11 INSTITUTIONAL DEVELOPMENT AND CAPACITY BUILDING REQUIREMENTS

11.1 Purpose

There are many differing approaches towards quarantine and related aquatic animal health procedures in the countries of Asia, related to the social, cultural, economic and ecological environment; the different status of aquaculture development; and the priorities given to aquaculture and health management. In many cases, the implementation of the *Technical Guidelines* will require further development of policies and institutional responsibilities. In some countries, and particularly Low-Income Food-Deficit Countries (LIFDCs), substantial capacity building may be required to protect investments in aquaculture and the livelihoods of people involved from the negative impacts of aquatic animal pathogens.

The implementation of the *Technical Guidelines* is dependent on having an appropriate national administrative and legal framework. Another critical aspect is having sufficient national capacity in terms of knowledgeable and skilled manpower and institutional resources for their implementation (see *Technical Guidelines*, Section 13). The purpose of this section is to provide guidance in the policy, institutional and human capacity considerations for the implementation of the *Technical Guidelines*. Reference is provided below to the health management procedure identified in the guidelines.

11.2 Legislative Frameworks

There are varying degrees of aquatic animal quarantine or health-related regulations to be found in the region, ranging from total absence to strict regulation based on precise legislation. In general terms, a legal framework concerning the health management procedure will be essential to implement the *Technical Guidelines*. There are various experiences within the region on aquatic animal health legislation, including quarantine, which can provide useful guidance.

Australia and Indonesia require quarantine of all imported live aquatic animals as mandated by the Australian *Quarantine Act 1908* and Indonesian *Law No 16/1992*, and their subordinate legislation. Countries such as the People's Republic of China and the Philippines report well-structured and comprehensive legislation for aquatic animal import/export, although regulations do not currently require mandatory quarantine or certification. Pakistan reports the existence of the necessary legislative framework giving its Quarantine Department a mandate to prevent the spread of disease both into, and out of, the country. Vietnam reports that its first regulations dealing with the introduction and transfer of aquatic animals recently came into effect.

Singapore permits import of live fish for human consumption only from countries not on their prohibited list. Ornamental fishes must be healthy and free of clinical signs of disease. An accreditation scheme for those exporting ornamental fish from Singapore also exists. Several member countries e.g., Hong Kong and Myanmar, report no legislative framework to control aquatic animal health or quarantine except for exportation, where a certification requirement is imposed by the importing country. Cambodia, Hong Kong SAR China and Nepal were among those countries with little or no live aquatic animal health and quarantine legislation.

In all cases, legislation for the import and export of live aquatic animals tends to be more comprehensive than that for the within-country movement of aquatic animals. Equally, more precise legislation dealing with the importation of live aquatics was reported in comparison to that dealing with their exportation. In terms of health, export regulations are governed predominantly by importing country requirements.

Several Asian countries also indicated the existence of environmental/conservation policy/regulations that, outside of direct animal health management procedures, impact on import/export or the internal movement of live aquatic animals. In Australia, for example, both import and export are regulated through the *Wildlife Protection (Regulation of Exports and Imports) Act 1982,* as well as by international environmental protection treaties such as the *Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).* Similar legislation was also reported from Sri Lanka (*Fauna & Flora Protection Act*) although their legislation specifically excludes ornamental fish. Nepal reported that its *Aquatic Animal Conservation Act 1961* is currently under review. In general, there should be consistency between the various legislation concerning the responsible movement of live aquatic animals.

Given the significant impact of disease on regional aquaculture and fisheries, several countries have initiated processes for the development of policy and/or legislation. Bangladesh, for example, has announced an *Environmental Policy and Implementation Schedule*. In this regard, an executive committee has been formed with the brief of formulating a national quarantine system. Although Australia has one of the most developed live aquatic animal quarantine programs, recent reviews have identified some concerns. These are currently being addressed as an overall national review of aquatic animal import policy. The Republic of Korea is also in the process of considering proposals to impose quarantine requirements for imported aquatic animals, as well to control internal fish movement. Malaysia has proposed introduction of live fish quarantine and upgrading of support services, based on regional requirements. Legislative changes proposed in Thailand have focussed on exports, with a centralized pre-export holding and certification facility currently under consideration. A thorough review of current legal frameworks in relation to the health management procedures given in the *Technical Guidelines* would provide a sound basis for the identification of future needs to development of legislation.

11.3 Resources

The resources that are needed for aquatic animal disease control take many forms; the implementation of the *Technical Guidelines* will require access to institutional, laboratory and human resources.

Institutional Resources

Institutional resources comprise both those organizations responsible for policy development, and those applying and enforcing regulations. The country strategies indicate a range of existing governmental infrastructure in terms of aquatic animal trade and production. Institutions other than those holding direct legislative responsibility for aquatic animal health and live animal movement involved in this area, include government and semi-government research organizations, universities, international research institutes, extension services and private-sector companies with diagnostic capability.

In Malaysia, where the primary responsibility for aquatic animal health lies with the Ministry of Fisheries, laboratory support and expertise are provided by three major universities, as well as the Department of Veterinary Services (Ministry of Agriculture).

In Japan, certification/permits are provided by the Ministry of Agriculture, Forestry and Fisheries (MAFF) through the Japanese Fisheries Agency (JFA). Disease control efforts are supported by a network of organizations coordinated by the Fisheries Agency - Office of Fish Health Protection, which includes the Japanese Fisheries Resource Conservation Association, the National Research Institute of Aquaculture, the National Fisheries Research Institute, universities and local (prefectural) government. The certification/permits are part of an integrated aquatic animal health management system.

Extension services and integrated networks of support services, whether managed at a national or state level, are a very effective system for aquatic animal health management. They can and should provide support at the farm level. In Korea, for example, the National

Fisheries Research and Development Institute (NFRDI) imposes strict inspection and certification of imported live fish/eggs, as well as conducting export certification to comply with importing country specifications. NFRDI has subsidiary facilities in the form of three major fisheries institutes, five local fisheries laboratories and three inland fisheries laboratories. China reported on its National Fisheries Extension Centre (NFEC), which includes a national demonstration area for disease control in shrimp culture. A fisheries extension service was also reported by Cambodia.

As some of the health management procedures outlined in the *Technical Guidelines* are relatively new to some countries, substantial institutional strengthening may be required. A useful starting point may be an institutional analysis to clarify responsibilities and identify the requirements for institutional strengthening. As resources for institutional strengthening may be limited, effective use should be made of existing resources, rather than building of new structures. For example, in some countries, the use of existing veterinary institutions may be an effective means of dealing with the health management procedures in aquatic animal movements. In Lao PDR, for example, local veterinary networks are being considered for extension of aquatic animal health management advice to farmers.

Laboratory Resources

The diagnostic laboratory resources range from those whose primary purpose is non-diagnostic (e.g., general bacteriology or water quality laboratories) through general veterinary facilities to laboratories specialized in aquatic animal disease diagnosis for fisheries and/or aquaculture. Diagnostic capability in many of the participating countries was reported to be deficient, from Level I through to Level III capacity. Enhancement of laboratory facilities and increased training are frequently identified within national strategies as areas for improvement. As emphasized in the *Asia Diagnostic Guide to Aquatic Animal Diseases*, there are considerable opportunities for regional cooperation to assist countries in the region build laboratory capacity.

Among the most highly developed facilities reported in the region are the CSIRO Australian Animal Health Laboratory, the Aquatic Animal Health Researcher Institute (AAHRI, Thailand), and the National Fisheries Research and Development Institute (NFRDI, Korea), as well as the many relevant university laboratories across the region. These are potential resource centers for support to countries with lesser-developed diagnostic capacity.

Several countries reported hierarchically structured laboratory services, such as that described above for the NFRDI in Korea. For example, in Indonesia, the Centre for Agriculture Quarantine (CAQ)has seven fish quarantine service stations and five sub-stations. Similarly, in the Philippines, the Fisheries Quarantine Service (FQS) has units at relevant ports of entry with diagnostic support provided by central and satellite fish health laboratories. In general terms, the responsibilities of diagnostic laboratories and capacity building requirements should be carefully reviewed to make effective use of existing resources, before building of new facilities.

Human Resources

The level of human resources involved in aquatic animal disease control, measured both as the number of staff and as the level of expertise and formal qualifications held by individuals, varied greatly between participating countries. Human resources development at all levels – from the farmer to the level of the policy maker – will be essential to support the implementation of the *Technical Guidelines*. The numbers of staff involved in national aquatic animal health control varies from a few individuals to several hundred, such as in the case of Indonesia, which reported 300 fish inspectors employed at the CAQ under the Ministry of Agriculture. Of these inspectors, 209 have been trained in basic fish disease diagnosis and treatment, 81 in bacteriology, 24 in immunochemistry, 30 in laboratory management and 20 in histopathology.

The range of expert disciplines includes veterinary science, virology, bacteriology/mycology, parasitology, water/soil chemistry and specific aquatic animal health/pathology expertise. The qualifications of staff include doctoral (Ph.D.), master's (M.Sc.) and bachelor's (B.Sc.) degrees in biological sciences; veterinary science degrees (DVM), and other technical qualifications.

Several countries noted a lack of aquatic animal health expertise and called for greater support for training. Training at all levels must take account of educational level and language skills. The quality of training needs to be monitored to ensure effectiveness. This is particularly critical at the extension and farm levels, where many people must be trained and educational levels may be lower. This is also the first and most important level of reporting and information gathering. In general terms, considerable capacity-building in terms of knowledge and skills s required at this – the pond level – among farmers and local (government and non-government) institutions involved in working directly with farmers.

Training at the satellite, national and regional laboratory levels must ensure accuracy and standardization if it is to fulfil both the needs of farmers and of an internationally recognized reporting system. Standardization of approaches will benefit from better national and regional cooperation in human resources development. In researchers, the capacity to carry out problem-solving research must be available. This research must be demand led and serve the end user. Research products must be delivered in a timely manner, and in a form that serves both the research and farming communities. In this way, both national and regional needs will be served.

Technical and other support staff must be trained in order to relieve researchers and diagnosticians of the burden of routine work and to ensure that this work is handled rapidly.

Training and infrastructure development should be clearly matched against requirements (e.g., potential pathogen risks, economic importance). Many of the least costly activities are ultimately the most important and are likely to generate the greatest benefits, as disease awareness and reporting begins at the pond side. Analysis of cost-benefits from investments in infrastructure and training should be considered at an early stage in the development of national strategies.

There are considerable opportunities for regional-level training, particularly in those areas where advanced skills are scarce or not yet available. This may include training in such fields as epidemiology, histopathological diagnosis, immunology and molecular biology, virology, extension methodology in aquatic animal health, mycology, research methodology and design, and risk analysis and management. Training should be matched against the health management procedures given in the *Technical Guidelines*. Examples of knowledge and skills required for selected health management procedures is provided in the table below.

A rational approach to staff development requires national institutions to develop a policy that identifies their requirements and focuses on areas of need, identifying appropriate staff and providing them with the training and resources needed to develop facilities and services.

Many, if not all, skills and facilities required for staff development in this field already exist in this region. An inventory and database of personnel and institutions should be developed to assist in identifying and mobilizing them. Such an initiative was carried out by the South East Asia Aquatic Animal Disease Control Project (SEAADCP) in AAHRI and could be expanded to encompass this aim. Skilled staff, once identified, can be mobilized to provide training and technical assistance. This could be more cost effectively provided within the region, particularly in light of the current financial climate.

Level	Site	Activity	Requirement
I	Field	Observation of animal and the environment Clinical examination	Investment in training, access to information – little or no equipment required. (Site access may require boat or negotiation of cooperation with culture-site managers/employees). Investment in training and basic equipment; access to information required.
II	Lab	Parasitology Bacteriology Mycology Histopathology	Significant investment in training, equipment and running costs. Access to current information required.
III	Lab	Virology Electron microscopy Molecular biology Immunology	Considerable investment in training and equipment and considerable running costs. Access to current information required.

Source: FAO/NACA. 2000. The Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals and The Beijing Consensus and Implementation Strategy. *FAO Fisheries Technical Paper* No. 402. Rome, FAO. 2000. 53p.

Financial Resources

There are significant differences among Asian countries in the budgetary allocation to aquatic animal health control. Some governments have injected considerable funds into aquatic animal health in response to the devastating impact of disease on aquaculture and fisheries in the region. Others have no specific funding earmarked for aquatic animal health-related activities, although some work is performed using general budgetary allocations for agriculture/fisheries activities.

India indicated its financial commitment to this area, reporting consecutive funding increases to the Indian Council of Agricultural Research (ICAR). Other countries reported substantial financial input toward aquatic animal health control, such as Japan (US$ 400 million), Malaysia (US$ 1.56 million) and China (US$ 1 million). Financial limitations are indicated by several countries to be at the crux of identified deficiencies in infrastructure, diagnostic facilities and relevant expertise in aquatic animal health control. As beneficiaries of improvement in the aquatic animal health status in the region, the private sector should be given consideration as a source of funds for the development of disease control strategies. However, in such a partnership approach, the private sector may want greater involvement and responsibility in policy-making processes. Such funding mechanisms need to be further explored. In general terms, the profile and importance of aquatic animal health management should be increased and arguments made for an appropriate level of resource allocation.

11.4 Harmonization with International Standards

International harmonization of aquatic animal health measures is becoming increasingly important, and all member countries should tailor development of aquatic animal health strategies to be consistent with their international trade and other obligations, such as the WTO's *Agreement on the Application of Sanitary and Phytosanitary Measures*.

11.5 Conclusions

The advent of serious disease incidents in both aquaculture and fisheries in the region over the past decade has resulted in a greater emphasis on aquatic animal health. In response, there has been the development of improved legislative frameworks, diagnostic facilities and

expertise, and an increased commitment to the goals of sustainability and minimizing ecological impacts.

It is clear from the national strategy reports that much remains to be done. Greater resources coupled with increased cooperation between member states, and a degree of harmonization of aquatic animal disease control policies and measures will facilitate meeting this goal.

The following are three specific areas that countries in the Asia Region should consider when developing aquatic animal health strategies:

- jurisdictional clarity,
- consistency with international standards and obligations, and
- greater participation of the private sector in policy making and providing financial resources.

Consistency between terrestrial and aquatic animal systems will provide increased efficiency and a larger workforce of trained staff at times of peak demand, as well as facilitate meeting international obligations.

11.6 References:

FAO/NACA. 2000. The Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals and The Beijing Consensus and Implementation Strategy. *FAO Fisheries Technical Paper* No. 402. Rome, FAO. 2000. 53p.