attractive as a self-employment avenue for small rural enterprise.

Littoral zone conservation and protection become an automatic necessity once such villagers are involved. Thus pollution or erosion avoidance, as well as protection of mangrove nursery areas for fish, are incidental but vital interests for the oysterculture entrepreneur. Fishermen find that floating raft systems attract fish, so that cageculture or capture fisheries in association also offer a good prospect for fishery production and employment.

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LIST OF CURRENTLY SUPPORTED PROJECTS ON SHELLFISH

MARICULTURE (COLOMBIA)

IDRC contribution $ 236,800 - Recipient contribution $ 182,000
3 years from 1978
Cultivating *Anadara tuberculosa* cockles (Pacific)
& *Callinectes toxotes* crabs (Pacific)
& *Crassostrea rhizophorae* oysters (Atlantic)

OYSTERCULTURE (JAMAICA)

IDRC contribution $198,100 - Recipient contribution $ 202,000
3 years from 1977
Cultivating *Cassostrea rhizophorae*

MARICULTURE (PERU)

IDRC contribution $ 193,900 - Recipient contribution $ 153,050
Cultivating *Aulacomya ater* mussel
& *Aequipecten purpuratus* Scallop
& *Mesodesma donacium* clam

OYSTERCULTURE (SABAH)

IDRC contribution $ 105,600 - Recipient contribution $ 190,000
3 years from 1975
Cultivating *Crassostrea belcheri*
& *Saccostrea cucculata*

OYSTERCULTURE (SIERRA LEONE)

IDRC contribution $ 164,500 Phase I - Recipient contribution $ 54,650
3½ years from 1974

IDRC contribution $ 157,300 Phase II - Recipient contribution $ 302,000
3 years from 1978
Cultivating *Crassostrea tulipa*

MUSSELCULTURE (SINGAPORE)

IDRC contribution $ 100,800 - Recipient contribution $ 1,400,000
3 years from 1978
Cultivating *Mytilus viridis*

OYSTERCULTURE (SUDAN)

IDRC contribution $ 231,500 - Recipient contribution $ 1,167,410
3 years from 1977
Cultivating *Pinctada margaritifera*