

Producer Associations and Farmer Societies: Support to Sustainable Development and Management of Aquaculture

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Introduction

The role of Associations within professional life can vary, but is generally one of uniting the views and actions of a profession for the common good. This paper tries to demonstrate how different types of Associations can play a significant part in support of the sustainable development and management of aquaculture.

As aquaculture develops in many countries, it is playing an important and complementary role to traditional fisheries and providing increasing amounts of food products for consumption in local and international markets. While providing significant potential for poverty alleviation and improved human nutrition in the developing countries, the sector is required to do this in a sustainable manner, as described in the FAO Code of Conduct for Responsible Fisheries. The aquaculture sector produces approximately one third of the world's food fish supply, a level that is also reflected in different regions. For example, the European Union's aquaculture contribution equates to 30% of all fisheries products¹.

The principal region of aquaculture production is Asia and the majority of aquaculture products (>80%) are produced in low-income food-deficit countries (LIDFCs). While aquaculture is anticipated to contribute significantly to food security and poverty alleviation in the LIDFCs, aquaculture is perceived in the developed regions as being able to offset fisheries catch reductions and provide food of high nutritional quality. Additional benefits include the creation of year-round employment in rural and coastal areas and providing a counter to urban migration.

Semi-intensive production techniques are widespread in the LIDFCs while finfish production in the developed countries has focused primarily on higher value species produced in intensive conditions. While integrated agriculture-aquaculture techniques may be appropriate for LIDFCs, these are rarely practical within the economic conditions experienced in the developed countries. Indeed, while increasing production may be the foremost consideration in the LIDFCs, market stability, food safety and environmental acceptance are more important to the aquaculturists in the developed countries.

Nonetheless, producers outside the developed countries are attracted to export markets, as demonstrated by the growth in the production and trade of, for example, tropical shrimp, tilapia, salmon, eels and an increasing number of 'new' species. Neither should one ignore the growing trade of aquaculture products between developing countries. Following the adoption of the

¹ "Facts and Figures on the CFP", European Commission 2001 (ISBN 92-894-1842-7)

Code of Conduct for Responsible Fisheries, specific issues and challenges for attaining the long-term sustainability of aquaculture have been recognised. These include several important areas where associative professional structures have an important role to play, notably, the following:

- Comprehensive policies and a supportive legal and institutional framework that support sustainable development cannot be developed without communication and consultation with the major stakeholders, the producers.
- Enhanced participation and consultation of all stakeholders in the planning, development and management of aquaculture, including the promotion of codes of practice and good management practices.
- Promotion of the appropriate and efficient use of resources, including water, sites, seed stock and other inputs.
- Human resource development and capacity building, where training, technology transfer and the provision of and access to information are the most important components.
- Voluntary self-regulatory mechanisms for attaining best practices.

A survey conducted by the Network of Aquaculture Centres in Asia-Pacific (NACA) from 1997-98 that covered about 400 farmer associations, groups and structures involved in aquaculture in 16 countries of the region identified the following general classification of activities of these associations:

- Highlighting farmer problems
- Mobilising public and institutional support for farmers
- Protecting the interest of the association
- Providing technical services to members
- Getting organised to resist exploitation by middlemen and local pressure groups
- Mobilising credits
- Influencing policy decisions

Local and national associations were covered by the survey. In the Asian region there is no regional structure such as a federation of aquaculture farmers.

From the perspective of governments of developing countries, particularly in Asia, aquaculture farmers organisations are seen to facilitate the provision of extension services, credit and market information. In some cases, they are used as sounding boards for policy formulation. To governments, farmers associations are seen as partners in progressing and implementing policies and programmes, which makes government efforts and use of often scarce resources more cost-effective.

Box 1: Excerpt from the Aquaculture Sustainability Action Plan (ASAP) Section on “Policy”

Farmer Associations and the Private Sector

“Farmer associations or groups are gaining acceptance and strength in many countries. The Workshop emphasized that continued and membership, capability and capacity of such associations is an integral part of promoting sustainable development. The role of farmers and private sector industries has been highlighted in connection with several activities in the Action Plan.

- Farmer associations should be established or strengthened where necessary and encouraged to voice the problems and concerns of farmers and act as a mechanism for dissemination of information.
- NACA should assist in the formation of regional and national farmer associations or centres to act as nodes in its network.
- Regional and national farmer associations should take an active role in assisting in the guidance and financing of research and development activities.
- NACA and other agencies should assist in the transfer of appropriate technology through farmer groups.
- Farmer associations should consult and actively engage local communities in the development of farming projects.

The need for a regional organization in Asia was first expressed at a regional workshop convened by ADB and NACA in 1995 in Beijing which, among others, formulated the Aquaculture Sustainability Action Plan (ASAP) for Asia-Pacific. Representatives of farmer and producers associations from the various countries approached Asian Development Bank (ADB) and NACA for assistance in forming a “regional aquafarmers network,” the broad idea being for such network to work in partnership with NACA. The response of NACA was to conduct the regional survey. The Aquaculture Sustainability Action Plan (ADB/NACA March 1996) included a section on Farmer Association and the Private Sector under the “Policy” element of the Plan (see Box 1).

More recently, at the regional AquaFarmers/AquaBusiness Seminar and Exhibit (AFBiS 2002) organized by NACA and the Government of Malaysia concurrent with NACA’s 13th Governing Council Meeting, a joint of session of the delegates of the Governing Council and participants of AFBiS 2002 developed a set of recommendations that included the formation of an Asia Regional Aquaculture Producers Association (ARAPA). The conclusions and recommendations from the seminar (held 15-18 January 2002 in Malaysia) are given in Box 2.

Box 2: Conclusions and Recommendations of the Joint Meeting of the delegates of Asian Regional AquaBusiness Seminar (AFBiS 2002) and the 13th NACA Governing Council Meeting

Discussion, on the final day of the Aquabusiness Seminar 2002, by the participants of the themes and topics of the Seminar focused on potential actions by Government, International Organizations and Producers led to the following conclusions and recommendations:

- The aquaculture production sector is diverse in nature and structure both in Nations and throughout the Region. This diversity means that both the conditions and the needs of the sector are highly variable. The production sector is perceived as urgently requiring:
 - Educational and training facilities
 - Access to reliable information supply
 - Basic and detailed information that assists production and sales
 - Technical recommendations on product use
- Common standards are needed for:
 - Use of chemicals and drugs
 - Overall approach to production standards
 - Best Operating Practices
- Furthermore, there is the scope for identifying additional common interests that will help sectoral development
- The state of Producer Associations is highly inconsistent, again reflecting the diversity of needs within different Nations, and where strengthening is seen as necessary at both the local and national levels.
- Actions required of such Associations should include:
 - Providing a forum for producers
 - Providing the opportunity to access information and technology
 - Improving the communication flow to the ‘grass roots’
 - Demonstration of the benefits of being in Association
- Producers must play a strong participative role in sectoral development but the conditions for an effective stakeholder position have yet to be fulfilled.
- The establishment of Regional aquaculture producer representation is seen as the right move, while recognizing that this may take time to develop. The benefits are recognized and these could be achieved through the formalization and function of an appropriate representative body.
- It is recommended that NACA be used as a catalyst for such development, facilitating the possibility for a Regional Aquaculture Producers Organization.
- For this to be achieved, better knowledge of the activities and importance of existing Associations is needed, particularly where there is interplay with other Community organizations and Councils.
- Action needs to be taken both at strengthening the local and National Associations, while developing such a Regional Organization, noting that the identification of clear goals and common actions is needed.
- It is felt that developing an autonomous Regional Aquaculture Producer Organization would take time and that NACA could provide a degree of support (preliminary infrastructural services) that should be limited in the time and scope.
- Integral to this effort would be the definition of the exact structure, statutory constitution, membership conditions and responsibility of a Regional Producer Organization, established in consultation with National and Regional stakeholders.
- Assistance was also requested for the establishment of an aquafeed network

The position of aquaculture as an important supplier of nutritious and desirable food has been consolidated by unsustainable overfishing practices. The need to develop aquaculture to the point where it can contribute significantly to global food security has to be accompanied by the adoption of sustainable practises and the assumption by the production sector of the responsibilities expected of it. In responding to the challenge of assuring sustainable aquaculture, the production sector has to be organised efficiently for the implementation of the requirements anticipated, be they oriented towards technology or policy implementation. While the debate on the sustainability of aquaculture covers many different technical and environmental questions, it must also include economic and marketing issues as well, subjects that the profession probably knows better than most.

To these purposes, the use of Associations, at the National and Regional levels, provides the basis and the practical means of 2-way communication with the sector that will lead to the improvements in resource and sectoral management that are anticipated.

The need for Associations

Associations that group members of a profession have existed for centuries, where discussion on common issues, for development or for identifying solutions to common problems, provided the incentive for association. Doctors, engineers and architects provide classic early examples where the pooling of knowledge within a common forum was an additional reason for association. These reasons hold good today, particularly where additional stakeholders, including authorities and the public, anticipate dialogue with a profession and where the profession concerned interacts with the public. For aquaculture, the reasoning goes even further because of its interaction with the environment and its production of, primarily, food products destined for human consumption.

One of the earliest associative bodies concerning aquaculture is the 'Confrérie des Chevaliers de la Truite' (the Brotherhood of the Knights of the Trout), which started as the 'Brotherhood of the Fishermen of the King's Waters' in France in 1158. However, the first modern aquaculture Associations started in the second half of the 20th century following the expansion of carp and trout farming. If one looks at the parallel with agricultural farming in Europe, one can see that agriculture developed its representative bodies much more rapidly and in line with its evident importance in contribution. Aquaculture has a lot in common with agriculture due to the rural nature of its activity and, hence, the geographic spread of the profession.

The dispersion of agriculture combined with the localisation of important markets gave rise to specific entities for the common trade of produce, where co-operative structures became common place within the profession. Aquaculture has always suffered by comparison to both agriculture and fisheries in that the smaller volumes produced were largely inadequate to justify either the development of cooperatives or common companies for marketing purposes. While agriculture's interests were increasingly represented through National Unions (such as the National Farmers' Unions that exist in most countries), aquaculture did not attain the 'critical mass' required for such representation until recently.

Furthermore, aquaculture's expansion in the developed countries came at the same time that multiple retail stores (supermarkets) started to consolidate their position within the consumer market. Changing patterns of retail sales have affected almost every supply profession and notably those that provide fresh and chilled food. New requirements for food processing, leading to the development of rigorous standards, combined with ever-changing logistical requirements (e.g. for deliveries and distribution) make food production and supply one of the hardest and most competitive businesses today. The advent of E-commerce and easier international despatching are recent additions to this observation, where today's client demands a fresh, hygienic, nutritious product, which is produced without harming the environment and, of course, at the cheapest price.

Evidently, this position reflects primarily the situation of the markets and trends in the developed countries, which are increasingly a preferred target of the produce of global aquaculture. However, there is no reason to believe that the patterns seen in these Regions will not be repeated elsewhere.

As aquaculture has expanded its activities, legislation has also adapted to accommodate the sector. Nonetheless, development plans and strategies for aquaculture are recent innovations and, in many cases, aquaculture has developed without clear legislative guidance. The legislation that is applied to aquaculture encompasses a wide range of topics, including water management, environmental issues, animal welfare, organic and ecolabelling conditions, work responsibilities, food processing etc. Effective representation of the interests of the profession is often required and requested by government or authoritative bodies (e.g. organisations charged with monitoring the environment). Legislation that incorporates the results of constructive consultation is generally satisfactory to all sides and much easier for general acceptance and implementation by the profession.

Increasingly, the topic of self-regulation and/or governance is raised, particularly where the decentralisation of authority is discussed. Achieving effective degrees of consultation and moving towards successful self-regulation can only be achieved through having an associative body that is authoritative and representative of the profession.

A tendency in Asian developing countries where democratic processes are in place but such processes are influenced by the elite or interest groups is for farmer associations to emphasise their role in policy formulation. For such a group to have any influence at all, it has to be large, although it is also ironic that these farmer groups are led by members of the elite who tend to use the group to advance their political and economic agenda. The organisation thus becomes another power group, enjoying a privileged status by being turned into a so-called “partner” (in reality another agency of the ruling elite) to government. There are however associations or national federations of farmers that take the advocacy and even adversarial stance to governments, but these are rare in aquaculture or even in the larger fisheries sector. Development, whether this is expansion of the activity or, for example, the incorporation of new technologies, requires access to research and training for the development of skills. Linking the production and research sectors is a priority for continuous and good development, particularly during the periods of high growth seen for the global aquaculture sector. It is essential that an efficient bridge is provided to achieve this and associations are one of the important foundations of this process.

The findings of the NACA survey generally supports the above observations. But there there degrees of emphasis of objectives. There was a tendency for farmer groups in countries where the market economy is prone to distortion to include in their statement of purposes a counterweight to these distortions e.g. “getting organized to resist exploitation by middlemen and local pressure groups”. The common purposes among the surveyed groups are those that have to do with provision of services to members, mobilizing credit and other institutional support, and having their problems highlighted and then drawing support for their resolution. In the more developed economies in the region, the associations tend to have more focus on a fewer objectives such as technological services and responding to market requirements.

The main conclusion drawn is that modern aquaculture cannot develop successfully without having adequate and representative associative structures that act not only to promote and develop aquaculture but also to provide a pivotal communication centre for the profession. This has to work in both the upstream and downstream directions, providing information from and to the profession. Most importantly, such structures must have the capacity for being able to develop the opinions and actions required of the profession. While the need for national associations are well recognized, some governments go to the extent of themselves establishing

a national organization and assigning government officials to administer them. In some countries, the government allows the establishment of a national farmers organization whose remit is the broad aquaculture sector (thus including fisheries and aquaculture) and provides assistance as well as regulatory guidance through an Authority.

Establishment of Associations

The creation of an Association can be done for several reasons where the primordial one is the addressing of issues common to the profession in order to identify appropriate solutions. The nature of the issues and the responsibilities assumed by the profession determines the role and scope of the Association.

For example, if the common organisation of the sale of the product of the profession is required, a structure such as a co-operative company may be required. Such a company would probably be limited geographically to producers within a certain zone. The core financing for the company would be made by members (the capital structure) with the retention of a proportion of the sales revenue to assure operations and corporate development.

Where the profession has to link to civil society, including government authorities, the structure foreseen is that of a professional association that is usually incorporated as a non-profit making organisation. The creation of such Associations may be at a local (i.e. a zone within a country) or at a National level (i.e. covering the whole country's production). Financing is generally obtained solely from membership fees.

In the case where several local Associations exist within a Nation, these may be grouped within a Federation (of Associations) that acts as the representative body for the country. Most National Associations are, however, the product of several local Associations. In fact, they can even be the result of the fusion of (previously) local Associations. In such a case, a hierarchy is established where it is the National Association or National Federation that is the voice for the profession at the National level. The financing of a Federation of Associations is primarily from subscriptions provided by the Member Associations.

The case exists where several National Associations wish to group in order to address common issues and the solution provided is that of an International Federation composed of National Associations; this is the case for the Federation of European Aquaculture Producers (FEAP) which is composed of the National Aquaculture Associations in Europe and the International Salmon Farmers Association (ISFA). The financing position is the same as in the previous case.

In recent times, attention has also been given to the creation of inter-professional Associations, incorporating different stake-holders within a sector. In Europe, one of these is the Comité Interprofessionnelle des Produits de l'Aquaculture (CIPA), which incorporates representatives from the production sector, feed suppliers, anglers, material supplies and processors. At the regional level, the closest to this position is the Global Aquaculture Alliance (GAA - www.gaalliance.org). These organisations confirm an encouraging trend towards improved intra-sectoral cooperation.

Efficiency and stability are the foremost requirements for organisational purposes; while efficiency is obtained mostly from practical aspects, stability comes from the commitment of the Members of the Association and, importantly, an adequate financial base for assuring operation. If these requirements are not satisfied, planning for the realisation of effective actions is extremely difficult. Inevitably, with the evolution of such structures and the hierarchy developed, the nature of the issues addressed changes, as do the responsibilities and competence required at each level. In order to develop the subject of this paper, reference will be made to practical experience and the circumstances that contribute to effective actions. It is often said that "it only counts if it works

and it only works if it counts” and assuring that Associations both work and count is a vital issue within the successful management and development of aquaculture.

Incorporation of an Association

Associations are officially-recognised structures that have to be incorporated on the basis of statutes that are acceptable to and agreed by the founder members. These are usually very simple in terms of the goals (e.g. providing a common forum) but due care and consideration have to be given to:

- The Membership structure foreseen, including procedures for candidature and expulsion
- The nature and frequency of statutory meetings
- The operating structure envisaged
- The responsibilities of members, office-holders and Association staff
- The nature of elections of office-holders
- Finance – fees and how they will be calculated

An Association should incorporate members who have a similar or identical legal status and who share common goals and activities. While there may be considerable variation in the scale of operation represented, the goals of a small farmer are very similar to those of a large corporate producer. This is the position of most local and National associations that are responsible for aquaculture. Most Associations are incorporated as non-profit making organisations, so budgets are geared primarily to annual operating costs rather than medium term development. As in any organisation, accurate budget estimations are important since many Associations collect their funds once per year.

Generally, an Association will have a Management Committee or a Board of Directors, which is elected by the Members, and include, at least, a President who is often the sole legal representative of the Association. Office-holders usually provide their work contributions on a voluntary unpaid basis. Small Associations (i.e. a local producer association or farmers’ society) rarely have the financial resources to be able to employ professional staff and are generally entirely voluntary operations. At a national level, where more important production levels are represented and where the responsibilities of the Association may include linking to government and promotional activities, professional personnel are usually required in order to achieve the tasks established.

Association Management

Finance

The core finance of the Associations comes from Membership fees which must be fair and affordable for the members. While there are different methods for calculation of this, the most common technique appears to be a calculation based on 2 parts.

- A basic Membership fee
- A production-related contribution

The funds obtained for this have to be put solely towards Association operations and actions.

In the case of the FEAP, no single Member is allowed to contribute more than 20% of the budget obtained from such fees. This means that should an important financial subscriber leave the Federation, it will not collapse financially. In addition, a member that wishes to leave the Association has to give one year’s notice (and the reasons) prior to departure.

The operations of an Association can best be compared to those of a small business that has a large number of shareholders. Money is often short but many actions are anticipated and a lot of people have valid (and sometimes contradictory opinions). Furthermore, when all is well, members will easily support the Association but when finance is tight, the membership fee becomes of lesser importance. This is also the time that the Association is expected to work hardest. This conundrum can only be resolved by the Association having adequate reserves to operate properly in hard times. While a strong financial base is a luxury that few Associations possess, it is essential to have a regular review of operations, strengths and weaknesses, achievements and failures, in order to improve and to build strength and influence. Skill development within the Association is extremely important, particularly when it is charged with issues that (may) include marketing, consultation with governmental services, public relations and topics related to crisis management.

Management

All Associations should have a transparent structure for their management and administration. This is normally a Board of Directors or, at least, a Management Committee, which is appointed by the Assembly.

In the case of the FEAP, the management structure is composed of a Federal President, assisted by 3 Vice- Presidents, who are all or have been Presidents of their own National Association and who act as a Board of Directors for the management of the Federation, with the assistance of the General Secretary. These posts are all voluntary, with the exception of the General Secretary and staff who are charged with organising all the administrative and operating aspects of the Federation. This type of structure is mirrored by most Associations. It goes without saying that access to skilled and experienced office-holders is an important management consideration. While Association office-holders tend to be active and successful in their profession, it is important to be able to access skills in the topics covered by the Association's work. The appointment of, for example, experienced scientific or veterinary advisers is a regular occurrence for most National Associations.

Awareness, experience and skills related to the prime issues that concern the profession are, of course, required and, if these are not available or adequately represented within the membership, recourse to outside assistance should be made. For example, many Associations have specialist scientific (from the academic world) and public relations advisers in order to address research and marketing issues in the best manner.

Building the capacity and the capabilities of an Association are integral to its success in promoting and assisting development. In the 'information' age, establishing an efficient network for cost-effective and competent communication has become much easier but also requires good information management, providing neither too little nor too much.

Decision-taking

Decisions have to be taken and the appropriate conditions for voting must be anticipated. While general management matters are usually the responsibility of the Association Director or its Management structure, important decisions are usually put to the Assembly of the Association members. While many Associations have a "one man, one vote" structure, this may not always be the case. Within the FEAP, for example, the allocation of voting rights is related to the importance of production. Such conditions must always be agreed by the Assembly and incorporated either into the Statutes or the by-laws of the Association.

Providing the 'right' or 'wrong' response to an issue can be subjective but, in an Association, it is essential that the views of all members are taken into consideration before a public position is

taken. Guaranteeing a fair hearing or consultation is one of the golden rules of operating an Association although, practically, this is not always achievable.

Association work

Since much of the work done within an Association is voluntary, where the participants are active professionally, attention is given to the best use of skills within committees that are allocated specific tasks. For example, the FEAP has several active working groups that cover issues of importance to its members, covering notably:

- The development of a Code of Conduct
- A review of European Fish Health Legislation
- Monitoring of the development of Mediterranean Aquaculture

The GAA developed a Responsible Aquaculture Programme² whose goal is to certify Best Aquaculture Practices at farm level; evidently, it had to develop the guidelines and conditions of certification by using professionals and expert advice and approval is made by a Certification Committee. While such groups have specific tasks to perform, their work has to be transparent and reported to the Assembly for approval. This method of working is very common within Associations and often provides excellent results.

By including expertise that is required for the specific topics (e.g. qualified Delegates and expert advisors), the results and actions, without doubt, can be of very high quality.

Reporting

Many Associations have accurate data on the production and prices of the products of their members and are often very aware of what is going on within the marketplace. Indeed, they often serve to provide National authorities with information of this nature. As a regional example, the FEAP collates data reported for production and (annual average) ex-farm prices for the species represented by its members; this data being seen as being the most accurate and up-to-date information for the Associations. In addition, all meetings are fully minuted and these are made available to all Member Associations. In certain circumstances, copies of selected materials are provided to third parties on request.

A very important tool that is available to Associations, particularly if they have been accorded liaison status with governmental authorities, is that of the Resolution. On matters of urgency, the Resolution (that has to be approved by the Assembly) is a firm declaration of opinion that is addressed to authorities and that should have the weight of well-researched arguments and references.

These actions provide accounted transparency within the sector and are of considerable benefit in demonstrating the responsibilities assumed by the professional sector in addition to the support given to the actions required for assuring the development of sustainable aquaculture.

Additional actions

Research, Training and Development

At the National level, most Associations establish links with national Universities for the purposes of research work. While few Associations are able to afford full-blown research programmes, they are often able to assist with the organisation of field trials and on-site training programmes. Evidently, this should work in both directions – farmers helping students or farmers being trained in new technology.

² <http://www.gaalliance.org/resp.html>

In some cases, Association representatives have been appointed to Institution Committees for the guidance of long-term research policy. Furthermore, there is an increasing requirement for the production sector to provide information on its needs and requirements for the future and the FEAP will be organising species-specific workshops on this issue during 2002-2003 in Europe.

Within Europe, the existence of several important RTD programmes, grouped within the European Framework Programme for Research, has allowed the FEAP to develop an active role within a range of projects. The common theme is that the goals and results of such research are applicable to the whole of the European fish farming sector, as represented by the FEAP. Such projects include:

- 'Aquaflow'³ – the dissemination of the results of EU sponsored research projects on aquaculture (EU RTD project)
- 'Maraqua'⁴ – a review of environmental legislation and issues affecting European aquaculture (EU RTD project)
- Assisting the development of training programmes and skill development (AquaTnet⁵ and Pisces) (EU Leonardo da Vinci programme)

While the FEAP has been the manager of some projects, generally it is incorporated as a partner in order to assure communication to the production sector, as an information dissemination activity. Providing this facility, access to and communication with the profession, is an increasingly important role for the Federation and provides an important model for such regional or national activities. Assuming an active position within RTD actions is an essential job for a professional association.

Association-led actions

For Associations to develop their position in society, they cannot be passive and there are many actions that can be undertaken by Associations, for example in the form of projects or studies, that can be of immense use to their members and the sector that they represent. The development of Codes of Best Practice has been done by Associations at the local, national and regional levels and these are important actions for the development of self- and third-party regulated environmental and quality schemes.

The FEAP led the development of a project for managing price and production data within the European aquaculture sector in order to collate the data from the different countries under common conditions (condition and value). Data from this facility is used for the development of the FEAP reports on this subject. Association websites provide a public window on their activities for professionals and the public alike. This is an essential part of the public presence required of all Associations and Federations.

Perhaps the most important element developed recently by the FEAP is an action entitled 'Aquamedia', a project which is being developed for the purpose of informing the general public of what aquaculture really is, does and contributes. This project has been started using finance solely from within the industry and is a truly international action. Its activities will be wide-ranging and cover 'products' that will be provided on the Internet as well as paper and CD-ROM support.

Providing and promoting access to and communication with the profession is an increasingly important role for the Federation and provides an important model for such regional or national activities.

³ www.aquaflow.org

⁴ Journal of Applied Ichthyology. Vol 17 N°4 pp 137-194 (2001)

⁵ www.aquatnet.org

The Scope of an Association

An Association's field of action or scope is defined by its statutes and the nature of its membership. Experience shows that it is probably better to build on or expand an existing structure than to be too ambitious at the start. For example, many National Associations are the result of grouping existing local Associations. The first aquaculture Associations were species-oriented, e.g. a trout or catfish association, whose focus was localised and limited to the geographic area covered. As aquaculture developed and expanded, such Associations usually grouped themselves within a National structure that was either species or sector-oriented, including all or most aquaculture producers.

The scope of the different structures changed with the evolution of National Associations since these rapidly assumed the position for relations with government and actions taken at a national level. A National Association should have privileged links to its own National authorities and bodies, such as Universities and Environmental agencies, and be able to provide authoritative information about the operations and structure of the sector that it represents. These will usually be the voice for informing the National authorities about the state of the profession and its needs for development. In addition, National Associations are often the organiser of generic marketing campaigns that are made within the country and even in export markets. Furthermore, the National Association should be the coordinator of efforts for public relations, particularly where the sector may come under public criticism.

The goals and scope of action for a regional Federation are quite different since the practical issues addressed by the National Associations are not so evident to achieve at the regional level. In each case, however, growth of the representative activity and the development of influence take time and effort.

A regional Federation rarely has the contact privileges of a local or National Association, partly because of the absence of corresponding regional structures but also because its initial reason for being is usually less directly practical in nature and more one of communication and liaison with its members. It is important for a regional Federation to recognise the interlocutors that are appropriate to its function and to take the steps necessary for the establishment of its own contribution and authority.

The initiative for creating an international aquaculture Federation in Europe originated in 1968, following the creation of the Common Market by 6 European Nations. 4 National Fish Farming Associations (all involved with trout production) created the Federation Européenne de Salmoniculture (European Federation of Trout Growers). By 1990, this had expanded to include salmon farmers and 12 Nations. Following the admission of the countries producing seabass and seabream, the Federation rapidly grew to incorporate most of Europe, counting 30 Associations from 22 countries in 2002.

The primary goal of the FEAP is to provide a forum for the debate of issues (concerning European aquaculture primarily) common to its members and to communicate the results of such discussion to the appropriate authorities. Providing this possibility for fair and equitable debate to sectoral representatives gave the basis for the initial development of the Federation, reinforcing the potential for efficient communication between the Member Associations and developing clear opinions and arguments on matters of importance to the profession. One of the key objectives is the effective communication of these opinions to the authorities, which vary, dependent on the topic, and cover all aspects of aquaculture operation.

For example, one of the most important for the FEAP is the Commission of the European Community, particularly the Directorate General (DG) for Fisheries, which has a specific brief concerning European aquaculture. However, other DGs, which have responsibility for Sanitary

and Consumer issues (DG SANCO), the Environment (DG Environment) and Trade (DG Trade) also have direct relations with the aquaculture sector.

In Europe, many countries that are neighbours to those which are Member States of the European Union have adopted much of the harmonised legislation, a factor that reinforces the position and the reason for being of the Federation. Other international Associations include the International Salmon Farmers' Association (ISFA), which groups Salmon Producer Associations around the world (including the European countries, Canada, the USA, Chile, Australia and New Zealand), and the Global Aquaculture Alliance. The Global Aquaculture Alliance focuses more on tropical shrimp production and its membership covers Associations, private production companies and product importers. Its goal is to advocate aquaculture as an answer to global food needs and to educate producers, consumers and the media in regard of this, while furthering environmentally responsible aquaculture.

It is important for any regional Association/Federation to recognise the interlocutors that are appropriate to its function and to take the steps necessary for the establishment of its own contribution and authority. For example, outside of the links established with the European Commission, the FEAP also maintains liaison status with the FAO of the United Nations, particularly for the purposes of the European Inland Fisheries Advisory Committee and the Aquaculture section of the General Fisheries Council of the Mediterranean. The establishment of the Aquaculture sub-Committee of the Committee on Fisheries is of evident interest to all regional aquaculture bodies.

These links allows regional Associations and their members to be informed on many of the wider issues affecting the sector and often provide access to specialist professional input. On the other hand, there has been a significant increase in the requirement for consultation with the professional aquaculture sector in recent years, reflecting changes in government policies and the requirements of governance, for which a recent White Paper was published by the European Commission, where the higher involvement of stakeholders and the move towards self-regulation are important issues.

This attitude is also reflected in the development of international and interprofessional networks, which may be thematic or specific in nature and where input from the professional sector is required. More recently, it has been realised that market expansion and globalisation imposes better understanding of the markets and increased marketing efforts, particularly for the attainment of improved market stability and where the public image of a sector is increasingly important within an overall development scheme.

When issues such as international trade and market stability, sustainability, development of standards (including organic farming and ecolabelling issues), governance and self-regulation have to be debated, with the professional point of view in mind, this cannot be done in a vacuum. These are topics that pass frontiers and need consultation within the profession on an international basis. For the voice of the producer to be heard, it is essential to be able to provide a defensible sectoral opinion that has authority and cannot be accused of simply defending national interests. A Regional Association must be able to provide apolitical positions, based on science and/or good sense, which support the sector and its development.

Both the GAA and the FEAP have been active in promoting Codes of Conduct and Good Practice and, since each has direct access to producers, this activity has been quite successful in transposing the desires of government into practical actions at farm level. The development of internationally-acceptable standards may also be seen as an activity that could be developed through regional cooperation between such bodies.

Benefits of a Federation

The benefits of establishing a regional Association or Federation are not immediately clear at the start since its actions tend to be more general and medium to long term in effect. For organisations such as the FEAP and the GAA, the immediate advantages to their Members include the ability to meet and discuss issues of common interest on an international basis.

The key benefit of a Federation is to be able to give to its members the facility for informed debate and a platform for unified opinion. The cornerstone of any Association or Federation is the statutes; these have to demonstrate equity in structure and decision, enabling the authority of opinion.

The advantage of providing a common voice for a Regional sector is self-evident, particularly in Europe where the European Commission plays such an important role in determining legislation and actions that directly affect aquaculture within the European Union. The creation by DG Fish of the Advisory Committee on Fisheries and Aquaculture (ACFA), a body that allows direct consultation with the Commission, has placed increased importance on the views of the FEAP, which in turn has imposed increased responsibility on the development of its opinions and the professionalism of the delegates.

Establishing and maintaining links with international organisations involved with aquaculture provides the information and awareness of important topics that affect (or will affect in the future) the profession. Providing information on these to members should also be seen as a priority for a Federation, preparing for debate where necessary. The involvement in research and training programmes is made for a similar reason, while improving the speed and efficiency of the transfer of results to the profession must be seen as a key goal. As the sector has developed in Europe, it has been increasingly recognised as an important player and contributor to the fisheries sector. It is the sector's responsibility to 'stand and be counted' and it is the FEAP's responsibility to facilitate this position.

To be brief, this means knowing what has happened, is happening and is going to happen – a difficult task, but one where the Federation's Members are uniquely placed to be able to provide the answers.

A Federation also allows the achievement of projects or work of a scope that a National Association cannot undertake. Projects such as 'Aquamedia' or international information dissemination are typical of this position and it is the role of a Federation to identify such actions and whether they are appropriate to follow. There is no doubt that by widening the activity of the FEAP to include practical, wide-ranging actions as a supplement to its forum activities has increased its strength and influence.

The lessons learnt

Establishing, operating and managing an Association requires commitment, finance and results. Since seed finance has to come from within the sector, a Federation of Associations has to be financed from the individual Association budgets, which are in turn usually financed by the individual farmers. This means that the Federation budget is unlikely to be important – at the beginning. While this may limit the fixed structure of the Federation, it should not inhibit the basic goals targeted. The provision of a common voice is one of the important benefits of a Federation but this can only be obtained within an equitable forum. Providing the opportunity for the smallest Association to voice its opinion alongside the largest has to be respected. It should also be noted that within the FEAP, whose members speak 17 different languages, the meetings are held in one language (English). Although this can create some difficulties and misunderstandings, it has proven to be a cost-effective and efficient way of working.

The development of projects that involve the Federation can provide additional finance but a Federation's existence cannot be based solely on projects. It is essential to have a good balance between core activities and projects in order to respect the basic reasons for creating the Federation. Development has to be placed after achievement of the initial goals. It is important to recognise the actions and the links that can provide a service to the Members and which they could not obtain themselves individually. As an example of this, the FEAP has established strong links with the European Aquaculture Society and AquaTT (Aquaculture Technology and Training) which are reflected in a number of different ways – participation in joint network projects, distribution and dissemination of information, participation and development of workshops and conferences.

The success of a regional Federation can also be measured in terms of participation, encouraging the involvement of Member Associations and their representatives, without aspiring to be competitive to the function of the Members. Maintaining a complementary balance between objectives and actions and providing the services anticipated are integral to successful operation.

After 33 years of existence, the forefathers of the FEAP have recognised the benefits of their foresight. The Federation provides their platform for developing and resolving international issues that affect their activity, it gives them a common and important voice of opinion and allows the sector to move forward in ways they did not envisage at the time. While no crystal ball is perfectly accurate, one has to foresee that the global aquaculture sector must change and adapt to new circumstances, on many different fronts, and that effective and successful regional Federations are needed by the profession in order to assist the long term sustainability of the aquaculture profession.

In the Asian context, farmer associations should be considered as one of the institutions for a broader community development. As such there is need to foster a basic rapport and working relations among governments, NGOs, and even short-term development projects so that these institutions could work in harmony. The more fundamental need is strengthening of farmers associations so that they can perform their core objectives without dependence (at best) or being reduced to another compliant tool (at worst) for perpetuation of vested national or sectoral interests. The foregoing discussion on professionalising the associations covers this issue.

TABLE 1. TOP FINFISH AQUACULTURE PRODUCERS IN 2000

Referred to in page 9 and 11

Species	Production 1/ (mt)	Production (% total)	Total Value (1000 US \$)	Unit ^{2/} Value	Main producing countries (% species total)
Silver carp (<i>Hypophthalmichthys molitrix</i>)	3,473,051	15.1	3,046,534	0.88	China 92.9, Bangladesh 3.6, Cuba 0.9
Grass carp (<i>Ctenopharyngodon idella</i>)	3,447,474	30.0	2,887,529	0.84	China 91.7, India 4.4, Egypt 1.9, Banglad. 1.4
Common carp (<i>Cyprinus carpio</i>)	2,718,277	41.8	2,836,022	1.04	China 78.0, Indonesia 6.3, India 3.2, Brazil 1.9
Bighead carp (<i>Aristichthys nobilis</i>)	1,636,623	48.9	1,419,136	0.87	China 98.6, Lao 0.3
Crucian carp (<i>Carassius carassius</i>)	1,379,304	54.8	1,040,344	0.75	China 99.7
Nile tilapia (<i>Oreochromis niloticus</i>)	1,045,100	59.4	1,251,405	1.20	China 60.2, Egypt 15.1, Thailand 9.4, Phil ³ 7.4
Atlantic salmon (<i>Salmo salar</i>)	883,558	63.2	2,749,136	3.11	Norway 49.4, Chile 18.9, UK 14.6, Canada 7.7
Roho (<i>Roho labeo</i>)	795,128	66.7	1,487,909	1.87	India 71.4, Bangladesh 15.8, Myanmar 11.8
Catla (<i>Catla catla</i>)	653,440	69.5	650,951	1.00	India 83.6, Bangladesh 15.6
Mrigal carp (<i>Cirrhinus mrigala</i>)	573,294	72.0	527,256	0.92	India 90.2, Bangladesh 8.7
White amur bream (<i>Parabramis pekinensis</i>)	511,730	74.2	588,489	1.15	China 100.0
Milkfish (<i>Chanos chanos</i>)	461,857	76.2	715,091	1.55	Indonesia 47.0, Philippines 44.2, Taiwan ^{POC} 8.6
Rainbow trout (<i>Oncorhynchus mykiss</i>)	448,141	78.1	1,332,254	2.97	Chile 17.7, Norway 10.9, Italy 9.9, France 9.2
Channel catfish (<i>Ictalurus punctatus</i>)	269,367	79.3	447,170	1.66	USA 99.9
Japanese eel (<i>Anguilla japonica</i>)	220,043	80.3	885,092	4.02	China 73.0, Taiwan ^{POC} 13.8, Japan 11.0
Mud carp (<i>Cirrhinus molitorella</i>)	200,102	81.1	200,191	1.00	China 99.9
Black carp (<i>Mylopharyngodon piceus</i>)	170,786	81.9	290,257	1.70	China 99.2
Japanese amberjack (<i>Seriola quinqueradiata</i>)	137,328	82.5	1,235,892	9.00	Japan 99.6
Coho salmon (<i>Oncorhynchus kisutch</i>)	108,626	82.9	408,838	3.76	Chile 86.0, Japan 12.1, Canada 1.9
Mandarin fish (<i>Siniperca chuatsi</i>)	98,859	83.4	840,301	8.50	China 100.0
Total Finfish	23,068,083	100	31,565,104	1.37	China 65.8, India 8.8, Indonesia 2.8, Bangladesh 2.6, Norway 2.1, Vietnam 1.6

1/ Total finfish aquaculture production, live weight equivalents; 2/ US \$/kg live weight equivalent; 3/ Philippines.

TABLE 2. TOP CRUSTACEAN AQUACULTURE PRODUCERS IN 2000 Referred to in page 12

Species	Production ^{1/} (mt)	Production (% total)	Total Value (1000 US \$)	Unit ^{2/} Value	Main producing countries (% species total)
Giant tiger prawn (<i>Penaeus monodon</i>)	571,497	34.7	4,046,751	7.08	Thailand 51.6, Indonesia 15.8, India 9.2, Viet Nam 9.1, Philippines 7.1, Malaysia 2.7
Chinese river crab (<i>Eriocheir sinensis</i>)	232,391	48.8	1,162,602	5.00	China 99.9
Fleshy prawn (<i>Penaeus chinensis</i>)	219,152	62.1	1,324,969	6.04	China 99.5
Whiteleg shrimp (<i>Penaeus vannamei</i>)	143,737	70.8	878,324	6.11	Ecuador 34.9, Mexico 23.3, Brazil 17.4, Colombia 7.9, Venezuela 5.7, Nicaragua 3.6
Marine crabs (<i>Brachyura</i>)	125,341	78.4	501,700	4.00	China 99.9
Giant river prawn (<i>M. rosenbergii</i>)	118,501	85.6	410,001	3.46	China 82.2, Taiwan 6.9, Bangladesh 5.4, Thailand 3.1, Malaysia 1.1
Banana prawn (<i>Penaeus merguirensis</i>)	45,717	88.4	179,932	3.94	Indonesia 60, Viet Nam 30.4, Thailand 6.6
Metapenaeid shrimp (<i>Metapenaeus</i> sp)	20,916	89.6	75,800	3.62	Indonesia 93.5, Thailand 4.8
Indo-Pacific swamp crab (<i>Scylla serrata</i>)	10,752	90.3	34,993	3.25	Indonesia 47.7, Philippines 46.2
Red swamp crawfish (<i>Procambarus clarkii</i>)	7,718	90.8	27,632	3.58	USA 99.9
Indian white prawn (<i>Penaeus indicus</i>)	4,370	91.0	23,094	5.28	Viet Nam 79.5, Oman 9.9, India 6.9
Total Crustaceans	1,647,720	100	9,371,794	5.69	China 42.9, Thailand 18.4, Indonesia 8.9, Viet Nam 5.8, Bangladesh 3.9, India 3.2, Ecuador 3.1, Philippines 2.8, Mexico 2.0

TABLE 3. TOP MOLLUSC AQUACULTURE PRODUCERS IN 2000

Referred to in page 13

Species	Production ^{1/} (mt)	Production (% total)	Total Value (1000 US \$)	Unit ^{2/} Value	Main producing countries (% species total)
Pacific cupped oyster (<i>Crassostrea gigas</i>) Japanese	3,944,042	36.7	3,404,277	0.86	China 83.5, Japan 5.6, Korea Rep 5.3, France 3.4, USA 1.0
Carpet shell (<i>Ruditapes philippinarum</i>)	1,693,012	52.5	2,129,698	1.26	China 95.5, Italy 3.1, Korea Rep 1.0
Yesso scallop (<i>Pecten yessoensis</i>)	1,132,866	63.1	1,529,089	1.35	China 81.2, Japan 18.6
Blue mussel (<i>Mytilus edulis</i>)	458,558	67.3	296,425	0.65	Spain 54.0, Netherlands 14.6, France 12.6
Blood cockle (<i>Anadara granosa</i>)	319,382	70.3	293,864	0.92	China 62.3, Malaysia 20.2, Thailand 17.2
Mediterranean mussel (<i>M. galloprovincialis</i>)	177,271	72.0	75,865	0.43	Italy 80.2, France 8.5, Greece 8.3
Green mussel (<i>Perma viridis</i>)	87,533	72.8	9,558	0.11	Thailand 64.0, Philippines 19.4, Malaysia 12.6
New Zealand Mussel (<i>Perna canaliculus</i>)	76,000	73.5	30,400	0.40	New Zealand 100
Northern quahog (<i>Mercenaria mercenaria</i>)	50,685	74.0	57,881	1.14	Taiwan ^{P0C} 52.7, USA 47.3
Total molluscs	10,732,182	100	9,496,615	0.88	China 80.2, Japan 4.0, Spain 2.4, Korea Rep 2.4, France 1.9, Italy 1.2

TABLE 4. TOP AQUATIC PLANT AQUACULTURE PRODUCERS IN 2000 Referred to in page 13

Species	Production ^{1/} (mt)	Production (% total)	Total Value (1000 US \$)	Unit ^{2/} Value	Main producing countries (% species total)
Japanese kelp (<i>Laminaria japonica</i>)	4,580,056	45.2	2,811,440	0.61	China 90.6, Korea ^{DPR} 7.9, Japan 1.2
Laver (<i>Porphyra tenera</i>)	1,010,963	55.2	1,183,158	1.17	China 47.6, Japan 38.7, Korea ^{Rep} 12.9
Euclidean cottoni (<i>Euclidean cottonii</i>)	604,600	61.2	43,889	0.07	Philippines 100.0
Wakame (<i>Undaria pinnatifida</i>)	311,105	64.2	148,859	0.48	Korea ^{REP} 68.3, Japan 21.4, Korea ^{DPR} 10.3
Elkhorn sea moss (<i>Kappaphycus alvarezii</i>)	17,432	64.4	1,484	0.08	Philippines 100.0
Warty gracilaria (<i>Gracilaria verrucosa</i>)	12,510	64.5	10,945	0.87	Taiwan ^{POC} 100.0
Spiny euclidean (<i>Euclidean denticulatum</i>)	6,544	64.6	637	0.10	Philippines 100.0
Green laver (<i>Monostroma nitidum</i>)	5,288	64.6	1,849	0.35	Korea REP 100.0
Total aquatic plants	10,130,448	100	5,607,835	0.55	China 77.6, Philippines 6.5, Japan 5.2, Korea DPR 3.9, Korea REP 3.7, Indonesia 2.0

TABLE 5. TOP COUNTRY PRODUCERS IN 2000: TOTAL AQUACULTURE PRODUCTION Referred to in pages 16, 17 and 19

Country	Production (mt) 1/	70-80	APR (%) ^{2/} 80-90	90-00	70-00	Change (%) ^{3/} 99-00	Total Value (1000 US Value)	Unit ^{4/}
01. China, mainland	32,444,211	+7.5	+11.6	+15.1	+11.3	+8.0	28,117,045	0.87
02. India	2,095,072	+11.6	+10.7	+7.5	+9.9	-1.2	2,165,767	1.03
03. Japan	1,291,705	+6.1	+2.3	-0.6	+2	-1.8	4,449,752	3.44
04. Philippines	1,044,311	+12.6	+7.3	+4.5	+8.1	+10.0	729,789	0.70
05. Indonesia	993,727	+7.5	+10.3	+5.2	+7.6	+12.5	2,268,270	2.28
06. Thailand	706,999	+1.8	+11.3	+9.2	+7.4	+2.2	2,431,020	3.44
07. Korea, Rep.	697,866	+16.0	+3.8	-1.2	+5.9	-10.2	697,669	1.00
08. Bangladesh	657,121	+3.5	+7.8	+13.1	+8.0	+6.0	1,159,239	1.76
09. Viet Nam	525,555	+4.3	+5.0	+12.8	+7.2	+9.3	1,096,003	2.08
10. Norway	487,920	+32.5	+34.1	+12.5	+26.0	+2.5	1,356,999	2.78
11. Korea, DPR	467,700	+17.1	+10.0	-6.8	+6.4	-2.9	280,650	0.60
12. USA	428,262	0	+6.5	+3.1	+3.1	-10.5	870,375	2.03
13. Chile	425,058	+27.6	+42.2	+19.7	+29.5	+39.1	1,266,241	2.98
14. Egypt	340,093	+12.2	+12.5	+18.6	+14.4	+50.3	815,046	2.40
15. Spain	312,171	+2.8	0	+4.3	+2.3	-2.8	382,392	1.22
16. France	267,767	+6.9	+2.2	+0.4	+3.1	+1.1	433,873	1.62
17. Taiwan, China	256,385	+9.1	+7.1	-3.0	+13.4	-2.5	847,705	3.31
18. Italy	216,525	+10.1	+7.5	+3.5	+7.0	+2.9	455,774	2.10
19. Malaysia	167,898	+13.8	-9.0	+12.2	+5.4	+0.5	255,974	1.52
20. Brazil	153,558	+69.6	+18.5	+22.3	+35.0	+9.2	617,323	4.02
21. UK	152,485	+20.4	+60.4	+11.8	+21.5	-1.5	461,323	3.03
22. Canada	123,297	-	+27.7	+11.6	+12.5	+9.1	372,579	3.02
23. Myanmar	98,912	+14.3	+9.8	+30.2	+17.8	+8.5	811,152	8.20
24. New Zealand	85,640	+8.7	+24.4	+11.6	+14.7	-6.5	54,070	0.63
25. Greece	79,879	+6.5	+17.1	+23.7	+15.6	+0.5	287,018	3.59
26. Turkey	79,031	+13.1	+15.5	+29.9	+19.3	+25.4	219,775	2.78
27. Russian Fed.	77,132	-	-	-12.9	-	+7.7	204,779	2.65
28. Netherlands	75,339	-1.1	+2.7	-3.0	-0.4	-30.7	107,248	1.42
29. Ecuador	62,111	+69.1	+23.3	-2.3	+26.8	-51.2	323,567	5.21
30. Colombia	61,786	-	+46.9	+19.4	-	+16.7	257,612	4.17

1/ Total aquaculture production, live weight (includes finfish, crustaceans, molluscs, miscellaneous aquatic animals/products, aquatic plants);

2/ Annual Percent Growth Rate in production by weight between 1970-1980, 1980-1990, 1990-2000 and 1970-2000;

3/ Percent change in production by weight between 1999 and 2000; 4/ US \$/kg live weight equivalent.

TABLE 6. REPORTED TOTAL AQUACULTURE PRODUCTION IN MAINLAND CHINA IN 2000 Referred to in page 19

Species code	Production (mt)	APR (%)				Percent change 99-00
		70-80	80-90	90-00	70-00	
TOTAL FINFISH	15,174,183	+4.5	+17.3	+13.0	+11.5	+6.6
FRESHWATER FISHES	14,586,486	+4.5	+17.1	+12.8	+11.3	+6.2
<i>Carp, Barbels & Other Cyprinids</i>	12,380,911	+4.5	+16.4	+11.7	+10.8	+3.6
Silver carp (<i>Hypophthalmichthys molitrix</i>)	3,227,944	+4.5	+13.2	+8.7	+8.7	+1.5
Grass carp (<i>Ctenopharyngodon idella</i>)	3,162,634	+4.5	+22.4	+11.9	+12.7	+3.3
Common carp (<i>Cyprinus carpio</i>)	2,119,762	+4.5	+25.4	+15.0	+14.7	+3.4
Bighorn carp (<i>Aristichthys nobilis</i>)	1,613,972	+4.8	+11.3	+9.2	+9.0	+1.7
Crucian carp (<i>Carassius carassius</i>)	1,375,378	+4.6	+21.3	+20.4	+15.2	+11.3
White amur bream (<i>Parabramis pekinensis</i>)	511,730	+4.5	+13.6	+12.2	+10.0	+7.5
Mud carp (<i>Cirrhinus molitorella</i>)	200,000	+4.5	+16.1	+9.6	+9.9	+10.0
Black carp (<i>Mylopharyngodon piceus</i>)	169,491	+4.5	+3.3	+16.3	+7.9	-2.2
<i>Tilapia & Other Cichlids</i>	629,182	+4.4	+28.0	+19.5	+16.9	+12.0
Nile tilapia (<i>Oreochromis niloticus</i>)	629,182	+4.4	+28.0	+19.5	+16.9	+12.0
<i>Miscellaneous Freshwater Fishes</i>	1,576,393	-	-	+23.7	-	+29.5
Osteichthyes (species not given)	1,477,534	-	-	+23.7	-	+29.5
Mandarin fish (<i>Siniperca chuatsi</i>)	98,859	-	-	-	+10.5	-
DIADROMOUS FISHES	160,940	-	-	+9.0	-	-2.3
<i>River Eels</i>	160,940	-	-	+9.0	-	-2.3
Japanese eel (<i>Anguilla japonica</i>)	160,940	-	-	+9.0	-	-2.3
MARINE FISHES	426,957	+32.2	+21.9	+29.2	+27.7	+26.0
<i>Miscellaneous Marine Fishes</i>	426,957	+32.2	+21.9	+29.2	+27.7	+26.0
Osteichthyes (species not given)	426,957	+32.2	+21.9	+29.2	+27.7	+26.0
TOTAL CRUSTACEANS	707,095	+49.1	+33.7	+13.8	+31.4	+29.1
<i>Freshwater Crustaceans</i>	329,796	-	-	+52.5	-	+31.4
Chinese river crab (<i>Eriocheir sinensis</i>)	232,376	-	-	+47.3	-	+35.1
Giant river prawn (<i>M. rosenbergii</i>)	97,420	-	-	-	-	+23.2
<i>Sea-spiders, Crabs</i>	125,190	-	-	-	-	+31.0
Marine crabs (<i>Brachyura</i> ; spp. not given)	125,190	-	-	-	-	+31.0
Shrimps, Prawns	217,994	+61.9	+34.2	+1.7	+30.2	+27.6
Fleshy prawn (<i>Penaeus chinensis</i>)	217,994	+61.9	+34.2	+1.7	+30.2	+27.6
<i>Marine Crustaceans</i>	34,115	+22.3	+17.3	+22.9	+20.8	+13.1
Marine Crustaceans (spp. not given)	34,115	+22.3	+17.3	+22.9	+20.8	+13.1

TABLE 6. REPORTED TOTAL AQUACULTURE PRODUCTION IN MAINLAND CHINA IN 2000 (continued)

Species code	Production (mt)	APR (%)				Percent change 99-00
		70-80	80-90	90-00	70-00	
Shrimps, Prawns	217,994	+61.9	+34.2	+1.7	+30.2	+27.6
Fleshy prawn (<i>Penaeus chinensis</i>)	217,994	+61.9	+34.2	+1.7	+30.2	+27.6
Marine Crustaceans	34,115	+22.3	+17.3	+22.9	+20.8	+13.1
Marine Crustaceans (spp. not given)	34,115	+22.3	+17.3	+22.9	+20.8	+13.1
MOLLUSCS	8,607,050	+8.2	+16.2	+16.9	+13.7	+8.5
Oysters	3,291,929	+6.0	+8.6	+20.7	+11.6	+10.1
Pacific cupped oyster (<i>Crassostrea gigas</i>)	3,291,929	+6.0	+8.6	+20.7	+11.6	+10.1
Mussels	534,503	+5.7	+22.7	+0.7	+9.3	-12.1
Sea mussels (Mytilidae)	534,503	+5.7	+22.7	+0.7	+9.3	-12.1
Scallops, Pectins, etc.	919,591	-	+120.5	+20.1	-	+29.1
Yesso scallop (<i>Pecten yessoensis</i>)	919,591	-	+120.5	+20.1	-	+29.1
Clams, Cockles, Arkshells, etc.	2,368,336	+16.7	+17.3	+18.6	+17.6	-4.1
Carpet shell (<i>Ruditapes philippinarum</i>)	1,616,378	+61.2	+32.7	+21.3	+37.4	-10.1
Razor clams (<i>Solen</i> sp)	552,792	+13.9	+8.5	+14.7	+12.3	+15.3
Blood cockle (<i>Anadara granosa</i>)	199,166	+22.8	+17.7	+13.6	+18.0	+5.7
Miscellaneous Marine Molluscs	1,492,691	+22.2	+22.7	+20.8	+21.9	+28.6
Marine Molluscs (spp not given)	1,492,691	+22.2	+22.7	+20.8	+21.9	+28.6
MISCELLANEOUS AQUATIC ANIMALS	92,343	-	-	-	-	+20.3
Turtles	92,343	-	-	-	-	+20.3
Soft shell turtle (<i>Trionyx sinensis</i>)	92,343	-	-	-	-	+20.3
AQUATIC PLANTS	7,863,540	+9.7	+0.9	+18.2	+9.4	+8.4
Brown Seaweeds	4,152,050	+9.1	-0.3	+13.0	+7.1	-7.7
Japanese kelp (<i>Laminaria japonica</i>)	4,152,050	+9.1	-0.3	+13.0	+7.1	-7.7
Red Seaweeds	481,590	-	-3.1	+24.7	-	+17.1
Laver (<i>Porphyra tenera</i>)	481,590	-	-3.1	+24.7	-	+17.1
Miscellaneous aquatic plants	3,229,900	-	+38.9	+32.3	-	+36.3
Misc. aquatic plants (spp not given)	3,229,900	-	+38.9	+32.3	-	+36.3
TOTAL AQUACULTURE PRODUCTION	32,444,211	+7.5	+11.6	+15.1	+11.3	+8.0