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Aquaculture at the University of the South Pacific

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AQUACULTURE AT THE UNIVERSITY OF THE SOUTH PACIFIC

THE PURPOSE OF THIS PAPER IS TO PROVIDE AN UPDATE OF PROGRESS IN AQUACULTURE ACTIVITIES WITHIN THE MARINE STUDIES PROGRAMME OF THE UNIVERSITY OF THE SOUTH PACIFIC, AND SEEK THE VIEWS OF 2ND HOF PARTICIPANTS ABOUT AQUACULTURE TRAINING NEEDS IN THE REGION.

NEW AQUACULTURE POST

A NEW POST, LECTURER IN AQUACULTURE, HAS BEEN CREATED WITHIN MARINE STUDIES PROGRAMME, AND DR TIM PICKERING WAS APPOINTED ON 1 JULY 2000. DUTIES INCLUDE OFFER OF A NEW UNDERGRADUATE AQUACULTURE COURSE, POST-GRADUATE SUPERVISION IN AQUACULTURE, AND IMPLEMENTATION OF THE C-SPOD-FUNDED PROJECT USP04 AQUACULTURE TRAINING.

UNDERGRADUATE TEACHING

A NEW COURSE, MS324 AQUACULTURE IN PACIFIC ISLAND COUNTRIES, IS NOW BEING OFFERED AT USP LAUCALA CAMPUS. A COURSE OUTLINE IS ATTACHED TO THIS PAPER. THERE ARE CURRENTLY 21 STUDENTS ENROLLED IN THIS FIRST OFFERING OF THE COURSE, FROM COUNTRIES SUCH AS FIJI, KIRIBATI, VANUATU AND SAMOA.

POST-GRADUATE RESEARCH

SEVERAL CANDIDATES FOR MSC AND PHD DEGREES ARE WORKING ON AQUACULTURE TOPICS AT MARINE STUDIES PROGRAMME. THESE TOPICS INCLUDE *MACROBRACHIUM* PRAWN, *KAPPAPHYCUS* SEAWEED (ON CULTIVATION, AND ON SOCIO-ECONOMICS), AND MARINE ORNAMENTALS LIKE FIRESHRIMP *LYSMATA* AND CORALLIMORPH *DISCOSOMA*. IN THE PROCESS, USEFUL COLLABORATIONS HAVE BEEN ESTABLISHED WITH ACIAR, QUEENSLAND UNIVERSITY, WALT SMITH INTERNATIONAL, FMC CORPORATION, AND FIJI FISHERIES DIVISION.

C-SPOD PROJECT USP04 AQUACULTURE TRAINING

This project commenced in earnest in February 2001, with total funding of CAD420,000 over three years. The **goal** of the project is to contribute to the development of a diversified, economically-viable and sustainable aquaculture industry (both commercial and non-commercial/subsistence) in Pacific Island countries. The **purpose** is to improve public-sector

institutions (Government departments, NGO's, RPO's) and private sector capacities to implement successful aquaculture development projects.

THE SCOPE OF POSSIBLE TRAINING IS VERY BROAD, FROM "GRASS-ROOTS" COMMUNITY-LEVEL TO TERTIARY LEVEL, AND SPANNING SHORT COURSES, WORKSHOPS, IN-SERVICE TRAINING, TRAINING ATTACHMENTS, AND ACADEMIC COURSES SUCH AS MS324. THE PROJECT HAS THREE MAIN WORK AREAS, (1) TRAINING-COURSE CURRICULUM DEVELOPMENT, (2) OFFER OF COURSES DEVELOPED, AND (3) TRAINING ATTACHMENTS.

ACTIVITIES SO FAR HAVE FOCUSSED UPON ACQUISITION OF EQUIPMENT TO SUPPORT THE PROJECT, AND WORK TO DEVELOP CURRICULA FOR MS324 AND FOR TRAINING NEEDS WHERE THERE IS OBVIOUS REGIONAL DEMAND, SUCH AS SEAWEED FARMING SMALL-BUSINESS TRAINING. FINALISATION OF A DETAILED WORKPLAN HAS BEEN DEFERRED UNTIL NOW, TO CAPITALISE ON THE OPPORTUNITY FOR FEEDBACK ABOUT SPECIFIC TRAINING NEEDS FROM COUNTRY REPRESENTATIVES AT 2ND HOF.

COUNTRY REPRESENTATIVES HAD EARLIER BEEN CONSULTED AT 1ST HOF IN 1999 ABOUT MARINE SECTOR TRAINING NEEDS (INCLUDING AQUACULTURE) AS PART OF THE C-SPOD-FUNDED PROJECT USP01 MARINE SECTOR TRAINING NEEDS ASSESSMENT. THE PROJECT REPORT INCLUDED THE FOLLOWING RECOMMENDATIONS FOR AQUACULTURE:

- 1. A BROAD-BASED AQUACULTURE UNDERGRADUATE COURSE BE INTRODUCED AT USP AS SOON AS POSSIBLE;**
- 2. ENVIRONMENTAL AND CZM ISSUES OF AQUACULTURE BE INCLUDED IN THE COURSE AND BE THE SUBJECT OF A REGIONAL TRAINING COURSE/WORKSHOP FOR ENVIRONMENTAL AND PLANNING OFFICIALS;**
- 3. A SOURCE OF TECHNICAL SPECIALISTS FOR LONG-TERM ATTACHMENT/EMPLOYMENT BE LOCATED FOR THE PRIVATE SECTOR; AND**
- 4. THE CONCEPT OF MASTER AQUACULTURISTS BE DEVELOPED FOR SEMI-COMMERCIAL, COMMUNITY AND PERHAPS PRIVATE-SECTOR AQUACULTURE INITIATIVES.**

BECAUSE THESE RECOMMENDATIONS ARE NOW TWO YEARS OLD AND NOT ALL ARE APPROPRIATE FOR USP TO IMPLEMENT, WE ARE SEEKING ADDITIONAL AND MORE UP-TO-DATE INFORMATION UPON WHICH TO BASE THE USP04 PROJECT WORKPLAN. AN EARLIER PAPER CIRCULATED PRIOR TO THIS MEETING (INFORMATION PAPER NO. 8) INVITES PARTICIPANTS TO INCLUDE SOME OF THESE INFORMATION REQUIREMENTS IN COUNTRY REPORTS. IT IS HOPED THAT THIS PRESENT

PAPER WILL STIMULATE SOME DISCUSSION AND GUIDANCE ON AQUACULTURE TRAINING NEEDS, TO IDENTIFY WHERE THERE IS MOST COMMONALITY OF INTEREST ACROSS THE REGION.

AS A BASIS FOR DISCUSSION, SOME POSSIBLE IDEAS ALREADY PUT FORWARD AT 1ST HOF AND SINCE ARE LISTED BELOW:

- *Kappaphycus* seaweed post-harvest handling and loss of quality
- Tilapia farm management
- Community-level coral propagation methods for aquarium trade
- *Macrobrachium* prawn hatchery, growout, local-ingredients feed manufacture
- Giant clam spawning
- Microalgal culture and Live Feed production
- Pearl grafting
- *Kappaphycus* seaweed small-business training
- Implementation of Quarantine procedures for transboundary introductions
- Aquaculture management, (EIA, Space Allocation, Conflict Resolution)
- Aquaculture project appraisal and feasibility-study methods
- Familiarisation with aquaculture (for civil servants who make decisions concerning aquaculture projects, eg Trade and Investment Board officials)
- Legal drafting for aquaculture
- Develop a range of short practical-oriented courses as modules that, when combined with selected undergraduate courses at USP, can over time lead to award of a Diploma in Tropical Aquaculture (similar to the old Diploma in Tropical Fisheries at USP)

SPC Regional Aquaculture Programme

USP supports the concept of a Regional Aquaculture Programme with SPC as a focal point for a Strategy and a Network. We view the USP04 Aquaculture Training Project and USP's on-going undergraduate and post-graduate academic programmes as ways in which we can help implement this programme in concert with other organisations like SPC, ICLARM and ACIAR.

MS324 AQUACULTURE IN PACIFIC ISLAND COUNTRIES COURSE INFORMATION

Course description

This course provides an introduction to the present-day status of aquaculture in the world and in Pacific Island Countries. Students will gain information and necessary skills to help plan and implement regionally-appropriate and sustainable aquaculture projects. Topics covered will include the biology and ecology of the main aquacultured species in the oceanic Pacific, aquaculture engineering, aquaculture economics, aquaculture management (public sector environmental management, and private sector project management), aquaculture nutrition, and an overview of the techniques used to cultivate various common aquacultured species (finfishes, crustaceans, molluscs, seaweeds, etc.) The course involves lectures on theory, practical exercises in the laboratory, and field trips to various aquaculture operations.

Specific learning objectives are to:

- Raise students' awareness about the importance and potential of aquaculture as an option for economic development in Pacific island countries
- Enable students to better appreciate the present-day status and past experiences of aquaculture development in Pacific island countries, and recognise the constraints to such development
- Equip students with skills and methodologies to help manage and implement sustainable, regionally-appropriate aquaculture projects in Pacific island countries
- Equip students with some practical technical skills for the cultivation of some common aquacultured species

Teaching Methods

There will be three weekly lectures and one weekly four-hour practical exercise or field trip. Lectures will be supplemented with selected readings from aquaculture monographs, academic journals, unpublished reports and governmental statistics to increase students understanding about the sustainable development of aquaculture. Particular emphasis will be given in lectures and practical exercises to providing real hands-on experience in methods to cultivate various organisms. The course will be taught by a team made up of USP academics and visiting technical experts.

Assessment

Individual Assignment	20%	Due on Friday 31 August
Mid Semester test	10%	Held on Monday 10 September
Practical Work	20%	Due on Friday 26 October
Final Examination	50%	

The Practical Work is intended to develop teamwork and individual skills in inter-disciplinary research. The Individual Assignment is to test individuals' own library-research, analytical and writing skills. The mid-semester test is to check ability to recall relevant information and apply it to specific problems, and will also help to prepare candidates for the final examination. The Laboratory work will be graded from a combination of Group-project work and individual laboratory reports, and is a test of students' ability to keep good records and interpret experimental results.

MS324 AQUACULTURE IN PACIFIC ISLAND COUNTRIES LECTURE OUTLINE
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Week 1	Introduction to Aquaculture: Definitions of “aquaculture” – biological, economic, legal General types of aquaculture – intensive, extensive etc History in the region, Pacific governments’ objectives for aquaculture, Roles of aquaculture in economic development (food security and subsistence-level, domestic commercial, export-oriented commercial, and restocking).
Week 2	Aquaculture nutrition: Hatchery food production for larval rearing – microalgae, rotifers, brine shrimp, other live food sources, micro-encapsulated/freezedried foods, larval nutrition requirements, Adult food sources – pellet feeds, live feeds, nutritional requirements, local substitutes for imported feeds.
Week 3	Aquaculture engineering: Hatchery design, operation and maintenance, site-selection criteria and design of growout facilities, principles of tank design, water treatment, good hygiene practices
Week 4	Aquaculture of “unusual” organisms: Polychaetes, echinoderms, turtles, sponges, corals, items for aquarium trade Outline of basic biology, life cycle, environmental tolerances, techniques to obtain broodstock, growout techniques, markets, value, constraints
Week 5	Aquaculture of finfish: Freshwater finfish (tilapia, Asian carps) Outline of basic biology, life cycle, environmental tolerances, techniques to obtain broodstock, growout techniques, markets, value, constraints

Week 6	Finfish continued: Marine finfish (groupers, milkfish, aquarium fish, siganids etc) Outline of basic biology, life cycle, environmental tolerances, techniques to obtain broodstock, growout techniques, markets, value, constraints
Week 7	Aquaculture of crustaceans: Macrobrachium, penaeids, spiny lobster, crabs Outline of basic biology, life cycle, environmental tolerances, techniques to obtain broodstock, growout techniques, markets, value, constraints MID-SEMESTER BREAK
Week 8	Aquaculture of crustaceans continued:
Week 9	Aquaculture of molluscs: Giant clam, Pacific oyster, pearl oyster Outline of basic biology, life cycle, environmental tolerances, techniques to obtain broodstock, growout techniques, markets, value, constraints
Week 10	Aquaculture of molluscs continued:
Week 11	Aquaculture of seaweeds: Outline of basic biology, life cycle, environmental tolerances, techniques to obtain broodstock, growout techniques, markets, value, constraints
Week 12	Genetics in Aquaculture: Basic principles, applications, case studies (eg ACIAR tilapia project)
Week 13	Social aspects of aquaculture: Pacific rural economies, social equity, culture and gender issues, social and economic constraints, development strategies Economic (business) aspects of aquaculture: Project appraisal, economic feasibility, marketing, supporting infrastructure, challenges for private-sector development of aquaculture

Week 14**Governance aspects of aquaculture:**

The importance of good governance. Roles of government (i) to enable aquaculture, and (ii) to regulate aquaculture. Institutional arrangements for aquaculture management - legislation, management policies and plans, aquaculture permits, EIA, government infrastructure, human resources development, and support for aquaculture