



Aitutaki Marine Research Centre Capacity Needs Assessment

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Ministry of Marine Resources

TU'ANGA O TE PAE MOANA

COOK ISLANDS

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Introduction

Under the GCCA project, the AMRC will undergo renovations and strategic re-alignment. The purpose of this report is to document the current functions and capacities of the AMRC; and to explore future potential functions noting the capacity and resource gaps and challenges.

Future potential functions have been discussed with a range of stakeholders through the lens of AMRC providing services to the broader community. Ultimately the focus of the AMRC will prioritise core MMR functions and activities and, where possible, consider broader services.

This report will consider all potential functions of the AMRC and prioritise them according to resourcing, capacity and need. This report will inform the development of renovation and capacity building activities for the GCCA project.

Consultations

The following stakeholders were consulted as part of this assessment:

- MMR staff
 - Pamela Maru, Head of Ministry
 - Koroa Raumea, Director of Inshore and Aquaculture Division
 - Richard Story, AMRC Station Manager
- Local Schools
 - Vaitau School Principal Tuaine Rota and Deputy Principal Colette Clarke
 - Araura Primary School Principal Retire Puapii
- Tourism
 - Noeline Mateariki, Marketing Manager
 - Sieni Tiraa, Destination Development Coordinator

Background to AMRC

The Aitutaki Marine Research Centre (AMRC) was established in 1990 under the Ministry of Marine Resources in collaboration with the Aitutaki Island Council and Australia's AusAid funding program. The foundational purpose of the AMRC was to assist in the restoration and restocking of marine resources within the lagoon of Aitutaki, particularly the giant clam (*pa'ua*, *Tridacna* spp.) which had been overharvested. Aquaculture focused on three non-native species of clams thought to have fast growth rates (*Tridacna gigas*, *Tridacna derasa* and *Hippopus hippopus*) with the hope that outplanted clams can begin spawning and reproducing in the lagoon themselves/naturally. The restocking efforts for these species produced only limited success, and the AMRC expanded its aquaculture program to include the slower growing native giant clam, *Tridacna maxima*, for outplanting, restoration and restocking.

Through aquaculture and husbandry protocols, clams are spawned, cultured and raised at the AMRC facility. Clams are then outplanted into the lagoon or sold for the aquarium trade market, however, this function was banned by the Aitutaki Island Council several years ago. Any outplanted clams are

protected under traditional *ra'ui* management, despite recurring observations of poaching in these areas and poor enforcement capabilities.

Since its establishment, the AMRC has further operated as a local office for MMR staff and their core business duties including FADs, artisanal fisheries catch data collection, water quality testing, coral restoration and outreach.

Over the past 30 years, since 1991, the AMRC has had only one minor renovation. Funded by the UNDP Ridge to Reef Program, this renovation occurred in 2018 and aimed to improve the office and accommodation facilities at the AMRC. These renovations focused on improvements to the working environment, eliminating insects and making the rooms more private and comfortable.

Current state of the AMRC

Currently, the AMRC still maintains its established function of giant clam aquaculture, though at a limited capacity. With the resources currently available, the giant clam aquaculture and restocking of the lagoon is only achieving minimal production and success. AMRC Station Manager, Richard Story, suggests that giant clam aquaculture is currently operating at only 30% capacity demonstrating room for improvement.

The AMRC also serves as the Aitutaki hub of other MMR activities. Assessment indicated that for these other MMR core functions operations are at approximately 60-80% capacity again indicating room for improvement and/or re-prioritisation of activities and resources.

Of the major issues identified that were limiting capacity and output of the AMRC, the lack of appropriate resourcing (staff) and for ongoing requirements to repair and maintain old equipment were highlighted as major factors contributing to the limitations on output and progress. There is more energy that is put towards fixing issues than implementing work. Further to this, the AMRC accommodates for visitor and tourist information. MMR staff are required to host the visitors who are interested in learning about the aquaculture and giant clam work that the AMRC manages. This is currently seen as an ad-hoc activity, rather than a core function with dedicated resources.

Table 1. Current activities and functions of the AMRC, including an estimation of the current operational capacity for each activity. The current operational capacity reflects whether the AMRC is implementing the activity to its maximum capacity (does that even make sense?).

Activity	Current Operational Capacity	Comments
Giant clam aquaculture	30%	Clam aquaculture has slowed down significantly due budget reductions and to the other work required of the FOs on site. Not enough staff to run all activities.
Bonefish permitting and licensing	75%	This process is being digitised and will soon be removed.
Small fisheries grants - Aitutaki		For the Aitutaki grants, AMRC staff handles most of the admin. There is one round of grants and 15-20 applicants per year.

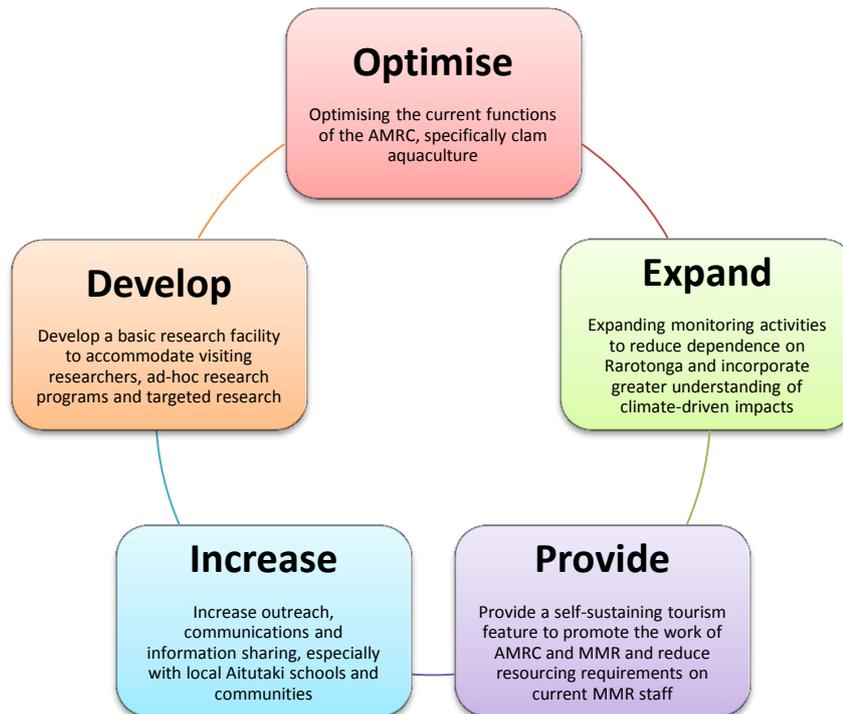
Activity	Current Operational Capacity	Comments
TAILS – artisanal fisheries catch data collection	75%	The collection of this data takes time due to the nature of fishing activities. Typically AMRC staff need to chase and follow up fishers for the data.
Lagoon patrols and compliance work	50-65%	The responsibility of lagoon patrols currently sits with one person only, affecting capacity to implement. Pursuing prosecution for breaches of compliance remains an on-going issue. MMR staff work with local Police where possible.
Crown of Thorns Starfish (COTS) monitoring and removal	80%	One off activity that started due to an outbreak in 2020. This work is labour intensive, taking a lot of time from FO's days
Marine resource surveys		These are only done when staff from Rarotonga organise and come to lead.
FAD program	80%	FAD deployment still requires support from Rarotonga for materials and logistics. Recent capacity development through SPC is looking to improve this.
General maintenance		AMRC now has 3 boats to manage. There are often mechanical problems requiring attention and resources.
Outreach	Ad-hoc	

GCCA project details

Climate change and natural disasters are one of the greatest challenges adding to vulnerabilities and undermining the resilience of Pacific Island communities and environments. The combination of climate driven and human derived stressors exacerbate impacts on the marine environment. This is especially true in Aitutaki where there have been major declines in marine resources over the past 30 years and where data indicates that Aitutaki has the lowest reef building coral cover in the Southern Group of the Cook Islands.

The Global Climate Change Alliance, Scaling Up Pacific Adaptation (GCCA) Flagship Project has provided funding under their output to “Scale up resilient development measures in the marine resources sector” to facilitate renovations, upgrades, optimisation and expansion of the AMRC and its activities. The objectives of the project are to strengthen adaptive management of marine systems through strengthened climate-focussed monitoring, education and awareness.

The future vision for the AMRC and the work to be completed under the GCCA project comprises five key components.



The renovations will be the biggest priority and will facilitate improvement under most of these components/objectives. Based on the previous renovations in 2018, several issues around the implementation of this work were raised and provide a platform to improve upon. These issues centre on a lack of oversight and supervision for the construction work, and the responsibility to complete unfinished work falling onto MMR staff.

Following a recent inspection of the AMRC and land survey of section boundaries, further issues were raised. The land survey revealed that the infrastructure of the AMRC does not lie solely within the marked section, flagging potential conflicts in the future. Furthermore, the AMRC hosts a number of key assets and business outputs for MMR and the proposed renovations should also focus on a long term strategic purpose of maintaining and protecting these assets. One such asset is the R2R boat. Finally, work under the GGCA project should also consider opportunities for cost-recovery and revenue generation, as well as the savings to be made through incorporating better self-sufficiency into the AMRC operations.

Recommendation: Construction work to be contracted to a reliable building contractor, including a provision for a construction supervisor written into the contract. Additional supervision to be supported by MMR personnel.

Recommendation: Progress on construction work to be inspected regularly to ensure timely delivery and that it is meeting the needs of AMRC.

Recommendation: Renovations and construction work should consider appropriate storage for MMR assets, especially boats and including facilities for care and maintenance, and road and driveway access.

Optimise current aquaculture functions

The AMRC is the primary centre for clam aquaculture activities in the Cook Islands. Currently, clams are spawned on a yearly basis and cohorts of hatchery-reared clams are outplanted to a lagoon nursery once they have reached adequate size, approximately 5-8 years old. The last spawning occurred in May 2018. With this current protocol, it is estimated that the survivorship of outplanted clams is limited to only 10% (R. Story, 2020, pers. comms.).



Photo: Aerial view on Aitutaki Marine Research Centre, including clam aquaculture tanks. Lara Ainley, MMR.

Activities under the GCCA should attempt to review the current aquaculture protocols in the context of regional best practices. This review can identify gaps and inefficiencies where activities can be implemented to target optimisation of the protocols. The primary goal of the work is to improve the survivorship of outplanted clams and increase densities of wild clam populations in Aitutaki. Secondary goals of the work include increasing capacity of clam aquaculture in the Cook Islands and providing opportunities for expanded aquaculture (including coral), food security and restocking potential for other islands.

Recommendation: Seek technical assistance from SPC (Jamie Whitford) to review current clam spawning and aquaculture procedures at the AMRC and provide advice to enhance current protocols taking into account regional standards.

Recommendation Conduct spawning and outplanting trials that test the implementation of suggested improvements.

Recommendation: Develop monitoring protocols and indicators to track the survivorship of outplanted clams and the densities of wild populations.

Expand monitoring activities

AMRC monitoring activities are currently limited to artisanal fisheries data collection and water quality. Recent COTS outbreaks and fisheries management issues have highlighted the need for a broader range of monitoring work. New monitoring activities should aim to increase reporting on issues such as coral health, water quality, algae and marine resources. Further to this, monitoring activities that help track and generate information on climate-driven impacts to marine ecosystems will be essential to apply adaptive management for marine resources and AMRC outputs. The need to expand monitoring, build capacity and create consistency across all MMR data collection activities must be carefully balanced with the time and resources required from existing MMR staff and their current workloads. Additionally, integrating broader stakeholder participation in these activities should improve access to relevant information, and broaden resource availability (including people) and buy-in from the broader community in these work areas. Such resourcing issues are likely to be a recurring issue throughout this discussion of the AMRC operations and the GCCA project.

Monitoring activities should be consolidated into the development of lagoon management plans, and island-wide development policies that include inter-agency coordination.

Under the GCCA, resources and capacity will be developed for the AMRC to conduct monitoring activities on a more self-sustaining basis, with reduced need for assistance from Rarotonga resources. Monitoring activities should be expanded to improve current activities and introduce new ones with the goal to build long term datasets and improve understanding of climate change impacts on marine environments.

Recommendation: Increase coverage for coastal fisheries data collection (using TAILS).

Recommendation: Improve water quality monitoring through the establishment of a data logger network that records data continuously and contributes to long term datasets.

Recommendation: Develop monitoring protocols for algae growth and distribution.

Recommendation: Equip AMRC with resources needed for COTS monitoring and removal protocols.

Recommendation: Improve data collection and reporting for coral health.

Recommendation: Provide resources at AMRC to conduct marine field work, reducing support and equipment required from Rarotonga.

Recommendation: Proposed work under the GCCA must carefully consider resource skills and capacity, which may require increasing AMRC staff numbers, or alternative HR models that incorporate staff secondments from other outer islands.

Research facility (remote field station)

The AMRC operates as a clam hatchery and remote field station to conduct MMR core business work. It is equipped with basic facilities required to conduct this work. A potential exists to improve these “basic facilities” to create and provide space for broader research programs and activities. The AMRC can be equipped as a remote field station servicing both MMR core business functions and visiting or ad-hoc research objectives. Furthermore, the opportunity to encourage external, collaborative research projects that meet the needs of MMR, the Cook Islands and visiting researchers can be explored and supported by the AMRC.

Improvement of basic facilities to support research should be considered as part of the suggested renovations and construction work, particularly the provision of appropriate and comfortable accommodation and amenities for visiting researchers and MMR staff.

Recommendation: Renovation work should separate accommodation and amenities, bathroom and office spaces.

Recommendation: Office space to provide comfortable working conditions for existing MMR staff (3 positions) and potential visiting researchers.

Recommendation: Renovate existing wet lab and clam spawning areas (eg, replace walls, improve ventilation, create work benches and improve walkways around the spawning tanks) and create new air-conditioned dry lab space.

Tourism

The AMRC currently facilitates an ad-hoc function for visitors to observe and learn about the clam aquaculture work that is done. This function is not structured and where MMR/AMRC staff are otherwise occupied, visitors are left to themselves to wander the property and view the clams. While a secondary function of the AMRC, outreach and communications to visitors and the community remains an important activity.

Development in and up-scaling of AMRC's tourism and visitor facilities would be a boost for both tourism and the work of MMR. Such facilities could contribute to raising awareness for several key issues including, climate change, resource and environmental management and conservation. This work can build from the existing interests in clam aquaculture, and be expanded to include other work conducted by MMR, history of the AMRC, information about climate driven impacts on the marine environment and marine resources. To alleviate potential burden on MMR staff and resources, tourism facilities at the AMRC should be a self-guided design.

There is also an opportunity to investigate revenue generating activities that may contribute to the cost recovery and development of self-sustaining business models for the AMRC. Examples include the production and selling of merchandise like posters, booklets, images and t-shirts.

Recommendation: Construct a designated visitor and recreational area with information, posters, audio-visual and photo displays, and designated parking area.

Recommendation: Investigate revenue generating activities to provide return on investment for the AMRC, including selling merchandise.

Recommendation: Develop a self-guided walk/tour through the visitor area and clam aquaculture facilities of the AMRC.

Recommendation: Liaise with interested tour operators to provide resources for the development of their own tourism features (eg, place clams in the lagoons in front of hotels).

Recommendation: Develop and construct a central tourism feature, such as a Lagoonarium, for broader community benefit and create self-guided lagoon and snorkel tours.

Outreach to schools and communities

Providing outreach and support for education both within schools and the community through the AMRC is a valuable component of the GCCA project. MMR staff spoke to several stakeholders from local schools in Aitutaki in order to understand how the AMRC may facilitate future collaboration with the schools and support outreach and education.

Stakeholders responded positively to the consideration of schools and education in the functions of the AMRC. Several themes came out of these perspectives indicating why such collaboration would be valuable. In general, local schools are supportive of building stronger relationships with MMR through the AMRC and finding ways to incorporate more marine science, resources and management concepts into student learning. The facilities at the AMRC may provide opportunities for students to gain more immersive and practical experiences relating to the marine environment. The opportunities that such collaboration would provide in terms of increasing awareness about the marine environment, biology, ecosystems and fisheries would be highly valued. This project provides an opportunity to develop resources to expand and achieve effective school outreach.

Additionally, in the development of lagoon management plans, any monitoring and survey activities could be integrated in to school curriculum, support local efforts for marine resource management and conservation, but also provide students insight into the range of marine-related career opportunities.

Recommendation: Renovations of AMRC to include construction of designated classroom facilities.

Recommendation: Develop outreach and practical activities to improve the integration of marine resource concepts and issues into AMRC's engagement with schools.

Summary

The following is a summary of the recommendations made in the above analysis. To assess the current needs of the AMRC and therefore effectively utilise funding provided under the GCCA project, these recommendations have further been prioritised and comments on implementation provided. The two primary focus areas were identified as the renovations and the clam aquaculture work.

Priority	Recommendation	Comments on Implementation
1	Renovate existing wet lab and clam spawning areas (eg, replace walls, improve ventilation, create work benches and improve walkways around the spawning tanks) and create new air-conditioned dry lab space.	Ensure labs are appropriately resourced for basic work.
2	Renovations and construction work should consider appropriate storage for MMR assets, especially boats and including facilities for care and maintenance, and road and driveway access.	Consider the recent survey work, re-defining the AMRC property boundary lines and impact on road access and boat manoeuvring.

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Priority	Recommendation	Comments on Implementation
3	Seek technical assistance from SPC (Jamie Whitford) to review current clam spawning and aquaculture procedures at the AMRC and provide advice to enhance current protocols taking into account regional standards.	Review should identify gaps, areas for improvement and targets; and inform the potential renovations. Consider if there are specific renovations required (eg, improving the raceways and wet lab areas). Ensure AMRC is appropriately resourced for optimised function (eg, balance, microscopes, serotonin, etc).
4	Develop monitoring protocols and indicators to track the survivorship of outplanted clams and the densities of wild populations.	This could align with marine resource and biodiversity assessments, if possible.
5	Proposed work under the GCCA must carefully consider resource skills and capacity, which may require increasing AMRC staff numbers, or alternative HR models that incorporate staff secondments from other outer islands.	Consider the increased workload for current MMR staff that will need appropriate management.
6	Progress on construction work to be inspected regularly to ensure timely delivery and that it is meeting the needs of AMRC.	This should be done by the GCCA National Coordinator and MMR Technical Advisor.
7	Construction work to be contracted to a reliable building contractor, including a provision for a construction supervisor written into the contract. Additional supervision to be supported by MMR personnel.	This may increase expected costs. Consider if it's reasonable to expect a foreman or manager to remain on-site during construction.
8	Provide resources at AMRC to conduct marine field work, reducing support and equipment required from Rarotonga.	The AMRC should be appropriately equipped with as much of the required field gear as possible, including SCUBA tanks and compressor, transects, slates, cameras and boats. Renovations should adequately provide for equipment storage that is secure, screened and ventilated. Consider if equipment is required for work in Manuae.
9	Construct a designated visitor and recreational area with information, posters, audio-visual and photo displays, and designated parking area.	Consider an area that may double as a recreational area for AMRC and MMR staff utilising benches and seating. Consider some basic amenities (eg, water cooler). Allowing visitors to be more self-sufficient frees up time for the MMR staff to focus on their work.
10	Develop a self-guided walk/tour through the visitor area and clam aquaculture facilities of the AMRC.	Ensure appropriate signage and labelling. This links directly to the visitor and recreational area.
11	Office space to provide comfortable working conditions for existing MMR staff (3 positions) and potential visiting researchers.	Ensure appropriate workstation for data management. Consider that provisions for visiting researchers should include desk space, chairs and power points. This may also include a small kitchenette and air conditioning for the storage of sensitive equipment (eg, cameras) and longevity of electronics.
12	Renovation work should separate accommodation and amenities, bathroom and office spaces.	Consider any cost-recovery opportunities through visiting researchers using AMRC's facilities.

Priority	Recommendation	Comments on Implementation
13	Conduct spawning and outplanting trials that test the implementation of suggested improvements.	Consider resources required for outplanting trials.
14	Liaise with interested tour operators to provide resources for the development of their own tourism features (eg, place clams in the lagoons in front of hotels).	Consider clam and coral outplanting programs. This would be linked to outputs from the clam aquaculture functions of the AMRC and could improve outplanting success. It encourages tour operators to take ownership of the husbandry of the outplanted clams. There may be a previous report on this from SPC.
15	Increase coverage for coastal fisheries data collection (using TAILS).	How can accessibility to fishers be improved?
16	Develop outreach and practical activities to improve the integration of marine resource concepts and issues into AMRC's engagement with schools.	This could be integrated into the AMRC communications strategy, under the GCCA.
17	Develop monitoring protocols for algae growth and distribution.	We foresee this becoming an important issue for Aitutaki in the future. Consider purchasing a drone to visually assess imagery and track the spatial growth and distribution of algae.
18	Improve water quality monitoring through the establishment of a data logger network that records data continuously and contributes to long term datasets.	Data loggers should be established at a few key areas to complement the existing water quality monitoring program. Existing water quality monitoring will continue as is, sending samples to Rarotonga for analysis.
19	Renovations of AMRC to include construction of designated classroom facilities.	Ensure space for desks/benches/seating, blackboard and projector with "white space". This would expand the remit of the AMRC.
20	Equip AMRC with resources needed for COTS monitoring and removal protocols.	This work will continue on an ad-hoc basis and may be naturally monitored by people in the water on a regular basis.
21	Improve data collection and reporting for coral health.	Consider the construction and deployment of permanent photostations. This is likely an unrealistic activity.
22	Develop and construct a central tourism feature, such as a Lagoonarium, for broader community benefit and create self-guided lagoon and snorkel tours.	See previous Lagoonarium report.
23	Recommendation: Investigate revenue generating activities to provide return on investment for the AMRC, including selling merchandise.	

The renovation work proposed under the GCCA will provide the necessary infrastructure to carry out AMRC's functions effectively and efficiently and as such is a major priority. Based on the recommendations above, priorities for construction work focus on clam aquaculture facilities, access and storage of assets, improving working conditions and improve outreach activities. However, there are several details that need to be considered which are not captured in the recommendations above. It is expected that the GCCA project team provide input and oversight in the design and planning for the renovations to ensure all details and considerations are met.

Previous scoping of the AMRC facilities have highlighted the following needs and notes for renovations that may not be captured in the recommendations above but are still to be considered in the design and planning of construction work.

First priority:

1. The driveway location needs to be reviewed to account for changes to section boundaries, minimise manoeuvring and allow for easy use of the boats;
2. Boat storage should have adequate electricity and water supply for wash down, care and maintenance;
3. Remove the rubbish piles;
4. Improve the wet working areas which are especially important for clam spawning work, and consider appropriate cooling and ventilation;
5. Clam raceways to be re-sealed and re-painted;
6. Improve the shading, walkways and access around clam raceways;
7. Include a ramp next to the clam raceways;
8. Replace existing saltwater pump with something stronger for the clam aquaculture work, and get a backup;
9. Construct appropriate storage areas for tools, field gear, FAD equipment and a drying area for wet gear;
10. Fill in existing holes to make more space available;
11. Check the quality of foundations in the pump-house and generator rooms;
12. Fix the generator and get a backup.

Second priority:

13. Lab areas could be made as open plan as possible;
14. Storage areas need to be well ventilated to ensure good conditions for the longevity of equipment and gears;
15. Extend the water intake pipe for the saltwater pump further into the lagoon.

Third priority:

16. Consider building a second story above the wet lab area for air conditioned offices and storage;
17. Create a boat mooring in the lagoon in front of the AMRC;
18. Use the saltwater intake pipe as a base for coral outplanting;
19. Where possible, construction should be cyclone proof;
20. Remove algae lab and incorporate into main lab facilities;
21. Consider the wet lab and work area to also be a space for the potential classroom;
22. Create an aquarium.

Fourth priority:

23. Expand solar panels where possible.

Other:

- The current tool shed may be removed and the space used for a tourist information area;
- The carport area roof should be re-aligned to the cement slab;
- Boat bay height needs to be at least 4m;

- Improve the manager's residence.

Next steps

1. Based on this assessment, the GCCA project team should consult with reliable contractors to begin the planning and design for construction works. For the implementation of construction and renovation objectives, a suggested approach is to request fully budgeted expressions of interest from suppliers. The Terms of Reference (TOR) should be developed to reflect work that is essential and must be included in the budget (**recommendations 1 and 2**); and lower priority construction work should be included if the budget allows for it. Further construction priorities based on MMR's scoping exercise are also listed. Essential works should focus on first and second priorities.
2. In parallel operational plans can be drafted to incorporate non-construction recommendations that have also been made. Attention should be given to the identified priorities and where some activities and recommendations may be supported by other sources of funding. Since construction works and operational enhancements will focus on the aquaculture facilities of the AMRC, **recommendations 3, 4 and 5** should be given the highest priority.
3. Throughout the course of the project, where implementation and expenditure allow for budget re-alignment, investment should continue to be placed in the physical and operational aspects of the AMRC facility (construction and resources, including salaries). Having higher quality facilities may increase the success of other activities such as monitoring and research.