

Republic of Palau – National Aquaculture Strategy

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Introduction

There is increasing recognition both globally, and within Palau, and other Micronesian nations, that aquaculture is an important source of aquatic food under declining marine capture fisheries resources and the current growing demand for aquatic products. Within Palau, there is a small and growing aquaculture sector which has potential for future growth, and possibilities to contribute to food production, employment, export earnings and economic growth.

This National Aquaculture Strategy was prepared with assistance from FAO TCP/RAS/3101-3208 project to support Government priorities for development of aquaculture in Palau.

Why a National Aquaculture Strategy?

The Code of Conduct for Responsible Fisheries (CCRF), a voluntary agreement of the FAO Members since 1995, sets out principles and international standards of behavior for responsible practices with a view to ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity. The Code recognizes the nutritional, economic, social, environmental and cultural importance of fisheries, and the interests of all those concerned with the fishery sector. The Code takes into account the biological characteristics of the resources and their environment and the interests of consumers and other users. States and all those involved in fisheries are encouraged to apply the Code and give effect to it.

Article 9 of the FAO Code of Conduct for Responsible Fisheries (CCRF) recognizes the importance of aquaculture sector strategies and plans to provide guidance to the responsible development of the sector. The CCRF notes it is the responsibility of the State to provide that enabling environment (such as policy and legislation) for the development of the sector, and allow interested stakeholders to effectively participate in aquaculture development processes. A National Aquaculture Strategy is a recognized vehicle for creating that enabling environment.

Purpose of the National Aquaculture Strategy

The purpose of this National Aquaculture Strategy is to provide guidance to promote and develop national aquaculture, be it by the state or by the private sector, in a responsible and environmentally sustainable manner. The Strategy outlines the actions necessary for future development of aquaculture in Palau, including responsibilities for its implementation.

Methods and process for preparation

The National Aquaculture Strategy was prepared based on the recommendations made during a national workshop held in Koror in 2006, and a series of subsequent consultations with State governments and stakeholders (communities) led by the Bureau of Marine Resources (BMR). The process was supported by some studies and reviews on aquaculture and relevant natural resources in Palau, and assessments of current aquaculture practices and market demands and opportunities. The draft National Aquaculture Strategy document was then presented and further revised during a workshop of national stakeholders held on 09-10 June

2009 in Koror. The participatory process used during the preparation of the strategy was intended to ensure ownership and consensus in the final strategy thus facilitating its implementation.

Consistency with national and international legislation and agreements

The National Aquaculture Strategy is consistent with, and builds on the following national and international legislation and agreements.

In Palau, the recent and ongoing initiatives of particular relevance include:

At regional and international level, there are several agreements and initiatives relevant to aquaculture development in Palau, within Micronesia, and internationally, that include:

- FAO Code of Conduct for Responsible Fisheries (CCRF)
- Other relevant agreements and treaties governing aquaculture production and marketing of products from aquaculture, such as Codex Alimentarius Commission, WTO/SPS Agreement, Convention on Biodiversity, etc.

Aquaculture in Palau

Aquaculture was introduced in Palau over 30 years ago (Japanese introduced in 1930's), although recently it is receiving priority in government development policies. Since the 1970's, several species have been farmed during trials, but the aquaculture industry is still in its infancy and requires assistance to grow. There have been several successes, such as clams and corals, and several species show promising results (mangrove crabs, milkfish, grouper). The production through aquaculture is slowly growing, reaching a production of xxx tones with a farm gate value estimated at US\$ xxxxxx in 2008.

Palau was one of the first countries to succeed in mass production of giant clams during the 1970's and now giant clams of several species produced by BMR are planted out and farmed in coastal areas around the country; an environmentally suitable farming technique for coral reefs. Species cultured include *Tridacna crocea*, *T. derasa*, *T. gigas*, *T. maxima*, *T. squamosa*, *Hippopus hippopus* and *H. porcellanus* grown for local consumption and export. Juvenile clams have been exported to fulfill demand for ornamental species in US and Europe. A Palau Aquaculture Clam Association (PACA) has been recently formed for further development of clam farming in Palau and take over the hatchery functions currently assumed by Palau Mariculture Demonstration Center (PMDC). Recent CITES listing poses special challenges to international trade for these species.

Milkfish farming has a long tradition in some Palauan States and there are traditional extensive milkfish farm ponds found around the country. Milkfish farming using fry from the wild has been ongoing by private entrepreneurs and State government over several years. The main operating milkfish farm at present is in Ngatpang State, where a State government farm is in operation producing fish for local consumption. Grouper hatchery production has been successful, and two pilot cage farms are now in operation, producing tiger group *Epinephelus fuscoguttatus*, and *Plectropomus* species, with the vision of targeting livefish markets in East and Southeast Asia. Young fish for stocking come from a mix of hatchery fish, and wild caught juveniles. Growing interest in grouper farming has potential to build on successes in hatchery production and pilot farms, and although local markets are limited, export markets for higher value livefish are available in East and Southeast Asia. Other marine fish species such as rabbit fish also have some potential for further development. Milkfish demand is

likely to continue to rise providing opportunities for expanding culture of the species for the domestic markets, partially as a substitute for imported milkfish, and as bait for tuna boats.

Crustacean farming include some experience with pond culture of shrimp at Ngatpang, and pen culture of mangrove crabs in mangrove areas producing products for domestic consumption. There appear to be plans for further growth of shrimp farming using imported post-larvae of whiteleg shrimp (*Litopenaeus vannamei*) from certified hatcheries in Guam.

These experiences demonstrate that aquaculture can be successful in Palau, responding to demand in local and export markets, and provide a baseline of experiences for moving forward with further development of the sector.

Future development

Future development of aquaculture in Palau has potential to contribute in various ways to development of Palau through earning of export income, local employment and household income, food security and livelihoods. Production and marketing opportunities exist for several aquaculture commodities within the country, although each faces various challenges. Private interest in investment in aquaculture in the, from Palauan companies and overseas investors also shows some promise.

Palau has a number of strengths, opportunities, weaknesses and threats to the future development of aquaculture that need to be considered:

Strengths:

- Positive government support for aquaculture
- Generally clean environment and green image; and
- Apparent freedom from many aquatic animal diseases.

Opportunities:

- Growing domestic demand for fish and other aquatic products
- Markets and demand in neighboring countries
- Possibilities to exploit markets for higher value niche products

Weaknesses:

- Cost of production reduces capacity to compete in large commodity markets (e.g. milkfish, shrimp)
- Minimum economically viable quantity of production vs. demand
- Labor skills and costs
- Lack of existing infrastructure and services for aquaculture

Threats:

- Competition with neighboring islands/countries for export markets
- Access to input resources and economical sourcing and production
- Weak institutional support

These points have been considered in the development of this National Aquaculture Strategy.

Special considerations

With 586 islands, the lagoons, reefs and nearshore areas of Palau provide significant opportunities for development of marine aquaculture. These marine resources include some of the world's best corals, and an extensive mangrove forest cover. With such valuable natural resources, the development of aquaculture must be well planned, and implemented with due consideration of the natural environment, and other users. This approach conforms to the primary objective of the 2001 Presidential Management Action Plan (MAP) "to integrate environmental planning into developmental planning efforts". The approach to aquaculture development therefore has to give a high priority to environmental management and sustainability. An environmentally sensitive approach will allow aquaculture to develop in harmony with other users, as well as the many traditional uses, of these resources, in particular:

- Palau is in a good position to capitalize on the image of "clean and green" aquaculture products.
- Environmental management of the sector is a high priority— through siting and management – and integrating aquaculture into the natural environment to put the image of a clean and green industry in practice.
- The economy of Palau relies heavily on the tourism sector and maintaining a high quality environment therefore careful aquaculture planning is essential that balances use of resources between these sectors.

Aquaculture therefore faces special challenges in Palau to integrate into the coastal ecosystems and economy. It also faces all the economic and capacity difficulties of a small island developing state, and therefore economic, market led approaches well tuned to the local environment, customs and capacity are necessary.

State priorities for aquaculture

The preparation of this National Aquaculture Strategy involved various consultations with State governments throughout Palau that helped identify potential and State interest in aquaculture development. Annex 1 provides a short summary of the outcomes from the State consultations indicating various objectives and potential for aquaculture in the islands.

Aquaculture Strategy

Vision and Objectives

The first workshop during 2006 requested elaboration of a Vision for Aquaculture Development in Palau, which has been prepared based on the goal of the Medium Term Development Strategy (2009-2014) as follows:

Contribute to achieving sustainable economic development in Palau through environmentally responsible aquaculture.

The objective of the National Aquaculture Strategy is to assist Palau in achieving this vision or goal through a series of practical steps, taking account of the following principles:

- Aquaculture enterprises should be market-driven and commercially viable

- Growth of the aquaculture should be driven by improvements in use of existing and new locations, species, products and markets
- Growth should take place through an environmentally sustainable approach taking account of the need to preserve the values of special environmental conditions in Palau
- The private sector should be mobilized for a greater role in aquaculture but with improved government management.
- The aquaculture strategy should be implemented through a partnership between industry and government, communities, States, and research/education/training providers.

Major elements

The National Aquaculture Strategy sets out the twelve key actions to be taken at the sector level to promote sustainable growth in the aquaculture sector and the ways and means of supporting development of aquaculture in the country in line with this vision. It also includes priorities and responsibilities for implementation of the identified actions.

Better use of existing aquaculture facilities and resources

Some improvements to existing aquaculture facilities have started to be made during the FAO TCP/RAS/3101 project, through demonstration and technical assistance, but potential exists to make better use of and improve production and efficiency of existing aquaculture facilities and resources in Palau. A priority should be given to continuing to improve the efficiency of use of these existing facilities that include.

- PMDC marine fish hatchery
- Demonstration ponds in Ngatpang
- Traditional milkfish ponds in Peleliu and other locations in coastal Palau

Implementation Responsibilities: State governments, with technical assistance from BMR, PCC.

Improve access to aquaculture inputs

Aquatic animal seed, feed, fertilizers, materials and other input supplies are required in sufficient quantity and quality for aquaculture development in Palau.

Fish seed production and hatcheries

Aquatic animal seed availability for aquaculture in Palau is insufficient to meet current requirements, and projected future demand. Present sources are imported seed, wild sources, and a limited supply from local PMDC hatchery. Palau needs to increase the capacity for quality fish seed production from local hatcheries to support future development of brackishwater and marine fish farming through:

- Improvement of existing PMDC hatchery for groupers. The BMR should continue to support and improve its hatchery for production of marine fish grouper fry, using locally caught broodstock, and avoid dependence on foreign sources. Efforts should be made to engage the private sector in the hatchery.
- Import of milkfish seed is still necessary. Possibilities of developing a milkfish broodstock and establishing a hatchery should be considered.
- Mud crab imports should be avoided and assessment of the local availability and abundance of juvenile mangrove crabs and the feasibility of setting up a collection program.

- BMR should gradually pass the clam seed production to the private sector and the Palau Aquaculture Clam Association (PACA) to run the operation as a commercial enterprise.
- Shrimp seed imports should be avoided, and only from certified sources using internationally recognized guidelines and risk assessments.

To support fish seed production, improved awareness of disease issues is needed together better procedures for importation. There is a current need for importation of certain species of fish seed (particularly milkfish) for aquaculture for local consumption. There appears to be a demand for milkfish as bait for fishing. Thus, if aquaculture sector to be further developed and expanded for supporting such demands, Palau should move away from reliance on import of fish seed and establishment of hatcheries must be considered. Risk analysis should be conducted and practical risks management measures identified to allow responsible and low risk importation where necessary in the short-term to support aquaculture industry growth.

Implementation Responsibilities: Private sector (investors, suppliers, importers, farming/hatchery operations) but with regulatory oversight and technical advice from BMR, EQPB (seed imports) and State governments.

Feeds and fertilizers

Feeds, fertilizers and sometimes feed additives are required for aquaculture, except for species farmed using extensive methods such as giant clams, sponges and seaweeds. Such species are highly suitable for Palau as growth does not require imported inputs.

For those species requiring feeds and/or fertilizers, such as finfish farming, current sources in Palau are from local domestic sources, or imports. No domestic formulated feeds are available, and even organic fertilizer for milkfish farming has been imported. Responsible sourcing and efficient use of feeds and fertilizers will contribute to efficient production and reduced impacts on the environment by minimizing wastage of more intensive aquaculture systems. Future development of aquaculture in Palau requires:

- Grouper and other intensive marine fish farming require development of suitable feeds. Research is required into sourcing and development of local feeds (e.g. tuna waste) and use of FADs as a basis for development of economically and environmentally efficient methods of feeding such carnivorous fish.
- Manures should only be imported with suitable precautions to minimize risks of pathogens during import of manures for aquaculture
- Grouper hatcheries will require import of specially formulated hatchery feeds, and should be allowed.
- If the milkfish aquaculture is expanded, there may be opportunity for small-scale local feed plant using local resources.

Implementation Responsibilities: Private sector (investors, suppliers, importers, farming/hatchery operations), but with regulatory oversight and technical advice from BMR and PCC (research on feed alternatives).

Aquatic animal health management

Palau has not faced any serious aquatic animal disease outbreaks, and appears likely to be free of many major pathogens infecting aquaculture species, but improved management is necessary to minimize the risks of introduction of pathogens, and aquatic animal disease

outbreaks. Adoption of better practices is required in the introduction of non-native species, and the production, sale and transport of eggs, larvae or fry, broodstock or other live materials to address the following:

- Establishment of an Introductions and Transfers Committee including representatives of all key agencies with the power to make legally binding decisions. This approach would recognize the close similarity between issues surrounding the introduction and transfer of live aquatic animals and broader issues surrounding invasive alien species.
- Further importations of live aquatic animals should be strongly discouraged until adequate risk analyses have been completed. If the government chooses, an alternative may be to allow only permitted sources that are able to provide reliable health certificates.
- Specific requirements and procedures for the importation of aquatic animals need to be developed along the lines of those established for plants and terrestrial animals and applied on a case by case basis using risk analysis procedures.
- Appropriate Level of Protection (ALOP) should be stated based on completion of risk analyses. The Plant and Animal Quarantine Regulations apply a high level of protection and state that the standards to be applied should meet or exceed those specified by the World Organisation for Animal Health (OIE). All aquatic animals of interest for aquaculture, including crustaceans, finfish, mollusks, sponges and corals should be included.
- Contingency plan for disease outbreaks in aquatic animals should be prepared.
- Palau should also develop closer contacts with the OIE and monitor standards that govern aquatic animal trade.

A National Aquatic Animal Health Management strategy should be developed to address these points in accordance with the FAO technical guidelines on health management for responsible movement of live aquatic animals.

Implementation Responsibilities: EQPB, BMR, CRE, Quarantine, PPUG, PICRC, PCS and Private sector (importers, farming/hatchery operations).

Ensuring environmental sustainability and integrity

Underpinning the aquaculture strategy should be a firm commitment to further build the environmental sustainability and integrity of the sector. Aquaculture is one of a handful of natural resource industries that can offer truly environmentally sustainable economic growth. Aquaculture is based on renewable resources, and it depends for its existence on pristine water and therefore it has a stewardship role in assisting to protect the natural environment. The FAO Code of Conduct for Responsible Fisheries emphasizes the need for advance evaluation of the effects of aquaculture on ecosystem integrity, and regular update of aquaculture development strategies and plans, to ensure that aquaculture is ecologically sustainable, and to allow rational development of resources shared by aquaculture and other activities. A number of actions are therefore necessary to support environmentally sustainable development of aquaculture in Palau:

- Better processes and procedures are required for advanced evaluation of new aquaculture developments. The guidelines for environmental assessment, monitoring and management prepared during the FAO TCP/RAS/3101 project should be applied by government and private operators for the planning and operation of aquaculture projects.
- New developments in marine fish farming should be preceded, in parallel with the aquaculture zoning plans mentioned below, with an assessment of carrying capacity of

different areas around the Palau coastline, and preparation of initial carrying capacity estimates.

- Developments in other sectors – such as the tourism and hotel industries – should also pay attention to the potential impacts on aquaculture sites and operations, and should be considered in environmental assessment and monitoring procedures. Aesthetic issues should be considered.

Implementation Responsibilities: EQPB, BMR, CRE, State Governments, PICRC and Private sector (importers, farming/hatchery operations).

Aquaculture zoning

Aquaculture farms should be sited in locations which are suitable for sustainable production, and prevent or minimize conflicts with other users of resources, and do not create undue externalities and respect nature reserves, protected areas and critical or especially sensitive habitats. Preliminary analysis of suitable areas for aquaculture has been completed during the TCP/RAS/3101 project, and the National Aquaculture Strategy should continue to build on this initial analysis into formal zoning plans for each State.

- National/State governments should seek to complete the identification of suitable areas for aquaculture and complete a zoning plan for land-based and marine aquaculture in each.
- Subsequent permitting for aquaculture should only be allowed within these designated suitable areas.
- A marine zoning plan for marine cage farming is needed to address the growing interest in marine fish cage farming around Palau. This assessment should take account of carrying capacity of coastal environments.
- Protected areas may make up to 50% of the land and water areas of some states, there is a need for further dialogue between BMR, States and the Protected Area Network (PAN) regarding the types of aquaculture to be permitted inside conservation zones (e.g. clam culture is allowed in some zones) and the completion of State aquaculture zoning plans.

Implementation Responsibilities: State Governments with technical support from the BMR, PALARIS, PCS, BAC, BLS, Marine Law Enforcement Division and Private sector stakeholders.

Approval and permitting process

Approval and permitting procedures require strengthening and streamlining to take account of the following:

- Clarity in institutional responsibilities
- Incorporation of marine based aquaculture, and particularly marine fish farming
- Permitting of living aquatic animal movement, transfer and introduction
- Improved guidance and streamlining of EA and EIS

Implementation Responsibilities: BMR (coordinator), EQPB (final approval), quarantine, State Governments, BLA, FIB, Chiefs (traditional uses/rights) and BAC

Monitoring and compliance

There is as yet no systematic framework for environmental monitoring of aquaculture operations, but environmental monitoring should form an integral part of all aquaculture operations in Palau. There are no environmental standards and monitoring procedures in place, which are/could be relevant to aquaculture. This will require organized and thoughtful research, data collection and information gathering. This will also require designations of responsibilities, clear guidance on allowable impacts and the allocation of relevant budget for monitoring activities. Some recommendations on monitoring are included in the guidelines for environmental assessment, monitoring and management prepared during the FAO TCP/RAS/3101 project.

Implementation Responsibilities: BMR, PICRC, CRE, PCS, State Governments, Fish and Wildlife.

Improving the legislation for aquaculture

Development of a sound and comprehensive aquaculture legislation is considered as high priority. The new Palau Fisheries and Marine Resources Act is in early draft form and is being developed with assistance from FAO through TCP/RAS/2907. The priority provisions to be included for aquaculture, drawing on this National Aquaculture Strategy document, would include:

- Provisions prohibiting the release of unauthorized aquatic animals into natural waters and providing for the management of aquatic animal health in aquaculture facilities. The new regulation should complement the Plant and Animal Quarantine Regulations by strengthening domestic aquaculture health management.
- Expansion of the Palau Fisheries Advisory Committee competence and Terms of Reference to include aquaculture, and specifically “the formulation, establishment and implementation of a comprehensive aquaculture policy, guidelines or codes for the sustainable development and management of aquaculture”.
- Clarify institutional arrangements for strategy development, and monitoring of implementation and update.

Implementation Responsibilities: BMR as lead agency in consultation with range of private, State and central government stakeholders.

Government and private institutions

The responsibilities of Government, private/business sector, and communities have been identified during preparation of this strategy document. In addition, the following key points are emphasized for implementation:

- The importance of collaboration in development of aquaculture and sharing of responsibilities, making effective use of existing institutional resources.
- Capacity building in BMR also required with staff dedicated to aquaculture.
- Active participation of aquaculture farmers and producer organizations in development and implementation of responsible aquaculture practices should continue to be promoted. The Palau Aquaculture Clam Association (PACA) is an excellent example and government support for aquaculture should seek to give more responsibilities to PACA and other aquaculture associations in future for self-regulation and management.

- Due to limitations in human resources, it is also proposed that a public-private partnership should be considered to monitor progress towards implementation of the national strategy and make adjustments as needed.

Implementation Responsibilities: As noted above.

Training and education

Palau has made some progress in development of capacity of local institutions and farmers to develop and implement aquaculture projects, including through support of the TCP/RAS/3101 project. Future development of the aquaculture industry in Palau will require increased numbers of trained staff and extension skills, and access for farmers to training opportunities. The strategy emphasizes further strengthening of capacity building to assist and manage future aquaculture development through the following:

- BMR should build more capacity (one staff member, with basic facilities for Level 1 diagnosis) in aquatic animal health.
- Extension capacity should also be improved
- The Palau Community College continue to offer short and long-term training and aquaculture education opportunities.
- Further use of the Ngatpang demonstration facility to promote responsible aquaculture practices in Palau, and as an example for other nations in the Micronesian region.
- Knowledge transfer on grouper hatchery.
- Risk assessment of potential species to be moved into Palau or between islands
- Improving skills in business analysis and management for aquaculture enterprises.

Implementation Responsibilities: BMR, CRE, and Private sector (importers, farming/hatchery operations).

Secure and promote more investment in aquaculture

Investment will be required by government, and the private sector, to implement the strategy and support future aquaculture development in Palau. This will require clear prioritization of where investment should be placed first, together with appropriate scheduling. To assist in raising investment funds:

- It is also important to continue to raise awareness and support banks and business development facilities to provide financial assistance and advice to aquaculture. In particular, the Palau Small Business Development Center facilities and National Development Bank.
- National government should establish funds for use of overseas laboratories during emergencies
- ADB?

Implementation Responsibilities: BMR, Banks, and Private sector (importers, farming/hatchery operations).

Development of markets and trade

Markets for aquaculture products are expanding in Palau, as well as within the Asia-Pacific region, and more globally. Palau will be unable to compete in mass commodity markets, but

should seek to actively explore and promote access to higher value niche markets, or local markets where products from Palau have a comparative advantage. A more active approach to market analysis and access will be required for the future development of aquaculture in the country. The following priorities have been identified:

- Develop strategies to promote marketing of Palau aquaculture products in domestic and international markets where there is competitive advantage
- Market development with Micronesian islands.
- Ensure Palau products adhere to food safety and international trade requirements for aquaculture products
- Raise awareness in BMR and other government agencies and the private sector of international trading requirements (in particular Codex for food safety; OIE for aquatic animal health; and CITES for endangered species trade).

Implementation Responsibilities: BMR, and Private sector (importers, farming/hatchery operations).

Regional cooperation

Opportunities and needs for regional cooperation have been explored during a Micronesia Regional Workshop hosted by the Government of Palau on 11-13 June 2009. The workshop identified several opportunities for enhanced cooperation among Micronesian nations, and well as more broadly for supporting aquaculture development within Palau.

- Government should seek ways to develop better communication and cooperation among all parties concerned with the safe movement of live aquatic animals. This should include an effort to better educate aquaculturists and the general public of risks of importing aquatic animals of uncertain health status.
- Government (agency?) should continue to strive to harmonize its aquatic animal health policy with that of neighboring countries and trading partners, both within and outside the Pacific region.
- Strengthening of engagement with regional programs in the Pacific (SPC) and the Asian region (NACA, SEAFDEC) would provide useful opportunities for learning on various aspects of aquaculture relevant to Palau.
- Micronesia regional cooperation in sharing of aquaculture training and educational courses/tools among the network of community colleges.

Implementation Responsibilities: BMR.

Action Plan for Implementation

Implementation responsibilities and follow up actions were discussed during the National Workshop on 09-10 June and have been highlighted in the 12 main points above.

BMR as the lead agency responsible is recommended to use the National Aquaculture Strategy document to assign clearer priorities, targets and timeframe and responsibilities for follow up and to regularly monitor progress for reporting to stakeholders involved.