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PROPOSAL FOR A REGIONAL POST-HARVEST FISHERIES LABORATORY

(Paper prepared by the Secretariat)

Introduction

1. The ambition of all countries in the region is to catch more fish. The increased fish landings would be utilised either to improve supply of fish to the domestic market, help reduce imports of canned fish or other canned protein foods, or as a means of securing foreign exchange by exporting fish or fishery produce to overseas markets.
2. In all cases proper handling and improved processing of the catch plays an essential role. The objective must be not just to minimise post-harvest losses, but to aim for the highest quality standards which must consistently be kept to compete with imported produce, or more importantly to succeed in an increasingly demanding and competitive world of export marketing of seafoods. These aims can only be achieved through growing awareness of post-harvest fisheries needs, quality assurance procedures, established product standards, novel processing and packaging technology, marketing strategies, combined with the support of analytical, research, development, extension and advisory facilities.
3. Much is being done through the Fish Handling and Processing Project (FHPP) at SPC, and other regional organisations that are involved in post-harvest fisheries work, to assist countries in the Pacific. Most of this assistance and country assignments are either advisory, training orientated or of a basic applied/practical nature. Valuable as these inputs are to the region, they are limited by the lack of analytical support facilities that are normally not available in-country. This is coupled with time constraints for carrying out detailed studies during country visits of fixed and limited duration.
4. More could be done to help the region if laboratory facilities and highly trained staff were available to take on the more difficult and time consuming research and development practical and analytical work (in preference to going outside the region), thus supporting the type of in-country work presently undertaken by post-harvest fisheries specialists.
5. It is not feasible in the short term for most countries to acquire their own sophisticated laboratories to carry out these support functions and to justify the high capital and running costs for purchasing and servicing expensive analytical equipment with respect to the size of their fishing industry. Difficulties in appointing highly trained and experienced

fisheries technologist must also be expected. It therefore follows that a central facility that can address post-harvest applied research and development problems, quality assurance requirement, and other technical needs, on behalf of countries, would be the most efficient and cost effective way for the region to acquire these services.

The Need for a Regional Post-harvest Fisheries Laboratory (RPFL) for the Pacific

6. There are at present no laboratory facilities in the region that actively pursues post-harvest fisheries R&D, product development, analytical support needs, etc. This leaves the region at a distinct disadvantage when aiming to improve and expand their activities for domestic and export marketing of fish and marine products of the highest quality.

7. The only regional laboratories available for analytical work are those in PNG (Institute of Medical Research, Department of Primary Industries and PNG University of Technology), and INR-USP in Fiji. Specialised research institutes are actively involved in marine toxins research, such as medical laboratories in French Polynesia with ciguatera (Louise Malarde Medical Research Institute), and IMR, Fiji, in the recent past. Some of the pathology departments attached to national hospitals may be able to carry out basic microbial water quality analysis to test hygienic quality of water for processing plants and ice makers. These however are not set up for product development, or applied research and development work in fisheries. In practice these facilities are rarely used for fisheries analytical work.

8. Fish processing and marketing has become an increasingly sophisticated fisheries activity. Progress in this field has only been achieved through research and development work and the introduction of new packaging technology, that tie in with the demands of various markets for high quality and diverse products. This coincides with a period of increased consumption of seafoods for what is now perceived in many parts of the world as a health food commodity. Opportunities are available to take advantage of the increased demand by manufacturing products with a "Pacific" character. For example, one possible raw material that could fall into this category are the tunas, the most important marine resource in the Pacific. It should be possible to develop a range of value-added products from this raw material that could have an impact on certain targeted markets. However, without the support of product development facilities, analytical laboratories, which are linked to a marketing advisory service (for market research, import regulations, etc) opportunities like this could be lost.

9. Quality assurance, checking processing hygiene and investigating marine toxins and heavy metals are additional functions of analytical laboratories. Without these precautions, guarantees can not be given on the safety and quality of exported fresh and processed fish. This is important as the reputation of the exporter, and often the country from which the product came from, suffers as a consequence.

10. In the past, outside institutions have performed most of the post-harvest research work specific to the requirements of individual

countries, that need a laboratory input - either by undertaking the research assignment in-country or by working on raw materials transported to the research establishment. For example, the Overseas Development and Research Resources Institute (previously the Tropical Development and Research Institute) of London, carried out ice storage trials of fish in Vanuatu, and conducted frozen storage trials of fish from Vanuatu and product development work on giant clam from ICLARM's Giant Clam Project, in the U.K. Other institutions in countries closer to the Pacific may also be willing to assist with specific projects related to their areas of proven expertise. These would include New Zealand, Australia, Hawaii, and S.E. Asian countries. Having these neighbours on hand does not however detract from the need for the Pacific to acquire its own laboratory facilities. In fact, it is more likely that a RPFL will create more project work that will require cooperative input from other countries, and the facility can be made available for advisers and consultants visiting the region to utilise. Interaction of ideas and exchange of personnel between research establishments will also be possible and desirable, and the region will be able to contribute positively to post-harvest fisheries meetings such as the four yearly IPFC workshop on fish utilisation and marketing.

11. As well as the lack of facilities there is a dearth of qualified fisheries technicians and technologists in the Pacific to appoint to key positions within a RPFL. Minimum qualifications for these posts must be graduate degrees or diplomas in either chemistry, biochemistry, microbiology, food science or food/agricultural engineering. Additional specialised training in post-harvest fisheries technology is also advisable. An early initiative would be needed to identify suitable graduates for training courses in fish handling and processing technology to start addressing this problem, so that technical staff from the region can eventually be employed at a RPFL.

What Services Could a RPFL Offer the Region?

12. The ideal laboratory facility should be able to offer regional fisheries departments and enterprises a wide range of services and practical support in post-harvest fisheries. These services could range from hygiene testing of processing operations to storage life of new products, and product development and packaging to training in quality assurance techniques (see Appendix 1). This would complement the assistance presently offered by the SPC's FHPP, and other organisations in the region active in fish handling and processing, increasing the overall effectiveness of post-harvest fisheries programmes. The envisaged operational relationship between the practical and research services of the RPFL and advisory and training programmes of projects such as SPC's Fish Handling and Processing Project, is shown in Appendix 2. This clearly shows the close interdependent and complementary association that should develop between the RPFL and other post-harvest fisheries projects.

13. A provisional lists of projects that the RPFL could undertake under each individual function heading is also shown in Appendix 1. This demonstrates an extensive and diverse programme of possible activities that are likely to need inputs by the RPFL. This list is meant as a guide-line only, with the work undertaken by such a possible facility directed by

regional and individual country's needs and priorities.

14. Educational opportunities should also be encouraged for undergraduates and post-graduates to work on specific research projects through studentship and scholarship schemes. This would give valuable research training and experience for graduates and post-graduates with the aim that once they returned to their own countries they could undertake or direct post-harvest fisheries projects at home. This in the long term would help build up a pool of experienced technologists and strengthen coverage of post-harvest fisheries in the region.

15. Training courses on specialised subjects could be run at the facility. These could for example include courses on quality assurance, packaging technology, basic hygiene for processors, and product development. Maximum duration for such courses would be about two weeks to minimise interruption of the research and development function of the RPFL. It is envisaged that general courses in fish handling and processing will remain an in-country or sub-regional activity. However, expert staff from the facility should be available to assist with these courses and institutional courses when necessary.

Setting up a RPFL

16. If the RPFL is to service the region effectively it will be important that it is located where as far as possible all countries can benefit from its work and where fresh raw materials for research projects and product development are easily accessible. The RPFL should therefore be:

- within easy access to a reliable supply of fresh and diverse species of fish and non-fish marine produce to supply the laboratories with the best raw materials for R&D programmes. A fish landing would be the ideal location. An additional advantage to being near a fish landing is that researchers will be able to go out fishing with commercial, research or training vessels and collect live samples of fish in preparation for specific experiments. If the RPFL is sited away from landings difficulties are likely to be encountered in finding the fresh raw materials necessary for scientific work, or samples will have to be frozen and stored resulting in inferior starting materials. Additional transport costs will also be incurred when collecting samples from distant landings.
- centrally located. Preferably this should be as close as possible to an international airport with good links to other countries. This means samples that need to be analysed can be sent to the RPFL by the most direct and quickest air-package routes; representatives from countries wishing to discuss post-harvest fisheries matters can conveniently call into the laboratories for talks; and, specialists and consultants visiting the region can have easy access to the facility for practical work, service or advice. Convenient access to target export communities will make marketing possibilities and trials much easier to carry out.

- close to servicing facilities for sophisticated analytical apparatus and refrigerated equipment either within the country where the RPFL is located or by good air-links to the original supplier or servicing agent.

17. To carry out the functions expected of the RPFL the following basic facilities will be needed on one site, as separate rooms and laboratories:

- Wet laboratory/processing room/small pilot plant, with chill and frozen storage (small ice maker, blast freezer, plus ice, chill and cold stores)
- Chemistry/biochemistry laboratory
- Microbiology laboratory
- Product development laboratory (inclusive of taste panel booths)
- Teaching class-room
- Library
- Offices.
- Toilets and wash-room
- Open area outside for building fish driers, smokers, etc. for demonstrations and experiments

The main disciplines within the RPFL have been allocated their own laboratories, as it is important from a safety and practical point of view that laboratories with different functions are given their own specific rooms. A fully updated library is also considered an essential feature.

18. The RPFL will primarily be a research facility, with a significant educational input. It therefore follows that it should be closely associated with an academic institute, the obvious one being the University of the South Pacific and Institute of Marine Resources. Technically this is considered acceptable if the RPFL is located on the same site as the IMR, because it could contribute to courses already established at the Institute. For example, assisting with fish handling procedures on-board fishing vessels and at landings, while the fishing activities of the institute would supply the raw materials need for research, product development work, etc. An additional advantage would be the possible access to other University departments such as the Institute of Natural Resources to carry out specialised analytical procedures that they are already able to perform (e.g. heavy metals). Economically, shared buildings, manpower/expertise, transport, equipment, materials and running expenses would be considerably more cost effective for what is likely to be an expensive facility to set up and run. The only other alternative is to establish the RPFL as a single unit. This could also be appropriate if the laboratories were to be located according to the technical prerequisites previously stated above (see section 16).

Conclusion

19. The aim of this paper is to present the technical and practical requirements for establishing a RPFL in the Pacific, a concept supported in principle by a FFA technical meeting which followed the FFC in April this year.

20. A summary of the technical parameters and prerequisites of such a facility have been outlined so that factors affecting its installation have been considered - the aim being to ensure that the region acquires the best facilities possible to meet the post-harvest fisheries needs and to work side by side with and give back-up support to fish handling and processing projects such as SPC's.

21. It is clear that there is a need for careful evaluation before deciding on whether the region proceeds with a RPFL, as suggested in this paper, and if so questions such as where should such a facility be located, who should administer and supervise its operation, what institutional/organisational links should be made, size and manpower needs, training requirements and educational functions, must be addressed in detail, taking into account the technical and practical points made here.

Appendix 1. Main functions of a RPFL with topics for possible project work**Applied Research and Development:**

- Refrigerated storage trials
- Freezing trials
- Microbiological evaluation of traditional products

Product Development:

- Alternative tuna products
- Giant clam products
- Trochus meat products
- Fish snacks
- Delicatessen smoked products
- Dried products
- Salted/pickled products
- Marinades

Packaging Technology:

- Primary package (flexible packaging material e.g. vacuum pack, vacuum-skin pack; cartons; retortable pouches, etc)
- Secondary packaging (boxing, banding, shrink wraps, etc)
- Raw material handling (fish boxes, insulated boxes - locally constructed)
- Air-freight packaging
- Labelling requirements (legislative and nutritional details)

Improved Processing and Storage Procedures:

- Sun-drying (natural/artificial)
- Traditional smoking
- Alternative (indigenous) material for smoking fish
- Salting methods
- Sea-salt manufacture

Miscellaneous/by-products:

- Shark fins (processed and packaged to finished product)
- Fish maws
- Fish oils
- Shark and fish leather
- Marine crafts (shells, coral, etc)
- Seaweed
- Beche-de-mer

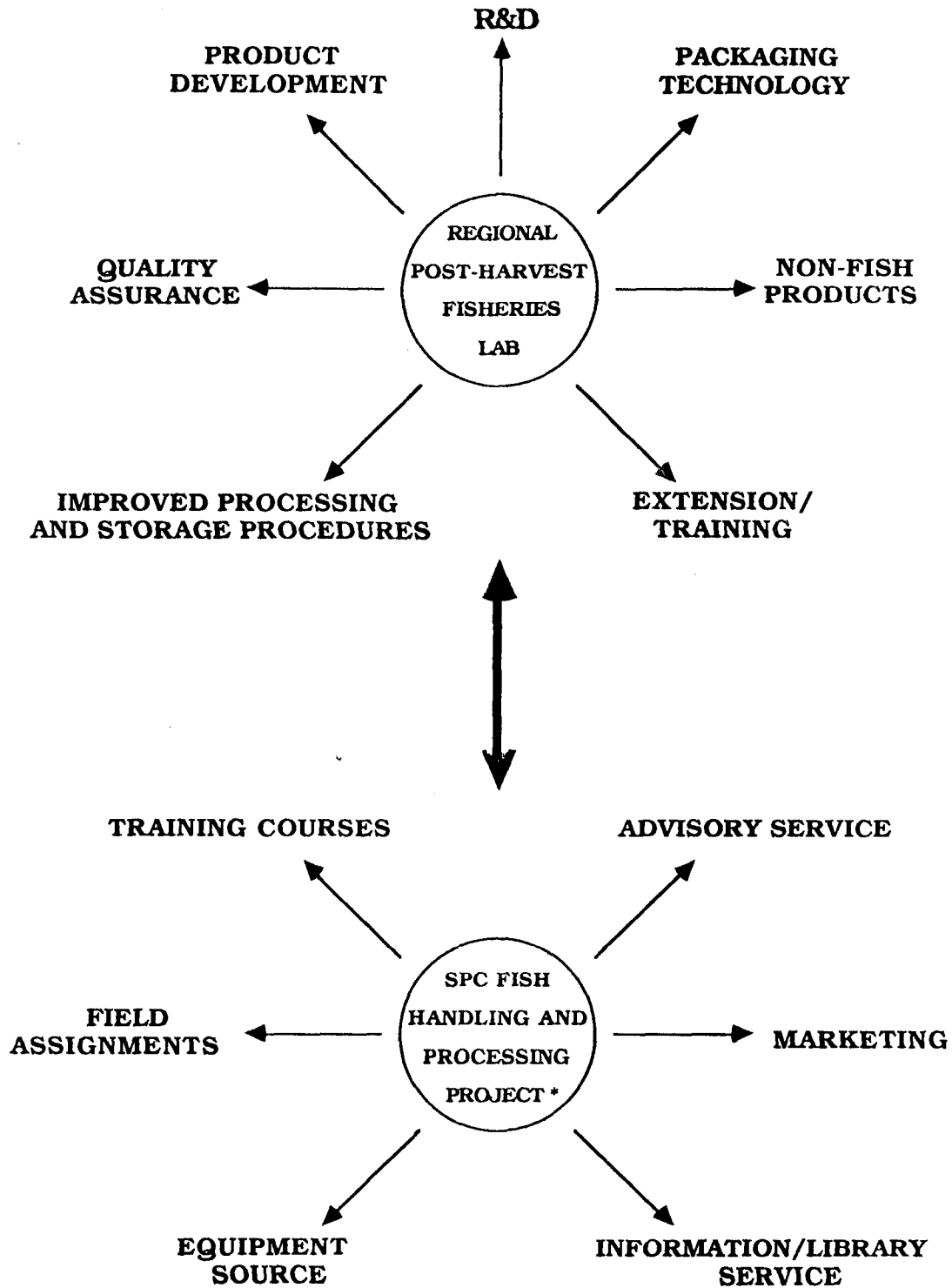
Quality assurance and product assessment:

- Chemical/Biochemical laboratory (proximate analysis, nutritional analysis, heavy metals, marine toxins, histamines, etc)
- Microbiological laboratory (water quality, product testing, storage life)
- Product standards
- Solar salt analysis

Extension/Training:

- Field evaluation and training of developed handling and processing methodologies and equipment.

Appendix 2. Services that could be offered to countries by the RPFL and its interactive relationship with SPC's FHPP



* + Other organisations involved in FH&P