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Report of the

FAO/SPC REGIONAL SCOPING WORKSHOP: DEVELOPMENT OF A PACIFIC AQUACULTURE REGIONAL COOPERATIVE PROGRAMME

Nadi, Fiji, 11–14 October 2011

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PREPARATION OF THIS DOCUMENT

This document is the final report of the FAO/SPC Regional Scoping Workshop: Development of a Pacific Aquaculture Regional Cooperative Programme held in Nadi, Fiji, on 11–14 October 2011.

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ABSTRACT

The FAO/SPC Regional Scoping Workshop: Development of a Pacific Aquaculture Regional Cooperative Programme held from 11 to 14 October 2011 in Nadi, Fiji was convened to engage high level discussions between national governments and international development partner organizations on the need to provide more attention to aquaculture development to small island developing states including the Pacific Island Countries and Territories (PICTs).

Fifty five experts representing 17 PICTs, representatives from the private sector, eight international and regional institutions, and SPC and FAO staff participated in this regional scoping workshop whose overall objective was to assess the needs and map out a coordinating strategy and actions for the development of aquaculture in the Pacific region. To this end, a Pacific Regional Aquaculture Strategy was drafted with a vision of a sustainable aquaculture sector that meets food security and livelihood requirements based on economically viable enterprises supported by enabling governance arrangements.

The overall outcomes of the strategy are envisioned to include: (1) successful, competitive and biosecure aquaculture enterprises, using and adapting proven technologies to meet local requirements (technical, social and environmental); (2) recognition of the actual and potential contributions of the aquaculture sector towards regional livelihoods and food security (in response to the pressures of population growth, depleted/overfished inshore fisheries resources and climate change); and (3) framework for aquaculture development that builds cooperation among PICT government aquaculture institutions, national, regional and international agencies, farmer groups/associations, and other stakeholders.

To meet these objectives, the strategy proposes six broad programme elements including biosecurity, capacity building, feasibility assessment, statistics and data, markets and trade and technology transfer and improvement.

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BACKGROUND

1. The physical, natural, environmental, cultural and demographic endowments of the vast Pacific region have been a source of comparative advantage or cause of limited success in the region's aquaculture development projects and enterprises. The initial efforts by Pacific island nations and territories to develop aquaculture industries were led by a number of key nations including French Polynesia, New Caledonia, Cook Islands and Fiji. These efforts were initially supported by the FAO Regional Aquaculture Development Programme (GCP/RAS/116/JPN) which ran from the late 1980s to the 1990s.

2. The Secretariat of the Pacific Community (SPC) Aquaculture Programme was established in the early 2000s to provide technical services, coordinate capacity building and a clearing house for information. The SPC's work programmes aim to develop technical assistance, professional, scientific and research support and planning and management capability building.

3. The efforts by national fisheries administrations, SPC and FAO have been augmented by those of other technical agencies including the Australian Centre for International Agricultural Research (ACIAR), the WorldFish Center (WFC), the Pacific Islands Development Programme (PIDP), and Japan International Cooperation Agency (JICA). For the most part, these activities lacked formal coordination mechanisms at a regional level.

4. On 23 September 2010, during the FAO Global Conference on Aquaculture in Thailand, an informal «Evening on Pacific Aquaculture» meeting organized by FAO and SPC was held with five Pacific island countries namely Cook Islands, Fiji, Nauru, Papua New Guinea and Tonga. The meeting was also attended by representatives from other fisheries organizations and educational institutes including ACIAR, Aquaculture Without Frontiers, Ghent University (GU), JICA, the Network of Aquaculture Centres in Asia and the Pacific (NACA) and the WFC.

5. Discussions considered three major points of interest including: (1) history and status of aquaculture development in the Pacific; (2) persistent and emerging issues on aquaculture development in the region; and (3) national aquaculture aspirations and constraints in the five Pacific countries present at the meeting.

6. The meeting recommended three strategic actions namely: (1) further assistance in developing a biosecurity policy for the Region; (2) organization of a regional aquaculture development workshop in the Pacific to assess needs and develop cooperative programmes; and (3) exploring the feasibility of a regional networking arrangement.

7. Further, it was decided that the islands of the Pacific deserved special attention, being among the 'least aquaculturally developed' regions of the world. The twenty-ninth session of the FAO Committee on Fisheries (COFI) held from 29 January to 4 February 2011 in Rome, Italy, on the recommendation of the fifth session of the COFI Sub-Committee on Aquaculture held from 27 September to 1 October 2010 in Phuket, Thailand, placed on record its recognition of this need to provide more attention to aquaculture development in small island developing states including the Pacific Island Countries and Territories (PICTs).

8. These were the broad justification for FAO and SPC's decision to organize the Regional Scoping Workshop on Pacific Aquaculture to assess the needs and map out a coordinating strategy and action plan for all major and international agencies and other relevant stakeholders working on aquaculture development in the region.

9. The meeting was held in Nadi, Fiji from 11 to 14 October 2011.

OPENING OF THE WORKSHOP

10. The meeting was opened with a prayer led by Mr Jacob Wani (Papua New Guinea).

11. Mr Jiansan Jia, Chief, Aquaculture Service (FAO), on behalf of FAO Director-General Jacques Diouf, welcomed the participants to the workshop which he called a "stock-taking exercise" that will look into the current status of regional aquaculture. He hoped that the workshop would serve as a catalyst for a cooperative programme to facilitate a regional aquaculture development strategy. The welcome statement of Mr Jia can be seen as Appendix 1.

12. Mr Mike Batty (SPC) speaking on behalf of the Director General of SPC said the region has been slow to turn "potential" into "production" and stressed this was not due to the lack of support from donors. He observed that a number of barriers to export clearly exist, but it should also be possible to reduce imports as a counter measure. He felt that too many research and development and investments had focused on fish and not enough on people, noted that there had not been enough emphasis on private sector participation in the sector, and thought that sufficient effort had been spent on trying to understand better the local communities, markets, fish farmers and the private sector.

13. The Honorable Joketani Cokanasiga, Ministry of Primary Industries, Fiji, formally opened the workshop. The Minister expressed his hope that existing cooperation between member countries and development partners would be strengthened by more effective coordination between regional aquaculture stakeholders. The workshop was requested to balance three crucial factors particularly those relating to ecological, economic and social issues and to tailor the strategy and plan to the needs of the Pacific.

14. Mr Masanami Izumi (FAO Subregional Office for the Pacific Islands, Samoa) provided a background to the workshop, describing its development through a series of global and regional meetings. Mr Izumi outlined the objectives and expected outcomes of the workshop and the procedure that would be followed during the four-day workshop.

15. The workshop agenda is attached as Appendix 2.

PURPOSE OF THE WORKSHOP

16. The overall objective of the regional scoping workshop was to engage the governments of PICTs and development partners in assessing the needs and mapping out a coordinating strategy and actions for the development of aquaculture in the Pacific region. The specific objectives were to:

- understand past and recently completed activities, on-going national and regional strategies/development plans and the current status of aquaculture in the region, including an analysis of its progress;
- identify emerging issues, opportunities and required support for the sector's continued development;
- exchange lessons and good practices based on the work of development partners, inspire fresh thinking and innovative initiatives; and
- build and support a potential regional aquaculture development framework and programme or roadmap for aquaculture development for PICTs.

WORKSHOP PARTICIPATION

17. Fifty-five experts representing 17 PICTs (American Samoa, Cook Islands, Fiji, Federated States of Micronesia (FSM), French Polynesia, Guam, Kiribati, Republic of the Marshall Islands (RMI), Nauru, New Caledonia, Palau, Papua New Guinea (PNG), Tonga, Tuvalu, Samoa, Vanuatu and Wallis and Futuna Islands), representatives from the private sector (Vate Ocean Gardens Ltd [VOG] and Pacific Seaweed Ltd [PS]), eight regional institutions (ACIAR, Freshwater Fisheries Research Center, Chinese Academy of Fishery Sciences [FFRC-China], JICA, Kasetsart University [KU], Queensland University of Technology [QUT], NACA, Aquaculture Department of the Southeast Asian Fisheries Development Center [SEAFDEC-AQD], and WFC-Solomon Islands), and SPC and FAO staff participated in this regional scoping workshop. See Appendix 3 for a list of participants and Appendix 6 for a group photo.

WORKSHOP PROCESSES

18. The workshop was divided into three sessions.

The first session was primarily an information session which generated better understanding of past and recently completed activities, on-going national and regional strategies/development plans and the current state of the status of aquaculture in the region, including an analysis of their progress. A total of 14 informational/experiential presentations and an additional six institutional presentations were provided, with opportunities for participants to question speakers and debate on issues arising. This session consisted of two parts:

- national and regional aquaculture aspirations and constraints and presentations from institutions working in the region, including their mandates, ongoing work in the Pacific region and interests for future cooperation; and
- thematic presentations on issues relevant to aquaculture development.

19. The second session comprised of working group discussions, based on the information sessions and national experience/exchanges. The outcomes were reported back to the plenary and discussed.

20. The final session focused on developing the draft Pacific Regional Aquaculture Strategy (RAS) and agreeing on the way forward.

PRESENTATION HIGHLIGHTS AND DISCUSSIONS (SESSION 1)

Session 1.1 National and regional aquaculture aspirations and constraints, institutional presentations (mandates, ongoing work in the Pacific region, and interests for future cooperation)

21. Mr Pedro Bueno (FAO Consultant) looked into the historical overview of aquaculture in the region, drawing lessons from a recently concluded review of aquaculture experiences and lessons in eight PICTs. It was noted that despite a relatively good level of investment in research in the region, and a number of systems and species that have shown technical feasibility, few have achieved commercial success. A common constraint is the availability of farm inputs (feed, seed, and capital), limited local demand and distant export markets. These issues remain challenging and will remain so while demand is low due to the infancy of the aquaculture sector.

22. The prospects for aquaculture development in the Pacific, specifically the upscaling of technically feasible systems to commercial level, increasing competitiveness but avoiding environmental and biodiversity impacts, were discussed. The more than 80 years (since the 1930s, although it has only been 40 years in most Pacific islands) of research, development, training and facility development in the region in general, as well as movement around and introduction of species into the region, have provided a good

foundation for current and future development efforts in terms of people, infrastructure, knowledge, experiences and lessons.

23. The current status of aquaculture development in the Pacific where issues have moved from technical success to economic viability, increasing competitiveness while avoiding environmental and biodiversity impacts was discussed. Progress was noted wherein facilities are now established, people trained and lessons learned both from the region and outside.

24. Persistent and emerging issues on aquaculture development in the region relate to, e.g., an appropriate role for government, biosecurity risks, technical resources, attracting (and retaining) private sector investment and working effectively within the region's social and cultural settings.

25. Mr Hugh Govan (SPC Consultant) presented the findings from the SPC economic study of the mariculture sector in the region. Mariculture is risky and technically demanding. It also takes time to establish a mariculture enterprise and in the end margins are slim because economy of scale is difficult to achieve. Success has been limited by inappropriate project design from inadequate or no feasibility studies, poor social and cultural fit and a lack of monitoring in terms of practical and commercial performance. Constraints (feed, seed, logistics, skills, finance and environmental) were balanced with a presentation of opportunities (sites, disease-free environment and small–scale livelihoods). Attention was drawn to the enormous variation in potential between countries, the vital need to undertake adequate economic and market analysis and involve the private sector and, most importantly, to apply the lessons learned.

26. Mr Govan said that his stressing the importance of feasibility studies and business skills did not mean he was advocating the need for more consultants. Relatively simple approaches to feasibility and the development of business skills are available. Secondly, in relation to restocking, the consultants were having considerable difficulty finding adequate feasibility assessments for this process.

27. Discussions pointed towards the general lack of understanding by financial institutions about aquaculture, which has given rise to difficulties faced by small farmers in obtaining loans. There has been substantial work on research and development but inadequate attention devoted to the commercial aspects of aquaculture and in developing the range of financial advice that should be available to prospective farmers and lenders in the Pacific. There is need to strengthen the capacity in aquaculture business planning and economic feasibility evaluation in both the aquaculture sector and lending institutions.

28. It was also stressed that aquaculture data and statistics are inadequate, making it difficult to develop realistic plans or track progress and to put together for decision makers convincing arguments on the need to support aquaculture development.

29. The representative from Tuvalu expressed its pressing need for assistance in helping the country to revitalize the aquaculture development in the country which was positively responded by a FAO/SAP officer and SPC.

30. The representative from Cook Islands confirmed that there were pearl farmers who began as part-time operators but ceased their operations as disease struck their farms. A number of individuals have been holding leases on areas where there has been no production. The revised management plan sets out the process of mapping farms using GPS, the review and issue of annual licenses and the intention to reclaim unused licenses.

31. Fiji participants indicated that they have indeed learned a number of significant lessons. They felt that food security as a primary objective for mariculture in Fiji may not be compatible with the

profitability objective. Fiji has placed priority on restocking of reefs to assure coastal communities a future supply of protein.

32. The representative from the Marshall Islands said that they had successfully bred and distributed juvenile clams under an Overseas Fishery Cooperation Foundation (OFCF) project. When the project concluded, the interest that it had created intensified the demand and therefore competition for juveniles among atoll communities. As the hatchery production was less than the demand and therefore had to be equitably allocated, the strong demand from some communities was soon accompanied by political pressure.

33. Representatives from Kiribati noted that they are adopting a private sector approach to clam farming and that there is a commercial company currently engaged in the activity. The question was raised as to the possibility of financing assistance along with technical assistance from SPC or FAO to the private sector.

34. The representative from Nauru indicated interest in sea cage farming given the availability of resource and using studies that assess the feasibility of that activity. It was noted that the cost of production might be quite high given that production should be export oriented. Although Nauru does not currently have a bank, there is an Entrepreneurs Centre that can provide co- financing.

35. The presentation of Mr Robert Jimmy (SPC) focused on the production characteristics of key commodities produced by aquaculture sector, drawing on a report by Ponia (2010)[1], and a number of case studies. The drivers of growing domestic markets, increasing need for food security and aspirations to improve trade balances were highlighted. In some PICTs, food security commodities have become livelihoods opportunities, e.g. “lead farmers” of tilapia.

36. Re-stocking activities are widespread and hatcheries are expensive to operate and are unproven in terms of results. The link to sound in-shore fisheries management, essential for successful restocking initiatives, was highlighted. The reservations about reef re-stocking were acknowledged during the discussions but there was some support (Fiji) to re-stock marine protected areas (MPAs) which could yield some valuable results.

37. The danger of overfishing sea cucumber was highlighted and caution advised against excessive collection of broodstock to support aquaculture ventures. SPC has developed guidelines to assist countries to screen such proposals and weed out those that are not operating ethically, and can provide advice on these issues. Political issues and linkages with investors have been an issue in the past.

38. Aquaculture governance in the form of legislation, polices and plans has been weak but is improving. There are gaps in technical skills across all levels. This is being addressed by a range of tertiary and other programmes including short course workshops, trainings and project attachments. However, capacity-building to date has been somewhat *ad hoc* in the absence of national manpower development policies.

39. The state of infrastructure and facilities is highly variable among PICTs and facilities are generally primitive due to the difficulty for donors to fund “bricks and mortar” projects. Biosecurity, economics,

[1] Ponia, B. 2010. A review of aquaculture in the Pacific Islands 1998–2007: Tracking a decade of progress through official and provisional statistics. SPC Aquaculture Technical Papers/ Secretariat of the Pacific Community, ISSN: 1683-7568.

climate change, poor disease reporting to the World Organisation for Animal Health (OIE), and feed and seed supply were also presented as key issues to be addressed.

40. Key concluding points included the danger of over harvesting of wild stocks in the guise of aquaculture, the importance of statistics to measure performance and justify political and other support, understanding industry need, understanding the development aspirations of member countries, communication of findings to decision-makers, national political commitment, and partnerships.

41. Discussions arising from the presentation stated the need for farmers to be sure where they put their time and energy. Aquaculture has to blend with their lifestyle in order to be sustained.

42. In relation to aquatic biosecurity regional arrangements, SPC advised that it will be seeking the support of other agencies to join SPC in a subregional meeting to develop a roadmap for aquatic biosecurity, including needed infrastructure and facilities to implement. In the meantime, an inventory of capacities will be compiled. FAO noted that it can provide assistance in this area if it is a regional priority and governments request it.

43. Mr Jacques Patrois and Dr Tim Pickering (SPC) presented a status and analysis of progress in shrimp aquaculture in the PICTs. The issue is to determine how other PICTs can best learn from those that are successful and what regional support should be given to shrimp aquaculture. Shrimp industries in New Caledonia, Guam, Commonwealth of the Northern Mariana Islands, French Polynesia, Fiji and Vanuatu were described and a number of critical success factors identified.

44. These factors relate to the use of captive/domesticated broodstock, biosecurity, stock intensification and economic viability. Successful on-going production have domesticated broodstocks (combination of local or imported species which were maintained as captive broodstock) to ensure good supply of post larvae (PLs). Sufficient investment and hatchery capacity for captive brooders and well-trained personnel are essential. It was pointed out that, even if it were possible to have captive brooders, it may well not be viable to set up an industry if the industry required continuing subsidy. Finally, regional cooperation has much to offer particularly in capacity building. Increasing the capacity of biosecurity measures, providing strong economic and technical analysis and advice to modernise the culture systems will increase production efficiency and competitiveness.

45. Biosecurity remains a challenge. Disease in shrimp is a major threat; FAO alerts included the recent outbreak of an unknown disease in Viet Nam affecting *Penaeus monodon* and *Litopenaeus. vannamei,* the cause or causes of which are yet unknown. The Infectious Myonecrosis Virus (IMNV) in Indonesia might have been brought in from specific pathogen free (SPF) imports from Brazil. Further, the white spot virus (WSV) disease is now present in Mozambique shrimp, an indication of its rapid spread and global threat. It is critical to have the appropriate biosecurity measures backed by regulation and good management practices.

46. Lessons from the New Caledonian experience include the importance of undertaking marketing studies to decide what each market demands, e.g. red-legged prawns for Australia and white prawns for Japan, before selecting species for farming. There is also a need to remain adaptive to the market; marketing strategies should be updated at least every five years. Given the high cost of SPF PLs, closed systems are likely to be necessary, and genetic variability will be an ongoing challenge for Pacific aquaculture.

47. Other issues raised during the discussion include the need for market studies (to know which products are demanded by the market, dynamism of the market requiring constant revision of plans and production, as well as marketing strategies). The need for highly skilled scientific and technical support

for the industry and assistance to producers to get over the crisis and to compete in the world market were likewise highlighted.

48. Mr Paul Ryan (VOG) presented tilapia production in Vanuatu. Market identification, selection of cage culture through pilot trials and readily available stock, equipment, and locally produced feed ingredients, combined with the support of government, were the requisites to establishing a viable enterprise.

49. Development issues included delays in import protocols and permission to develop breeding facilities, staff skills, costs associated with the remote location, and nuisance species. Over time, the business successfully adapted to tackle these challenges including the development and implementation of staff training, putting up good farm infrastructure, implementation of promotional activities, bulk importation of seed as well as feed, and the production of local feed.

50. Recommendations for other similar operations in the Pacific included the importance of utilising probe on species and strains, methods of culture, production regime and suppliers. It is vital to match the scale of production with individual country demand, recognising tilapia as an inexpensive protein source. Finally, it is important to ensure a consistent and predictable supply to the market and to secure appropriate funding and knowledge to offset risks and implement contingency arrangements.

51. Ms Shamron Pickering (PS Ltd.) presented their experiences in seaweed production in Fiji. A locally owned company, PS Ltd, specializes in the production, first stage drying and export of tropical seaweed (*Eucheuma cottonii* or *Kappaphycus alvarezii*) for refinement into carrageenan. In addition to the development of new methods and techniques and improved strains, there are a number of other suggestions for improving the prospect of seaweed culture in Fiji. These include improvements and lower cost of inter-island shipping, post-harvest training to farmers, a change in mindset away from government dependence by producers, determination of the true market prices and government concessions including tax and duty exemptions.

52. The prospect of a regional processing plant to reduce costs and increase economic viability was raised. It was noted that a previous study had been done by the Fédération Française d'Aquaculture (FFA) which indicated that a relatively high threshold quantity is required to undertake primary processing. In addition, secondary processing is potentially polluting because of the chemicals used for extracting the colloid. It is believed that the volume of raw material needed for economic operation of a processing plant cannot be met by the current production levels from seaweed producing countries such as Fiji, Solomon Islands and Kiribati.

53. Dr Satya Nandlal (QUT) presented the outcomes and recommendations from two ACIAR projects, on the improvement of culture, stock quality and nutrition of freshwater prawn in Fiji and the assessment of genetic introgression in exotic culture stocks of tilapia in the Pacific. The outcomes included: quarantine facility built at Naduruloulou Research Station (NRS) in Fiji and three Asian giant freshwater prawn (GFP) strains were introduced and screened; GFP culture strains were introduced from Indonesia, Viet Nam and Malaysia; 12 experimental ponds were built at NRS; and training provided to NRS fisheries staff.

54. Relevant ACIAR projects were described including its fisheries programme projects in the Pacific, Papua New Guinea, Laos, Viet Nam and the Philippines. ACIAR’s fisheries programme comprised of 30 projects covering capture fisheries (30 percent) and aquaculture (70 percent). The major goal of the programme was to improve the productivity and sustainability of fisheries and aquatic farming systems in partner countries and Australia through international research partnerships.

55. Mr Min Kuanhong (FFRC-China) introduced FFRC, its duties/programmes including aquaculture research, national education and international training and technology transfer and rural extension.

56. Mr Minoru Tamura (JICA) introduced JICA's cooperation programme on aquaculture development in the Pacific region by describing the various projects and programmes that JICA has implemented. He also explained the mechanisms for assistance which included technical cooperation (technical cooperation projects, development studies, providing long-term/short-term experts); training; grassroots technical cooperation; grants-in-aid and technical service of volunteer experts.

57. Mr Cletus Pita Oengpepa (WFC) introduced the lessons learned from projects undertaken in the Solomon Islands and its interest in future cooperation. Through an initiative funded by ACIAR, WFC will collaborate with Solomon's Ministry of Fisheries and Marine Resources and SPC to support the development of freshwater aquaculture with the aim of: identifying potential local fresh water and brackish water species (herbivorous/omnivorous); identify potential centers of production and work with communities in these areas to improve techniques in fish production for food security; improve technologies to suit local situation; strengthen freshwater aquaculture regulations; and facilitate training and capacity building within the fisheries sector.

58. Dr Jobert Toledo (SEAFDEC-AQD) introduced the Aquaculture Department's thematic programmes for 2011, which include quality seeds for sustainable aquaculture; healthy and wholesome aquaculture; meeting socio-economic challenges; maintaining environmental integrity through responsible aquaculture; and climate change in aquaculture.

59. Mr Jamie Whitford (ACIAR) described the pearl industry development in the Pacific Islands which supports the largest single aquaculture product in the Pacific. Fiji has a relatively well-developed and expanding industry with a good reputation for high quality pearls, close ties with local villages and a growing number of smaller operations. Research areas have included the disease and genetic implications of stock movements, adoption of contemporary culture methods, capacity building, branding and the development of handicraft opportunities. Tonga has adopted a different approach based on the winged oyster (*Pteria penguin*) which offers the opportunity for product diversification, quality improvement, and value adding for export.

60. Development will require a secure supply of oysters to produce quality products and adequate training and capacity building to support value adding and higher value products. Based on these opportunities and products, the project has developed a range of objectives including development planning, production and business capacity, product qualities and market structures. Further, the project builds on prior research, includes researchers from the region and involves SPC, the University of the South Pacific (USP) and the pearl industry.

Session 1.2 Thematic presentations

61. Dr Reantaso (FAO) in her presentation on biosecurity issues for sustainable aquaculture development explained biosecurity in aquaculture as a collective term referring to the concept of applying appropriate measures, e.g. proactive risk analysis, to reduce the probability of a biological organism or agent spreading to an individual, population or ecosystem, and to mitigate the adverse impacts that may result.

62. Various biosecurity issues facing aquaculture include transboundary aquatic animal diseases (TAADs); public health risks on the use of veterinary medicinal products; food safety and zoonoses (transmission between humans and animals); biological invasions; and climate change. Dr Reantaso's

presentation focused on the first two issues, namely TAADs and public health risks on the use of veterinary medicines.

63. Dr Reantaso concluded her presentation by citing the benefits of improved biosecurity such as its positive effect on animal and human health; a strategy to stimulate market supply and private investments; and an enabling environment that allows developing countries to efficiently grow more food (leading to increased income). The outlook for the sector including fisheries growth based on aquaculture was highlighted.

64. Dr Ruth Garcia Gomez (SPC) presented biodiversity issues for sustainable aquaculture with particular attention on the responsible use and control of introduced aquatic species. Maintaining biodiversity in ecosystems is essential in ensuring the world's food and agriculture production, including those from aquatic environments. Aquaculture is the fastest-growing animal food producing sector. While the benefits of this increase are well known, intensification of aquaculture may have undesirable impacts on the resilience of socio-ecological systems which, in turn, could undermine the productivity and sustainability of aquaculture sector growth.

65. The key drivers for species introductions are commercial/economic, ease of working with many introduced species, food security and rural development, and biological control. To minimise undesirable risks from the introduction of new species, information is key in reducing uncertainties and unknowns. SPC is able to provide a range of advice on request from the PICTs for information about the possible impacts of the introduction of aquatic fish species such as tilapia, cobia sand fish and improved *Eucheuma* spp. strains.

66. Effective policies and plans are necessary to ensure responsible management of aquatic biodiversity particularly since the practice of using species outside their natural range to increase production or profitability can be expected to continue. It is thus necessary to assess the associated risks and benefits and as appropriate, develop and implement a plan for the responsible use of alien species rather than simply banning them. The establishment of a regional framework for management of aquatic biosecurity in support of sustainable aquaculture development could be a possible approach.

67. Answering a question regarding the protocol for reporting aquatic animal diseases to OIE, FAO said there is a standard procedure and obligation for OIE members to report to OIE the occurrence of any OIE-listed notifiable disease as well as any outbreak of diseases of aquatic animals; information on this is available on the OIE web site.

68. French Polynesia has been regularly reporting to OIE, and has established a monitoring system for pearl oyster and developed a special platform for aquatic animal health management. There are regulations to prohibit introduction of oysters from New Zealand, prohibit use of natural pearl nucleus material coming from outside and to protect shrimp brooders. It was noted that it would be more appropriate to develop biosecurity training in the region to reduce the need to send trainees to Australia or elsewhere.

69. Dr Ambekar Eknath (NACA) presented his view of networking to support sustainable aquaculture drawing from NACA’s experience. After introducing NACA as an intergovernmental organization including its mandate, structure, history and major components, he described the organization’s major work programmes, namely, sustainable farming systems, aquatic animal health, food safety and quality, genetics and biodiversity, and response to climate change. In addition there are two crosscutting programmes: education and training and communications.

70. The keys to NACA's success have been its being able to engage in a participatory way all stakeholders in the development and implementation of a regional work programme and having a large network of collaborating research centres throughout the region. Member governments address issues of common interest through consensus and collaboration. Lastly, it has an open philosophy of collaboration with external partners.

71. NACA is continually looking for ways to improve through greater ownership of its network and activities, a reduced dependence on donor funding, a better distribution of benefits, and attracting more experienced staff.

72. Since SPC is an associate member of NACA, there are a number of potential areas of collaboration including the transboundary movement of aquatic animals, disease surveillance and reporting, preparedness, conservation and sustainable use of genetic resources, impacts of climate change and training, education and study tours.

73. Mr Pedro B. Bueno (FAO Consultant) then presented the theme on «farmer clusters: their formation and management». Defining clusters as a group of farmers found within a given geographical area with a common water source, he then provided a number of reasons and benefits for forming clusters. There are economies of scale, stronger transaction power, and better compliance with regulations, standards, and voluntary management arrangements. The discussion arrived at a broad consensus that around 10–15 farmers would make an effective cluster and that clusters larger than this would be difficult to manage while smaller ones would be inefficient.

74. The adoption of best management practices (BMPs) has provided considerable benefits for aquaculture farmers in Southeast Asia. It has been found that better managed operations improve returns and fewer impacts, reduce environmental and social impacts, and increase profits. BMPs are also effective in reducing the risk of (e.g. in shrimp) health problems well as improve food safety and quality of products.

75. Clusters can exert greater influence on government decision-makers. Potential exists for the application of clusters in the Pacific among pearl farmers in Cook Islands, giant clam growers in Kiribati and RMI, shrimp farmers in New Caledonia and freshwater fish farmers in PNG and Fiji. In establishing clusters, it is important to give consideration to effective leadership, capacity building, and establishing effective contractual relationships between farmers and the hatcheries, feed and other input suppliers, processors/exporters and buyers.

76. Opportunities were explored, during the discussion, for fish farmers in PICTs learning from cluster operations in Southeast and South Asia and having some capacity building activities for cluster formation and management.

77. Mr Weimin Miao (FAO Regional Office for Asia and the Pacific) introduced the theme on aquaculture statistics and information for cultured species unique to the Pacific region. He described some important issues that need to be addressed in aquaculture statistics in the Pacific. These included capacity building in aquaculture statistics, collection and reporting (including the development of national data collection and reporting mechanisms and standards). Some discrepancies exist in the data, e.g. PNG's production level is considered to be under reported/estimated, seaweed production being reported in dry weight instead of live weight bracket; significant inconsistency in the records of French Polynesia in the FAO database with respect to pearl oyster shell quantity and value. Nine of the 15 species important for the Pacific Islands have achieved significant and steady growth globally – suggesting good potential for increased production of the species.

78. Some participants raised the point concerning the suitability of current FAO forms for reporting some species. In a number of Pacific countries, products such as clams are reported by pieces rather than by tonnes. It was suggested that FAO consider how these may be modified to be in sync with the statistics reports of PICTs. FAO indicated that they are in the process of altering their information systems to accommodate such requests through FAO's Action Committee on Aquaculture Statistics.

79. Ms Cathy Hair (ACIAR) presented a theme on research and technology development versus knowledge generation and utilisation. One of the major issues identified was that the efforts in research and technology development have not been matched by knowledge development and utilization, while the upscaling of research results has not translated to commercial application. There is disconnect between research and practicality and useful outcomes for private sector or fish farmers.

80. There is little doubt that research has its place in the future development of new commodities and techniques which must be tested properly to have confidence in the results. In addition, research can teach valuable skills. However, some questions and problems can only be addressed with pure research. The key issue is that PICTs need practical solutions now and an over focus on research and technology development at the research level risks wasting time and resources.

81. The discussions emphasized the need to broaden perspectives of research to include training (knowledge generation) while practical issues are also being solved. In general, there is a need to bring the commercial sector into projects earlier and to planned transition phases using business planning and commercial reality checks. It is also important to collaborate and coordinate in developing a long-term strategy and applying resources to applied research.

WORKING GROUP'S (SESSION 2) AND PLENARY SESSION'S (SESSION 3) HIGHLIGHTS (

Working group's session (Session 2)

82. Following the information session, participants were divided into three working groups. The first task was to consider and report at the plenary the following:

- What are the objectives of the draft Pacific Regional Aquaculture Strategy (Pacific RAS)?
- What principles should underpin the strategy?
- Identify and prioritise the ten most important current and emerging issues that the strategy will need to deal with.
- Identify the key opportunities that the strategy should take advantage of, using the following headings:
    i. Markets (domestic and export) by commodity or species
    ii. Production method, scale and intensity
    iii. Inputs (feed, services etc)
    iv. Others
    v. Capacity building (human and institutional) including:
        - Government
        - Private sector
        - Cooperatives and associations
        - Small-scale producers
        - Extension
    vi. Research

83. A second round of workshop discussions, this time on the lessons learned and needs identified in the first set of working group discussion, required the identification of a range of actions and activities to be delivered through the draft Pacific RAS. These were grouped under the following programmes:

- Biosecurity
- Capacity building, training and education
- Economic analysis/feasibility studies
- Statistics and data
- Marketing/product selection/branding
- Technology/species transfer and improvement

Working Group 1

84. Working Group 1 made the following contributions and conclusions:

- Objective of the Pacific RAS: The Pacific RAS would aim to assess the technical/environmental capacities of PICTs, strengthen stakeholder networking and identify regional commodities of significance with the ultimate aim of establishing a regional aquaculture network which would strengthen cooperation among regional development partners.

- The underlying principles of the Pacific RAS include:

  i. Ensure and develop public-private sector participation whenever possible.
  ii. Strive for effective budgetary planning at the government level.
  iii. Endeavor to be environmentally sustainable, economically viable, technical feasible and social/cultural acceptable.
  iv. Strive to consider regional similarities/commonalities and achieve food security in the region.

- Working Group 1 also identified the ten most important current and emerging issues facing the aquaculture sector in the region falling under the following categories: (1) biosecurity (including food safety) concerns; (2) technical capacity/capacity building; (3) government/institutional support (legal framework and policies); (4) financial needs; (5) market/trade issues; (6) economic growth; (7) population growth; (8) land tenure/community support; (9) information/statistics; and (10) climate change.

- The range of actions and activities to be delivered through the Pacific RAS include:

  i. Biosecurity: To enable the transfer of aquatic commodities with minimum biosecurity risks (affecting human and aquatic organisms and communities) to PICTs, the following actions are being proposed: (1) undertake the assessment of capacities and the needs on biosecurity related issues: risk analysis, diseases diagnosis and identification, international standards compliance (OIE, Codex, CITES[2], CBD[3]), translocation and introduction protocols, etc.; (2) scoping policy analysis on biosecurity and aquatic animal health management; (3) improve compliance with relevant international standards (OIE, Codex); (4) improve national and regional capacities on biosecurity related issues: disease diagnosis, risk analysis, international standards requirements; and raise awareness

[2] Convention on International Trade in Endangered Species of Wild Fauna and Flora.
[3] Convention on Biological Diversity.

at all levels. The scope of the activities would cover food safety, aquatic animal health and ecological risks in a broad sense (introduction and transfer of aquatic organisms).

ii. Capacity building: The following activities should improve the competence of stakeholders: (1) undertake SWOT[4] analysis at the national and regional levels; (2) identify capacity needs at all levels, with special attention to non-technical capacity needs; (3) identify existing training opportunities in the region (including main training centres, agencies, institutions, stakeholders); (4) use of regional bodies/agencies/networks for training; (5) develop business and engineering capacities, marketing/trade skills; (6) standardization of degrees/training programmes; promote exchange visits within the region (for officers and farmers at all levels); (7) promote the use of regional knowledge; (8) request international expert support for specific issues; (9) capitalization of existing knowledge at the country level; (10) promote government involvement in the development of the sector and the need for capacity building; (11) promote national investment in capacity building and stakeholder identification; (12) identification of main drivers and champions regarding capacity building/training including time schedules (short-term training including hands-on training, practical training (technicians, technical staff, aquaculture workers); medium-term training through existing programmes and agencies such as SPC, ACIAR, FAO; and long-term training through universities through formal or official training).

iii. Economic analysis and financial needs: To strengthen the ability to undertake business-oriented aquaculture ventures, the following activities are proposed: (1) capacity building on business planning/economic analysis; (2) improve access to market information; (3) update existing financial models for aquaculture ventures; (4) educating financial institutions and partners about aquaculture; (5) economical feasibility studies development for the most important sector commodities and farming strategies; and (6) improve availability of feasibility studies.

iv. Statistics and data: The following activities aim to establish an assistance programme for the National Aquaculture Statistics: (1) examine existing data collection systems for aquaculture production at national and regional levels; (2) capacity building on aquaculture statistics (standardization for enterprise data and national production data); (3) increase awareness/commitment by governments to contribute to the database; and (4) develop data collection methods that are suitable to the region and describe/define common data that should be collected.

v. Market and trade issues: To improve market analysis and encourage a regional approach to promote Pacific aquaculture products, the following are being advocated by the group: (1) increase access to market information and market intelligence; (2) improve knowledge regarding relevant international standards and capacities to comply with such standards; (3) promote private public sector partnership; (4) utilize existing market/trade information systems in the region (INFOFISH); (5) use regional and/or international organizations to influence international trade agreements and certification setting bodies; and (6) establish a regional market strategy for major commodities (information, sharing, quality, certification schemes and promotion of a value chain analysis for main commodities as well as value addition for the Pacific region).

[4] Strengths, weaknesses, opportunities and threats.

vi. Technology transfer: To increase in-country and out-country technology transfer through government private sector partnerships, the following activities are being proposed: (1) increase technology transfer; (2) analyse existing technology transfer mechanisms/strategies; (3) improve existing technology transfer mechanisms; (4) capitalise successful technology development and technology transfer; (5) promote private sector involvement in technology transfer; (6) tailor existing reporting systems to national capacities and (7) improve capacities for data collection (for national and FAO reporting systems).

Working Group 2

85. Working Group 2 presented their contribution in the drafting of the Pacific RAS. These included:

- Objective of the Pacific RAS: The Pacific RAS aims to provide a framework for aquaculture development by promoting awareness of aquaculture in the region, improving cost effectiveness in aquaculture activities, disseminating market intelligence and encouraging better collaboration and networking among its various stakeholders. This strategy aims to improve access to seed and feed, increase quality of products, ensure minimum standards of biosecurity and generally promote sustainable aquaculture.

- The strategy will be underpinned by the following principles:

  i. Strive to reflect the individual and collective needs of the PICTs.
  ii. Strive to build on PICT strengths and comparative advantages.
  iii. Activities to be undertaken under the strategy should be economically and environmentally sustainable.
  iv. The strategy must encourage the development of private sector led approach.
  v. The strategy must meet food security needs and encourage sustained and self-perpetuating activities.
  vi. The strategy should encourage socially and culturally responsible and appropriate activities.
  vii. It must ensure the appropriate role for government which is to underpin the actions of the private sector through provision of core services and statutory functions.

- Working Group 2 identified the ten most important current and emerging issues facing the aquaculture sector in the region and have grouped them under the following headings: (1) Biosecurity; (2) Food security; (3) Capacity building; (4) Competitiveness; (5) Market information; (6) Climate change; (7) High cost of feed; (8) Availability of technology; (9) Scale and size; and (10) Biodiversity.

Aside from these, the working group noted that access to aquaculture sites, availability of technology, transportation difficulties (equitable freight rates), uncertainty in business environments, lack of entrepreneurial spirit and business-like approaches, need for good governance at different levels and difficulties in accessing farm inputs pose emerging concerns for the sector.

- The key opportunities which the sector currently enjoy include:

  i. Domestic markets: With increasing knowledge about the health benefits of fish, increased demand has led to its high and rising local price benefitting local producers. This is coupled with tourism-driven demand and import substitution wherein imported fishes are being substituted with local production providing opportunities for the domestic market.

ii. Export markets: Compliance with international norms towards biosecurity and endangered species has provided opportunities for the industry. The inexhaustible demand for sea cucumber in China, value-addition (e.g. seaweed) and niche products (e.g. smoked eel, clam and pearl meat), improved technologies for trade in live and perishable products and high-value endemic biodiversity (e.g. marine ornamentals) have all contributed to increasing demand in overseas markets.

iii. Production method, scale and intensity: The presence of regional clusters has enabled producers to combine shipments and meet growing demand. Improved techniques through production of pathogen free strains in bio-secure facilities for export of seed or brooders, high diversity of aquatic environments and socially and economically-adapted production scales and intensity have led to a wide range of aquaculture production/system options.

iv. Improved inputs: Use of local feed ingredients and mini-mills, better matching of formulations to nutritional requirements for unique species, capture-based supply of seeds, development of genetically improved lines (for PICTs with capacity) and establishment of livestock feed companies and millers enabled a diversified selection of aquafeeds.

v. Training and accessibility of data: Enhancing regional opportunity for technology transfer, education and training while at the same time exploring options for a regional facility for broodstock maintenance and quality-seed distribution would generally benefit the industry. Further, access to data such as availability of a regional trade list for seed and feed sources and prices (and regularly updating this) and development prospectus for commodities to guide investors and apply proven micro-finance models to aquaculture in the Pacific will enable the stakeholders to be better informed in their business and pricing decisions.

vi. Research: Research includes finding better and cheaper feed, improving efficiency of present production systems, domestication of indigenous species and impacts of alien species, survey and assessment of aquatic diseases to support biosecurity strategy, complementarity of research to avoid duplication of efforts (research coordination mechanism), GIS mapping of aquaculture habitat to identify possible production zones, exploration of best models for community engagement and “failure analysis” and aquaculture success stories will together aid in the development of the sector.

vii. The range of actions and activities to be delivered through the Pacific RAS include:

- Biosecurity: To ensure that the introduction and transfer of aquatic diseases in the region is prevented, the following activities are being proposed: (1) review current biosecurity arrangements to identify gaps in the system; (2) develop minimum standards for biosecurity in the region; (3) adopt protocols and procedures to meet the standards; (4) develop capacities in the region for prevention (e.g. risk analysis), detection/diagnosis and notification of aquatic diseases; (5) implementation of improved national strategies and inter-departmental linkages for aquatic animal health management and reporting; and (6) improve national capacity to utilise available data collection and disease information systems.

- Capacity building: The following actions will aim to improve the capacity among PICTs to manage their strategic and technical issues in aquaculture: (1) strengthen networking among PICT government aquaculture agencies, national and regional institutions, farmer groups/associations and stakeholders; (2) conduct an assessment of aquaculture training needs among PICTs and identify opportunities and gaps; (3) to fill these gaps, identify or develop sources of delivery both within the region and in other regions.

- Economic analysis and financial needs: To ensure commercial and non-commercial aquaculture is economically viable with sustained and stable production, the following activities are advocated: (1) economic screening and advice during project development; (2) market industry analysis; (3) risk profiling template developed for priority commodities; (4) improve access to capital by joint education and engagement of both farmers and financial institutions; and (5) careful analysis and review of subsidies to avoid market distortions or continued dependence for economic viability.

- Statistics and data: To improve knowledge about the status, contributions and trends in the aquaculture sector, the following activities are proposed: (1) implement continuous data collection on production, value, impact and other parameters; (2) develop a regionally harmonised aquaculture data collection and storage methodology and template; and (3) build capacity in data collection and storage.

- Market and trade issues (production selection, branding, post harvest, export and value-addition): To enhance and increase market opportunities for Pacific aquaculture products, the following are being advocated: (1) determine the break-even price which is important during product price negotiations; (2) complete market profiles for selected commodities; (3) develop a Market Information System (MIS); (4) adopt a market-led approach to aquaculture development; (5) explore the opportunities for niche marketing and value-adding; (6) provide advice in export requirements and post-harvest standards/procedures (e.g. HAACP[5])

- Technology transfer and improvement: To improve production efficiency through adoption of appropriate and proven technology, the following actions are being proposed: (1) deliver technology packages and commodity-specific BMPs; (2) establish Centres of Excellence within the region, and links to Centres outside the region, in selected production technologies; (3) establish closer connections with inter- and intra-regional partners (NACA/FAO/SPC/JICA/PICTs, national institutions, etc.); (4) develop a trade directory for farm inputs (seed, feed, equipment, etc.); and (5) encourage targeted applied-research to solve nationally-relevant constraints.

Working Group 3

86. Working Group 3 presented their contribution in the drafting of the Pacific RAS. These included:

- Objective of the Pacific RAS: Create an enabling environment for promoting and developing aquaculture that is economically viable and biologically and socially sustainable.

- The strategy will be underpinned by the following principles:
  i. Understand and respond to the needs of the farmers.
  ii. Sustainability in all aspects such as economic, biological, environmental, and social.
  iii. Use of strategic partnership between regional organisations to promote public-private partnerships.
  iv. Address risks facing the sector.

- Working Group 3 identified the ten issues that the strategy would address including: (1) market (market price, bargaining power) and competition; (2) availability of transportation and costs; (3) weak capacity in infrastructure and human resources at different levels; (4) ability to assimilate technology and access to non-public domain technology e.g. seaweeds, better strains

[5] Hazard Analysis and Critical Control Points.

developed in some parts of Asia but not willing to share with the region; (5) lack of financial support; (6) lack of persistent political will supporting aquaculture sector in some countries; (7) lack of risk analysis on translocation of new species; (8) lack or unavailability of inputs (feed); (9) overcoming trade barriers such as meeting standards and accessing markets; and (10) impacts of climate change.

- The key opportunities which the sector currently enjoy include:

  i. Markets (domestic and export): The industry should put emphasis on domestic markets as a first option and consider emerging high value markets such as China. The Pacific region's "pristine environment" (far from disease) with biosecurity, diverse ecosystems (pathogen free), abundant resources (land and water) coupled with its image of lagoons and palm trees are opportunities that maybe exploited. Further, the lessons learned from the other regions may be transferred and shared through an exchange program with other regional institutions.

  ii. Commodities: The presence of non-perishable commodities such as seaweeds and sponge, small scale/pond production like tilapia, prawns, milkfish; aquatic products (aquarium fish, live rocks, clams) and beche-der-mer will prompt interest in the sector.

  iii. Production methods: With PICTs diverse production methods such as small/ medium pond (earthen ponds), extensive- community based seaweed, cage culture such as Vanuatu's cage culture of tilapia, Tuvalu's milkfish, and PNG's barramundi culture, hydro/dams like Fiji and PNG, closed systems such as hatchery based systems, captive broodstock, hanging long-lines-pearl farming, polyculture like integrated farming systems-seaweed and sea cucumber and integrated culture, enable the adoption of various production methods that may be easier to implement and more productive.

  iv. Inputs (feed, seed, credit, services, etc.): Having access to locally produced feed provide a constant quality seed supply and is cost effective particularly since imported feed is expensive. Presence of good logistics and utilities (power-solar and wind, transport)/incentives for their use, and supportive government policy and regulations (streamlined regulations) provide an enabling environment.

  v. Capacity building: Capacity building may be given to many sectors which are relevant to the industry such as the government (study tour and visits, intra-regional exchange, high level (ministerial) interactions and an opportunity to understand the private sector); private sector (information sharing, joint visits with government, getting the government to share information, hands-on-exchange for farmers, economic appraisals, feasibility studies, banker education-getting banks to better understand the business in aquaculture); cooperatives and associations (clusters approaches, start with specific issues); and small-scale producers. Providing an opportunity for these sectors to improve their capacities will eventually lead to a more sustainable aquaculture sector in the Pacific.

  vi. Research: Research is needed to improve existing technology, enhance networking, and enhance production (e.g. new strains).

  vii. The range of actions and activities to be delivered through the Pacific RAS include:

  viii. Biosecurity: To ensure the safe transfer of biological materials across the Pacific region, the following activities are being proposed: (1) establishment of a regional protocol for biosecurity development including risk assessment based on a review of existing mechanisms; (2) Review existing national status of biosecurity control including its regulations and mechanisms.

ix. Capacity building: To strengthen the overall capacity at all levels to facilitate and safeguard aquaculture development in the region, the following actions are being proposed: In the immediate timeframe, biosecurity, hatchery/broodstock, national training policy supporting capacity building (development of appropriate tertiary training program for existing staff) and in the long-term, strengthen the tertiary program on aquaculture in the region, strengthen relevant regional institutions' collaboration activities delivering capacity in the region.

x. Economic analysis (feasibility studies): To establish a guideline for the selection of appropriate aquaculture projects, the following activities are advocated: (1) review and analyse past and current aquaculture projects; and (2) develop guidelines for feasibility studies.

xi. Statistics and data: To formulate an informed aquaculture policy and decision-making process through standardisation and streamlining of aquaculture statistics data collection at all levels would require the following activities: (1) establish/strengthen national policies on statistics (aquaculture) collections; (2) formalise a regional network on aquaculture data collection with support from SPC, FAO and other collaborative partners; (3) collection and sharing of market information/price commodities (SPC) and (4) capacity building on aquaculture statistics and data collection at all levels.

xii. Market (production selection and branding): To be able to market aquaculture products at a premium price, these should be established: (1) a regional accreditation system/mechanism for aquaculture products (which would improve brand recognition) and (2) aquaculture traceability programme in the region.

xiii. Technology/species transfer and improvement: To improve aquaculture production, the following actions are being proposed: (1) improve access and assimilation to new technology and improved aquaculture strains; (2) strengthen institutions for introduction and adaptation of new technologies and improve species/strains; (3) identify and establish regional centre for major aquaculture species based on existing strength; (4) strengthen the technical collaboration and exchange with other regions such as Asia and (5) strengthen research and technology development and disseminate for aquaculture addressing feed, seed etc in the region.

Plenary Session (Session 3)

87. The third session developed a draft Pacific RAS and a way forward. The outcomes of the workshop sessions were compiled into a draft Pacific RAS strategy which was presented to and refined during the plenary session of the workshop.

88. The long-term vision of the Pacific RAS is to have:

> «A sustainable aquaculture sector that meets food security and livelihood requirements based on economically viable enterprises supported by enabling governance arrangements.»

89. The strategy includes a set of Guiding Principles for aquaculture activities and actions in the Pacific region and consists of six Programme Elements containing examples of 44 programme activities. The Programme Elements address the broad themes of biosecurity; capacity building; feasibility assessment; statistics and data; markets and trade; and technology transfer and improvement.

The draft Pacific RAS appears as Appendix 4.

CONCLUSIONS AND THE WAY FORWARD

90. The workshop generated a rich pool of information and contributed significantly to the understanding of the current status of aquaculture in the PICTs and the challenges and threats facing the sector. The workshop was a first step in generating a draft Pacific RAS and identifying additional activities/actions to ensure its successful execution. The following steps were recommended to follow from the workshop:

a. Send the Report and Strategy to governments, donors and other interested partners.
b. Strengthen regionally coordinated initiatives with FAO continuing to continuously find resources and other appropriate mechanisms to take up some of the identified national or regional activities.
c. Assist in the development of a regional biosecurity framework to include an assessment of capacity and performance survey with FAO leading this initiative.
d. Capacity building for fisheries and aquaculture statistics (collection and reporting at national level) with the SPC leading the initiative.
e. Initiate action to establishing a PICTs subregional aquaculture network (e.g. Micronesia network as a starting point) as a joint FAO/SPC initiative.and strengthen collaboration with other region (e.g. NACA, SEAFDEC, WFC, etc.)
f. National level initiatives must be implemented.
g. Report the outcomes of the workshop (make presentations) to the highest aquaculture authorities in the countries.
h. Establish/update national plans and consider the outcomes of the workshop and the draft Pacific RAS.
i. Develop proposals to generate funding support to implement some of the activities.

CLOSING

91. Mr Mike Batty (SPC) formally closed the workshop by summarizing its outputs and articulating the way forward. Mr Jiansan Jia (FAO) congratulated the participants for their hard work in ensuring the success of the workshop. He noted the strong call for increased regional cooperation to address the issues facing the PICTs. He also stressed the commitments of FAO to help tap the potential for aquaculture growth in the region through FAO/FI, FAO/RAP and FAO/SAP. FAO’s concerned units shall work together with the PICTs in promoting aquaculture development in the region through all possible means, including involving and partnering with all interested parties and stakeholders.

APPENDIX 1

WELCOME STATEMENT

by Mr Jiansan Jia
Chief, Aquaculture Service
Fisheries and Aquaculture Department
Food and Agriculture Organization of the United Nations (FAO)
11 October 2011, Nadi, Fiji

The Honourable Minister for Primary Industries of Fiji, Mr Joketani Cokanasiga;
Mr Mike Batty, Director, Division of Fisheries, Aquaculture and Marine Ecosystems, SPC; respected representatives of member governments of FAO and SPC; invited colleagues, experts and resources from partner organizations and the private sector, colleagues from Fiji,
Ladies and Gentlemen,

On behalf of Mr Jacques Diouf, Director-General of FAO, Mr Arni Mathiesen, Assistant Director of the Department of Fisheries and Aquaculture and Mr Vili Fuavao, Subregional Representative for the Pacific Islands – I have the honour to welcome you to the FAO/SPC Regional Scoping Workshop: Development of a Pacific Aquaculture Regional Cooperative Programme.

Some of you may recall that there are a number of recent important events which became the basis for organizing this workshop. From the FAO side, the potential for aquaculture development in the Pacific (and small island developing states) - was highlighted during the Fifth Session of the Sub-Committee on Aquaculture (October 2011 in Phuket, Thailand), the 29th Session of the Committee on Fisheries (February 2011 in Rome, Italy), the Ninth Meeting of the FAO South West Pacific Ministers for Agriculture (April 2011 in Vava'u, Tonga) and the most recent Asia Fisheries Ministerial Meeting (July 2011 in Colombo, Sri Lanka). Such recognition required a stock-taking exercise in order to understand the current status of aquaculture development in the region, be cognizant of important issues affecting sustainability of the sector, exchange ideas and good practices and build consensus towards a regional framework and programme.

We have an important task ahead of us – 4 days of intensive listening and brainstorming. Our workshop will be informed by important presentations including historical and ongoing developments of the sector in the region, national and regional aspirations for aquaculture development, and an overview of salient points affecting aquaculture sustainability. We will learn the perspectives of the private sector on some of the most important commodities for the region, i.e. shrimp, tilapia, seaweed and pearl oysters. We will hear the mandates and areas for future cooperation of partner organizations.

I am confident that with the above and the range and level expertise assembled here this week, we will be able to successfully meet the workshop objectives and put in place a regional strategy and road map that will support sustainable aquaculture development in the Pacific region. Our expectations are: that this road map will guide how aquaculture can fill the gap in the increasing demand for domestic food production and opportunities for export and at the same time protecting the environment and biodiversity of the region, how national and regional capacities in aquaculture development can be strengthened, how private investments can be generated and supported through effective policies and regulatory frameworks and how to engage relevant stakeholders.

I am particularly pleased with the high response both from FAO and SPC member governments and our partner institutions including the private sector for their keen interest and support to this important undertaking. We thank everyone for your kind participation.

Before closing, I would like to offer, on behalf of FAO, our sincere appreciation to SPC for this joint collaboration, to the Australian Centre for International Agricultural Research for technical and financial support and last but not least, our local host, the Ministry of Fisheries and Forests.

I wish everyone a productive workshop while also taking time to enjoy the local hospitality to be offered by our Fijian colleagues.

Vikana bakalevu!

APPENDIX 2

WORKSHOP AGENDA

Date and Time	Activities
10 October 2011, Monday	
	Arrival of delegates/participants
DAY 1: 11 October 2011, Tuesday	
08:30–09:00	Registration and distribution of expert workshop information package Opening Session Moderator: (Representative from Fiji)
09:00–09:30	Opening ceremony Opening prayer Welcome statement Mr Mike Batty, Director, Division of Fisheries, Aquaculture and Marine Ecosystems, SPC Opening statement Mr Jiansan Jia, Chief, Aquaculture Service, Fisheries and Aquaculture Department, FAO Official opening Honourable Minister for Primary Industries, Mr Joketani Cokanasiga, Fiji Group photo with the Honourable Minister
09:30–10:00	Coffee break
10:00–10:30	Moderator to introduce facilitator Self introduction by participants
10:30–10:40	Presentation of objectives, expected outcomes, workshop mechanics Mr Masanami Izumi, FAO
10:40–10:50	Introduction of the session Facilitator: Mr Ian Cartwright, SPC
10:50–	SESSION 1 Objectives: Understanding past and recently completed activities, existing national and regional strategies/development plans and the current status of aquaculture in the Region, including an analysis of progress Facilitator: Mr Ian Cartwright Rapporteurs: FAO/SPC Session 1.1: National and Regional Aquaculture Aspirations and Constraint Institutional Presentations: Mandates, Ongoing Work in the Pacific Region, and Interests for Future Cooperation

10:50–11:25	Presentation 1: Historical and current status of aquaculture development in the Pacific, persistent and emerging issues on aquaculture development in the Region and outcomes of 'An evening of Pacific aquaculture' Mr Pedro Bueno, FAO
11:25–11:40	General discussion
11:40-12:25	Presentation 2: Findings from the SPC economic study of the mariculture sector in the region Mr Hugh Govan, SPC
12:25–12:40	General discussion
12:40–14:00	Lunch break
14:00–14:45	Presentation 3: Pacific Aquaculture Synthesis
14:45–15:00	General discussion
15:00–15:20	Presentation 4 (private sector): Shrimp Mr Tim Pickering, SPC on behalf of consultant
15:20–15:40	Presentation 5 (private sector): Tilapia Mr Paul Christian Ryan, Vate Ocean Gardens Ltd
15:40–16:00	General discussion Moderators: Mr Gerald Billings, Fiji Dr Robert Jimmy, SPC
16:00–16:20	Coffee break
16:20–16:40	Presentation 6 (private sector): Seaweed Mr Donald & Ms Shamron Pickering, Pacific Seaweeds
16:40–17:00	General discussion
17:00–17:30	Presentation 7 (partner organizations): Summary presentation of partner organizations' mandates and interests for future cooperation
17:30–17:50	General discussion
17:50–18:10	Wrap-up and Tasks for Day 2
DAY 2: 12 October 2011, Wednesday	
08:30–08:40	Summary of Day 1 outcomes

08:40–09:00	Presentation 8 (private sector): Pearl oyster Mr Jamie Whitford, ACIAR
09:00–	SESSION 1 Objectives: Understanding past and recently completed activities, existing national and regional strategies/development plans and the current status of aquaculture in the Region, including an analysis of progress Facilitator: Mr Ian Cartwright Rapporteurs: FAO/SPC Session 1.2 Thematic Presentations
09:00–09:20	Presentation 1: Biosecurity issues for sustainable aquaculture Dr Melba Reantaso, FAO
09:20–09:40	Presentation 2: Biodiversity issues for sustainable aquaculture Dr Ruth Garcia-Gomez, SPC
09:40–10:00	General discussion
10:00–10:20	Coffee break
10:20–10:40	Presentation 3: Networking to support sustainable aquaculture Mr Ambekar Eknath, NACA
10:40–11:00	Presentation 4: Cluster management for small farmer groups Mr Pedro Bueno, FAO
11:00–11:20	General discussion
11:20–11:40	Presentation 5: Aquaculture statistics and information for cultured species unique to the region Mr Miao Weimin, FAO
11:40–12:00	Presentation 6: Research and technology development vs. knowledge generation and utilization Ms Cathy Hair, ACIAR
12:00–12:30	General discussion
12:30–14:00	Lunch break
14:00–14:15	Introduction and guidelines for Session 2
14:15–17:45	SESSION 2 Objectives: Working Group Discussions to 1. identify emerging issues, opportunities and required support for its development; 2. lessons and good practices based on the work of development partners, inspire fresh thinking and innovative initiatives 3. a potential regional aquaculture development framework and programme or road map for aquaculture development for PICTs

	Working Group 1.1/ 1.2	Working Group 2.1/ 2.2	Working Group 3.1/ 3.2
	(1) identify emerging issues, opportunities and required support for its development; (2) lessons and good practices based on the work of development partners, fresh thinking and innovative initiatives	(1) identify emerging issues, opportunities and required support for its development; (2) lessons and good practices based on the work of development partners, fresh thinking and innovative initiatives	(1) identify emerging issues, opportunities and required support for its development; (2) lessons and good practices based on the work of development partners, fresh thinking and innovative initiatives

17:45–18:00	Wrap –up and tasks for Day 3
DAY 3: 13 October 2011 (Thursday)	
08:30–10:00	Session 2 Working Group Discussions continued
09:30–10:00	Presentations: Working Group 1.1/1.2, 2.1/2.2 and 2.1/3.2 Facilitator: Mr Ian Cartwright Rapporteurs: FAO/SPC
10:00–10:30	Coffee break
10:30–11:00	Presentations: Working Group 1.1/1.2, 2.1/2.2 and 3.1/3.2 Facilitator: Mr Ian Cartwright Rapporteurs: FAO/SPC
11:00–12:00	General discussions, Wrap-up and tasks for Day 4
12:00–13:30	Lunch break
13:30–18:00	Field trip
DAY 4: 14 October 2011 (Friday)	
08:30–11:00	SESSION 2 continued: Working Groups discussions (3) a potential regional aquaculture development framework and programme or road map for aquaculture development for PICTs.

	Working Group 1.3	Working Group 2.3	Working Group 3.3
	(3) a potential regional aquaculture development framework and programme or road map for aquaculture development for PICTs.	(3) a potential regional aquaculture development framework and programme or road map for aquaculture development for PICTs.	(3) a potential regional aquaculture development framework and programme or road map for aquaculture development for PICTs.

10:00–10:30	Coffee break
11:00–11:30	Presentations: Working Group 1.3, 2.3, 3.3 Facilitator: Mr Ian Cartwright Rapporteurs: FAO/SPC
11:30–12:00	General discussion
12:00–15:00	Lunch break and free time
15:00–16:30	SESSION 3 Objectives: Presentation of Workshop Outputs and the Way Forward – FAO/SPC Secretariat Plenary discussions Facilitator: Mr Ian Cartwright Rapporteurs: FAO/SPC
16:30–17:00	Closing of the Workshop
15 October (Saturday) - Departure of participants	

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APPENDIX 4

DRAFT PACIFIC REGIONAL AQUACULTURE STRATEGY

Prepared by

FAO/SPC Regional Scoping Workshop: Development of a Pacific Aquaculture Regional Cooperative Programme

FAO/SPC. 2012. Draft Pacific Regional Aquaculture Strategy. In *FAO/SPC Regional Scoping Workshop: Development of a Pacific Aquaculture Regional Cooperative Programme. Nadi, Fiji, 11–14 October 2011*. FAO Fisheries and Aquaculture Report No. R1023. Rome, FAO. pp. 33–45.

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INTRODUCTION

The physical, natural, environmental, cultural and demographic endowments of the vast Pacific region have been a source of comparative advantage or cause of limited success in the region's aquaculture development projects and enterprises

The initial efforts by Pacific island nations and territories to develop aquaculture industries were led by a number of key nations including French Polynesia New Caledonia, Cook Islands and Fiji. These efforts were initially supported by the FAO Regional Aquaculture Development Programme (GCP/RAS/116/JPN) which ran from the late 198Os to the 1990s.

The Secretariat for the Pacific Communities (SPC) Aquaculture Programme was established in the early 2000s to provide technical services, coordinate capacity building and serve as a clearing house for information. Since 2007, the work of SPC has been guided by the SPC aquaculture action plan. The plan is a vehicle for supporting SPC members towards fulfilling the potential of aquaculture in the region. It

builds on the achievements that resulted in an earlier milestone for aquaculture in the Pacific – the first SPC aquaculture plan in 2002.

The efforts by national fisheries administrations, SPC and FAO have been augmented by those of other technical agencies including the Australian Centre for International Agricultural Research (ACIAR), the WorldFish Center (WFC), the Pacific Islands Development Programme (PIDP) and Japan International Cooperation Agency (JICA). For the most part, these activities lacked formal coordination mechanisms at a regional level.

On 23 September 2010, during the FAO Global Conference on Aquaculture in Thailand, an informal «Evening on Pacific Aquaculture» meeting organized by FAO and SPC was held with five Pacific island countries namely Cook Islands, Fiji, Nauru, Papua New Guinea and Tonga. The meeting was also attended by representatives from other fisheries organizations and educational institutes including ACIAR, Aquaculture Without Frontiers, Ghent University (GU), JICA, the Network of Aquaculture Centres in Asia and the Pacific (NACA) and the WFC.

Three major points of interest were highlighted including: (1) history and status of aquaculture development in the Pacific; (2) persistent and emerging issues on aquaculture development in the region; and (3) national aquaculture aspirations and constraints in the five Pacific countries present at the meeting.

Three strategic actions were recommended, namely: (1) further assistance in developing a biosecurity policy for the Region; (2) organization of a regional aquaculture development workshop in the Pacific to assess needs and develop cooperative programmes; and (3) exploring the feasibility of a regional networking arrangement.

The twenty-ninth session of the FAO Committee on Fisheries (COFI) held from 29 January to 4 February 2011 in Rome, Italy, on the recommendation of the fifth session of the COFI Sub-Committee on Aquaculture held from 27 September to 1 October 2010 in Phuket, Thailand, placed on record its recognition of this need to provide more attention to aquaculture development in small island developing states including the Pacific Island Countries and Territories (PICTs).

One key outcome of these events was an agreement to hold a FAO/SPC Regional Scoping Workshop on Pacific Aquaculture[6] to assess the needs and map out a coordinating strategy and actions for all major and international agencies and other relevant stakeholders working on aquaculture development in the region. The meeting was held in Nadi, Fiji 11 to 14 October 2011 and developed the key elements of this strategy.

Coincidentally, during the time of the FAO/SPC Regional Scoping Workshop, the 2007 action plan of SPC was due for review. It was decided to combine the outcomes of the coordination workshop and a review of this document to provide a refreshed vision and mandate to support the development of aquaculture in the region.

While the 2007 plan is built around commodity groups rather than programmes, many of the key elements of that plan remain relevant, and will be included in the strategy.

[6] FAO. 2012. *Report of the FAO/SPC Regional Scoping Workshop: Development of a Pacific Regional Cooperative Programme. Nadi, Fiji, 11–14 October 2011*. FAO Fisheries and Aquaculture Report No. 1023, Rome. 50 pp.

HIGHLIGHTS OF THE SPC 2007 AQUACULTURE STRATEGY

The SPC 2007 aquaculture strategy sets the regional focus on aquaculture based on prioritizing commodities for livelihood and for food security in the region as well as identifying important cross-cutting issues surrounding the sector. These are presented below:

1. Commodities targeting livelihoods

1.1 Pearl oyster

- A significant drop in pearl production in the region due to a number of related factors such as over-supply especially for lower graded pearls, poor market price and a number of environmental related problems such as water quality and disease.
- Developments in pearl culture continue and include smaller and more specialized producers that target local tourism and local industry, for instance in Fiji and FSM.
- New research are underway in Tonga to produce round pearls from other pearl oyster species such as the winged pearl oyster (*Pteria penguin*),
- Baseline studies of pearl culture are currently being investigated in PNG.

1.2 Seaweed

- Seaweed continues to be promoted as an important cash crop for the region as it is relatively simple to culture and requires little investment. It is showing significant progress in Solomon Islands, Fiji and more recently, in PNG.
- Lack of suitable varieties and disease are some of the constraints affecting seaweed producing countries such as Fiji and PNG.
- Improved strains of seaweed are being sought recently from Indonesia and are currently being cultured in Fiji with the aim of distributing these to countries who are interested in seaweed culture.

1.3 Marine ornamentals

- Opportunities for growth for giant clam and coral culture production targeting aquarium trade industry appears good especially for locations readily accessible to international airports. However, production coming from the region is not meeting market demand.
- Focus continued to be on assisting member countries through regional workshops in 2010 and 2012 to meet their OIE reporting requirements.

1.4 Marine shrimp

- Shrimp farming is one of the most successful mariculture activities in the region and is being cultured in Commonwealth of the Northern Mariana Islands (CNMI), Guam, Fiji, French Polynesia, New Caledonia, PNG and Vanuatu.
- A major aspect has been to provide technical assistance to improve aquatic biosecurity aspect in the shrimp farming industry particularly in French Polynesia and New Caledonia.
- A major review of shrimp farming in the Pacific has been undertaken in 2010[7]. Securing the availability and quality of breeders to supply post larvae to the farms through captive breeders in the key message to any aquaculture venture including shrimp. Therefore reliance on availability of local wild shrimps or imported breeders or post larvae is a transitional measure.

[7] Patrois, J. 2010. *Shrimp farming in Pacific Island countries and territories: status and trends in 2010*. Noumea, New Caledonia: Secretariat of the Pacific Community. 76 pp.

1.5 Finfish

- Apart from PNG, introduction of barramundi (*Lates calcarifer*) into Vanuatu was successfully carried out by the industry and is now an established industry.

2. Commodities targeting food security

2.1 Tilapia culture

- Tilapia is commonly highlighted in national aquaculture strategic plans as a high priority species that has the potential to improve nutrition in both rural and urban areas of the Pacific.
- Targeted species for culture include genetically improved farmed tilapia (GIFT) tilapia and the hybrid red tilapia and are being cultured commercially, semi commercially and on a subsistence basis.
- Recent research to improve tilapia culture in the region includes ACIAR-funded tilapia genetic study to assess the strains which are being cultured in countries such as Fiji, Vanuatu, Samoa and the Cook Islands
- To improve tilapia production, proper broodstock management plans and hatchery production plans should be developed at the national level.

2.2 Milkfish culture

- Feasibility trials for milkfish utilizing captured fingerlings from the wild are being cultured in Fiji and similar trials are being conducted in Solomon Islands. Likewise, a large-scale culture of milkfish using hatchery produced fingerlings is underway in Kiribati.
- A subregional training on milkfish culture has been conducted in early 2012 to improve skills and capacity on milkfish farming.

3. Cross-cutting issues

3.1 Information

- The SPC's aquaculture portal continues to be an important source of media for sharing of practical information. This will continue to be further strengthened and improved to meet member countries' needs.
- Study tours have been an important source of information exchange. A number of countries benefitted from these activities such as: Solomon Island delegation visit to PNG on freshwater aquaculture (2012), study tour for 4 persons from New Caledonia to Viet Nam in 2008.

3.2 Training

This is a cross-cutting issue and has been central to the on-going core program of the SPC. Some key highlights for short-term non-formal trainings include:

- Regional OIE disease reporting workshop in 2010 and 2012
- Subregional milkfish culture training in Vitawa, Fiji in February 2012
- Training attachment of one French Polynesia Fisheries Officer on aquatic disease in 2010 (Australia) and 2012 (USA), training attachment for one person from Solomon Islands to Fiji on tilapia culture
- Pearl handicraft jewelry training workshop for Tonga in 2008

3.3 Research and development

- Feed-based aquaculture continues to be a challenge in the region but some form of aquaculture such as pearl culture does not require feed and is optional for low density culture systems such as milkfish and tilapia. Progress have been made on feed based aquaculture such as ACIAR-SPC

regional feed ingredient survey in 2011 which provided valuable information for member countries to utilize locally available feed ingredients where possible.

- Continued supervision of postgraduate research students from the University of the South Pacific (USP) through placement in ACIAR Projects. Postgraduate supervisory support has been present in areas including shrimp cage culture, half pearl formation, prawn disease, rabbit fish farming, freshwater prawns and milkfish culture.

3.4 Biosecurity

The SPC is yet to put in place a SPC regional biosecurity framework. The concept has already been considered and approved by the 6th Heads of Fisheries Meeting in 2009. Despite the absence of a regional program, activities relating to aquatic biosecurity continue to be implemented and some include:

- Impact risk analysis conducted in a number of countries including: PNG for cobia introduction, Kiribati for sea cucumber sandfish introduction, Fiji for seaweed introduction.
- Development of a Micronesia biosecurity policy, a draft was recently produced.

3.5 Climate change

The SPC's recent report "Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change[8]" on climate change has Chapter 11 dedicated to aquaculture. In terms of overall vulnerability, the following were observed:

- Commodities for food security such as tilapia, carp and milkfish in freshwater ponds are likely to benefit from anticipated changes to subsurface climate.
- Commodities for livelihood such as pearls, shrimps and seaweed are likely to encounter production problems due to projected changes to occur in tropical Pacific Ocean.

3.6 Planning and policies for sustainable aquaculture

- Progresses have been made in improving policies on aquaculture at the regional and national levels. At the regional level, the outcome of the joint FAO/SPC regional scoping workshop on aquaculture was accepted by the meeting to form the basis of the revised SPC regional aquaculture strategy replacing SPC Aquaculture Action Plan 2007.
- At the national level, SPC member countries have incorporated aquaculture into their national legislations either as a stand-alone Aquaculture Act or as part of the existing national Fisheries Act with the objectives to promote and safeguard aquaculture development and management at the national level.
    - Some countries such as Tonga have stand-alone Aquaculture Act while Fiji is in the final stages of producing one. Vanuatu is currently drafting an aquaculture legislation as part of its existing national Fisheries Act.
    - Aquaculture strategies have been developed for Cook Islands, CNMI, Fiji, FSM, Guam, Nauru, Samoa, Solomon Islands, Vanuatu, Wallis and Futuna Islands.

3.7 Economics and marketing

- A major review has been conducted in the mariculture sector. The report titled Opportunities for the Development of the Pacific Islands' Mariculture Sector[9]" using five countries as case studies,

[8] Bell, J.D., Johnson, J.E. & Hobday, A.J. 2011 Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change. Secretariat of the Pacific Community, Noumea, New Caledonia.

[9] Hambrey Consulting. 2011. Opportunities for the Development of the Pacific islands' mariculture sector: report to the Secretariat of the Pacific Community, SPC. 123 pp.

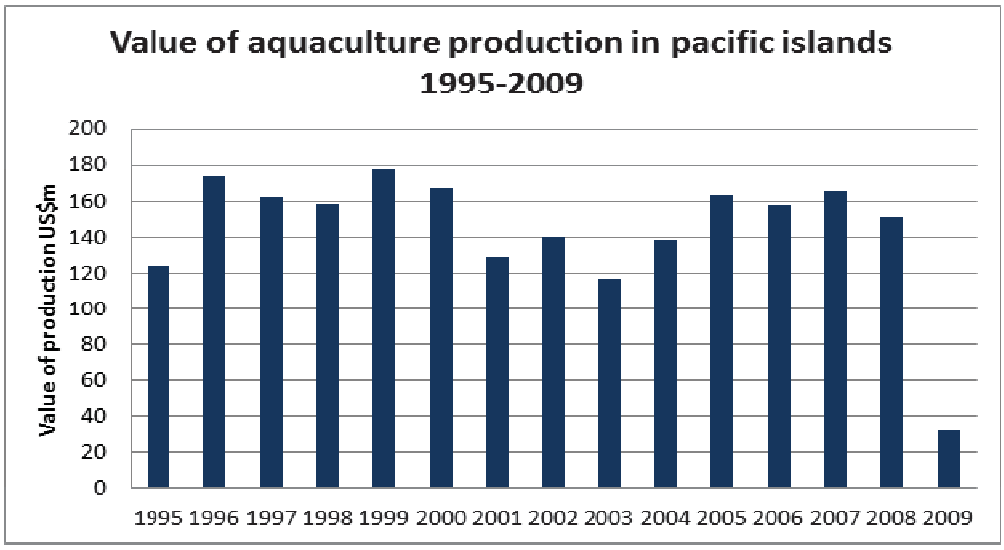
namely Cook Islands, Fiji, PNG, RMI and Solomon Islands. It highlighted the need for rigorous assessment on the potentials for mariculture with consideration of proper economic assessment

- A newly dedicated 4-year project funded by the European Union (EU) entitled Increasing Agricultural Commodity Trade (IACT) for the Pacific ACP States has an aquaculture component which funds one Aquaculture Officer position and is focused on promoting small- to medium-scale aquaculture development to increase export of aquaculture products.

SNAPSHOT OF AQUACULTURE STATUS

Aquaculture statistics based on the report of Hambrey Consulting (2011) showed that production in shrimp industry has overtaken pearl as the most valuable commodity in the region (Figure 1). The bulk of the region's aquaculture production comes from pearl and shrimp from French Polynesia and New Caledonia as well as pearl production from Cook Islands.

FIGURE 1
Value of aquaculture production in the Pacific Islands and Territories

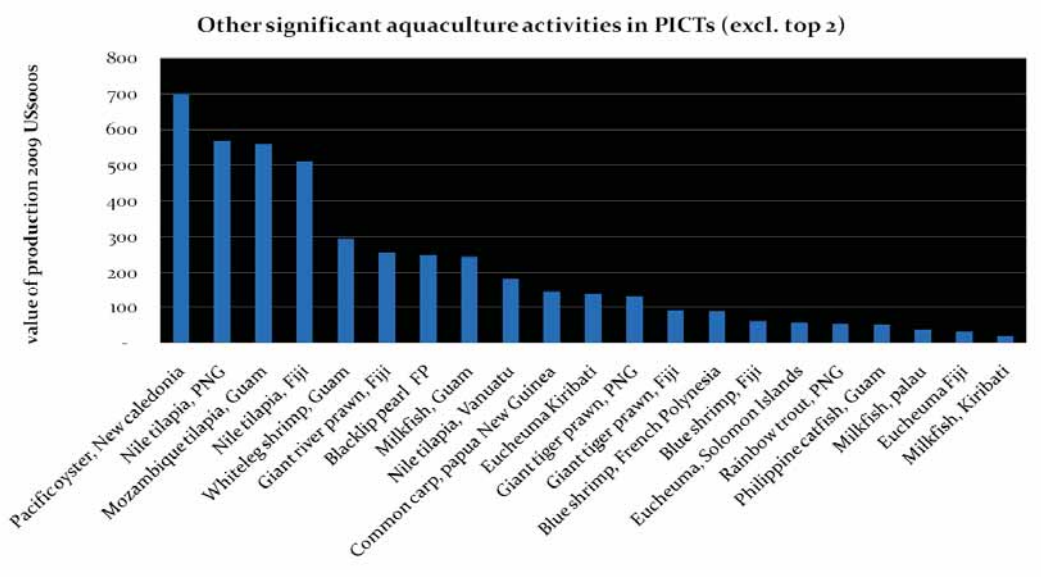


Source: Hambrey Consulting (2011)

The dramatic decline in total value of production in this region in 2009 is mostly attributed to a collapse in pearl production value from oversupply, poor market price, disease and environmentally related problems.

Fortunately, there are other significant aquaculture activities which are very well sustained such as Pacific oyster production in New Caledonia, seaweed production on the uptrend particularly from Solomon Islands and Fiji and so is tilapia production from PNG, Fiji and Vanuatu (Figure 2).

FIGURE 2
Significant aquaculture activities in the Pacific Islands and Territories



Source: Hambrey Consulting (2011)

A review conducted by the FAO Subregional Office for the Pacific Islands (SAP) (2010)[10] sums up the consensus among veteran workers and observers that the decades long aquaculture development effort in the insular Pacific region has spawned a reasonable amount of achievement which a renewed and concerted strategic regional programme can – with confidence -- build on. There is strong optimism and hope that the stakeholders have steadfastly upheld through years of trials, failures and the occasional success. For the region indeed holds much promise as had been reiterated in a succession of assessments of its potentials and constraints and shown by the results and promise of recent public and private initiatives.

Assessments made between the end of the previous millennium and this decade painted a mixed picture of progress. One image, purely based on value of output, suggests there had been little progress: the value of aquaculture production reported by SPC in 2007 of USD 211 million[11] was not much of a change in real terms from the value of coastal species cultured in tropical PICTs in 1996 of USD 157 Million reported also by SPC[12] during the Aquaculture Conference in the Third Millennium. The more recent estimate had included freshwater species, tilapia, carps and freshwater prawn, which were not accounted for in the earlier estimate, even as cultured pearl continues to contribute more than 90 percent to the entire production value. In 2011, at the time of the Scoping Workshop, one problem persists, characterized

[10] Bueno, P. & Izumi, M. 2010. Subregional Office for the Pacific Islands: Mission Report. Project No. TCP/PAL/3301.
[11] SPC. 2007. Aquaculture Action Plan 2007. Secretariat of the Pacific Community, Noumea, New Caledonia.
[12] Adams, T., Bell, J. & Labrosse, P. 2000. Current Status of Aquaculture in the Pacific Islands. *In*: NACA/FAO. 2001. *Aquaculture in the Third Millennium*. Subasinghe *et al.* eds.. Technical Proceedings of the Conference on Aquaculture in the Third Millennium, Bangkok, 20-25 February 2000. NACA Bangkok and FAO Rome. 471 pp.

twenty years earlier by Adams, Bell and Labrosse (2000)[13] as projects having unrealistic short-term aims lacked follow up or failed. This continued to be identified in recent assessments by FAO SAP and SPC. Their common findings from separate studies as was reported in the Workshop, was that very few of the projects that proved to be technically feasible at the adaptive research or pilot scale levels become a commercial success[14].

There are, however, examples of success and a few bright spots at the regional and national levels that warrant some optimism. For the success story, the production of coastal species other than pearl oyster had spread from only a few (in 1997 significant volumes were coming only from Fiji, Guam, Kiribati and New Caledonia) to more than a dozen countries and territories. Species whose aquaculture has spread over the Pacific from Palau to PNG have included tilapia, milkfish and freshwater prawn. Pearl farming has expanded out of French Polynesia and giant clam has become an important commodity in the global ornamental fish trade and is now joined by the culture of corals. To guide, promote and regulate aquaculture development and investments, governments have enacted legislation specific to aquaculture, and formulated national policy, strategy and plan for aquaculture development. Biosecurity measures to buttress the existing quarantine protocols are now built into aquaculture regulations. Food security has joined livelihoods as a priority goal for aquaculture. These and a number of successful and profitable private enterprises are foundations to build on.

REGIONAL CONSTRAINTS AND OPPORTUNITIES

The scoping workshop identified a number of regional constraints and opportunities as presented in Table 1 below.

[13] Adams, T., Bell, J. & Labrosse, P. 2001. Current status of aquaculture in the Pacific Islands. *In* R.P. Subasinghe, P. Bueno, M.J. Phillips, C. Hough, S.E. McGladdery & J.R. Arthur, eds. *Aquaculture in the Third Millennium*. Technical Proceedings of the Conference on Aquaculture in the Third Millennium, Bangkok, Thailand, 20-25 February 2000. pp. 295-305. NACA, Bangkok and FAO, Rome.

[14] Govan, H., Hambrey, J. & Sharp, M. 2010. *Building on Progress: An Evening of Pacific Aquaculture*. FAO SAP Samoa and SPC Noumea, 8 pp.

TABLE 1
Regional constraints and opportunities facing the Pacific aquaculture sector

Regional Constraints	Regional opportunities
• limited capacity to undertake risk analysis including biosecurity risks • limited technical capacities and lack of training opportunities • limited infrastructure and facilities • limited institutional (policy, legislative and financial) support (or political will) for aquaculture development • difficulties in accessing start-up and other capital needs • difficulties accessing some markets due to geographic isolation and compliance with trade requirements • complex land and water tenure arrangements • Limited data on market, production and input data and product prices • uncertainty surrounding impacts of climate change • difficulty to compete with other major aquaculture producers of low to mid range commodities, especially Southeast Asia and China • high cost of feed due to transportation costs and availability • requirement to maintain a unique and fragile biodiversity • limited profile of aquaculture and inconsistent political support.	• presence of local food ingredients, mini-mills and feedstock existing feedstock producers enable their use in the production process • ample capture-based supply of seed • regional opportunities for technology transfer, education and training using regional and other organisations/networks are present • regional cooperative arrangements to overcome problems of scale e.g. regional broodstock facility, regional feed mill production. • presence of production, seaweed processing factory • domestic markets facing a decreasing supply of fish particularly in urban areas can lead to increased fish prices • high value emerging markets, including China for niche/high value/top shelf products • pristine environment and image help in marketing the products. • rising value of other products enables the substitution into the sector's products. • insularity of the region provides biosecurity advantages • substantial past experience and lessons once challenges facing the sector arise • links to institutions in other regions provide a support network • general availability of a diverse range of ecosystems for aquaculture sites. • presence of non-perishable products allow for opportunities for remote communities. • availability of an educated and capable workforce ensure efficient production processes

DRAFT PACIFIC REGIONAL AQUACULTURE STRATEGY

PURPOSE OF THE STRATEGY

The proposed Pacific RAS outlines a long-term, agreed upon plan of action that lays out key programme areas of work in support of the region's aquaculture priorities for sustainable aquaculture development at the national level leading to livelihoods and food security in the Pacific.

It aims to provide avenues to address shortfalls in human, infrastructure and institutional capacity of the region as well as to promote the exchange of lessons learned and good practices, particularly between PICTs based on their aquaculture experiences.

The strategy provides guidance for investment in aquaculture by donor agencies, national governments and the private sector and builds upon and greatly expands the collaborative links between and among regional and international agencies and institutions.

The strategy includes a Vision and a set of Guiding Principles for aquaculture activities and action in the Pacific region and consists of six Programme Elements containing 44 examples of Programme Activities. The six Programme Elements address the broad themes of:

1. Biosecurity
2. Capacity building
3. Feasibility assessment
4. Statistics and data
5. Markets and trade
6. Technology transfer and improvement

VISION

The long-term vision of the Pacific RAS is to have:

"A sustainable aquaculture sector that meets food security and livelihood requirements based on economically viable enterprises supported by enabling governance arrangements."

OVERALL OUTCOMES

This strategy hopes to have the following overall outcomes upon its successful implementation:

- Successful, competitive and biosecure aquaculture enterprises, using and adopting proven technologies to meet local requirements (technical, social and environmental).

- Recognition of the actual and potential contributions of the aquaculture sector towards regional livelihoods and food security (in response to the pressures of population growth, depleted/overfished inshore fisheries resources and climate change).

- A framework for aquaculture development that builds cooperation among PICT government aquaculture institutions, national, regional and international agencies, farmer groups/associations, and other stakeholders.

GUIDING PRINCIPLES

The following principles were developed to guide the preparation of this Pacific RAS:

- Private sector led development should be advocated, wherever possible, together with understanding and responding to the needs of the producers.
- Taking into account the impact of climate change, the strategy must strive for best management practices and systems.
- Science-based approaches must be used in the management of risk.
- The strategy should strive for the protection of the ecosystems and the environment as well as maintain a high level of disease-free status.
- Enterprises must be based on feasibility studies and activities and actions should be economically viable, socially and culturally acceptable.
- The strategy should ensure that food security needs are met through business-like approaches.
- The strategy should support the aquaculture aspirations of individual PICTs, building on their strengths and comparative advantages.
- The strategy should strive for differentiation example of which is top shelf (e.g. knowledge/innovative based production).

REGIONAL STRATEGY: PROGRAMME ELEMENTS AND ACTIVITIES

Programme Element 1: Biosecurity

Maintaining biosecurity in ecosystems is essential in ensuring the world's food and agriculture production, including those from aquatic environments. Aquaculture is the fastest-growing animal food producing sector. While the benefits of this increase are well known, unconstrained and intensification of aquaculture may have undesirable impacts on the resilience of socio-ecological systems which, in turn, could undermine the productivity and sustainability of aquaculture sector growth. It is therefore important to ensure the safe production and transfer of biological materials/aquatic organisms with minimum biosecurity risks across the Pacific region.

Programme Activities:

1. Review current biosecurity arrangements, through a survey of biosecurity performance and capacities, to identify gaps in the system
2. Develop minimum standards for biosecurity in the region, based on a compliance with international norms

3. Adopt protocols and procedures to meet international standards
4. Develop capacities in the region, including by building on existing facilities, networking and a biosecurity unit, for prevention (e.g. risk analysis), detection/diagnosis and notification of aquatic diseases
5. Implement improved national strategies and inter-departmental linkages for aquatic animal health management and reporting
6. Improve national capacity to utilise available data collection and disease information systems

Programme Element 2: Capacity building

Capacity development is an important pillar in any development efforts. While gaps in technical skills across all levels are being addressed by a range of tertiary and other programmes including short course workshops, trainings and project attachments - capacity-building to-date reflects a somewhat *ad hoc* absence of national training policies. Improving capacity at all levels (individual, organization and enabling environment) among PICTs to develop aquaculture and manage strategic and technical issues will be essential.

Programme Activities:

1. Strengthen networking among PICT government aquaculture agencies, national and regional institutions, farmer groups/associations, and stakeholders
2. Conduct an assessment of aquaculture training needs among PICTs and identify opportunities and gaps at all levels in the aquaculture sector
3. Identify or develop sources of training, education and work experience/study tours/exchanges, or within the region, and in other regions
4. Strengthen tertiary programmes on aquaculture in the region and strengthen relevant regional institutions linked into relevant research topics (e.g. the ACIAR mini-projects)
5. Develop in-country programmes that train multiple people

Programme Element 3: Feasibility assessment

Success in the sector has been limited by inappropriate project design with inadequate feasibility studies, poor social and cultural fit and a lack of monitoring in terms of practical and commercial performance. Attention was drawn to the enormous variation in potential between countries, the vital need to undertake adequate economic/market analysis and involve the private sector and, most importantly, to apply the lessons learned. To this end, the strategy aims to develop commercial and non-commercial aquaculture that is economically, socially and environmentally viable with sustained and stable production.

Programme Activities:

1. Review and analyse past successful and unsuccessful aquaculture enterprises and develop lessons learned
2. Undertake capacity building, economic screening, advice during project development and feasibility study guidelines on business planning/economic analysis
3. Improve access to market/production information as well as to capital by joint education and engagement of both farmers and financial institutions
4. Develop risk profiling template for priority commodities and up to date financial models for aquaculture ventures
5. Educate financial institutions and partners about aquaculture
6. Provide feasibility studies for sector commodities and farming strategies on demand.

7. Analyse and review of subsides to avoid market distortions or continuing dependence for economic viability

Programme Element 4: Statistics and data

Research has its place in the future development of new commodities and techniques which must be tested properly to have confidence in the results. Activities to strengthen research results include capacity building in aquaculture statistics, collection and reporting (including the development of national data collection and reporting mechanisms and standards). Aquaculture data and statistics are rather inadequate making it difficult to convince decision-makers to take a proactive role in aquaculture development. The strategy thus aims to have an improved aquaculture policy and decision-making through the provision of knowledge of the status, contributions and trends in the aquaculture sector.

Programme Activities:

1. Review and strengthen national policies, government commitment and capabilities in aquaculture statistics collection, storage, analysis and dissemination including the use of data/analysis for knowledge transformation
2. Ensure aquaculture statistics and data are readily available/accessible to both government and the private sector to inform investment and other decisions
3. Build capacity in data collection and storage with an aim of developing a one-stop shop for information on aquaculture commodities, inputs and prices, etc.
4. Implement on-going data collection about production, value, impact and other parameters
5. Develop a regionally harmonised aquaculture data collection using the aquaculture network, storage methodology and template
6. Collect and share market information, and commodity and input prices
7. Establish an Aquaculture Knowledge Management Unit (AKMU)

Programme Element 5: Markets and trade

The need to increase the capacity on biosecurity measures and to provide strong economic and technical analysis and advice to modernise the culture systems will increase production efficiency and competitiveness. This will lead to increased trade (domestic and export) for Pacific aquaculture products.

Programme Activities:

1. Establish a framework to determine break-even price for price-setting negotiations
2. Complete market profiles for selected commodities
3. Develop a Market Information System (MIS), utilising and building on existing systems (e.g. Infofish)
4. Adopt a market-led approach to aquaculture development
5. Enhance the scope of opportunities for niche marketing and value-adding
6. Provide advice in export requirements/compliance and post-harvest standards/procedures (e.g. HAACP)
7. Explore opportunities for branding/accreditation/traceability/certification, based on Pacific attributes
8. Use regional and/or international organisations to influence international trade agreements and certification-setting bodies
9. Conduct value chain analysis for main commodities to increase benefits to producers

Programme Element 6: Technology transfer and improvement

Broadening ideas of research to include training (knowledge generation) while practical issues are also being solved through technology development are both essential elements for aquaculture development. In general, there is a need to bring the commercial sector into projects earlier and to plan transition phases using business planning and commercial reality checks. Collaboration and coordination in developing a long-term strategy and applying resources to applied research are also important. A major aim of the strategy is to improve production efficiency through the adoption of appropriate, proven technology.

Programme Activities:

1. Analyse existing technology transfer mechanisms/strategies
2. Improve access and assimilation of existing and new technology and improved aquaculture strains, and delivery to the private sector
3. Establish Centres of Excellence within the region, and links to Centres outside the region
4. Form closer connections with inter- and intra-regional partners (NACA/FAO/SPC/JICA/PICT national institutions, etc)
5. Develop a trade directory for farm inputs (seed, feed, equipment, etc) and examine options for a 'one-stop shop' approach
6. Strengthen and target applied-research to solve nationally-relevant constraints with an emphasis on feed, seed and production systems
7. Plan study visits for both government and private sectors and other methods to demonstrate new/innovative methods of production
8. Discuss cross-cutting issues including those relating to gender and consideration of negative social outcomes from aquaculture for women
9. Increase capacity building including generic/cross sector capacity building under Programme Element 2 and detailed capacity building requirements to be included under each programme elements
10. Provide a forum to discuss: the effects of climate change and environmental sustainability for the sector; the proper role of governance; and concerns regarding programme implementation and monitoring
11. Outline detailed research requirements to be included under each programme elements

IMPLEMENTATION, MONITORING AND EVALUATION

Implementation of the strategy requires strong commitments from PICTs, strong driver of the process and significant resources. Detailed implementation (list of priority activities, responsibilities, log frame analysis, life of project work plan, etc.) and monitoring and evaluation plans (institutional, context and results monitoring) are essential. Mechanisms for implementation and monitoring of the strategy including associated responsibilities as well as mobilizing funding resources shall be developed through a consultative process among relevant stakeholders.

APPENDIX 5

CLOSING REMARKS

by Mr Jiansan Jia, Chief, Aquaculture Service,
Fisheries and Aquaculture Department,
Food and Agriculture Organization of the United Nations (FAO)

Distinguished experts and participants,

Good afternoon!

We have come to the end of our four-day workshop. It is a great honor for me to make the closing remarks on behalf of both FAO and SPC at this important event.

First of all, I would wish to extend our grateful gratitude to the government of Fiji, and our special thanks to the Honorable Minister, Mr Joketani Cokanasiga, and also to our Fijian colleagues who have helped in organizing and convening the workshop.

It is my great pleasure to attend this workshop, which had more than 50 participants from 18 countries and territories and 8 partner institutions and organizations. After four full days of interesting discussions and presentations, it has come to the end with great success. In the past few days, we had the opportunity to learn from quite a few presentations of their respective past experiences and views on development of aquaculture in the Pacific island countries and territories, which have highlighted the present status and the issues the sector is in confrontation with, and identified challenges and analyzed advantages and constraints. There were 3 working groups that had extensive discussions with focus on identifying priority issues and proposing solutions.

We have heard the presentations by different working groups of their discussion on issues identified and solutions proposed for resolving the problems that are encountered by the aquaculture development in the Pacific island countries and territories. The conclusions of the discussion revealed that the Pacific islands are of full resource potential for aquaculture development, including farming of food and non-food and ornamental commodities. Its contribution to food fish supply and economic development and livelihood improvement of the islands can be very much enhanced as the resource potentials are tapped off. Present status of the sector development in the Pacific, with exception a few cases, in most island countries and territories, is still in its early developing stage, or in other words, at the stage to take off. It is noted that there is a strong call for increased regional cooperation or adopting a regional approach to address the issues that faced by, if not everyone, most countries and territories in the region in common. The workshop has come up collectively with a regional strategy containing a number of programmes, outcomes and activities. Dr. Mike Batty has summarized the output and the way forward. As for the issues identified will need all stakeholders to react to, the group presentations have made a number of recommendations and I think it would be a good source of information and recommendation for being up-taken by different stakeholders including many presented here today.

As I mentioned at my earlier statement, FAO is committed to help to tap the potential for aquaculture growth in the region and we would like to work with all of you in this endeavor. I can assure you that the FAO Fisheries and Aquaculture Department and the Regional Office for Asia and the Pacific and the Subregional Office for the Pacific will work closely together with you in promoting aquaculture

development in the region through all possible means, including involving and partnering with all interested parties and stakeholders. I also wish to see strengthening exchange and cooperation between the Pacific and other regional institutions, present in here or absent from this workshop, in order to share the successful experiences and lessons of other regions in the aquaculture development.

Before closing, I would express on behalf of my fellow participants our sincere thanks to the interpreters, to our facilitator, Mr Ian Cartwright, to Workshop Assistant, Genevieve, without their excellent support, we could hardly achieve the success of the workshop.

Finally, I would like to thank you all, my fellow participants, for your active participation and contribution. I am looking forward to working with you and seeing you in the future in promoting the Pacific islands aquaculture development!

Vinaka Vakelevu!

APPENDIX 6

WORKSHOP PHOTOGRAPH

Participants to the FAO/SPC Regional Scoping Workshop: Development of a Pacific Aquaculture Regional Cooperative Programme, 11-14 October 2011, Nadi, Fiji.

The FAO/SPC Regional Scoping Workshop: Development of a Pacific Aquaculture Regional Cooperative Programme held from 11 to 14 October 2011 in Nadi, Fiji was convened to engage high level discussions between national governments and international development partner organizations on the need to provide more attention to aquaculture development to small island developing states including the Pacific Island Countries and Territories (PICTs).

Fifty five experts representing 18 PICTs, representatives from the private sector, eight international and regional institutions, and SPC and FAO staff participated in this regional scoping workshop whose overall objective was to assess the needs and map out a coordinating strategy and actions for the development of aquaculture in the Pacific region. To this end, a Regional Aquaculture Strategy was drafted with a vision of a sustainable aquaculture sector that meets food security and livelihood requirements based on economically viable enterprises supported by enabling governance arrangements.

The overall outcomes of the strategy are envisioned to include: (1) successful, competitive and biosecure aquaculture enterprises, using and adapting proven technologies to meet local requirements (technical, social and environmental); (2) recognition of the actual and potential contributions of the aquaculture sector towards regional livelihoods and food security (in response to the pressures of population growth, depleted/overfished inshore fisheries resources and climate change); and (3) framework for aquaculture development that builds cooperation among PICT government aquaculture institutions, national, regional and international agencies, farmer groups/associations, and other stakeholders.

To meet these objectives, the strategy proposes six broad programme elements including biosecurity, capacity building, feasibility assessment, statistics and data, markets and trade and technology transfer and improvement.

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