

8 AUG 1983

SPC/Fisheries 15/Background Paper 2
1 July 1983
ORIGINAL : ENGLISH

SOUTH PACIFIC COMMISSION
FIFTEENTH REGIONAL TECHNICAL MEETING ON FISHERIES
(Noumea, New Caledonia, 1-5 August 1983)
AQUACULTURE DEVELOPMENT: THE PACIFIC WAY?

by

Dr. K. Roger Uwate and Peniasi Kunatuba
Pacific Islands Development Program
East-West Center
Honolulu, Hawaii

725/83

LIBRARY
SOUTH PACIFIC COMMISSION

ABSTRACT

Despite having many apparent advantages to aquaculture development, the Pacific Islands region also has significant disadvantages which may limit its development of aquaculture.

The Pacific Islands region has had considerable experience with aquaculture. Some islands have a tradition of aquaculture, while to others it is a new concept. More recently, the first regional wave of interest in aquaculture was spawned by the South Pacific Commission in the 1950s and early 1960s. A later wave of interest occurred in the early 1970s under the leadership of the South Pacific Islands Fisheries Development Agency (SPIFDA). SPIFDA sponsored consultants to the region and also initiated demonstration projects in the region.

Currently, various aid organizations are supporting several aquaculture development projects in the region. In addition, some island governments are supporting their own efforts.

Aquaculture projects in the region have a poor track record. The list of complete failures, or of those which only failed to stimulate commercial production is long. The successes are rare and may not even be related to any demonstration project.

In a review of regional aquaculture activities, certain issues surfaced repeatedly in the aquaculture experience of the Pacific Islands. These included: (1) the poor project success rate when outside consultants were used; (2) the question of who really benefits from aid projects; (3) missing components in aquaculture projects; (4) unrealistic estimates used in projects and proposals; and (5) the possibility that the Southeast Asian experience may not fit the Pacific Islands.

Alternatives for the future include whether to continue on as at present or to thoroughly review the past so as to improve the future. Perhaps, if the above issues are addressed, aquaculture project success (in terms of stimulating a commercial base) can be greatly improved and real benefit to the Pacific Islands regions can be achieved.

AQUACULTURE DEVELOPMENT: THE PACIFIC WAY?

I. Aquaculture Potential

The Pacific Islands region appears to be especially well-suited for aquaculture development. The tropical and subtropical climates facilitate year-round production in the pristine aquatic environment. The region also has significant disadvantages to aquaculture development. The two major ones are the small sizes of islands and their isolation. Small dispersed land masses and small populations mean small local markets and limited support facilities and infrastructure. In addition, distances to export markets are often great, while intra- and inter-island transport is frequently unreliable and expensive.

II. Aquaculture Experiences

The Pacific Islands region has had varied experiences with aquaculture. Aquaculture, or some form of aquatic husbandry, was done traditionally in French Polynesia, Kiribati, and Nauru. In other Pacific nations, such as New Caledonia and Papua New Guinea, no documentation was found of aquaculture having been traditionally carried out.

More recently, the Pacific Islands region has experienced successive waves of modern aquaculture "development." The first wave occurred in the late 1950s and early 1960s and centered around the activities of H. Van Pel and L.C. Devambeze of the South Pacific Commission. Much of this early work in aquaculture was justified on the basis of supplementing protein deficient diets (Fiji, Hall 1949; Western Samoa, Van Pel 1954; Cook Islands, Van Pel 1955; Papua New Guinea, Schuster 1950 cited from West and Glucksman 1976). All early attempts failed to establish long-term commercial, or even subsistence level, fish farming activities. One response to introductions from these early efforts was eradication projects (for tilapia) as in Nauru (UNDP 1981) and in Kiribati (Gilbert and Islands Colony 1968). In Papua New Guinea, where initial fish culture attempts also failed, tilapia escaped to the natural water ways where today it is the basis of a 2,700 tonne/year artisanal fishery (Kan 1979).

The second wave of aquaculture initiatives occurred in the early 1970s. This effort was a joint UNDP/FAO and SPC venture titled the South Pacific Islands Fisheries Development Agency (SPIFDA). It was designed to assist the Pacific Islands to develop their fisheries (including aquaculture). In 1971, SPIFDA sponsored two aquaculture consultants to the region, J. Glude (mollusc culture specialist) and D. Villaluz (fish culture specialist). Based on their recommendations (Glude 1972, and Villaluz 1972), various aquaculture projects in the region were initiated. In addition, SPIFDA, with local support, set up aquaculture research and demonstration facilities at: (1) St. Vincent Bay, New Caledonia; (2) Raviravi, Fiji; and (3) Koror, Belau.

The long-term impact of both the consultants and the SPIFDA demonstration projects is questionable. Although some of the consultants' recommendations were followed up on, no viable projects resulted. The research and demonstration centers fared no better. The St. Vincent Bay project failed to establish a local aquaculture industry. It has now been taken over by the

French government funded Centre National pour l'Exploitation des Oceans (CNEOX) which is investing in penaeid shrimp farming.

The Raviravi project in Fiji met a similar fate. When SPIFDA terminated, the Fiji Government funded the project for a number of years. However, no commercial or subsistence ventures resulted from this initial project. The site has recently been taken over by a joint venture between France Aquaculture (a subsidiary of CNEOX) and the Fiji Government. This new project is examining, on a pilot level, the feasibility of commercial penaeid shrimp culture.

The Koror facility (now known as the Micronesian Mariculture Demonstration Center) also failed to establish a local aquaculture industry. Since 1973, the facility has been run and funded by the Marine Resources Division of TTPI, now of Belau. To date, the center has shown the biological and technical feasibility of culturing numerous species, most recently for giant clams (*Heslinga* and Perron 1982) and trochus (*Heslinga* 1981). However, translation of these results to commercial operations has yet to be realized.

The current wave of aquaculture development is primarily from various aid sources. CNEOX is involved in aquaculture development projects, as mentioned above, in Fiji and New Caledonia. UNDP/FAO has recently (1982) terminated support for the milkfish farm project in Kiribati. The British O.D.A. is providing funds for an extension of this project. Japanese aid provided funds to Tonga for its mariculture lab. It is also supplying a team of experts to prove the biological and technical feasibility of prawn culture in Fiji. U.S. involvement is limited to the Peace Corp Program. Volunteers are now active in subsistence aquaculture projects in such countries as Fiji and Western Samoa. In addition, the British Volunteer Service Organization (VSO) has an individual working on a *Euchema* culture project in Kiribati. Australian involvement includes recent funding of a proposed baitfish culture farm in Fiji.

Current efforts in aquaculture development at the local level include the support of various aquaculture facilities by individual governments. Examples include the Naduruloulou station in Fiji, the Kanudi and Dobel stations in Papua New Guinea, and the Micronesian Mariculture Demonstration Center in Belau. CNEOX's facility in French Polynesia might also be included as a Pacific Island government supported facility.

Aquaculture activities in the Pacific Islands have had a relatively poor success rate. Failures have included projects on a variety of species, in a variety of locations. Some examples include:

- o the brine shrimp project in Christmas Island, Kiribati;
- o the total atoll production system pilot project in the Cook Islands;
- o the SPIFDA projects in Raviravi, Korror, and St. Vincent Bay;
- o the two oyster farms in Vanuatu;
- o the baitfish projects in Western and American Samoa; and
- o the introduction of the oyster *Crassostrea gigas* throughout the region for culture.

Those projects initiated to research and demonstrate aquaculture that resulted in viable commercial operations are rare. The cultured pearl industry which grew from the natural pearl fishery in French Polynesia is one such

example. In addition, the trout farm in Papua New Guinea is an isolated example of a successful commercial project in the region.

III. Recurrent Issues in Aquaculture Development

Based on the regional reviews of aquaculture activities recently completed by PIDP, certain issues appear to surface repeatedly in the aquaculture experiences of the Pacific Islands. Some of the more visible issues include:

1. the poor project success rate when outside consulting firms were used;
2. the question of who really benefits from aid projects;
3. aquaculture projects lack components necessary for long-term success;
4. the unrealistic estimates in projects and proposals; and
5. the possibility that the Southeast Asian experiences may not fit the Pacific Islands.

Outside consultants have been used from time to time on aquaculture development projects in the region. However, the project results did not always come up to the expectations of the host government (Cook Islands and Kiribati). Contractual arrangements were such that the consultants were paid (to some extent) even if their products were not satisfactory.

In aid projects, a foreign expert or team of experts may be brought in. They are given a budget and the task of proving the feasibility of culturing a particular species in country. Given the aid budget allocated, and their level of expertise, the biological and technical feasibility is easily "proven." However, these "experts" are often poorly trained in economics or business. The economic feasibility studies that they do are often naive and superficial. Thus this issue is often poorly addressed in the actual project.

If no commercial operations result, did the host government benefit? Did the local people benefit? Could the real benefit be to the aid donor (for political visibility) and to the expert (for employment at international salaries)?

Aquaculture projects appear to be missing key components for long-term success. Often the aid donor provides aquaculture experts with no counterpart or technology transfer component in the project. Does it really mean anything if a few scientists prove they can grow an aquatic species on a Pacific Island? Without the counterpart's active and adequate training, or a significant technology transfer portion allocated to the project, the work by the experts may well be in vain.

Unrealistic estimates can be found in both projects and proposals. In projects, as stated earlier, the economic expertise of the expert is often limited. This results in over optimistic production, as well as sales, estimates in the superficial economic analysis which is usually completed at the termination of a project. Revenue estimates rarely relate to realistic market projections. In addition, production costs are often incomplete and understated.

In proposals, the same inflation of sales and deflation of cost estimates occurs. This is done (maybe unconsciously) to paint a very positive picture of

the potential success of the proposal (see PIDP 1983a). The proposal is then funded and initiated. The resultant project eventually falls quite short of expectations.

Finally, the connection between the Pacific Islands and Asia is often made. As a result, the question is often posed, "Why isn't aquaculture successful in the Pacific Islands as it is in Asia?" The answer can be related to markets and factors of production. Asia has large population centers (big markets) that are accessible by reliable transportation networks. As stated earlier, the Pacific Islands have small local markets, and export transportation links are often unreliable and therefore quite expensive.

In Asia, the subsistence-level market is enormous, with people facing a real protein/food crisis. The diet of the Pacific Islanders is changing, but it is nowhere near the crisis levels found in Southeast Asia. Pacific Islanders are not starving. In addition, in Asia, labor, land, and water are abundant. In the Pacific Islands, the labor supply and suitable land are limited, and fresh water supplies may be critical.

IV. Alternatives for the Future

A number of scenarios come to mind as to what could be done in the area of aquaculture development in the Pacific Islands region. The simplest, of course, is to do nothing. Other possibilities include addressing some of the issues presented above.

Key actions which may greatly improve aquaculture project success are: (1) to critically evaluate all proposals; (2) to ensure that only projects which fully address the technology transfer issue are initiated; (3) to allow only projects with high a probability of success be initiated; (4) to scrutinize carefully the consultant firms which are being considered for project contracts (see Dwyer 1983); and (5) to incorporate protective clauses in contracts with consulting firms which tie funds to the quality of the final product (see Hodgson and Uwate 1983).

Aquaculture may well be an excellent vehicle for economic stability and growth for Pacific Island governments. However, its track record to date is not impressive. It has been used as a vehicle for political visibility, as well as for personal (company) profits.

With such a record, it would be easy to disregard any further attempts at developing this industry. A more rational approach may be to screen all future projects critically and to evaluate them individually on their own merits. If the project seems reasonable and if the numbers presented are realistic and balance out, then with proper safeguards in the contract, the project may be initiated.

One additional safeguard which can be used is the "contingency allowance." Despite the best of plans, logistic and production delays, as well as other unexpected delays, occur in aquaculture projects in the region (see PIDP 1983b). If these factors are taken into account in the original project's budget, the need for additional funding after a project is initiated can be

minimized. This can also provide a more realistic portrait of a proposal's true costs prior to its acceptance and implementation.

The approach outlined above not only minimizes risk but also increases the probability of a successful project. It should also filter out ill-conceived, grandiose plans which could only cost precious developmental funds and result in additional aquaculture failures in the region.

LITERATURE CITED

- Dwyer, M. 1983. List and short summary of aquaculture consulting firms. Pacific Islands Development Program. East-West Center. Honolulu, Hawaii.
- Gilbert and Ellice Island Colony. 1968. Agricultural annual report for the year ended 1968. Tarawa.
- Glude, J. B. 1972. Report on the potential for shellfish aquaculture in Pacific Islands, Yap Islands, Guam Truk, Ponape, Ellice Islands, American Samoa, Cook Islands Fiji Islands, New Caledonia and French Polynesia. FAO FI:SF/SOP Reg 102/8.
- Hall, H. T. B. 1949. Fish culture in ponds. Fiji Agricultural Journal 20(2):58-60.
- Heslinga, G. 1981. Growth and Maturity of Trochus niloticus in the laboratory. Proceedings of the Fourth International Coral Reef Symposium. Manila 1981. Volume 1.
- Heslinga, G. and F. Perron. 1982. Giant clams: Palau hatchery offers hope for threatened species. (draft manuscript).
- Hodgson, G. and K. R. Uwate. 1983. Considerations regarding the use of consultants in aquaculture projects. Pacific Islands Development Program. East-West Center. Honolulu, Hawaii.
- Kan, T. T. 1979. Status of aquaculture in Papua New Guinea. South Pacific Commission 11th Regional Technical Meeting on Fisheries. 5-10 Dec. 1979. Noumea, New Caledonia. SPC/Fisheries 11/WP11.
- Pacific Islands Development Program. 1983a. A critique of the proposed Togalevu bait farm. East-West Center, Honolulu, Hawaii. Submitted to the Ministry of Agriculture and Fisheries, Government of Fiji, Suva, Fiji.
- _____. 1983b. A short critique on the Raviravi joint-venture shrimp project. East-West Center, Honolulu, Hawaii. Submitted to the Ministry of Agriculture and Fisheries, Government of Fiji, Suva, Fiji.
- United Nations Development Program. 1981. Programme information project descriptor report. 16 October 1981. Region: Asia and the Pacific.
- Van Pel, H. 1954. Possibilities of fish culture in ponds in Western Samoa. South Pacific Commission. Noumea, New Caledonia.

_____. 1955. The Fisheries industry of the Cook Islands. South Pacific Commission. Noumea, New Caledonia.

Villaluz, D. K. 1972. Aquaculture possibilities in some islands of the South Pacific. Report prepared for the South Pacific Islands Fisheries Development Programme. FAO DP/RAS/69/102/12.

West, G. J. and J. Glucksman. 1976. Introduction and distribution of exotic fish in Papua New Guinea. Papua New Guinea Agriculture Journal 27(1/2):19-48.
