

Review of the current state of world aquaculture insurance



Cover photograph:

Cages used in farming the European seabass (*Dicentrarchus labrax*) and gilthead seabream (*Sparus aurata*) in the Gulf of Gaeta, Lazio Province, Italy. FAO/A. Lovatelli.

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Preparation of this document

This publication on aquaculture insurance was written by Dr Raymon van Anrooy of the Fishery Policy and Planning Division (FIP), FAO Fisheries Department, Rome, Mr Philip A.D. Secretan of Aquaculture Underwriting Management Services Ltd (AUMS), East Sussex, United Kingdom of Great Britain and Northern Ireland, Ms Yong Lou of Tongji University, Shanghai, China, Dr Richard Roberts, Auckland, New Zealand and Dr Maroti Upare of the National Bank for Agriculture and Rural Development, Mumbai, India.

The document summarizes the findings of regional review desk studies carried out in late 2004 and early 2005, which covered China, other main Asian aquaculture producer countries (including Bangladesh, India, Japan and Viet Nam), Europe (France, Italy, Norway, Spain and the United Kingdom), South America (Brazil and Chile), North America (the United States of America and Canada), sub-Saharan Africa (Madagascar, Nigeria, South Africa, Zambia and Zimbabwe) and Oceania (Australia and New Zealand).

Abstract

Due to the rapidly changing production processes in aquaculture worldwide (e.g. submergible cages, sea ranching, intensification, aquaponics and recirculation systems), which sometimes increase vulnerability to disease outbreaks and which generally require large investments from aquaculturists, over the last decades the demand for insurance to share and cover the risks involved has increased significantly within the aquaculture sector. Risk management is increasingly gaining attention within the aquaculture sector, which is reflected in the development and increasing implementation of Better Management Practices (BMPs), Codes of Conduct and Codes of Good Practice, Standard Operational Procedures, certification and traceability. Aquaculture insurance is one of the tools used in aquaculture risk management, but there is considerable ignorance within the aquaculture industry about its availability, the process of obtaining insurance cover, especially on aquaculture stock mortality, and the constraints to insurers providing its services.

With this review study FAO intends to increase awareness of aquaculture producers worldwide, particularly those in developing countries, on the opportunities that aquaculture insurance can offer their businesses. FAO also aims to inform decision-makers at national government levels as well as in international agencies about the role of aquaculture insurance in the sustainable development of the aquaculture sector and provide aquaculture sector stakeholders with insights into what is all-too-frequently considered a complicated type of activity.

A review study carried out in early 2005 covered the main aquaculture-producing countries worldwide. Seven regional syntheses (China, Asia, Europe, North America, South America, sub-Saharan Africa and Oceania) were prepared, discussing the specificities of their situation with regard to aquaculture insurance. A summary of the regional syntheses was made, together with conclusions and clear recommendations at various levels to increase the contribution of aquaculture insurance to the sustainable management and development of the aquaculture sector.

Some of the main conclusions of the review study are the following: the demand for aquaculture insurance has never been as high as it is now; there is a widening gap between the demand for and supply of aquaculture insurance in the world; the number of aquaculture insurance policies in force is estimated at around 8 000 worldwide; some regions (sub-Saharan Africa, South America and large parts of Asia) are barely covered by aquaculture insurance services; aquaculture insurance policies in force in Asia are generally of the “named perils” type, while those in other regions are often of the “all risks” type; while the range of species and culture systems covered under aquaculture policies worldwide is diverse, many insurers only focus on a small number of traditional aquaculture species and are reluctant to include “new” species and culture systems; reinsurance is an important component of aquaculture insurance in a country and for developing and disseminating the

service; the underwriting experiences of aquaculture insurance companies largely differ among companies and regions and from year to year; since the start of the new millennium it seems that experiences are improving and that aquaculture insurance activity is becoming profitable; mutual insurance schemes in aquaculture are still insignificant; the lack of enabling policies and regulatory frameworks for aquaculture and fisheries insurance is negatively affecting the development of insurance services and the sustainable development of the aquaculture sector; and asymmetric information, moral hazard and adverse selection remain among the major constraints to undertake aquaculture insurance activities for international and national insurance companies, which negatively influence the results of new entrants in the aquaculture insurance sector during the first few years of business.

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Abbreviations and acronyms

ADCP	Aquaculture Development and Coordination Programme
APRACA	Asia-Pacific Rural and Agricultural Credit Association
AUMS	Aquaculture Underwriting Management Services Ltd
BMP	better management practices
FAO	Food and Agriculture Organization of the United Nations
ICCU	Insurance Company of the Chinese Union
MOFI	Ministry of Fisheries of the Socialist Republic of Viet Nam
PICC	People's Insurance Company of China
UNDP	United Nations Development Programme
WTO	World Trade Organization
ZENGYOREN	National Federation of Fisheries Co-operative Association (Japan)

1. Introduction and review objectives

There is a general perception that aquaculture is a high-risk activity involving greater risk than in other food production industries (Pillay, 1994). While there is no industry-wide, scientifically quantified and publicly available information to confirm this, the experience of the specialist insurance industry is that risks to aquaculture crops are very high.

Aquaculture involves risk as in other sectors that work with biological processes, but these risks may differ in that its products are often raised outside the aquaculturists' direct observation. Due to the rapidly changing production processes in aquaculture worldwide (e.g. underwater cages sea-ranching, intensification, aquaponics, recirculation systems), which sometimes increase susceptibility to disease outbreaks and which generally ask for large investments from the aquaculturists, over the last decades the demand for insurance to share and cover the risks involved has increased significantly within the aquaculture sector. However, there is considerable ignorance in the industry about the availability of aquaculture insurance, the process of obtaining insurance cover, especially for aquaculture stock mortality, and the constraints on insurers providing it.

In this respect, it should be noted that the global aquaculture insurance market has increased considerably since the mid-1970s; the premium paid by aquaculture producers has grown from around US\$100 000 in 1974 to an estimated value of US\$50 million in 2002 (AUMS, 2003).

The benefits of aquaculture stock mortality insurance to aquaculturists can be large. Aquaculture insurance should provide the following benefits, among others:

- some “peace of mind” (Secretan, 1980);
- protection against a variety of natural hazards beyond their control, which affect their health and personal security, assets and harvests (FAO, 1999);
- basic compensation for the loss of harvests;
- more secure incomes, greater stability and social and economic welfare in the farming community;
- improved access to investment capital and capital to expand, and to formal credit, by reducing the risk of non-payment of loans for the lending financial institutions.
- increased incentives to invest in the development of their farms and the adoption of new technologies;
- improved market supply quality, consistency and reliability;

- increased opportunities for mutual assistance and cooperation among aquaculturists;
- access to additional sources of information on risk management.

Moreover, governments can benefit from aquaculture insurance since it can contribute to solving some of the problems associated with the occurrence of natural and other disasters, for which otherwise it would have to provide emergency assistance. Finally, aquaculture insurance can help to stabilize the contribution of the aquaculture sector to the national economy (FAO, 1999).

Considering the wide range of benefits mentioned above, it might be surprising that the use of commercial aquaculture insurance is not widespread, but largely limited to the Western world. There are various reasons for this, among others: (i) the general lack of knowledge of aquaculture insurance operations among insurers in developing countries; (ii) limited awareness among aquaculturists in developing countries of the benefits of insurance; (iii) lack of stock control and other management skills and processes that are required for insurance cover eligibility, (iv) exclusion of small-scale aquaculturists from insurance; (v) lack of well-established village institutions, such as co-operatives, to act as insurance agents; (vi) lack of legal frameworks for fisheries insurance and lack of related government policies; (vii) difficulties in promoting insurance policies, designing sustainable insurance programmes and co-ordinating the work of the agencies concerned; (viii) lack of staff within insurance institutions with knowledge of the sector; and (ix) some negative experiences by reinsurers that have borne substantial losses, for example, from algal blooms.

While aware of the opportunities offered by aquaculture stock and crop insurance to the sustainable development of aquaculture in developing countries, FAO has not ignored the subject, but has given more attention to capture fisheries insurance.

In 1989, in close cooperation with the United Nations Development Programme (UNDP), FAO produced a document entitled, "Aquaculture and Risk Management" (ADCP/REP/89/41). It primarily deals with risk management as a practical technique for establishing and maintaining profitability of aquaculture enterprises. The Aquaculture Development and Coordination Programme (ADCP) produced this guideline document on risk management mainly for the benefit of producers, to assist them in becoming more efficient and to reduce their risks.

In November 1996, in close cooperation with the Asian-Pacific Rural and Agricultural Credit Association (APRACA) and the National Federation of Fisheries Co-operative Associations (ZENGYOREN) of Japan, FAO organized the Regional Conference on Insurance and Credit for Sustainable Fisheries Development in Asia. This conference took place in Tokyo, Japan and resulted in FAO Fisheries Circular No. 948 entitled, *Fisheries insurance programmes in Asia – experiences, practices and principles*. The regional conference largely focused on insurance for capture fisheries, but also showed that few countries in Asia (e.g. India, Japan) had well-functioning aquaculture insurance schemes in place and that experiments and pilot projects providing insurance to the aquaculture sector

failed in a number of countries (e.g. the Republic of Korea, Indonesia, Malaysia and Viet Nam) for a variety of reasons.

Another FAO activity in the field of aquaculture insurance took place five years later in Viet Nam. In November 2001, in cooperation with the Research Institute for Aquaculture No. 3, FAO held the “First National Workshop on Aquaculture Insurance in Viet Nam” in Nha Trang. The workshop aimed at creating awareness on the need for establishing a coastal shrimp insurance scheme in Viet Nam and to elicit the interest of insurance companies and shrimp farmers in the subject. Although the proposed shrimp insurance project was never financed, the issue was put on the national agenda, and as a result, a multinational insurance company, Groupama Vietnam General Insurance Co. Ltd., has provided aquaculture insurance in the Mekong Delta since late 2002.

Recently, FAO published *Livestock and aquaculture insurance in developing countries: a brief overview*¹ in which Dr R.A.J. Roberts presents an accessible introduction to the role of insurance as a risk management mechanism in livestock and aquaculture enterprises. Although some relevant example material is drawn from developed countries’ experiences, the overview targets enterprises in developing countries, especially in the sections covering aquaculture.

The FAO Fisheries Department decided to carry out a world review of the state of aquaculture insurance due to the rapidly increasing size of the aquaculture industry, which appears to be followed by only limited growth in aquaculture insurance; the limited awareness and/or take-up of aquaculture insurance and its benefits by a great number of small- and medium-scale aquaculture entrepreneurs in developing countries; and the fact that the aquaculture insurance business is not very transparent at present and therefore not much information is readily available for aquaculturists worldwide.

OBJECTIVES OF THE REVIEW STUDY

Through this world review and the conclusions that will be drawn from it, the FAO Fisheries Department, through its Policy and Planning Division, intends to contribute to the promotion of aquaculture insurance and the development and implementation of better management and/or better risk management practices. The main purpose of this document is to provide an overview of the current status of aquaculture insurance in the world. Moreover, with this review study FAO intends to increase awareness of aquaculture producers worldwide, particularly those in developing countries, on the opportunities that aquaculture insurance can offer to their businesses. These include sustainability, the spreading and reduction of risks and hazards, increased access to credit and investment capital, the stabilization of income derived from aquaculture, and the smoothing of the supply of aquaculture products to the marketplace. Other aims of this document are to inform decision-makers at national government levels as well as in international agencies about the role of aquaculture insurance in the sustainable development of

¹ This publication can be found on-line at: <http://www.ruralfinance.org/id/31730>.

the aquaculture sector and provide aquaculture sector stakeholders insights into what is all-too-frequently considered a complicated activity.

ABOUT THIS DOCUMENT

A synthesis of the various regional studies on aquaculture insurance is presented here. As aquaculture production in China represents more than two-thirds of the total world production, it was decided to deal with the situation in China separately from the other Asian countries. The aquaculture insurance status in some of the main aquaculture-producing countries was studied for the Asian region (including Bangladesh, India, Japan and Viet Nam). This is followed by syntheses of the situation in Europe (France, Italy, Norway, Spain and the United Kingdom), South America (Brazil and Chile), North America (United States of America and Canada), sub-Saharan Africa (Madagascar, Nigeria, South Africa, Zambia and Zimbabwe) and Oceania (Australia and New Zealand).

Chapter 2 provides a summary of the regional syntheses, presented as an overview of the current state of aquaculture in the world. Chapter 3 presents the situation in China with regard to aquaculture insurance. Chapters 4 to 9 discuss the current state of aquaculture insurance in Asia, Europe, North America, South America, Africa and Oceania, respectively. Each chapter starts with an introduction followed by a very brief overview of the aquaculture production in the region, providing volumes and values of the main species. The insurance market is discussed in the third section of each chapter, which is followed by sections on demand and supply issues, policies in force, perils covered, species insured, systems insured, the underwriting situation, risk management, claims handling and underwriting experiences. Each chapter ends with two sections where some conclusions are drawn and recommendations are presented. Chapter 10 presents the main conclusions and recommendations from this review study.

2. Summary overview of the current state of aquaculture insurance in the world

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2.1 INTRODUCTION

This summary overview of the current state of aquaculture insurance in the world is based on findings from the regional overviews as presented in the next chapters and on the responses to the survey sent to the major underwriting organizations involved in recent years in fisheries and the aquaculture-related insurance business. The survey resulted in 17 responses from underwriting organizations, including Lloyd's of London, and companies from Chile, China, France, Greece, India, the Republic of Korea, New Zealand, Norway, Poland, Spain, the United States and the United Kingdom.

2.2 SHORT SUMMARY OF AQUACULTURE PRODUCTION IN THE WORLD²

World aquaculture production continues to grow. In addition, from 2003 to 2004, a considerable growth could be noticed in volume terms. Estimated total annual production increased 4.4 million tonnes, from nearly 55.2 million tonnes in 2003 to 59.4 million tonnes in 2004. Compared to the 31.2 million tonnes in 1995, considerable progress in annual production was made in this decade. In 2004, China remained by far the main aquaculture producer country in volume terms; its production reached 41.3 million tonnes. In the same year, other Asian countries together produced an estimated 13.0 million tonnes of aquaculture products. This means that almost 75 percent of the world's aquaculture production originated from Asian countries.

In value terms, a new height was reached in 2004 as well. The total value of world aquaculture production was estimated at US\$70.3 billion. This means that the total annual value of aquaculture production increased by over 7 percent from 2003 to 2004. Considering that the estimated value of aquaculture production in

² The information presented in this short summary is derived from the FAO FISHSTAT Plus database, which is accessible at: <http://www.fao.org/fi/statist/statist.asp>. Additional information on the aquaculture sector in this country can also be found in the fishery country profile, national aquaculture sector overviews and national aquaculture legislation overview, which are accessible at: <http://www.fao.org/fi/fcp/fcp.asp> and <http://www.fao.org/figis/servlet/static?dom=root&xml=index.xml>.

1995 was around US\$44.1 billion, one can argue that aquaculture made a major leap forward in the last decade. China was also the leading country in value terms, with an estimated output value in 2004 of US\$36 billion; grass carp, silver carp and Japanese carpet shell all reached production values higher than US\$2 billion. The aquaculture production in Asia (excluding China) had an estimated value of US\$20.8 billion in 2004. This means that 80 percent of the world aquaculture production in value terms was generated in Asia.

2.3 THE INSURANCE MARKET

The supply side of the aquaculture reinsurance market includes insurers and reinsurers. To spread the risks, insurance companies often aim to reinsure a part of them. The insurance market is dominated by a few large reinsurance institutions, which include Lloyd's of London, GE Insurance Solutions, Swiss Re and Munich Re. A great number of aquaculture policies are reinsured through these four institutions. Lloyd's should not be considered an insurance company, but rather a market in itself.

The situation in the aquaculture insurance market can be discussed by using the Structure, Conduct and Performance (SCP) framework. The market structure (i.e. the number, size and diversity of participants at different levels) influences market conduct (i.e. the reliability or timeliness of activities, control or standardization of quality, regulatory mechanisms). Structure and conduct together determine the performance of the marketing system as a whole (i.e. the technical and allocative efficiency of the market, the degree of market integration, market price and margins, accuracy and adequacy of information flows, etc.).

With regard to the *market structure*, it is clear that there are less companies offering aquaculture insurance services than those offering other insurance services (e.g. life, health and car insurance). Often there are none, just one, or a very limited number of insurance companies offering aquaculture underwriting services that are active in a country. As a result, competition in most national markets is limited and individual aquaculture insurance underwriters have high market shares. It can be argued that there is a fairly high market concentration on the supply side, particularly at the national level in Asia, Africa, Oceania and Latin America.

One cannot speak of perfect competition in the aquaculture insurance market in any of the surveyed regions, not only because of the limited number of suppliers, but also as a result of non-homogeneous products. Aquaculture insurance policies differ according to species, growing systems and identified risks. In addition, market knowledge is far from perfect, which affects competition. Legal barriers at the national level, sometimes only allowing national or state-owned insurance companies to operate, currently affecting the market structure tremendously. Risks involved in aquaculture underwriting generally require economies of scale – including a network of branch offices to market the insurance products and the availability of reinsurance.

As mentioned above, legal and regulatory frameworks are strongly affecting the *market conduct* of the aquaculture insurance market. Foreign insurance companies were not allowed to do business in a number of the countries surveyed. Although

it seems that market entry barriers are generally being lifted, they still exist in some countries. Moreover, some public (state-owned) insurance companies are not allowed to seek reinsurance in the international market according to national level regulations, which is hampering aquaculture insurance development.

When looking at the policy wording of aquaculture insurance policies, a fair amount of standardization can be found in terms of terminology, procedures and cover against perils. However, the great variety in species, growing systems and limited transparency in premium setting, risks assessments, policy conditions, product prices and compensation for claims make it difficult for aquaculturists to compare services from different insurance companies.

Market performance in the aquaculture stock insurance market can be measured by profits and marketing margins. Profits and losses are discussed in section 2.12 (underwriting experiences). Profit margins in aquaculture differ largely between species, culture systems and countries. The same is true for aquaculture insurance and reinsurance companies. The only stakeholders in the aquaculture insurance market that seem to have fairly stable margins are the insurance brokers. They generally get paid commission for finding the appropriate insurance companies to match the aquaculture companies' demands.

The various regions covered in this survey are served by the world reinsurance market, but some regions are traditionally better served than others. Europe, North America and Oceania are generally better off in terms of aquaculture insurance coverage than the other regions. The history of aquaculture insurance in these three regions is longer as well, while aquaculture's roots can be found in Asia, the region with the highest aquaculture production.

Aquaculture insurance in Asia started some 20 years ago, but while fisheries insurance soared, aquaculture insurance showed mixed results, and consequently, limited growth. Aquaculture insurance services in Asian countries are still often provided by state-owned insurance companies that are also involved in agriculture and fisheries insurance. Aquaculture insurance occasionally falls under agriculture insurance units or branches of general insurance companies, and as such the activity is generally not considered a priority area. Some reasons for this include the specific difficulties involved in aquaculture insurance and the limited profitability of aquaculture insurance pilot schemes. In the past, general insurance companies in Asia were sometimes ordered to provide aquaculture insurance services by law or decree, although knowledge of the sector was minimal, as was interest shown by the companies in setting up nationwide coverage. As a result, many aquaculture insurance schemes in Asian countries remained at a pilot scale, or insurance schemes were operational in theory but not operational anymore in practice. Unfortunately, this is still the case in some countries.

Europe can be considered the best served market in terms of aquaculture insurance. Aquaculture insurance services have been offered in this region from the early 1970s. A large number of the major insurance businesses have their headquarters in Europe, as well as Lloyd's of London, which is regarded as an insurance market in itself. The European insurance market is heavily regulated and

externally focused – i.e. the main players also provide services outside their country of origin. These services are often not just limited to the European countries, but address the international market. The major aquaculture-producing countries in Europe, including France, Italy, Norway, Spain and the United Kingdom, all have domestically-based underwriters who are active in providing insurance services to the sector. In many of the European countries, insurance brokers are actively bringing supply and demand together.

In North America, aquaculture insurance services have been available since the mid-1970s. The market in Canada is supplied from abroad because no national companies provide the service. The US aquaculturists are served by national and international underwriters, but aquaculture insurance has not yet established a firm base in the country. A fairly limited number of aquaculture establishments are insured at present in the United States. South America is not well served by aquaculture underwriting. In Chile, aquaculture insurance has been available for a little over one decade, while in Brazil and most of the other South American countries, no aquaculture insurance brokers or companies are active at present. Africa is the only survey region that is poorly served by the aquaculture insurance industry. Although in theory African aquaculture entrepreneurs can apply for coverage on the international aquaculture insurance market, the lack of brokerage services and unawareness of the insurance industry with aquaculture in Africa results in a very limited coverage. At present, South Africa is the only country reported to be served by aquaculture services in sub-Saharan Africa.

Oceania is well served by the international insurance market. While national agriculture underwriters in Australia generally do not provide aquaculture underwriting services, insurance brokers provide the necessary linkages between international insurers and aquaculture enterprises in Australia. Aquaculture insurance is still not very widespread among aquaculture enterprises in Australia. In contrast, some 90 percent of New Zealand's salmon production is covered by insurance services provided by both national and international underwriters.

2.4 DEMAND AND SUPPLY ISSUES

FAO estimated that the number of people employed worldwide in aquaculture production in 2002 at 9.8 million (FAO, 2004). Since some 9.5 million of them are found in Asia and Asian aquaculture industry continued to grow between 2002 and 2004 – with nearly 7 million tonnes, representing an increase in value of around US\$6.5 billion – it is foreseen that the estimated numbers of people employed in aquaculture have increased further. The total aquaculture production in the world in 2004 was estimated at 59.4 million tonnes, which represented a value of US\$70.3 billion. A simple calculation, using a non-confirmed fairly conservative estimate of ten million people employed in aquaculture in 2004, shows that, on average, each employed person produced almost six tonnes, with an average value of just over US\$7 000 per person. One can argue that the demand for aquaculture insurance has never been as high as it is now, taking in consideration the above impressive growth figures in the sector.

But is this truly the case? Here availability and access issues come into the picture. A large majority of aquaculture in Asia, Africa and Latin America is practised by small-scale farmers who often do not have access to modern means of communication, and in many cases practice low-risk, low-investment, low-input, low-output aquaculture. Many of these farmers do not have access to extension and financial services. Therefore, although these services are being provided at the national level, the individual aquaculturist cannot access them for a variety of reasons.

Concerning aquaculture extension and microfinance and credit services in support of aquaculture, insurance services for aquaculture enterprises are often available in theory within many countries, while in practice they are not for a large part of the sector. Availability of aquaculture insurance services is often limited to certain areas and most of the aquaculture underwriters show limited interest in providing them to small-scale aquaculturists located in distant areas from the capital. This means that often only subsidiaries of multi-national aquaculture enterprises and the largest domestic enterprises are served by aquaculture underwriters, and that the availability of the insurance service for the great majority of aquaculturists is limited.

In general, before entering the aquaculture insurance business in a country, insurance companies carry out *needs or demand assessments*. Such assessments provide excellent information to these companies, but are often considered confidential, even if a company decides not to enter the business after all. Therefore, no accurate information on the specific demand for aquaculture insurance in certain regions and countries could be presented here. It is reasonable, however, to expect that there is a large demand for aquaculture insurance as producers seek competitive cover for economically viable premiums, appropriately designed application forms and arrangement procedures, well drafted, comprehensive, and simple-to-understand policy wording, and effective claim handling and payment procedures.

Apart from the above-mentioned sectoral growth and the availability and access constraints, there are a number of current trends that seem to positively affect the demand:

- increasing recognition within governments of the socio-economic importance of aquaculture and accordingly, the drive for sustainable practices in which insurance services could play a role;
- increasing willingness of governments, particularly in Asia, to produce enabling policy and regulatory frameworks for agriculture, aquaculture and fisheries insurance;
- increasing investments in aquaculture technologies and advanced production systems that involve higher financial risks for aquaculture entrepreneurs;
- increasing influence of markets, trade and consumption in relation to fisheries products;
- increased awareness on insurance among aquaculturists through services from life and health insurance companies that do seem to reach the rural population in many developing countries;

- the boost in coverage of modern communication technologies such as internet and cell phones, which increases availability of information and decreases the costs of communicating with policy-holders.

As detailed in the section 2.3, the supply side of the aquaculture insurance market is dominated by a small number of international and national underwriters and reinsurance companies. At the national level, generally aquaculturists have little choice between aquaculture insurance suppliers since there are often just one or a few active in a country. Negative underwriting experiences in the last decades have caused a number of players to withdraw from offering aquaculture insurance services. Others have entered the sector, but overall the number of aquaculture insurance underwriters has remained stable or possibly even decreased in the last decade. The limited information on the sector and the production processes used in aquaculture, the lack of policy and regulatory frameworks on aquaculture insurance, and the underwriting experiences in the recent past were among the causes for this reluctance among insurers to enter the aquaculture insurance business.

On the supply side, aquaculture insurance companies are increasing diversity in insurance products, albeit slowly, in order to better address the needs of aquaculturists. Demand-led aquaculture insurance is slowly developing, although some subsectors (e.g. catfish culture in the United States and coastal shrimp culture in many Asian countries) are still not offered services that fit their needs and conditions. The modern aquaculture techniques and the implementation of better management practices tend to decrease the risks involved in aquaculture production processes. The increasing knowledge of insurance companies on the risks involved, together with the improvements in and adoption of risk management practices by aquaculture enterprises reduce uncertainties for aquaculture underwriters. The supply of aquaculture services might be positively affected by these developments in the future.

2.5 POLICIES CURRENTLY IN FORCE

The number of aquaculture enterprises insured by the insurance companies who replied to the survey (see also Annex 1) is in excess of 3 000. A few companies provided apparently accurate figures, while others provided ranges, such as “300 to 400”.

On the basis of responses received, over 2 000 farms, sometimes including several establishments of the same aquaculture enterprises, may currently be insured in Europe, Africa, North and South America.

In addition, in Oceania there are at least 25 salmon aquaculture establishments currently covered by insurance and a similar number of aquaculture enterprises may possibly be receiving some cover in Australia.

In China and other Asian countries, the total number of policies in force is a big question mark. Information from the main countries covered in the regional syntheses showed that in 2004, in Viet Nam and China together, there were at least some 2 000 aquaculture insurance policies in force. In the same year in Japan, it is roughly estimated that at least 3 000 aquaculture establishments were covered by insurance. A few hundred policies were estimated to be in force in the other Asian countries.

A conservative estimate of the total number of aquaculture policies in force globally would be between 7 500 and 8 000.

2.6 PERILS COVERED

In the major aquaculture producer countries in Asia, the aquaculture insurance policies in force are “named perils”, which means that the policies cover the policy-holders only for the risks named in the policy documents. The named perils often listed in the policies differ largely, but the following named perils are commonly included in standard policies:

For onshore systems:

- pollution from external sources;
- aircraft and other aerial devices or articles dropped from the sky;
- malicious acts;
- predation;
- floods, inundations and tidal waves;
- storm damage (including hurricanes, cyclones and typhoons);
- landslides, earthquakes and volcanic eruptions;
- structural failures (e.g. of dykes), breakage or blockage of any part of the water supply system;
- drought, fire, lightning, explosion;
- freezing, frost damage, frazil ice;
- mechanical breakdown or accidental damage to machinery and other installations;
- electrical breakdown, failure or interruption of the electricity supply, and electrocution;
- de-oxygenation and other changes in the concentration of the normal chemical constituents of the water that cause damage.

For offshore systems:

- pollution from external sources;
- aircraft and other aerial devices or articles dropped from the sky;
- malicious acts;
- predation or physical damage by predators or other aquatic organisms (excluding by sea lice or other ectoparasites);
- storm, lightning, tidal waves and collision;
- sudden and unforeseen structural failure of equipment;
- freezing, super-cooling, ice damage;
- de-oxygenation due to competing biological activity or to changes in the physical or chemical conditions of the water, including upwelling and high water temperatures;
- other changes in the concentration of the normal chemical constituents of the water, including pH or salinity.

Insurance policies with additional cover for diseases, such as shell disease, vibriosis, celidas and parasitical diseases, and for damage caused by red tides can often be arranged as well.

Theft, riots, strike, war and similar disturbances are generally not covered, nor is damage caused by negligence of the policy-holder.

TABLE 1
Summary of aquaculture species insured

Species group	Currently insured (scientific names)
Fishes	Arctic char, <i>Salvelinus alpinus alpinus</i>
	Atlantic salmon, <i>Salmo salar</i>
	Bluefin tuna, <i>Thunnus thynnus</i>
	Brown trout, <i>Salmo trutta trutta</i>
	Common carp, <i>Cyprinus carpio</i>
	Black carp, <i>Mylopharyngodon piceus</i>
	Grass carp, <i>Ctenopharyngodon idellus</i>
	Silver carp, <i>Hypophthalmichthys molitrix</i>
	Bighead carp, <i>Aristichthys nobilis</i>
	Crucian carp, <i>Carassius auratus</i>
	Blunt snout bream, <i>Megalobrama amblycephala</i>
	Atlantic cod, <i>Gadus morhua</i>
	Coho salmon, <i>Oncorhynchus kisutch</i>
	Common pandora, <i>Pagellus erythrinus</i>
	Flounder, <i>Syacium latifrons</i> and <i>Hippoglossina</i> spp., but also other species
	Gilthead bream, <i>Sparus aurata</i>
	Halibut, <i>Hippoglossus hippoglossus</i>
	Hybrid striped bass, <i>Morone saxatilis</i> , but also other species
	Rainbow trout, <i>Oncorhynchus mykiss</i>
	Seabass, <i>Dicentrarchus labrax</i> , but also other seabass species
	Sole, <i>Solea solea</i>
	Striped seabream, <i>Lithognathus mormyrus</i>
	Sturgeon, <i>Acipenser</i> spp.
	Tilapia, <i>Oreochromis</i> spp., but also other tilapia species
	Tuna, <i>Thunnus</i> spp.
	Turbot, <i>Reinhardtius hippoglossoides</i> , but also other species
	White seabream, <i>Diplodus</i> spp.
Molluscs	Abalone, <i>Haliotis</i> sp.
	Mussels, <i>Mytilus</i> sp.
	Hard clam, <i>Mercenaria mercenaria</i>
	Pearl oysters, various species
	Scallops, various species
Crustaceans	Lobsters, <i>Homarus</i> spp.
	Shrimp, <i>Penaeus</i> spp. (of various species)
	Prawn, <i>Macrobrachium rosenbergii</i>
Seaweeds	Kelp, <i>Laminaria</i> spp.

TABLE 2
Most commonly mentioned species

Species group	Projected (scientific names)
Fishes	Cobia, <i>Rachycentron canadum</i>
	Croaker, <i>Micropogonias</i> spp. and others
	Redfish, <i>Lutjanus</i> spp. and <i>Sebastes</i> spp.
Molluscs	Edible oysters, <i>Crassostrea gigas</i> , <i>Ostrea edulis</i> and others
Crustaceans	Shrimp (various species)
Seaweeds	Unspecified species

In the other regions of this review, the bulk of insurance policies in force are of the “all risks” type. Accordingly, a wide range of perils are covered as listed above, including: oxygen depletion due to competing biological activity; attacks by predators including seals, sharks, birds and jellyfish; storms, freeze and super-cooling; electrical breakdown; changes in the normal chemical constituents of water including pH and salinity; disease; and toxic algal bloom.

Although it was not surveyed in detail, the major insurance companies offering aquaculture stock insurance also cover onshore aquaculture equipment, boats, and other transport and offshore equipment. Insurance coverage of related areas, which include property, public liability, employer’s liability (sometimes also for divers), market price declines, transport, product liability and marine liability are also available with other companies in the market. Aquaculture livestock in transit is also currently insured by some insurance companies.

2.7 SPECIES INSURED

There is a large range of aquaculture species currently insured. The regional differences are large, however, as a number of species are only cultured in one or two regions. Aquaculture insurance cover is not limited to finfish species, but also includes molluscs, crustaceans and seaweeds. Table 1 gives a summary of the aquaculture species insured.

While the list looks impressive, it should be noted that to date many of the aquaculture insurance companies have limited their insurance activities to a small group of species with which they are most familiar. However, it seems that most insurance companies are prepared to insure species outside their current portfolio, provided that they obtain the required background information to carry out a proper analysis of the risks involved. A number of insurance companies stated that they are not prepared to cover shrimp production, and others are not prepared to insure tuna fattening in cages.

Insurance companies were also asked which aquaculture species they would be prepared to insure in the near future. Table 2 includes the most commonly mentioned species in response to the question.

2.8 GROWING SYSTEMS INSURED

The growing systems currently insured by the aquaculture insurance industry can be divided into offshore and onshore systems (Table 3). Most aquaculture insurance companies insure offshore cage culture and onshore culture in ponds, raceway systems and recirculation systems.

The respondents to the survey indicated that most intensive and semi-intensive culture systems will be considered for insurance. Extensive or improved extensive systems are less likely to be insured. Some improved-extensive pond production is insured, but only in Viet Nam.

Hatchery and nursery production is only insured on a very limited scale. Not many insurance companies are eager to step into shrimp hatchery production insurance.

TABLE 3
Growing systems currently insured

Culture systems	Currently insured
Offshore	Net cages, barges, oyster and mussel systems (hang/rope/line and bottom culture).
Onshore	Fresh water gravity tanks and raceways, and still water ponds. Hatcheries and on-growing units. Seawater and freshwater recirculation systems.

Offshore submersible and semi-submersible cages are considered culture systems that might be insured in the near future. At present, insurance companies have limited experience with offshore farms. The design of feasible moorings (cages and platforms) is considered insufficiently developed, at least against storms.

2.9 UNDERWRITING

The underwriting capacities of the insurance companies according to responses in the survey were wide-ranging, from a net underwriting capacity of US\$500 000, to a gross capacity, with reinsurance of US\$80 million.

Underwriting per farm differs largely between regions as farming systems and investments also differ largely. In general, there is a maximum set by the insurance companies providing cover to aquaculture for individual farms as well as for the activity. For instance, in Australia and New Zealand, the maximum per farm at one location is US\$250 000, retaining up to 50 percent of the risk. In China, reinsurance should be sought when the insured sum is higher than US\$2.4 million.

Mutual insurance schemes are very rare in the aquaculture sector. Although mutual insurance schemes in marine capture fisheries are fairly common, similar schemes for aquaculture can still be considered at the pilot stage; mutual insurance schemes for aquaculture were identified in China and Japan only. It should be noted that in some other countries, particularly in Asia, possibilities for establishing mutual insurance schemes for aquaculture are being discussed and frameworks are being developed.

The multinational insurance companies involved in aquaculture insurance often provide services in more than one country. State-owned insurance companies, in contrast, generally do not underwrite business outside their own country.

2.10 RISK MANAGEMENT

Aquaculture insurance is also used as a tool to increase cooperation between various aquaculture sector stakeholders (aquaculture entrepreneurs, financial institutions and government agencies), with the overall goal to reduce risks in both aquaculture production and the insurance service. Aquaculture insurance schemes are therefore generally designed to promote “good” behaviour, that is, aquaculturists should try to minimize the risks involved for themselves, the environment and their insurance companies.

Several insurance companies involved in aquaculture insurance include pre-conditions before policies are issued and sometimes include best practices in their

policies. Pre-conditions can include access to clean water sources for land-based ponds. Best practices listed may be the frequent monitoring of water quality, purchase of certified disease-free fingerlings, and farm record keeping.

Risk management surveys are generally not limited to risk assessment surveys. The latter are used by insurance companies to obtain more information in addition to the commonly used proposal forms that have to be filled by those who apply for aquaculture insurance. Risk management surveys include aquaculture site surveys, management and biological surveys.

Risk management surveys are regularly carried out by insurers everywhere. In most regions, insurance companies use local aquaculture experts and/or experienced general insurance surveyors to inspect fish farm sites. In the case of large or sophisticated operations, insurance companies may bring in surveyors from outside with particularly specialized experience. The aquaculture insurance companies in Oceania generally also have in-house expertise on risk management in aquaculture.

While in Asia risk management surveys of aquaculture insurance companies are generally carried out in collaboration with government agencies involved in or responsible for aquaculture development, management and promotion, this is not often the case in the other regions. In these other regions, private sector expertise is sought instead.

2.11 CLAIMS HANDLING

In most of the regions, independent loss adjusters are used for assessing claims against policies, following damage or losses. In some countries where aquaculture insurance is well established (e.g. the United Kingdom, Chile, Norway and New Zealand), the insurance companies often have in-house, experienced loss adjusters. National institutions are often contracted for disease diagnostics and specialized laboratory work.

In Asian countries, governmental fishery and aquaculture agencies and specialized universities are often asked by insurance companies to assist in loss adjustment, particularly in the case of larger disasters. These agencies assist the insurance company's in-house loss adjusters. Aquaculturists in India and Bangladesh can also use the services of independent experts and aquaculture cooperatives and/or associations to assess the loss and the related size of the claims, and reporting to the insurance company.

Insurance companies in all regions consider it of utmost importance that damage to or losses of insured aquaculture stock are reported immediately to the insurance company. The policies often provide guidance on the reporting procedures. Generally, events that might result in losses must also be reported so that the insurance companies receive information before the losses occur. This greatly facilitates their loss adjustment and enables the insurance companies to provide immediate, specialized assistance to mitigate or prevent losses.

2.12 UNDERWRITING EXPERIENCES

Underwriting experiences have differed tremendously over the last decade. Table 4 shows the responses of 17 insurance companies that provided some information on their experiences in aquaculture stock insurance. It should be noted that some of the companies that were active in aquaculture insurance in the 1990s have stopped offering the service due to unsatisfactory experiences. The table shows that in 2000, 2001 and 2003, more than 50 percent of the companies providing aquaculture insurance were making some profits from the activity. Of course, these are just three years over a period of ten years and most of the companies need some more good years before the earlier losses are compensated for. Nevertheless, the fact that three out of the four most recent years seem to have resulted in positive figures is a promising sign for the industry.

Experience of the respondents in the survey in the field of aquaculture insurance ranged from 3 years to up to 25 years.

In addition to the responses received in the survey, the general underwriting experiences seem to fluctuate largely between years. Overall, the experiences in the early 1990s were generally bad, while better performance has been achieved in the new millennium. Some of the companies that were active in the business in the late 1980s and early 1990s, particularly in Asia, have withdrawn from the business due to bad performance. Nevertheless, companies began providing aquaculture insurance have recently encountered start-up problems and generally show negative figures in the first few years.

The aquaculture stock underwriting experiences in Europe and North America have showed marginal profitability in recent years. Very bad years are followed by very good years and vice-versa. In Latin America, particularly in Chile, experiences in recent years are better than at the start of the new millennium. In Oceania, the aquaculture underwriting experiences were considered good or very good in seven years in the last decade, which suggests that the industry is progressing towards sustainability.

TABLE 4

Underwriting experience of aquaculture insurance companies between 1994 and 2003 (according to responses to the related survey question) (in percentages)

Year	Very bad	Bad	Neutral	Good	Very good	Total responses
2003	13%	20%	7%	40%	20%	15
2002	27%	7%	27%	20%	20%	15
2001	15%	38%	0%	31%	23%	13
2000	8%	17%	17%	42%	8%	12
1999	17%	0%	42%	25%	17%	12
1998	44%	33%	11%	11%	0%	9
1997	38%	25%	13%	25%	0%	8
1996	17%	33%	33%	17%	0%	6
1995	33%	17%	17%	17%	17%	6
1994	17%	33%	17%	17%	17%	6

3. The current state of aquaculture insurance in China

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3.1 INTRODUCTION

Aquaculture is considered a high-risk activity, being prone to natural disasters, market developments, techniques and management. Depending greatly on natural conditions, which are often unpredictable and beyond human control, aquaculturists may have to cope with many hazards, such as floods, typhoons, storms, abnormalities of the weather, pollution and disease outbreaks. Over the last decades, these hazards have caused great damage to aquaculture and its development. In recent years, it is common to see seaside marine aquaculture areas in China being ransacked by red tides. Natural disasters represent the most important risk that marine aquaculture establishments face.

Due to its size and location, China has a relatively frequent occurrence of natural disasters. While its aquaculture is enjoying constant and rapid development, its production and the livelihoods of those involved in the industry are under constant threat from natural hazards. For example, Typhoon Chebi in June 2001 caused direct economic losses to aquaculture in Fujian Province, estimated at around US\$270 million. The typhoon and the resulting floods submerged many fishing boats. In total, 6 430 fishing boats, 203 800 marine aquaculture cages and 34 200 mu of shrimp ponds were destroyed or heavily damaged by the disaster. (The Chinese unit of area *mu* equals 1/15 of a hectare.) Compensation from the government for this damage received by fisherfolk and aquaculturists was only US\$0.6 million in total. The gap between the value of the damage and the compensation received shows that aquaculture in China is in urgent need of insurance services.

3.2 SHORT SUMMARY OF AQUACULTURE PRODUCTION IN CHINA³

China is the largest aquaculture producer in the world: its production reached 20.0 million tonnes in 1995 and has doubled since then. In 2004, aquaculture production in volume terms added up to 41.3 million tonnes. The diversity in

³ Please see Chapter 2, section 2.2, footnote 2.

species cultivated is large and culture environments are diverse as well. The latter can also be seen in the list of the ten most popular aquaculture species in terms of volume produced. The main species produced are: Japanese kelp, Pacific cupped oyster, grass carp, silver carp, Japanese carpet shell, aquatic plants (nei), common carp, wakame, bighead carp and crucian carp. The first nine from this list of ten species, recorded production volumes of over 2 million tonnes each in 2004.

Aquaculture production in China was valued at US\$18.5 billion in 1995; it reached a value of US\$28.3 billion in 2000 and the total value for 2004 is estimated at US\$36 billion. Grass carp, silver carp and Japanese carpet shell all achieved production values higher than US\$2 billion in 2004.

Marine and brackish water aquaculture production in China increased tremendously in the last decades. While production in 1995 was estimated at 10.6 million tonnes, it increased over the last ten-year period to almost 22.8 million tonnes in 2004. In value terms, marine and brackish water aquaculture production increased from US\$4.4 billion in 1990 to US\$9.5 billion in 1995, reaching US\$16.2 billion in 2002. In 2004, marine and brackish water aquaculture production of China was valued at US\$16.1 billion.

The estimated number of people employed full-time in aquaculture production activities in China has increased from just less than 2.7 million in 1995 to almost 4.5 million in 2004.

3.3 THE INSURANCE MARKET

Insurance as it is known today was introduced in China in 1949 when the People's Republic of China was founded, but came to a halt in 1958. Only 20 years later, in 1979, the development of the Chinese insurance market resumed, entering a new period of rapid development.

At present, insurance in China is just becoming mature. In 2002, national domestic insurance operations gained an annual income as high as US\$37 billion, which is nearly ten times the income of a decade earlier. The growth rate of insurance surpassed that of the national economy in recent years. However, compared to many other countries, China is still lagging behind in the field of insurance.

At present, insurance operations established in China cover four fields – Property Insurance, Liability Insurance, Life Insurance and Guarantee Insurance; altogether more than 300 insurance products are offered. Table 5 presents a list of main insurance products groups, annual premium paid for insurance in US\$ billion, percentage of total premiums paid, indemnity confirmation and loss ratios in 2003. The table shows that agriculture insurance premiums were estimated at just US\$60 million and represented just 0.2 percent of the insurance market. The loss ratio of agriculture insurance is the highest among all listed insurance product groups. This implies that agriculture insurance starts with a backlog when competing with other sectors for insurance capacity.

On the supply side, the insurance market was completely monopolized until 1988 by China's state-owned commercial insurance company, the People's Insurance

TABLE 5

Insurance product groups, premium incomes and loss ratios of insurance in China (2003)

Product group	Premium in US\$1 000 million	Percentage (%) of total	Confirmed indemnity	Loss ratio (%)
Corporate Property Insurance	1.48	4.0	0.67	45.5
Family Property Insurance	0.29	0.8	0.05	16.7
Conveyance and Liability Insurance	5.84	15.9	3.37	57.7
Freight Insurance	0.51	1.4	0.19	38.1
Endowment Insurance	24.99	67.9	2.73	11
Injury Insurance	0.95	2.6	0.31	32.9
Life Insurance	1.46	3.9	0.59	40.5
Agriculture Insurance	0.06	0.2	0.05	80
Other Insurance	1.22	3.3	0.52	42.6
Total	36.8	100	8.52	23.1

Source: China's Statistics Yearbook, 2003

Company of China (PICC). At present, however, the ownership and management structure of the insurance market is becoming more diverse. Since 1988 PICC has continued to play a leading role; however, other insurance companies have been established to provide insurance services to a number of sectors such as finance and banking, civil administration, transport and agriculture. Meanwhile, foreign insurance companies were allowed to enter the Chinese market, thus increasing competition and further promoting the development and spread of insurance in China. In 2003, PICC's insurance market share was around 62 percent. Other major insurance companies were: Pacific Property Insurance (12 percent of the market share), Ping-an Property Insurance (9 percent of the market share), Chinese Union (5 percent of the market share) and Tian-an Insurance (4 percent of the market share).

In China, aquaculture insurance is considered part of agriculture insurance and handled similarly. Aquaculture insurance functions as a form of economic protection for aquaculturists. It protects against economic losses caused by natural hazards and contingencies in the aquaculture production process. The 20-year history of available aquaculture insurance has been filled with twists and turns. In the very beginning, the aquaculture insurance market was dominated by PICC, whose agriculture insurance unit was also in charge of aquaculture insurance. PICC was restructured into a limited corporation in July 1996. This restructuring also included a change in management goals and systems, which determined that the provision of agriculture insurance products was no longer economically viable. Therefore, despite the fact that in only a few regions, including the major region of Shanghai, agriculture insurance and therefore also aquaculture insurance were still in the portfolio of services, in practice they remained stagnant after 1996. Until 2004, agriculture insurance services were only provided by PICC and the Property Insurance Company of the Chinese Union, whose agriculture insurance units suffered great losses every year. It is estimated that the agriculture insurance premium income in 2003 was between US\$55 and US\$60 million, accounting for less than 0.2 percent of the total insurance premium income. This means that the

average premium payment by the 230 million farmers nationwide was less than US\$0.24 in 2003. When comparing the agriculture insurance premium income of 2003 with that of 1993 when it was at US\$100 million, a large decrease can be noticed. Further, over the same period, the agriculture insurance product diversity decreased from around 60 to around 30 products.

Concerning PICC, its activities in the field of aquaculture insurance covered less than 2 percent of the entire agriculture insurance in 2003. Between 1982 and 1995, the total premium income obtained by PICC from aquaculture insurance was US\$1.12 million, while US\$2.2 million was paid for compensation, resulting in a loss ratio of 197 percent. During the same period, the loss ratio of fish culture insurance was 144 percent. From 1989 to 1995, the average loss ratio of fish culture insurance was 172 percent, while that of shrimp culture insurance reached 1 440 percent, ranking the highest among the various agriculture insurance species (Ge Guang-hua and Lou Yong, 1997). The average loss ratio in aquaculture insurance from Shanghai Anxin has been around 80 to 90 percent in recent years, higher than that of any agriculture crop insurance.

In contrast, capture fisheries insurance in China has developed sustainably over the last decade. It has been argued by some that capture fisheries has been more profitable and that fisherfolk's awareness of insurance is higher. In particular, the capture fishery sector has its own insurance association, which has been up running for some ten years – the China Fishing Vessels Owners Mutual Assurance Association. This association has the necessary institutions, talents and technological advantages, and has established a system of capture fisheries insurance services throughout most of the country.

Chinese government had no policy or legislation on aquaculture insurance for a long time since aquaculture insurance was considered part of agriculture insurance. There was no uniform policy to support its development, and therefore a nationwide and standard insurance system was not formed. No policy changes in this respect occurred in 2005.

With China's membership in the World Trade Organization (WTO), it became clear that many issues have to be solved as soon as possible, including the provision of agriculture subsidies and some existing regulations in order to bring China's agriculture in line with the agricultural agreements signed between China and other WTO members. It has become inevitable for China to improve its agriculture insurance market structure and conduct as soon as possible and to set up better systems for protecting the agriculture and aquaculture sector against natural disasters. After several years of stagnant aquaculture insurance, it then entered into a new stage of development in 2004. Moreover, the operational structure for aquaculture insurance has become more diverse. The insurance institutions and their market conduct are becoming more diverse. Insurance institutions of different backgrounds (public, collective-owned, national, private, share-based and foreign-capital-funded all play separate roles in the aquaculture insurance market. They provide different insurance products – profit-oriented, policy-supported as well as disaster-assistance and mutual insurance – and

use different operation modalities (e.g. through agents and mutual insurance arrangements).

3.4 DEMAND AND SUPPLY ISSUES

In theory, all the institutions providing agriculture insurance services can also provide aquaculture insurance. However, China's territory is so vast that the natural conditions, industry structure and development, economic situation and other factors vary greatly from place to place. Aquaculture location- and condition-specific risks, the demand for insurance and the ability of aquaculturists to pay for the necessary premiums also differ greatly. Agriculture insurance, including aquaculture insurance, started to develop again in 2004, when various new agriculture insurance institutions were established and a number of pilot projects were initiated, also including aquaculture insurance services. The main institutions involved in agriculture insurance (and aquaculture insurance) in 2004 were the following: Shanghai Anxin Agriculture Insurance Company Ltd, PICC, Property Insurance Company of the Chinese Union, China Fishing Vessel Owners Mutual Assurance Association, and Groupama. The activities of the major players in aquaculture insurance in China are discussed below.

Shanghai Anxin was established in September 2004 as an insurance company specialized in providing services to the agriculture sector. Its charter states that the premium income of agriculture and aquaculture should consist of at least 60 percent of the total. In addition, in accordance with international practice, the insurance of agriculture, also including livestock and aquaculture stock insurance, is policy-supported. Farmers active in these subsectors can enjoy premium subsidies offered by the government of around 30 percent. The insurance company is also exempted from some agriculture insurance taxes. Other agriculture-related insurance products, including property insurance and liability insurance, are operated in a commercial manner. In this way, the losses made in arable farming and aquaculture can be compensated by profits gained in other insurance products. This system is called "insurance's self-raising". In case devastating disasters hit the sector, the government can offer its support under the existing special disaster relief policy; however, this would be done only if the insurance company could not afford to pay its insurance obligations. Shanghai Anxin's operations focus on the economically important agriculture and assemblage rural sectors near Shanghai. At present, the crop insurance services of the company include insurance policies for paddy, wheat, cole crops, vegetables, wood and melons; insurance of livestock and aquaculture stocks include policies for pigs, cattle, chicken, duck, freshwater fish aquaculture and crab culture in purse nets. Although the aquaculture production in Shanghai accounts for less than one percent only of the total aquaculture production in China, Shanghai Anxin's share of the total insurance premiums paid in aquaculture adds up to 42 percent of the total premiums paid for insurance of aquaculture in the country. In 2004, a total of some 70 000 mu of freshwater fishponds in Shanghai were insured. These were located in the suburbs of the city where aquaculture production risks

mainly come from natural hazards and other contingencies that may cause death by oxygen depletion. At present, annual premium rates for freshwater aquaculture insurance against death caused by oxygen lack are some 2 percent of the total insured sum; 30 percent of the premium can be subsidized by municipality or local government after purchase of the insurance. The maximum compensation that farmers can receive is US\$241 for each mu of their fishpond in case of losses. The local branches of the insurance companies, together with the aquatic product office are responsible for the work involved, including contract-signing, premium-charging and insurance-related investigations.

PICC started in 1982 with agriculture insurance services, using the slogan “low risk, low premium and fundamental indemnity”. However, the high risks involved in agriculture production and the low profits gained by the company caused it to terminate its agriculture insurance in the last decade, except in some regions where insurance was policy-supported. As of January 2005, PICC’s branch offices in Fujian, Liaoning and Heilongjiang Provinces still only provide agriculture insurance services. In recent years, the premium income from agriculture insurance, mainly from the insurance of arable crops, accounted for less than one percent of the company’s total premium income. Aquaculture insurance in its turn only accounted for a tiny part of this one percent premium income. For example, while aquaculture production in Fujian Province was estimated at 3.43 million tonnes in 2003, and the province is known for being frequently threatened by typhoons, droughts, storms and other natural hazards, the premium income from aquaculture insurance in the same year was only US\$7 000.

The Insurance Company of Chinese Union (ICCU) is also a state-owned company involved in agriculture insurance. The company was originally called the “Insurance Company of the Xinjiang Construction Corps” and was established in 1986. At that time, it was mainly involved in the agriculture insurance in Xinjiang Province. In 2002 it became ICCU after being ratified by the Insurance’s Supervising Committee of China and was allowed to expand its operations to other provinces around the country. At present, it has opened branch offices in nine municipalities and provinces including: Beijing Municipality, Shanghai Municipality, Chongqing Municipality, Guangdong Province, Zhejiang Province, Sichuan Province, Jiangsu Province, Liaoning Province and Shaanxi Province. Together with the Xinjiang Production and Construction Corps, ICCU established an agriculture risk fund, where the premium income is stored on a 30/70 percent basis, just as compensation is paid when disasters occur. ICCU provides crop insurance to farmers for arable crops and aquaculture, although the activity is only of minor importance to the company in terms of premium income. Since ICCU’s experiences with agriculture and aquaculture insurance are not very positive (e.g. the loss ratio in 1999 on agriculture insurance was around 76 percent), the company shows limited interest in promoting aquaculture insurance and making it a major activity.

In 2004, the China Fishing Vessel Owners Mutual Assurance Association started its first activities in aquaculture insurance (see Box 1). Some other professional agriculture insurance companies have just been established or allowed

BOX 1

Mutual insurance in aquaculture

Non-profit and mutual forms of insurance recently started to appear in the aquaculture insurance market. In 2004, the China Fishing Vessel Owners Mutual Assurance Association, which has been engaged in the mutual insurance operation for fisherfolk (life insurance and vessel insurance) since 1994, carried out a pilot project in aquaculture insurance for deepwater aquaculture cages in the Shengsi County, Zhoushan, Zhejiang Province. All seven local commercial aquaculture companies (or subsidiaries) got insured for “named perils”. The insurance proceeds was US\$0.8 million for 110 aquaculture cages and US\$0.5 million for the various kinds of fry. As the first of its kind in China, this pilot project has effectively reduced the aquaculture risks of marine aquaculture establishments and has since boosted the development of marine aquaculture in the province. The pilot project was successful; the association accumulated much experience and is planning to further expand its aquaculture insurance activities.

to enter the market. Their operations are generally confined to provinces where fisheries play only a limited role; so far no information could be given on any specific type of aquaculture insurance in their portfolio. Nevertheless, aquaculture insurance is listed among their services, so they might be regarded as potential suppliers in the aquaculture insurance market. One of the new parties on the market is Groupama, which opened a branch office in October 2004 in Chengdu, the capital of Sichuan Province. It is the only foreign company offering agriculture insurance services in China as of January 2005. Anhua Agriculture Insurance Company, which was operating in Jilin Province in December 2004, is another new market player. At present, it operates as a commercial company, not yet policy-supported. The company follows a marketing strategy of combining direct and indirect sales, cooperating closely with rural credit unions and utilizing them as its main marketing channel.

A final new market player worth mentioning here is the Yangguang Agricultural Mutual Insurance Company, which is the first real mutual insurance company in China. In January 2005, it was established to provide agriculture services (including aquaculture insurance) to farmers in Heilongjiang Province, which is located in China’s major “bread basket”.

On the demand side, in 2003 the total area used for aquaculture in China was 7 103 648 ha (*China’s Fisheries Statistics Yearbook, 2003*); however, less than one percent of this area was covered by insurance. Demand for insurance shows an increasing trend in the development of aquaculture. In recent years, fundamental changes have taken place with regard to the economic structure of aquaculture. Aquaculture is increasingly considered an activity that involves risks. Its vulnerability to risks objectively calls for the establishment and perfection of related social and financial service systems.

Moreover, aquaculture is developing in China towards intensification, increasing yields, and increasing efficiency and output in terms of high-quality and safe food. These trends require investment increases in facilities and equipment, and a culture of high-quality and high-value aquatic products; higher investments mean higher financial risks.

In addition, the awareness of risks among aquaculturists has also improved greatly in recent years. This is partly a result of a shakeout in some areas; production in these areas is being centralized in the hands of some very successful aquaculture enterprises and specialized households. The less profitable aquaculture farms are disappearing and the successful ones seem to grow in areas like Shanghai. Increased scale of operations and intensification create additional risks, which can be a great burden on individual aquaculture enterprises and households involved in the activity. To reduce this burden, more and more aquaculturists call for aquaculture insurance services. Many of the pilot projects in aquaculture insurance carried out in recent years were established at their request. The government generally urged locally active insurance institutions to respond to the farmers' requests.

Wang Wei-Jing (2004) estimated that in China the direct economic loss to the fishery sector (including aquaculture) each year caused by natural disasters is around US\$600 million. Relating this figure to the situation in Western countries where on average 20 percent of the losses are compensated for through insurance, the current capacity of the fishery insurance market in China would add up to around US\$120 million. It should be noted here, however, that the premium rates currently applied in aquaculture insurance depend on the average degree of damage or loss. The premium charged usually accounts for around ten percent or more of the production value. Such an insurance premium is considered too high for most aquaculture households in China.

3.5 POLICIES CURRENTLY IN FORCE

The exact number of aquaculture stock insurance policies in effect in China is unknown. Based on verbal communications from operators in the various insurance companies currently involved in aquaculture insurance in China, there are roughly a few hundred policies in force in 2005. The insurance companies approached did not, however, reveal the current number of aquaculture insurance policies.

The policies terms and conditions as well as the application forms of the current policies in force are generally developed by the insurance companies themselves.

3.6 PERILS COVERED

Aquaculture insurance in China is limited to "named perils".

As far as aquaculture stock insurance is concerned, the insurer generally compensates for the economic losses due to death caused by oxygen lacks, hurricanes, tornados, storms, floods and thunder storms, electricity failure at the farm and collapse of dykes.

In addition, insurance coverage occasionally includes theft, poison-casting, looting and pollution by pesticides flowing from neighbouring farmland into the

pond. The valid term of fish aquaculture insurance is generally one year, and if a pond is cleared halfway, the insurance obligation automatically comes to an end.

In shrimp production, the insurer compensates for the economic losses due to devastating tides, tsunamis, collapse of ponds, atrocious weather conditions causing an anoxic situation inside the fish pond, and losses due to poison-casting.

The present insurance policies in place prescribe that compensation shall be mainly confined to the death of species caused by devastating disasters beyond man's control or by contingencies that do not result from farmers' behaviour. Hazards such as diseases that can often be prevented and mitigated through technical methods are generally not included under the insurance coverage.

3.7 SPECIES INSURED

In 2005 aquaculture crop insurance included insurance policies for shrimp, fish, freshwater mussel, sea tangle (i.e. kelp) and shellfish culture. Currently, however, insurance coverage is limited to some fish and shrimp species culture in the Shanghai Municipality and Zhejiang and Liaoning Provinces. The main species include black carp (*Mylopharyngodon piceus*), grass carp (*Ctenopharyngodon idellus*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Aristichthys nobilis*), common carp (*Cyprinus carpio*), crucian carp (*Carassius auratus*) and blunt snout bream (*Megalobrama amblycephala*). In general, these species need not be differentiated very clearly when applying for insurance coverage.

The species in coastal and marine aquaculture that can be insured at present are shrimp (*Penaeus chinensis* and *Penaeus monodon*), scallop (*Chlamys farreri*) and kelp (*Laminaria digitata*). The major risks in the culture of these species originate from sea-borne disasters such as typhoons, tsunamis, abnormal tides and seawater pollutants. The insurance provides compensation for these risks. At present, the cages and fish fry of various species can be insured for deep-water cage fish culture. Insurance coverage neither includes misconduct and mismanagement by the aquaculturist, nor acts of war and government conduct. In some cases, diseases can also be insured against.

Some companies are investigating the possibility of also providing insurance cover for high-value aquarium fish species culture.

3.8 GROWING SYSTEMS INSURED

Although the specific insurance policies vary from place to place, intensive and semi-intensive grow-out of fish in fishponds is generally considered the main insurance of fish and shrimp aquaculture. Only aquaculturists raising fish or shrimp who have chosen the right place for the ponds and who have the necessary anti-disaster devices, such as those capable of providing additional oxygen under water to enable him/her to manage the pond normally, can apply for insurance coverage.

Shrimp, scallop and kelp raised in coastal areas, mainly in the shallow sea and on coastal banks, can also be insured.

At present, not one insurance company in China provides insurance coverage for hatchery production. Some companies plan to insure purse-net culture activities in inshore areas and inland water bodies.

In addition to aquaculture crop insurance, some of the Chinese insurance companies offer the aquaculturists coverage for buildings and onshore equipment, public liability, employer's liability and products liability.

3.9 UNDERWRITING

Insurance companies try to transfer part of the risks to reinsurance companies or government, mainly in the face of devastating disasters that might ruin their company and make it impossible to compensate all those insured. For example, it is prescribed by some companies that any insurance policy with a total sum of insurance above US\$2.4 million or premiums above US\$0.48 million shall be reinsured.

Due to the high loss ratio of agriculture (fisheries) insurance, China's commercial agriculture insurance companies have not managed to find reinsurance within China to date. This means that the risks are mainly borne by the company itself. In case large disasters hit the sector and the losses do not exceed the companies' solvency, sometimes it is the local government that provides some financial support. In many regions in China, however, no guarantee fund for agriculture insurance has ever been set up, and local governments cannot therefore provide any assistance in paying additional compensation to those insured that are hit by disasters.

To date, Chinese insurance companies involved in aquaculture insurance are not allowed to underwrite aquaculture risks in other countries.

3.10 RISK MANAGEMENT

Cooperation between insurance companies and aquatic product offices is common practice in China to create awareness and support the development of aquaculture insurance, reduce risks through promotion of better management practices, and the monitoring and evaluation of aquaculture practices and damage and losses. Any successful aquaculture insurance operation in China up until now has worked closely with aquatic products offices.

In the various pilot projects carried out over the past years, aquaculture insurance is also used as tool to increase cooperation between various participants in the project, with the overall goal to reduce the risks in both aquaculture production and the insurance service.

Some risk management activities most commonly used in China are:

- When introducing new insurance products, the marketing and extension personnel will evaluate the risks, using their experience and know-how of the sector.
- When aquaculturists apply for insurance, an inventory is made of the equipment, facilities and situation at the site, which will be compared with the situation after any damage or losses have occurred.
- Compensation is paid according to different levels of damage or loss, and those insured who enjoy successful production processes and thus need little

compensation from the insurers will be rewarded by a deduction in premium fees.

- When the insured sum is determined, insurance companies generally make the aquaculturists share some of the responsibilities and take on part of the risks; this is done to increase awareness of disaster prevention and stimulate mitigation efforts. For example, in some recent pilot projects, it was common practice that 30 percent of the risks were assumed by the aquaculturists themselves.
- Policies of some insurance companies allow for a certain amount of the insured items to be exempt from compensation. (For example, in the pilot aquaculture insurance project in Pingyang County, the exemption ratio for compensation varied between 10 and 20 percent for different aquaculture species.) This was introduced as a measure because it was extremely difficult to determine who was responsible for the damage or loss and the exact amount of damage or loss incurred. Exempting a certain amount from compensation can slightly reduce the risks for the insurance companies.
- Insurance companies usually cooperate with technical departments of aquatic products offices in their daily management to oversee the whole process of aquaculture production and carry out steps of disaster prevention; the tasks of the aquatic products offices sometimes includes contributing to risk management surveys.

In view of the above, the major responsibilities with regard to aquaculture insurance and risk management always lie with the insurance companies, particularly since they evaluate the risks involved in certain insurance products, introduce new insurance varieties, design insurance policies and decide on the insured sum and the premium rate, and evaluate the damage or loss and decide on the amount of compensation.

3.11 CLAIMS HANDLING

The sum of insurance is calculated according to the perennial average output per mu and the fixed unit price. The premium is calculated according to the premium rate prescribed by the insurer. Evaluation of any damage considers the quantity of fish that survived and the different degrees of damage. The procedure is as follows: when an accident occurs, insurers first carry out an investigation into the actual causes of the disaster and the losses or damages resulting from it, record this information, and wait until harvest time to decide on the compensation accordingly.

In general, only loss adjusters of the own company are used, but they might be assisted by staff of the local aquatic products offices.

3.12 UNDERWRITING EXPERIENCES

Severe losses in the 1980s and 1990s have caused many insurance companies to withdraw from aquaculture insurance. Those companies that have offered insurance coverage for aquaculture stocks since the mid-1990s reported having had major losses until 1998; they reported neither losses nor profits in 1999 and 2000, and better results from 2001 onwards (see also Box 2).

BOX 2

Bad experiences in aquaculture insurance pilots are counter-productive

In 1993, insurance companies in China gathered around US\$120 000 of premium for prawn culture insurance, but due to a prawn disease outbreak later on that year, they had to provide compensation of US\$960,000. Moreover, in a key aquaculture-producing region, Dalian in Liaoning Province, the premium income accumulated to US\$3.5 million in recent years, but US\$7 million was paid for compensation over the same period. One year aquatic product insurance in Dalian reached the loss ratio record of 3 800 percent! The experiences from these pilot projects made insurance companies think twice before offering policies on a large scale.

As far as the new market entrants since 2004 are concerned, it was still too early to obtain a historical overview of experiences from these companies.

3.13 CONCLUSIONS

In the provinces and municipalities in China where aquaculture insurance services are currently available, it is recognized that it plays an important role in the sustainable development of the aquaculture sector. Benefits of aquaculture insurance are as follows:

- It can help resume aquaculture production in a timely manner and to stabilize aquaculturists' livelihoods after calamities.
- It facilitates aquaculturists to access credit services and make the necessary investments. In cases where insurance companies provide cover to aquaculturists, their credit can be increased, which allows them to obtain the necessary capital for production in time.
- It increases the introduction and dissemination of better management practices in aquaculture. Insurance companies, their agents and the aquaculturists insured take measures to prevent, increase preparedness for, and mitigate disasters, which will not only reduce the insurance companies' burden of compensation, but will also contribute to sustainable aquaculture's development.

It is clear that there is a great demand for aquaculture insurance in China among the 3.9 million people employed in this sector. However, at present it seems that there is little aquaculture insurance available and in some provinces, access to aquaculture insurance is even shrinking. The gap between demand for and supply of aquaculture insurance services has widened in recent years. It is hoped that with the entry of new national and foreign capital-based agriculture insurance companies in 2004 and 2005, aquaculture insurance services will also get a new boost.

While it is recognized that aquaculture insurance is an essential service for the sustainable development of the sector, there are a number of constraints that hinder the widespread introduction of aquaculture insurance and decrease incentives for insurance companies to establish aquaculture insurance schemes.

Some major constraints are:

- The existing government policy is not supportive of aquaculture insurance development. It allows insurance companies to follow the profit oriented way of working only, creating insurance products that do not meet the demands of most aquaculturists or are out of their reach. At the same time, policies and regulations in support of mutual insurance are not yet standardized, causing market disturbances and unequal chances for insurance companies. The possibility of government intervention in the market for aquaculture insurance is not well-defined at present; which is mainly caused by the fact that the sector is still in an experimental state.
- The revised 2002 PRC Insurance Law prescribes that the insurance business serving the agricultural development should be supported by the government and that specific laws and administrative laws should be prepared for agriculture insurance. As of January 2005, there was not one policy in place to support and guide the responsible and sustainable development of aquaculture insurance. Aquaculture insurance seems to be neglected.
- The limited availability of historic data and the rapid technological developments in the sector make it difficult to assess production risks properly; this combined with the lack of specialists on both aquaculture production techniques and insurance management, and poor experiences with aquaculture insurance in the past create reluctance on the part of insurance companies to add aquaculture insurance to their product range.
- Aquaculture insurance capacity has to compete with insurance capacity of other sectors. The fact that the aquaculture insurance business has been less profitable than most other insurance businesses hinders its development.
- The widespread culture area and the fact that aquaculture households and companies are often scattered throughout the country, together with the large variety in culture systems and species used, increase the administrative and management costs involved in operating an aquaculture insurance scheme.
- The lack of reinsurance capacity available within China of companies providing aquaculture insurance makes insurance companies reluctant to develop products for and service the aquaculture sector.
- As profitability in aquaculture is under pressure due to rapidly increasing production combined with decreasing market prices and high competition on the world market, the demand for aquaculture insurance depends greatly on the premium rates established.
- Asymmetric information, moral hazard and adverse selection also remain among the major constraints for aquaculture insurance development.

3.14 RECOMMENDATIONS

Recommendations with respect to the development and dissemination of aquaculture insurance in China can be made at different levels. The following are some of the most frequently made recommendations when discussing the issue with insurance specialists, government officials and farmers:

- In order to suit aquaculture insurance product policies to the wide variety of aquaculture systems used in the country and thereby increase demand, diversification in aquaculture insurance policies is necessary, keeping policies extremely simple and comprehensible and making claim handling and loss confirmation procedures as straightforward as possible.
- Collaboration in the aquaculture products marketing chain should increase to spread the risks associated with the introduction of new technologies, new species and other innovations in aquaculture.
- Insurance companies and governmental agencies should actively collaborate to increase awareness among aquaculturists on insurance; at present, farmers and fisherfolk with lower education levels generally do not have a clear idea about the significance and functions of insurance, and how to get access to insurance services.
- A clear law on aquaculture insurance, supported by a specific national policy framework, should be developed as soon as possible in consultation with all relevant stakeholders, based on a comprehensive review study of the national and international experiences and in line with international standards.
- Although there are some major differences in opinion on this point, many argue that a policy-supported aquaculture insurance system should function as a general framework. In such a system in which aquaculturists widely participate, insurance is guaranteed by the national government, financed by government subsidies and organized in guilds. The main goals of such a system would be to guarantee food safety and food security, and enhance individual capacities for preventing natural disasters and resuming production after calamities. The insurance system should be multi-level, multi-channel and multi-proprietor, providing opportunities to both commercial and mutual insurance companies. Its main principles would include a low premium, low security and low compensation. In other words, the sum of insurance is based on materialized cost. The system gathers scientific evidence based on policy development, premium establishment and loss confirmation. It is argued that local aquaculture organizations should be responsible for implementation.
- Aquaculturists should keep records of their activities allowing insurance companies, when applying for their services, to gather historic data that would make it possible to better assess the risks involved in the aquaculture activity and to allow them to provide advice on better management practices. This record keeping has started already in some municipalities, but it should be spread to other municipalities and provinces.
- Government and insurance companies should search more actively for reinsurance opportunities for aquaculture, both within China as well as in the international reinsurance market.

4. The current state of aquaculture insurance in Asia

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4.1 INTRODUCTION

Major risks that affect the successful conduct of fish culture operations and fish-farmer enterprise profitability are accidents, natural calamities and fish diseases that might negatively affect the health and physical well-being of the fish farmers themselves, working conditions, farm production assets and the production of fish and other aquatic organisms.

While these risks were present in the past, the changes currently taking place in the fisheries sector in many cases require aquaculturists to modify their operations and acquire new production technologies and inputs. These required modifications often render aquaculturists more vulnerable to risks.

The effects of the risks are aggravated by the liberalization, privatization and drastic reduction of government support services (including subsidies) to the fisheries sector. As a result, aquaculturists have to rely more on themselves and their own resources. The introduction of appropriate insurance arrangements that assist aquaculturists in sharing the risks involved in aquaculture production will certainly enhance the economic and financial viability of the sector. Insurance will further facilitate the adoption of newly introduced measures and regulations that aim at promoting the environmental and social sustainability of aquaculture and the better use of aquatic resources.

4.2 SHORT SUMMARY OF AQUACULTURE PRODUCTION IN ASIA⁴

Aquaculture production in Asia (excluding China) was estimated at 13.0 million tonnes in 2004. The production volume increased immensely in just one decade; in 1995 the volume was only 8.4 million tonnes, reaching the 10 million tonnes benchmark in 2002. In value terms, aquaculture production in Asia (excluding China) reached US\$20.8 billion in 2004; in 1995 the value of aquaculture production in the same region was estimated at US\$18.3 billion. However, since 1995 there were only two years in which the estimated total value was above that of 1995.

4.2.1 India

Between 1995 and 2004, aquaculture production in India increased from 1.7 million tonnes to almost 2.5 million tonnes. Roho, catla, common carp and mrigal

⁴ Please see Chapter 2, section 2.2, footnote 2.

are all produced in volumes of around 450 000 tonnes. Silver carp, grass carp and tiger prawn are other important species that have been cultivated in volumes of over 100 000 tonnes annually in recent years. Indian aquaculture production in value terms reached US\$2.9 billion in 2004; this is an increase of US\$1 billion from the US\$1.9 billion realized in 1995. In 2004, some US\$700 million was generated by the production of giant tiger prawn; the total value of other important species, such as roho and catla, was US\$413 million and US\$398 million, respectively.

The total number of people in India working in aquaculture was estimated at 3.3 million in 2004, of which 829 000 are considered full-time employers in the sector. It is important to note that the sector is also an important provider of employment for women, with a total of 777 000 employed in recent years.

4.2.2 Japan

In Japan, aquaculture production decreased slightly between 1995 and 2004, from just below 1.4 million tonnes to under 1.3 million tonnes. Laver Nori, Pacific cupped oyster and Yesso scallop are the main species produced in terms of volume. Japanese amberjack and silver bream were the main aquaculture fish species in 2004, with production volumes of 150 000 tonnes and 81 000 tonnes, respectively.

The value of Japan's aquaculture production in 2004 is considerably lower than in 1995. In 1995 the value added up to over US\$5.6 billion, which decreased to US\$4.2 billion in 2004. The total production value realized by silver bream and Japanese eel decreased by half over this decade. Japanese amberjack remained the most valuable product in 2004, with a total value of US\$1.2 billion.

Employment in the fisheries sector in Japan decreased from an estimated 301 000 in 1995 to 230 000 in 2004. As Japanese statistics reported do not distinguish between capture fisheries and aquaculture, the share of aquaculture in this employment figure is unknown.

4.2.3 Bangladesh

Aquaculture production in Bangladesh reached an estimated 915 000 tonnes in 2004, which almost tripled since 1995 when production was estimated at 317 000 tonnes. No mariculture is reported for Bangladesh. The inland freshwater carp species, catla, roho, silvercarp and mrigal, are the most important species in terms of production. The production volume of the individual carp species was higher than 100 000 tonnes each annually. The value of aquaculture production of Bangladesh was estimated at almost US\$1.4 billion in 2004. Roho was the most important product, producing an output value of US\$265 million. In contrast, in 1995, the value was about US\$615 million; *Penaeus* spp. shrimp was the most important product in value terms.

Employment in fisheries and aquaculture is not frequently reported; at present it is estimated at 1.3 million people, of which almost 700 000 are full-time workers. Unfortunately, no distinction between capture fisheries and aquaculture is made in the figures.

4.2.4 Viet Nam

The Vietnamese aquaculture production increased from 389 000 tonnes in 1995 to an estimated 1.2 million tonnes in 2004. Catfish and carp are the main species produced, together accounting for over 700 000 tonnes. Giant tiger prawn production was estimated at 185 000 tonnes in 2004.

Viet Nam's aquaculture production value was estimated at around US\$2.4 billion in 2004; this is about US\$600 million higher than in 1995. An estimated 40 percent of the production value was generated in 2004 in freshwater environments, while 59 percent came from brackish water culture. This means that mariculture was still of minor importance in value terms when comparing with the other environments. The number of aquaculturists in Viet Nam was estimated at around 700 000 in 2004.

4.3 THE INSURANCE MARKET

4.3.1 India

In India, the entire insurance business consists of public sector, state-owned enterprises. All general insurance issues in the country, except for life insurance, are handled by the General Insurance Corporation of India (GLC), which is at the same time the overall policy-making body for general insurance. At the field level, insurance coverage is provided by four subsidiaries of the GLC. These are:

- United Indian Insurance Co. Chennai;
- National Insurance Co. New Delhi;
- Oriental Insurance Co. Kolkata;
- New India assurance Co. Mumbai.

Two insurance schemes were designed in the 1990s to assist the aquaculture sector:

- The Brackish Water Shrimp Insurance Scheme;
- The Inland Fish Insurance Scheme.

In 2003, the Agriculture Insurance Company of India Limited (AIC) was established by the Government of India. AIC took over the implementation of the National Agricultural Insurance Scheme (NAIS), which until a few years ago was implemented by the General Insurance Corporation of India. It is foreseen that in the near future, AIC will provide insurance services directly or indirectly to agriculture and its allied activities (under which aquaculture is considered as well).

The main reasons for the establishment of AIC were that crop production is subject to the vagaries of weather and large-scale damages due to attack of pests and diseases, and that crop insurance can assume a vital role in the stable growth of the sector. Although an All-Risk Comprehensive Crop Insurance Scheme (CCIS) for major crops was introduced in 1985, it was subsequently replaced by the National Agricultural Insurance Scheme (NAIS) around 2000, because the developed insurance schemes did not reach maturity and remained largely in an experimental pilot phase. AIC now aims to provide widespread crop insurance services.

4.3.2 Japan

In Japan, aquaculture insurance is offered under the Fishery Damage Indemnification System. The Fishery Damage Indemnification System is both a mutual aid system and an important part of the national government's fishery damage assistance policy. The system was originally designed to rationally insure fisherfolk against damages due to contingencies, and to spread the risks among them.

To achieve the objectives of this system, the government currently provides the following assistance to fisherfolk and aquaculturists:

- Government subsidies are granted to fisherfolk and aquaculturists participating in the Fishery Mutual Insurance Scheme to cover a part of their premium payments. This subsidy is available to those whose scale of fishing or aquaculture operations are below a certain level.
- In case of damages due to catastrophic disasters considered to be beyond fisherfolk and aquaculturists' mutual aid schemes, the government insurance scheme may cover such damages by a retrocession contract with the National Federation of Fishery Mutual Insurance Associations (excluding Fishing Gear Insurance).
- The government assists the fishery mutual insurance institutions by providing subsidies to cover a part of their administration expenses, including the wages of employees needed for managing the scheme.
- The government grants subsidies of up to two-thirds of the premium of special insurance contracts against damages by red tide, which are included in the Aquaculture Insurance Scheme.
- The government also provides support in guarantee capital to the Credit Fund for Agriculture, Forestry and Fisheries, which extends loans to the fisheries mutual insurance institutions for running their insurance operations in support of the sector.

4.3.3 Bangladesh

Bangladesh is disaster-prone country, making both pond culture in inland areas and shrimp culture in the coastal areas rather risky ventures. Some years ago, the Sadharan Bima Corporation introduced a specific programme for shrimp culture projects along with a livestock and crop insurance programme. At present, there is no insurance programme for fish farming. Although fish culture is not currently insured, the insurance programme is called Technology-based Fisheries Insurance.

4.3.4 Viet Nam

Aquaculture insurance in Viet Nam is widely considered an excellent means to support shrimp farmers and provide them with protection against a variety of natural hazards beyond their control that affect their health and personal security, assets and harvests, and with basic compensation for the loss of harvests, making their incomes more secure. Aquaculture insurance thereby contributes to greater stability and social and economic welfare in the farming community (FAO, 2001). Although the main national insurance companies of Viet Nam, Bao Minh

Insurance Company and Bao Viet Insurance Company, have shown some interest in agriculture and aquaculture insurance in the past, they have not employed any activity in aquaculture insurance to date.

A workshop in Nha Trang in 2001 revealed that the national insurance companies are reluctant to enter the aquaculture insurance activity because of the difficulties that they encounter in setting up such schemes, including:

- general lack of knowledge of the operation of agriculture/aquaculture insurance among insurers in Viet Nam;
- lack of awareness among fish farmers on the benefits of insurance;
- the likelihood that only those who carry out high-risk activities want to be insured;
- the high probability of false declarations of product losses;
- the periodical premium payment, which may not be compatible with the cash flow of the fish farmer.

At the same workshop, a Bao Minh Insurance Company spokesperson stated that the company would develop shrimp culture insurance in cooperation with local aquaculture research and extension centres. He added that specific responsibilities were foreseen for the partners: while Bao Minh would carry out the insurance business (receive requests, conduct preliminary appraisal, evaluate clients, issue policies, receive premiums, supervise and settle compensation), the local aquaculture agencies would assist the insurance company in the inspection and assessment before accepting insurance, prevent losses and examine claims to determine appropriate levels of compensation. Up until now Bao Minh Insurance Company has not offered aquaculture insurance services.

The only company offering aquaculture insurance services in 2004–2005 in Viet Nam was a foreign company, Groupama Vietnam General Insurance Company Ltd. Groupama is part of the French multinational insurance company, GAN. In Viet Nam, Groupama was licensed towards the end of 2001 to insure shrimp, fish poultry and small livestock activities. Groupama started its aquaculture insurance activities in 2003 in the Mekong Delta Provinces in Viet Nam.

There were three main insurance packages for aquaculture offered by Groupama in the Mekong Delta provinces in 2004:

- package insurance for fish farming in ponds and cages;
- package insurance for shrimp farming in ponds;
- package insurance for prawn farming in ponds.

4.4 DEMAND AND SUPPLY ISSUES

In all four countries covered under this review in Asia, there is apparently a growing demand for aquaculture insurance. The rapid growth in the aquaculture industry in terms of productions, species diversification and spread to areas where aquaculture had hardly been practised before, has caused an increase in risks. Aquaculture entrepreneurs are actively searching for risk-sharing measures, including mutual insurance arrangements through cooperatives and associations as well as individually with insurance companies. In addition to the growth in

aquaculture production, the number of aquaculture workers has grown as well with over two percent annually in many countries in Asia. The number of aquaculture insurance policies has neither kept pace with the growth in production nor with the growth in aquaculture workers. Insurance companies have piloted aquaculture insurance (often after having been asked to do so by national governments), but these pilots often failed and were used as an excuse to refrain from offering insurance after the pilot had terminated.

It should be noted, however, that in Japan, insurance of aquaculture stocks has kept pace relatively with the growth in production (particularly in comparison with other Asian countries), although exact data on the number of aquaculture insurance policies are lacking.

4.5 POLICIES CURRENTLY IN FORCE

4.5.1 India

The number of shrimp insurance policies currently in force is not known, but it is estimated that less than 25 policies were in force in 2005.

Most shrimp insurance policies in the mid-1990s were in effect in Andhra Pradesh; most of the claims were made in the same region. A considerable number of policies were also issued in that time in Tamil Nadu and Orissa.

The Inland Fish Insurance Scheme mainly operates within the State of Andhra Pradesh. The exact number of policies in force is not known, but the author estimates that it is less than 50.

4.5.2 Japan

The exact number of policies in force is not known, but it is estimated that many policies are in operation. The Fisheries Agency reported that 37 percent of the fish and crustacean aquaculture and over 70 percent of the seaweed and shellfish culture in terms of value of the output generated was covered by insurance in 2004. The total value of aquaculture production insured in 2004 was estimated at over US\$600 million. In particular, a large part of the yellowtail, kanpachi and seabream culture was insured. Moreover, in 2004, oyster and pearl oyster production was generally covered by insurance as the insured value of these species was estimated at 78 million.

The following are the reported numbers of aquaculture farms in 2003 for the main species: yellowtail (1 029), seabream (1 012), flatfish (244), other fish (463), scallop (3 858), oyster (3 308), seaweeds (over 10 000) and pearl oyster (over 2 000). A fairly conservative estimate would be that at least 3 000 farms are covered by aquaculture insurance.

4.5.3 Bangladesh

At present it is estimated that there are 25 aquaculture stock insurance policies in force.

4.5.4 Viet Nam

The current number of policies in force is not known. Groupama started in 2002 with some 20 policies, which increased in 2003 to over 1 300 policies.

4.6 PERILS COVERED

4.6.1 India

The following perils are covered in the Brackish Water Shrimp Insurance Scheme: summer kill, pollution from external sources, poisoning, riots and strikes, malicious acts by third parties, earthquakes, explosions, storms, tempests, cyclones, typhoons, floods, inundations, volcanic eruptions and other convulsions of nature, terrorism, aircraft and other aerial devices or articles dropped from the air, shell disease, vibriosis, aeromonas, celidas and other viral infections of epidemic or parasitical nature. Additional cover to the above-listed perils that are included under a basic policy can be purchased as well. Such additional cover can include death of the stock due to diseases other than those covered under the basic cover.

The insurance only provides cover against total loss of shrimp, which is defined as those cases where the loss of shrimp is so extensive (caused by one or more of the perils listed above) that the recovery/residual harvest during a single cropping period falls below 20 percent of the sum insured.

4.6.2 Japan

Aquaculture insurance in Japan is “named perils” insurance. Two types of aquaculture insurance policies can be distinguished: one that addresses partial and total loss by death or escape of the cultured products during the culture cycle, and one that addresses damage, losses and sinking of aquaculture facilities while in operation. With regard to the second type, one often uses the term “insurable damages”, which means that when the insured facility is partially damaged and in cases when the cost of full recovery of the facility are expected to be higher than a half of its insurable value, the total loss is covered by the insurance.

In general, damages are not covered by the insurance if they fall under these categories:

- damages caused by war or similar disturbance;
- damages caused by loss by theft;
- damages caused by contamination of water due to the discharge or leakage of sewages, waste fluids and other substances harmful to the cultured products;
- damages caused by negligence of the policy-holder or by third parties;
- damages caused by excessive red tides (excluding those under a special contract for red tides).

If an aquaculturist participates in the Aquaculture Insurance Scheme under the special policy that specifies coverage of damages caused by red tides in waters previously designated by the insurer, the damages due to excessive red tides are covered by this scheme. In this special policy, an excessive red tide is defined by any one of the following conditions:

- the period between the appearance and the disappearance of red tide is ten days or more;
- the red tide causes mortality of more than half of the cultured products within the specified waters;

- it is acknowledged that the red tide in question is different from ordinary red tides based on scientific observations of its extent, species or density of plankton.

A specific Aquaculture Insurance Scheme was also initiated to cover losses and damages to cultured seaweeds, such as laver, undaria and kelp. This specific scheme also covers financial losses due to the sudden declines in market prices for these products.

4.6.3 Bangladesh

The shrimp insurance policies issued are “named perils” policies, which cover damages to the stock due to tidal borne floods and cyclones causing sudden surcharges of water.

4.6.4 Viet Nam

Aquaculture insurance in Viet Nam is only available for named perils. The perils insured are: mortality of the stock caused by diseases, accidents, thunder strikes, sudden pollution, loss of water by chance and dikes or dam breakages. In addition to aquaculture stock insurance, one can opt for additional insurance coverage against fire, storms, floods and electrical damage affecting the buildings of the aquaculture enterprise.

4.7 SPECIES INSURED

4.7.1 India

Under the Brackish Water Shrimp Insurance Scheme, only *Penaeus spp* shrimp species are insured. The insurance includes various stages in the lifecycle, including postlarvae, juvenile and adult prawns and shrimp.

Fry, fingerlings, grow-out fish and broodstock of a large range of freshwater species (including common carp, silver carp, Indian carps, tilapia and catfish) are insured under the Inland Fish Insurance Scheme.

4.7.2 Japan

Aquaculture is defined by the Aquaculture Insurance Scheme as the artificial rearing of fish, shellfish and seaweeds and the marketing of these products. It is argued in the scheme documentation that aquaculture tends to suffer from losses in the stock of cultured fish; shellfish and/or seaweeds through death, escape or injury. It may also suffer damages to the aquaculture facilities. The Aquaculture Insurance Scheme covers losses based on the damage to the stock insured.

Species insured include oyster, pearl oyster, mother of pearl shells, scallops, yellowtail tuna, seabream, coho salmon, seabass, flatfish, kanpachi, horse mackerel and puffer fish. Only certain age categories can be insured for some of these species, thus not the whole production cycle; juveniles and fry are not insured at present.

A specific Aquaculture Insurance Scheme was initiated as well to cover losses and damages to cultured seaweeds, such as laver, undaria and kelp.

4.7.3 Bangladesh

The species covered are limited to shrimp (*Penaeus* spp.) and prawns (*Macrobrachium rosenbergii*).

4.7.4 Viet Nam

The species covered by the various aquaculture insurance packages offered by Groupama Insurance Company Ltd in Viet Nam are:

- wild-fish: snake head, snake skin gourami, sea bass, giant gourami (*Lotustus* spp.);
- cultured-fish: red tilapia, Kissing gourami, common carp, silver carp, tilapia, Indian carp, grass carp, and catfish species (*Pangasius hypophthalmus*, *Pangasius bocourti*, *Pangasius mytus*);
- shrimp and prawn: *Penaeus monodon* and *Macrobrachium rosenbergii*.

4.8 GROWING SYSTEMS INSURED

4.8.1 India

Pond and tank culture systems are the only systems insured under the Shrimp Insurance Scheme. Pond culture and culture in land freshwater reservoirs can be insured under the Inland Fish Insurance Scheme, which is not, however, applicable to brackish water and marine fisheries.

4.8.2 Japan

In Japan, aquaculture insurance systems mainly focus on marine aquaculture, which means that marine cage culture systems and hang-and-bottom culture of scallops, oysters and shells are the growing systems currently insured.

4.8.3 Bangladesh

The growing systems insured in Bangladesh are prawn/shrimp farming in ponds, and culture of postlarvae and juveniles. Also included in the fisheries insurance policy are coverage of dykes, embankment, shrimp and prawn feed, and fertilizer stockpiles at farms and buildings.

4.8.4 Viet Nam

Pond culture of shrimp, prawn and freshwater fish as well as cage culture of both freshwater and marine water species are insured. Extensive as well as intensive pond culture systems are covered. Prawn and shrimp insurance coverage last 12 weeks, starting from the date of stocking.

4.9 UNDERWRITING

4.9.1 India

Two aquaculture insurance schemes are presently operational in India. It should be noted, however, that access to them is extremely difficult, which affects the number of policies issued.

Underwriting conditions and considerations listed in the existing policies include the following:

- The farmer shall at all times exercise good care and diligence in the selection of employees and shall ensure that the shrimp insured receives sufficient and proper feeding.
- Water levels in tanks, lakes and ponds should be maintained constantly at a level that is safe for shrimp cultivation. Suitable inlets, outlets and sluices should be available to manage the water movement.
- The shrimp cultivation area should have strong and sufficient bunds at all times and be adequately supervised by watchmen under the supervision of a qualified technical person.
- The farmer shall neither introduce nor permit to be introduced any disease-affected or -infected fish or shrimp in the stock. Fish or shrimp affected with disease have to be completely separated from the remainder of the stock immediately upon the discovery of the health problem and all necessary precautions shall be taken to protect the healthy stock from getting affected as well.

4.9.2 Japan

Both the fishery mutual insurance system and the aquaculture insurance scheme under it have an underwriting structure that links local insurance activities with the general support of the government to the sector. The primary level consists of the Fishery Mutual Insurance Associations, organized in 39 coastal prefectures throughout the country. These associations underwrite the insurance contracts from fisherfolk and aquaculturists as primary insurers. The insurance contracts are then reinsured at a higher level by the National Federation of Fishery Mutual Insurance Associations, which underwrites all fishery mutual insurance, including aquaculture insurance contracts. In its turn, the government underwrites the National Federation's insurance contracts by covering damages caused by abnormal calamities. This retrocession contract between the National Federation and the government protects the fisherfolk's mutual aid system from excessive outflow of funds to cover serious damages caused by abnormal disasters.

4.9.3 Bangladesh

The fisheries (shrimp) insurance policy used by Sadharan Bima Corporation is the only one of its kind in Bangladesh. No other underwriters are known to the authors. The Sadharan Bima Corporation uses branch offices to promote the insurance products; however, every policy proposal is approved by the Sadharan Bima Corporation headquarters.

There were no insurance companies offering fish culture insurance services in Bangladesh in 2004–2005.

4.9.4 Viet Nam

Only one insurance company at present provides aquaculture stock insurance in Viet Nam, Groupama. To date, the activities of Groupama in aquaculture stock insurance have been limited to the Mekong Delta, although there are plans to

expand to the north as well. In 2004, the Ministry of Finance (MoF) of the Socialist Republic of Viet Nam investigated the possibility of assisting in the establishment of mutual insurance schemes. These schemes should have an organizational structure in which the policy-holders become owners of the insurance company (i.e. have ownership rights). A decree on the establishment of mutual insurance schemes was foreseen.

4.10 RISK MANAGEMENT

4.10.1 India

The shrimp insurance policies issued in India include a list of activities that the shrimp farmers must carry out with the aim of decreasing the risks involved in shrimp farming. The prime responsibility for these activities is given to the shrimp farmer, but it is general practice that the aquaculture insurer provides advice. The insurance company has the right to send an inspector to the farm to check the farming conditions before the policy is accepted.

The list of activities to be carried out by the insured includes:

- ensure the provision of extension service to the farm on a regular basis and when required;
- carry out regular and effective liming, manuring, feeding, dewatering, desilting, earth excavations and earth improvements at the appropriate time and maintain records;
- ensure proper regulation of water movements by suitable inlets, outlets and sluices;
- analyse the water in the ponds on a regular basis;
- prepare and provide follow-up to a proper work schedule;
- ensure safe stocking;
- screen and, if necessary, close any possible escape routes for shrimp such as gaps in the embankment;
- take immediate steps to eradicate diseases, epidemics and parasitic infestations;
- maintain proper records on a regular basis of the stock composition, feeding, the occurrence of diseases and preventive/curative measures taken, inputs provided and expenditures made;
- purchase postlarvae or juveniles from regular-suppliers.

4.10.2 Japan

The insurance policies issued under the Aquaculture Insurance Scheme are generally joint policies of a number of farmers, which implies some social control mechanism. Farmers do not like sharing contract with others who do not manage their farms in a socially acceptable manner; therefore, the insurance system implicitly encourages good aquaculture farm management. The conditions for obtaining access to the aquaculture stock insurance system, as set by the National Federation of Fishery Mutual Insurance Associations, add to the wide application of risk management measures.

4.10.3 Bangladesh

Under the issued policies, 20 percent of the loss of the insured amount for the feed and shrimp is borne by the policy-holder. Loss of other assets is covered completely, if insured.

4.10.4 Viet Nam

When an aquaculture farmer wants to purchase an aquaculture stock insurance policy from Groupama, he or she has to comply with a number of conditions set by the insurance company. The conditions for shrimp aquaculture are:

- All postlarvae are stocked at the same time and harvested at the same time.
- Postlarvae are disease-free (Negative PCR) and stressed particularly before stocking.
- Pond area should be between 2 000 and 10 000 m²/pond (except improved extensive practices).
- Water depth is a minimum of 1 m (improved extensive: 0.6 m).
- Inlets and outlets of water are of good quality.
- There is an aeration of paddlewheel system (not required for the improved extensive practices).
- There are enough tools to measure some basic indicators of water quality (pH, NH₃, alkalinity). Salinity should be 3-25 ppt, pH: 7.5-8.5, NH₃ <0.01 ppm (if available); -transparency: 30–40 cm.
- Stocking density (individuals/m²) should be recorded – a record notebook for each pond.
- In case of accidents Groupama has the right to check the farm and suggest solutions for improving environmental conditions if required.

The above conditions contribute to risk management and better farm management of shrimp farmers in Viet Nam. Fairly similar conditions are listed in the insurance policies issued by Groupama for cage culture.

4.11 CLAIMS HANDLING

4.11.1 India

Claim handling procedures for the inland fish insurance and shrimp insurance schemes are similar. The insured farmer is required to immediately inform the policy-issuing office at the local level of the insurance company, the Marine Product Export Development Authority (MPEDA), and the financing institutions, if any, by telegram, telephone or letter within 24 hours. The insured farmer must submit a satisfactory proof of the claim within 14 days after the notice. The responsibility therefore lies with the insured. It is common practice that the insurance company sends its own loss adjusters to verify the claims. In general, loss assessment is entirely based on the documentation received from the insured farmer together with the claim.

The claim should be accompanied by the following documentation:

- A duly completed claim form which specifies the mortality causes.
- A certificate from the Chief Executive Officer of the Brackish Water Fish Farmers Development Agency or any officer of equal rank in the State

Government Fisheries Department or Central Marine Fisheries Research Institute or a senior fisheries expert of Marine Products Export Development Authority or any marine biologist or a graduate qualified in fishery science meteorological report – if the claim is due to flood or cyclone – certifying the cause of death together with the value of the stock at the time of death with details of salvage, if any.

4.11.2 Japan

The Fishery Mutual Insurance Associations, organized in 39 coastal prefectures throughout the country, not only issue the insurance policies and collect the insurance premiums, but also deal with claims handling. The Fisheries Agency of Japan is often asked to assist in the loss adjustment, particularly when larger disasters occur. In its terms of reference, the Fisheries Agency of Japan aims at the sustainable management of the fisheries sector through planning, finance and taxation measures, provision of guidance and supervision of fisheries cooperatives, and through carrying out fisheries mutual aid systems and fishing vessel insurance systems.

4.11.3 Bangladesh

Liability is subject to the terms and conditions of the policy and is assessed jointly by a representative each of the corporation, the insured, the shrimp culture project association and the concerned district shrimp culture committee. In the claim handling process, the claims will be considered based on the sum insured. Claims, if admitted, will be settled on the basis of the assessed loss in the following manner:

Stage of production	Sum insured (price of larvae plus price of feed consumed)
1. First stage	Value of released larvae plus value of one month's feed.
2. Second stage	Value of larvae plus value of two months' feed.
3. Third stage	Value of larvae plus value of three months' feed.
4. Fourth stage	Value of larvae plus value of four months' feed.

The stages refer to the culture period, each stage representing one month. The duration of each culture period is estimated at 120 days from the date of release of the larvae into the pond. However, the policy will remain valid for another 30 days after the fourth stage to take into consideration delays in harvesting.

4.11.4 Viet Nam

Policy-holders should immediately notify the insurance company of serious damage to the stocks. Groupama only compensates for damages that are valued equal or less than normal dispensation levels when a written text or telephone call is made to the company to report the damage directly after its occurrence. Loss adjustment is carried out by Groupama staff and procedures are in place for cases

where there is some disagreement between the loss adjuster and the policy-holder on the level of damage.

4.12 UNDERWRITING EXPERIENCES

4.12.1 India

Based on the premiums received and insurance claims in the same years the New India Assurance Co. Ltd stressed that the loss ratios for shrimp insurance showed large differences. Loss ratios ranged between 84 and 524 percent in the 1990s. The main insurance claims related to losses caused by white spot (viral) disease. As a result of the high loss ratios, the provision of insurance services for shrimp production decreased at the end of the 1990s and early years of the new millennium. At present the shrimp insurance scheme is officially in operation but the insurance companies involved are not encouraging insurance coverage for shrimp in India.

The shrimp insurance business grew rapidly in the mid-1990s. During 1993–1994, nine regional offices collected premiums worth around US\$96 000, whereas business increased to US\$354 000 in 1994–1995.

The New India Assurance Co. Ltd. currently has 13 regional offices that offer inland fish insurance services, also known as pond fish insurance. The insurance claims made so far under the Inland Fish Insurance Scheme were mainly related to mortality of the stock caused by floods and cyclones, and only to a limited extent related to disease occurrence. The shrimp insurance scheme is in operation, but the insurance companies operate on a very selective basis.

Premiums collected for inland fish insurance totalled US\$93 000 in 1993–1994. This decreased to US\$89 000 during 1994–1995. Over the same period, insurance claims increased from US\$70 000 to US\$82 000. The claim ratios in these two years were 76 percent and 92 percent, respectively.

4.12.2 Japan

No information on recent experiences was obtained. Information from the early 1990s, although not separated between fisheries and aquaculture, reveals that the experiences with insuring aquaculture stocks were not very positive.

4.12.3 Bangladesh

The experiences of the Sadharan Bima Corporation in shrimp aquaculture insurance have been unsatisfactory in recent years.

4.12.4 Viet Nam

In 2004, Groupama reported that the company did not see much opportunity in developing its aquaculture insurance business a year after launching aquaculture insurance services to farmers in the Mekong River Delta Provinces. Claim settlements figures of 2003 show that the damages claimed doubled the premium received.

4.13 CONCLUSIONS

The countries reviewed in this section (India, Japan, Bangladesh and Viet Nam) all have aquaculture insurance programmes in place. By and large insurance procedures have been laid down and in each of these countries, at least one company obtained the legal rights to offer aquaculture stock insurance services. In India, Japan and Bangladesh, aquaculture insurance is provided mainly by national companies, whereas in Viet Nam this is done by a foreign company. Of these four countries, Japan is the only one where the government provides subsidies for aquaculture insurance.

The aquaculture stock insurance does not cover similar species in the four countries. In Bangladesh aquaculture insurance is limited to shrimp and prawn only. Insurance companies in India, Japan and Viet Nam also offer insurance for a range of freshwater and marine fish species. Pond and cage culture are the systems generally insured. There are no insurance services available for hatcheries in the four countries. Grow-out production is insured in the following stages: postlarvae/fry, juveniles/fingerlings and shrimp/fish.

Although fish and shrimp farmers are often interested in insuring their aquaculture stock and farm buildings, insurance companies generally do not show much interest in the countries reviewed. Support from the Japanese government makes the rather complex insurance system function well and the Fishery Mutual Insurance Associations more eager to underwrite aquaculture insurance. In the other three countries reviewed, the losses made by the insurance companies in the recent past generally make them reluctant to underwrite aquaculture insurance, although the service is part of their portfolio.

Shrimp and fish health problems (disease outbreaks) are the major causes for losses in aquaculture insurance in the four reviewed countries, followed by floods and red tides.

It is very difficult to estimate the percentage of total production insured due to limited data availability. Insurance companies often regard the number of policies and the area insured by them as confidential information.

It is evident from the study that insurance companies are not promoting aquaculture insurance coverage in India and Bangladesh. In 2004, Groupama's position in Viet Nam was also somewhat ambivalent with regard to further promoting aquaculture insurance in the country as serious losses were incurred. Japan is the only country where insurance is subsidized by the government and therefore a substantial share of the fish production is covered by insurance.

The study also showed that governments, financial institutions and farmers are aware of the important role that aquaculture stock insurance can play in the sustainable development of the sector. Insurance arrangements that reduce the risk of aquaculture operations and enhance their economic and financial feasibility add to the reduction of risks in aquaculture credit and investment programmes. In addition, the pre-requisites set by some insurance companies with regard to aquaculture pond/cage management and health standards can be important drivers of better aquaculture practices.

4.14 RECOMMENDATIONS

There are many possible recommendations for the development of aquaculture insurance in Asia, divided here into four general categories:

1. *Government support for aquaculture insurance is required to support the service in its early stages*

In Japan, aquaculture insurance is very popular among aquaculture farmers. Associations provide insurance cover with government assistance in the form of subsidies on the premiums paid. In other Asian countries, insurance companies are reluctant to provide insurance for aquaculture due to high risks of failure involved. Part of this reluctance could be lessened by some government support to aquaculture insurance companies, particularly in the pilot stages.

2. *Provision for partial loss claims*

Insurance companies generally do not compensate damages that are less than total losses; partial losses are not compensated for. Since many of the losses made are only partial, the current insurance policies are often less attractive to aquaculturists.

3. *Reinsurance*

In an era of globalization, reinsurance services are available from international reinsurance companies such as Munich Re, Swiss Re and through Lloyd's. In order to decrease their risks, national insurance companies should become more active in exploring the possibilities of international reinsurance.

4. *Linkage between credit and insurance*

There is a need to establish direct links between insurance and credit programmes so that insurance cover can form part of the collateral for a loan and insurance premiums are included in the loan itself and similar linkages. Appropriately linked credit and insurance arrangements will greatly enhance the scope for taking full advantage of new development opportunities and prospects in the aquaculture sector.

5. The current state of aquaculture insurance in Europe

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5.1 INTRODUCTION

Aquaculture insurance describes all the various types of insurance that would normally make up an insurance portfolio of an aquaculture business. For a reasonably large aquaculture company, this would typically include insurance protection for all buildings and equipment, employees, stock, livestock, liabilities, motor vehicles, vessels and divers, goods in transit, and any other insurable interests that are elements of almost every business insurance portfolio.

There are four challenging areas of insurable interests in the aquaculture portfolio – products liability, employers’ liability (especially on divers), certain marine insurances and livestock. Livestock, or more specifically, the aquatic animals (and plants) under culture, are the most difficult items for an aquaculture business operation to insure. Insuring aquaculture livestock presents many problems to the insurance industry, yet it is probably the most important insurable interest in any aquaculture operation. In addition to directly securing the value of livestock, other indirect benefits accrue to the owner who buys insurance, for example, improved access to capital, greater security for employees and stakeholders, and more reliable access to markets.

Aquaculture is a relatively new industry that has expanded extraordinarily rapidly. It mainly produces aquatic animals and plants as food for human consumption, but it also has sectors raising diverse aquatic products for jewellery, leathers, arts and crafts, cosmetics, tropical aquariums, medicines and drugs, and even medical research itself.

Aquaculture insurance has to be a profitable business or the insurers will not provide cover to aquaculturists. The industry’s diversity and impressive growth and value do not receive special treatment by the insurance industry: all insurance companies and underwriters are motivated by profit, but controlled in how they operate through national laws and regulations, and by the codes and conventions of their industry.

5.2 SHORT SUMMARY OF AQUACULTURE PRODUCTION IN EUROPE⁵

Aquaculture production in Europe increased between 1995 and 2004 from less than 1.6 million tonnes to 2.2 million tonnes. In 2004, Atlantic salmon, with a

⁵ Please see Chapter 2, section 2.2, footnote 2.

production of 781 000 tonnes, was the most cultured species in Europe. Since 1995 when the value of European aquaculture production was just under US\$4 billion, the sector has seen a considerable and sustainable growth, reaching over US\$5.5 billion in 2004. More than one-third of the total production value of European aquaculture was realized by Atlantic salmon.

5.2.1 France

France's aquaculture production in 2004 was almost 244 000 tonnes, which is considerably less than the 281 000 tonnes in 1995. Over the last decade there was only one year, 2003, in which France's aquaculture output in terms of volume was lower than in 2004. In 2004, 43 percent of the aquaculture output could be attributed to Pacific cupped oyster. The second most important product for the same year in terms of volume was blue mussel, with 56 000 tonnes.

The value of aquaculture production in France in 2004 was estimated at US\$655 million. Some US\$290 million of this amount was generated by Pacific cupped oyster and US\$111 million by blue mussel culture. Rainbow trout and European seabass were the other main aquaculture commodities produced in 2004, with US\$91 and US\$31 million production values respectively.

In 2002, there were approximately 21 000 people involved in aquaculture and a total of 40 000 involved in the entire fisheries sector in the country. In 2004, the official employment figures presented by France for the fisheries sector as a whole totalled less than 18 000.

5.2.2 Italy

The aquaculture production of Italy in terms of volume reached some 118 000 tonnes in 2004: the most important species cultured were Mediterranean mussel, with 39 000 tonnes, and rainbow trout, with 30 000 tonnes. Other important aquaculture products in terms of volume were Japanese carpet shell, gilthead seabream and European seabass, with production volumes of almost 27 000, 5 000 and 5 000 tonnes, respectively. In 1995, the aquaculture production of Italy was around 214 000 tonnes; since then the production volume has fluctuated between 218 000 and 183 000 tonnes annually. In 2003, it was still 191 000 tonnes, but in 2004 a large decrease could be seen in Mediterranean mussel (60 000 tonnes less than in the year before), indicating that aquaculture production⁶ apparently decreased.

Italy's aquaculture production value was estimated at US\$365 million in 2004. In 1995 the production value was estimated at US\$419 million, thus showing a considerable decrease. Japanese carpet shell and rainbow trout were the most important commodities in terms of value generated, with a production value in 2004 of US\$106 and US\$79 million, respectively.

While the number of people employed in aquaculture in Italy is unknown, the total number working in the fisheries sector as whole was estimated at around 39 million in 2004.

⁶ The large difference between 2003 and 2004 might be attributed to the fact that the data source for Italian production statistics changed between ISTAT (the Statistical Institute) and ICRAM (Central Institute for Fisheries Science and Technology).

5.2.3 Norway

Aquaculture production in Norway increased from nearly 278 000 tonnes in 1995 to 638 000 tonnes in 2004. The main aquaculture product from 1995 to 2004 was Atlantic salmon. In 2004, the Atlantic salmon production of Norway was estimated at 566 000 tonnes, followed by rainbow trout with 63 000 tonnes. While salmon continued to grow over the last years, some fluctuation can be observed in trout production figures. In 2002 trout production in the country reached almost 84 000 tonnes. In 2004, the production of Atlantic cod reached 3 000 tonnes for the first time, making it the third most important aquaculture product of the country.

The value of Norway's aquaculture production in 2004 was estimated at nearly US\$1.7 billion. More than US\$1.4 billion was generated by Atlantic salmon culture alone. Rainbow trout generated US\$118 million and Atlantic cod, over US\$10 million. As the value of aquaculture production in 1995 was about US\$1 billion, there has been a considerable increase since then.

It is estimated that the number of persons employed in the Norwegian aquaculture production in 2004 was almost 4 300.

5.2.4 Spain

Spain's aquaculture production showed an increasing trend over the last decade. In 1995, total production was estimated at 224 000 tonnes, which increased to 363 000 tonnes in 2004. In 2004, the blue mussel harvest was very good, reaching 295 000 tonnes. Other important aquaculture products in 2004 were rainbow trout and gilthead seabream, with production volumes of 31 000 and 14 000 tonnes, respectively. Gilthead seabream production increased considerably over the last years, as have bluefin tuna and European seabass production, reaching volumes in 2004 of 6 400 and 4 500 tonnes, respectively.

The value of aquaculture production in Spain increased from US\$250 million in 1995 to US\$432 million in 2004. Blue mussel culture alone generated over US\$103 million in 2004, while Atlantic bluefin tuna generated US\$96 million in the same year. Other important commodities that year were gilthead seabream and rainbow trout, which reported values of US\$69 and US\$68 million, respectively, while European seabass and turbot production values were estimated at around 31 million each.

5.2.5 The United Kingdom

In the United Kingdom, the aquaculture sector's production increased from 94 000 tonnes in 1995 to 207 000 tonnes in 2004. Atlantic salmon is the main commodity produced, with 158 000 tonnes in 2004. Other important aquaculture products of the United Kingdom are blue mussel, with almost 31 000 tonnes, and rainbow trout, with almost 14 000 tonnes. Blue mussel production has recently increased rapidly, from 11 000 tonnes in 2000.

In 2004, the United Kingdom's aquaculture sector generated an output that was estimated at a value of US\$593 million. A major share of this output originated

from Atlantic salmon culture, with an estimated value of US\$474 million. Blue mussel, with US\$56 million, and rainbow trout, with US\$41 million production values were the other main aquaculture commodities in 2004. In value terms, since 1995 the annual value of aquaculture production in the United Kingdom has more than doubled. In 1995, the value of aquaculture production was estimated at around US\$265 million.

5.3 THE INSURANCE MARKET

The insurance industry is a very flexible market, international in scope. Insurance cover is purchased on the international market through one or a combination of three groups of key participants in the market, namely reinsurance companies, insurance companies (often referred to as underwriters), and insurance brokers. Buyers purchase cover either directly from insurance companies or indirectly through an insurance broker.

Insurance companies and underwriters make up the supply-side of the industry and are motivated by profit. There are different kinds of insurance companies but their purpose and objectives are the same – to spread risk.

Lloyd's of London is an important component of the international insurance market, standing in a different and unique category. It is not an insurance company *per se*, but an insurance market in its own right, made up of different underwriting organizations known as “syndicates”. It is in effect a market within the market, but its objective is also to spread risk.

All insurance companies, including Lloyd's of London, are controlled in the ways they operate and act by the applicable insurance laws and regulations of their country of incorporation, as well as by those of the countries in which they do business.

The job of the insurance broker is to represent insurance buyers in the insurance market, first by finding insurance companies to take on their business, then by helping them through the insurance policy compliance processes, and finally by supporting their interests in claim situations. In the aquaculture industry, the role of the insurance broker is probably one of the most important in the whole insurance process. This is because the insurance market for the difficult parts of the aquaculture insurance portfolio is small, the insuring terms and conditions are restricted, and insurance policy compliance requirements can be onerous. Under such circumstances, policy-holders need the advice of specialist representatives.

Underwriting the risks involved in aquaculture stocks is a technically challenging task. For most domestic insurers, the lack of experience of the problems and difficulties involved make it very difficult to manage the business, so they routinely look to the international markets for experienced support.

The international market for aquaculture insurance is complex. The largest part of the market is located in Europe, with London, a global insurance centre, forming the largest component. There are large reinsurance markets in Switzerland, Germany, and France. It should be noted, however, that significant insurance and reinsurance centres outside Europe can also be found in the United States, Australia, New Zealand, India and Japan.

5.3.1 France

A number of French companies have provided aquaculture insurance in the past; however, it would appear that all or at least most of them have withdrawn from the class. However, one French insurance company, Groupama, provides aquaculture insurance services in some Asian countries (including Viet Nam and China). French reinsurance companies may still be involved, but on a very small basis and possibly only to favoured primary insurers.

5.3.2 Italy

Italian insurance companies have been involved in aquaculture insurance, both directly and as reinsurers, for many years. However, only a very small number of Italian farms appear to be insured, and most of them directly through the London market.

5.3.3 Norway

Norway has a well-developed market for aquaculture insurance. While in most countries aquaculture insurance is only available through the international market and local insurance companies know little or nothing about this class of insurance, Norway has one of the most specialist markets for aquaculture insurance. Norway produces some 700 000 tonnes of aquaculture products annually. A group of Norwegian insurance companies has specialized in the aquaculture insurance since salmon farming began in the early 1970s. The insurance companies have as much knowledge and experience of underwriting the specialist risks of aquaculture as can be found anywhere in the world. However, although these insurers underwrite some non-Norwegian business, their primary commitment is to Norwegian producers and their international interests. This is an example of how what appears to be domestic insurance arrangements in a country may in fact be nothing of the sort. Norwegian fish farming companies have interests all over the world, but the fact that one of their subsidiary companies in a particular country is fully insured does not mean that aquaculture insurance is generally available to all producers in that country. Local aquaculture producers in a country may also be insured, but that does not mean that there is a specialist aquaculture insurance market at home.

5.3.4 Spain

Aquaculture stock insurance in Spain is handled by the Spanish Insurance Group for Multi-Peril Crop Insurance. This is a pool of approximately 40 insurance companies together with the Consortium for Compensation of Insurance, a governmental agency funded by the Ministry of Finance, which is also the official reinsurer.

Every company within the pool is able to underwrite aquaculture policies, subject to strict parameters of rates terms and conditions. Premium are subsidized by the Ministry of Agriculture, Fisheries and Nutrition in various proportions. Private companies are not allowed to insure the same perils as those provided by the pool, but they may provide protection against the perils that the pool does not

cover. For example, the pool only covers the crop (biomass) and will not insure building, equipment and special structures.

5.3.5 The United Kingdom

The London insurance market is the largest and most flexible insurance market in the world. Aquaculture insurance was first conceived in London in the early 1970s, where three of the key players in today's aquaculture insurance market are located (Sunderland Marine Mutual Insurance Company Ltd, Aquarius Insurance Services/Royal & SunAlliance, and SBJ Nelson Steavenson Ltd). The UK industry is therefore very well served by aquaculture specialists.

5.4 DEMAND AND SUPPLY ISSUES

High premium levels are the most common reason given by aquaculture producers for not buying insurance. Prices for some of the main species cultured in Europe (e.g. Atlantic salmon, Rainbow trout, Sea bream and African catfish) have dropped considerably and the industry is under continuous financial pressure. While public companies buy insurance to protect shareholders' assets, as do companies with outstanding bank loans and obligations to feed companies, in many cases private companies choose to be self-insured.

The London insurance market has been the centre of world insurance for well over 100 years, during which time it has established contacts in every corner of the world. Access to aquaculture insurance is therefore comparatively easily achieved by contacting the brokers and insurers found in the financial centres of most countries, which will almost certainly have connections to the London market.

5.5 POLICIES CURRENTLY IN FORCE

The number of policies in effect in Europe or in any individual country is unknown. Answers to questions on numbers of policy-holders (Annex 1), indicate that in total, approximately 2 000 commercial aquaculture enterprises are insured around the world. It is probable that around 60 percent of these enterprises, i.e. around 1 200, are located in Europe.

5.6 PERILS COVERED

The cover offered by insurers to aquaculture entrepreneurs is generally available to European producers. They have a choice of "all risks" or "named perils" terms and conditions, with rates, self-insurance factors and excluded perils, structured to meet the physical location, design and management standards of each individual aquaculture establishment. As is the case in all regions, individual perils (such as certain diseases, flash floods, typhoons and hurricanes) assume a higher profile than others, and insurers structure their policy terms and conditions accordingly.

5.7 SPECIES INSURED

All the species in husbandry in Europe can be currently insured. The following species are believed to be insured in Europe at present:

Fish	Atlantic salmon, bluefin tuna, brown trout, carp, cod, halibut, rainbow trout, seabass, seabream, sole, sturgeon, tilapia, turbot;
Molluscs	Abalone, mussels, oysters, scallops;
Crustaceans	Lobsters.

5.8 GROWING SYSTEMS INSURED

All the systems in use in Europe can be insured. The following are the most common growing systems that are currently insured:

Offshore	Net cages, barges, oyster and mussel systems;
Onshore	Fresh water gravity fed and pumped tanks and raceways, still water ponds, hatcheries and on-growing units.

5.9 UNDERWRITING

Insurers require extensive information on every production operation to be insured. Applicants for insurance services are required to complete specialist application forms as part of the insurance process. Properly completed, when combined with underwriting and risk management surveys, these will analyse the relevant risks and hazards. Insurers adjust their underwriting approach accordingly.

5.10 RISK MANAGEMENT SURVEYS

Risk management surveys are regularly carried out by insurers, who use local aquaculture experts and/or experienced general insurance surveyors to inspect sites. Risk management surveys include surveys of electrical and mechanical systems, marine systems, and general health and husbandry conditions.

5.11 CLAIMS HANDLING

Insurers deal with claims from policy-holders in aquaculture in Europe just as they deal with them in all other regions. Aquaculture claims have to be handled with special care. Insurers put considerable effort into responding to *potential* losses quickly and effectively. Policy-holders are required to report any event that *might* lead to a claim in order to respond to incidents as fast as possible, before problems become established or any situation goes beyond remediation. Insurers who take on business in Europe undoubtedly make arrangements with local adjusters in order to respond to loss reports promptly. Insurers are also prepared to call in experts to assist with technical problems when they determine that the nature of the problem and the amount at risk justifies doing so.

5.12 UNDERWRITING EXPERIENCE

The European loss experience, characterized by poor early experience, is probably the most detailed anywhere, since aquaculture insurance has been available in Europe for several decades now. Subsequently, the aquaculture insurance industry went through a very steep learning curve in the 1970s and 1980s, with frequent

outbreaks of new diseases and periodic extreme climatic events and plankton blooms.

The commercial sensitivities of the insurers in the market make it virtually impossible to obtain detailed loss statistics for the industry. Based on a simple “very bad” to “very good” range, the European experience would appear to be of marginal profitability to insurers.

5.13 CONCLUSIONS

As far as insurance of aquaculture stock is concerned, Europe is the best served region in the world. Almost all countries reviewed have sophisticated insurance markets and good support infrastructures of brokers, loss adjusters and technical experts in aquaculture.

In view of the above, it should also be mentioned that stock cover presents the most difficult challenge for the insurance market. There is a small international market for stock insurance, mainly in Europe and principally in London. It is backed by reinsurance available from specialist companies in a number of countries. Insurance is available in almost every country of the world through this market, either through policies issued by London companies or by local companies that call on the expertise of the London market and available reinsurance capacities.

Insurance is mainly purchased by large, well-managed and well-financed producers in developed countries, which typically cover all their operations under one group insurance policy scheme. Access to cover is not as easy for small-scale, family-run businesses.

The aquaculture stock insurance market has generally developed very good insurance processes. Their business instruments include well-designed proposal forms and wording, and appropriate claim-handling procedures that recognize aquaculture realities. The processes are backed by survey and inspection systems, which are part of a valuable and comprehensive risk management approach.

The loss record of aquaculture stock insurance has not been good. As a result, the market’s existence is tenuous, subject to a turnover of insurers, and with a premium structure that some aquaculturists consider expensive.

In order to expand the aquaculture stock market and widen availability, insurers must be able to make profits from underwriting the risks of the industry.

5.14 RECOMMENDATIONS

Recommendations to the industry can be divided into two main categories: (i) education and outreach and (ii) the collection and analysis of global information.

5.14.1 Education and outreach

Credit schemes to encourage small and medium-scale farmers to participate in national aquaculture development in the emerging field of aquaculture were made successful in the late 1980s and 1990s by education and training courses, and workshops for loan portfolio managers and finance officers of national agricultural and rural development banks. These were organized through the cooperation of the

United Nations and international development banks. Through such events, banking individuals at the grass-roots level were familiarized with the systems and practices of aquaculture, and their microfinance and credit programmes were responsible for an enormous investment in aquaculture. As a consequence, family-run subsistence farms transformed themselves into family-run business enterprises.

Now that aquaculture has become commercialized and continues to expand globally, it has to be protected from an increasing number of risks. This can be achieved through aquaculture insurance, which for the most part is available worldwide. However, its use is constrained by insurance individuals at the grass-roots level who are unfamiliar with the systems and practices of aquaculture, and aquaculture producers who are unfamiliar with the management of risk and whose operations are not of a high enough standard for insurers to cover.

It is therefore recommended that the lessons learned be reviewed and the constraints removed through international programmes in education and outreach to increase the use of aquaculture insurance. The programme(s) should be a combination of traditional training courses and workshops, published materials and the use of modern information technology. The specific targets of the programme would be individuals in both the insurance industry and the aquaculture industry.

The goals of the programme should be:

- to create awareness and build capacities among “new” insurers in the basic principles and requirements of their national and local aquaculture sectors, with emphasis on training in on-farm risk analysis and management, and with the purpose of enabling them to understand and set standards for production operations to minimize risk and to underwrite appropriate business;
- to increase awareness and build capacities of producers and producer groups in the basic principles and requirements of aquaculture insurance, with emphasis on training in on-farm risk analysis and management, and with the purpose of elevating their production operations to standards acceptable by specialist insurers.

5.14.2 Collection and analysis of global information

Much more information needs to be gathered to provide a better picture of the underwriting experience throughout Europe. The aquaculture insurance market has been in existence for over 20 years, but very few individuals have benefited from its organizational history, practical experience, and statistics to help secure the future of the aquaculture industry.

It is recommended that serious efforts be made to collect and analyse information on the aquaculture insurance market as part of a risk management strategy to sustain an increasingly successful global aquaculture industry. The benefits of such information would be to provide: (i) a database of insurance experience, which will guide future risk avoidance in the industry; and (ii) the rapid distribution of this experience.

Experience is often a commercial commodity, however, and therefore obtaining information from the private sector about the aquaculture insurance market is

difficult at best. Nonetheless, a project has begun in the United Kingdom and the United States for this very aim: the AquacultureRiskWatch project.⁷ This effort could be expanded and accelerated, particularly if an international organization such as FAO would act as an “honest broker”, since the organization *per se* has no ulterior use for the information.

The approach would be to first work with the international reinsurers because they have a considerable stake in the aquaculture industry already, in view of their losses, and carry considerable weight with primary insurers, and then to follow up with the principle primary insurers themselves. The database may contain, for example, historic information on aquaculture insurance activities since 1990. Anonymity would have to be ensured together with the confidentiality of any raw data.

⁷ More information on this project can be found at the following Web site:
www.aquacultureriskwatch.com

6. The current state of aquaculture insurance in North America

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6.1 INTRODUCTION

In North America, aquaculture insurance is treated similarly to agriculture crop and livestock insurance. The agricultural insurance programme in the United States is complex and heavily subsidized (Skees, 2000), and its traditional crop insurance programme has grown from insuring only losses from shortfalls in crop yields to insuring losses in gross revenue. Unfortunately, these income insurance programmes have become new mechanisms for transferring subsidies.

The US Agricultural Risk Protection Act was passed in 2002 to provide funds to investigate the potential of offering risk management protection to previously underserved producers. The Risk Management Agency of the United States Department of Agriculture (USDA) and Mississippi State University formed a partnership to conduct a large-scale study to determine the feasibility of providing risk management protection in the form of insurance and risk management tools for aquaculture crops. Evaluations were made for four major subsectors of the industry, namely baitfish, channel catfish, trout and salmon.

In Canada, the Farm Income Protection Act (FIPA) provides federal contributions to a crop insurance programme. The goal is to stabilize farmers' incomes by minimizing the economic effects of crop losses caused by natural hazards, such as drought, flood, hail, frost, excessive moisture and insects. The programme is delivered through the provincial governments. The Act does not directly embrace aquaculture, although support has been given to aquaculturists in the past. However, a study of the implications of bringing in aquaculture is currently ongoing.

In the early stages of the development of the aquaculture in Canada, the emerging industry was subsidized. Particularly, the government financially supported an increase in research capacity in the Department of Fisheries and Oceans (DFO) and Canadian universities. Also, a variety of federal tax incentives for farming and small businesses, the extension of farm credit facilities to fish farmers, and targeted expenditures through regional development agencies (Howlett and Rayner, 2003) were used to promote the industry. However, the Office of the Commissioner for Aquaculture Development (OCAD) noted recently that the various kinds of

income support and stabilization programmes, including crop insurance, were not available to aquaculture producers.

6.2 SHORT SUMMARY OF AQUACULTURE PRODUCTION IN NORTH AMERICA⁸

The combined aquaculture production of the United States and Canada in 2004 was estimated at 752 000 tonnes. Channel catfish and American cupped oyster, with 286 000 tonnes and 110 000 tonnes respectively, were the main aquaculture species cultivated in these two countries. Atlantic salmon culture reached an output of 97 000 tonnes in the same year. Compared to 1995, a decade earlier, the aquaculture production in North America has increased tremendously. In 1995 the total production was estimated at 479 000 tonnes, of which channel catfish production assumed 203 000 tonnes. In recent years, a few aquaculture species have shown potential for further development. A significant increase could be seen in American cupped oyster production in the United States. The cultured volume increased from 38 000 tonnes in 2000 to 105 000 tonnes in 2004. Similarly, in the United States, the production of northern quahog (hard clams) more than doubled between 2003 and 2004, from 32 000 tonnes to 66 000 tonnes. Red swamp crayfish is another species that showed large growth rates in production. In 2000 the production volume was less than 8 000 tonnes; this increased to almost 32 000 tonnes in 2004.

The Atlantic salmon production on Canada's Atlantic coast was fairly stable in recent years, at around 35 000 tonnes. The production of the same species on Canada's Pacific coast fluctuated since 2000 between 39 000 tonnes and 72 000 tonnes annually. Canada's blue mussel production is fairly stable at around 20 000 to 22 000 tonnes annually since 2000.

In value terms the aquaculture production of Canada and the United States was estimated at around US\$1.3 billion in 2004. An increase of US\$150 million could be observed from 2003 to 2004. In comparison, in 1995 the total value of aquaculture production of the two countries was estimated at US\$961 million. In the United States in 2004, channel catfish generated the highest value, approximately US\$440 million. Atlantic salmon production in Canada realized a total value of around US\$253 million. Other species that generated production values of over US\$50 million in the United States in 2004 were rainbow trout, Atlantic salmon and hard clams.

6.3 THE AQUACULTURE INSURANCE MARKET

6.3.1 Canada

Aquaculture insurance has been available in Canada since the mid-1970s, on both the east and west coast. The main insured species are Atlantic and Pacific salmon, mainly in onshore hatcheries and offshore grow-out cages. Some policies have been placed on non-extensive shellfish stocks on long lines. In recent years the industry on both coasts has been rationalized, with a number of independent producers either going out of business or taken over by multi-national companies. Most of these multinationals have group insurance policies placed outside Canada, which cover all their international production facilities, including those in Canada.

⁸ Please see Chapter 2, section 2.2, footnote 2.

There is no indigenous aquaculture insurance market in Canada. Cover has been available through three main channels:

- through individual local companies reinsured by specialist aquaculture insurers and the international reinsurance market;
- directly through international insurance companies and Lloyd's of London, licensed to underwrite in Canada;
- through the group insurance facilities of the large multinational producers, under which their Canadian subsidiaries can be covered.

6.3.2 The United States

Aquaculture insurance has also been available in the United States since the mid-1970s, but cover has not been as widely taken up as in Canada. This is because the main efforts to provide cover have been directed at the catfish industry. As a consequence of its extensive nature and its disease record, catfish aquaculture has attracted insuring terms and conditions from underwriters that most farmers have not found acceptable.

Numerous unsuccessful attempts have been made to establish insurance schemes for catfish farms, but all are considered failures. A number of salmon, trout, striped bass and abalone operations are either covered or have purchased insurance from the private sector in the past; some clams operations are already covered by the Federal Crop Insurance Program. Extensive shellfish production systems are not considered insurable. The same applies to extensive crawfish production.

Despite the failure of the private insurance sector to provide cover that catfish farmers find acceptable, US fish farmers as a whole are keen to get protection and have lobbied extensively to get aquaculture covered under the Agricultural Risk Protection Act. The key issue connected with such a development centres around the premiums that are levied and their relationship to the cover granted under the policies issued. The question always arises – Where does the line between insurance and subsidy fall?

6.4 DEMAND AND SUPPLY ISSUES

It is reasonable to assume that the demand from aquaculture entrepreneurs for aquaculture stock insurance in North America is similar to those in other regions. All producers seek competitive cover for economically viable premiums, appropriately designed application forms and arrangement procedures, policy wording that are well drafted, free of ambiguity, clear and simple to understand, and effective claim handling and payment, all supported by a comprehensive risk management framework.

6.5 POLICIES CURRENTLY IN FORCE

6.5.1 Canada

The number of policies in effect in Canada is unknown, but it is probable that a substantial part of Atlantic and Pacific salmon production stock is insured on both the east and west coasts.

6.5.2 The United States

The actual number of policies in effect in the United States is unknown, but is likely to be less than one hundred.

6.6 PERILS COVERED

The cover offered by insurers to aquaculture is generally available to US and Canadian producers. Terms and conditions vary from “all risks” to “named perils”, with rates, self-insurance factors and excluded perils, structured according to physical location, design and management standards of each individual insurance applicant. As is the case in all other regions, in certain situations individual perils will assume a higher profile than in others, and insurers structure their policy terms and conditions accordingly.

6.7 SPECIES INSURED

Many species are cultivated in the United States and Canada, albeit some are only raised in very small quantities. The aquaculture insurance market is able to handle all of them, subject to the management and arrangement of each production unit. However, it appears that the species actually covered by insurance in the United States are limited to hybrid striped bass, tilapia, trout, salmon, mussels on longlines, hard clams and some oysters.

Policies have also been arranged on abalone and some clams are insured under the Federal Crop Insurance Program.

The species currently insured in Canada include Atlantic salmon, Pacific salmon, cod and mussels.

6.8 GROWING SYSTEMS INSURED

Aquaculture insurers will provide cover on species reared in most intensive- and semi-intensive aquaculture systems. These include marine cages, long lines, freshwater ponds, green water tanks and raceway and recirculation systems. Terms of cover will reflect information given in response to application form questions. It may prove difficult to arrange insurance on extensive shrimp and shellfish operations. Hatchery and nursery operations may be insured as well.

6.9 UNDERWRITING

6.9.1 Canada

Aquaculture insurance in Canada is classified as Business Insurance (Office of Superintendent of Financial Institutions Canada Notice 2005-02). Foreign insurers therefore require a licence before they can underwrite aquaculture business, including aquaculture stock. The industry in Canada is served by the international market, directly by foreign specialist companies and Lloyd's of London who have obtained licences or by Canadian companies backed by specialist reinsurance. The subsidiary production companies of the major international aquaculture producers are generally insured under group policies arranged by their head offices.

6.9.2 The United States

Two US companies have been involved in underwriting aquaculture risks; however, it is believed that only one involved in the market as of 2005. Lloyd's of London is licensed to underwrite risks in all US states. However, it is thought that very few US producers are in fact insured, a situation that is likely to change if the Federal Crop Insurance Program provides cover on aquaculture crops.

6.10 RISK MANAGEMENT SURVEYS

One of the US aquaculture insurance providers does not automatically carry out inspections of all the farms that they insure, though they do send their agents to visit some risks. This appears to be an exceptional approach, as most specialist insurers in the United States and Canada use site surveys to assess the physical risks inherent in production units and to ensure that high standards of operation are always maintained on farms that they insure.

Surveys are generally carried out by individuals who have either been trained in aquaculture inspection techniques or who are drawn from the insurance industry's worldwide inspection force of professional surveyors. Though the latter are unlikely to have experience of the peculiar risks and hazards of aquaculture, many of their skills are directly relevant to the physical arrangement and components of aquaculture systems. This especially applies in the case of marine sites, sites that use extensive pumping and aeration technology, and those that rely on sophisticated alarm systems.

The insurance industry's marine surveyors are familiar with the extremes of wind and wave forces, and with the currents and tides that occur along local coastlines, and can materially assist in the location and maintenance of cages and their moorings. Insurance companies' electrical and mechanical engineering surveyors can evaluate generators, pumps and alarm systems used in aquaculture operations to ensure that they are appropriate for each job, and ensure that they are properly installed and maintained. In addition, there are specialist insurance surveyors in numerous other disciplines, including health and safety, fire and food processing.

Biological risks present different risk management challenges for underwriters and need to be surveyed separately. Disease, for example, is one of the major economic perils for any aquaculture stock operation and a major source of aquaculture insurance claims. Biological surveys are therefore an important part of the risk evaluation / management process.

6.11 CLAIMS HANDLING

The handling of aquaculture claims in Canada and the United States is comparatively routine. There is an extensive loss adjuster network throughout North America. Although few US adjusters are familiar with adjusting aquaculture losses because comparatively few US farms are insured, there are very experienced aquaculture loss adjusters in eastern and western Canada. These loss adjusters can be used by insurers to handle losses anywhere in North America. Both countries have

support networks of excellent veterinarians and diagnostic facilities, as well as of sophisticated academic research organizations and institutes.

6.12 UNDERWRITING EXPERIENCE

6.12.1 Canada

Severe losses have occurred on both the east and west coasts in the late 1970s and early 1980s. The industry on the west coast experienced a high level of claims in the early days of its development, including major losses from disease and plankton blooms. There have also been substantial losses from disease (especially infectious salmon anaemia [ISA]) on the east coast, and substantial losses in the 1980s from perdition predation by seals. There was a major superchill event in first quarter of 2003, which is alleged to have resulted in insurance payments of around US\$21 million to the aquaculture industry.

6.12.2 The United States

Historically, the catfish industry has suffered a succession of disease problems which it is believed have not been covered by insurance. There have also been a number of natural disasters to shellfish industries caused by hurricanes and some major plankton blooms, none of which are believed to have been insured.

6.13 CONCLUSIONS

The need for aquaculture insurance is well established in both countries. However, the question is whether cover on livestock will be provided by the private aquaculture insurance industry or by government-sponsored crop insurance programmes. If the former, the premiums charged will have to reflect commercial considerations; if the latter, unless premiums, cover and claim settlements reflect true spreading of risk, the protection will cease to be insurance and will move into the area of subsidy.

6.14 RECOMMENDATIONS

The authors' recommendations to the industry in North America are similar to those listed already under chapter 5.14 for Europe:

- to review lessons learned and establish an international programme for awareness-raising and capacity building to promote the use of aquaculture insurance;
- to improve the collection and analysis of information on the aquaculture insurance market as part of a risk management strategy to sustain an increasingly global aquaculture industry.

7. The current state of aquaculture insurance in South America

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7.1 INTRODUCTION

The weaknesses of traditional crop insurance programmes with regard to South America have been analysed and described (Wenner and Arias, 2003), together with some new developments intended to make agricultural insurance more accessible, more efficient and more sustainable. The report lists the following ten risk management strategies and techniques often prescribed for farmers to mitigate common risks:

- crop diversification;
- maintaining financial reserves;
- reliance on off-farm employment and income generation;
- production contracting;
- marketing contracting;
- forward pricing;
- future options contracts;
- leasing inputs and custom hiring;
- acquiring crop insurance;
- acquiring revenue insurance.

Only the first three listed above were widely available and accessible in the countries of South America. In order for the remaining seven to materialize, certain market and supply conditions have to be met, and appropriate legal and regulatory as well as physical infrastructure have to be in place. In most South American countries these conditions were missing or incomplete, which compels farmers to depend more on the first three strategies on-farm. These inhibit achieving economies of scale in production, reduce farm profits, and lower production and productivity.

The same report also noted that many crop insurance programmes in the developed countries, including the United States and Europe, continue despite high fiscal costs. This is because developed countries have a greater financial capacity to sustain the costs through higher levels of income and the relatively fewer agricultural producers in the total population. In South America, the public treasuries do not have the same financial capacity. Their average annual incomes are much lower, and in addition, the number of producers in the agricultural sector is usually very large.

Some Spanish insurance companies have been advising Latin American governments on the development of a new, more rational crop insurance scheme. Spain has a mixed public-private insurance scheme; several species of farm-raised fish are among the many crops and animals that qualify for insurance in its national programme (Wenner and Arias, 2003).

7.2 SHORT SUMMARY OF AQUACULTURE PRODUCTION IN SOUTH AMERICA⁹

South America's aquaculture sector has grown rapidly over the last decade. The volume of production in 1995 was estimated at around 409 000 tonnes and in 2004 reached the 1.1 million tonnes benchmark. In 2004, the most important aquaculture products of South America in volume terms were: Atlantic salmon (349 000 tonnes), whiteleg shrimp (172 000 tonnes), rainbow trout (139 000 tonnes), Coho salmon and tilapia (each 90 000 tonnes), Chilean mussel (77 000 tonnes) and common carp (46 000 tonnes).

In 2004, the aquaculture sector in South America generated an estimated production value of almost US\$4.6 billion. This figure is a considerable increase from US\$1.6 billion in 1995 and the estimated US\$2.6 billion reported in 2000. In 2004, the most important aquaculture products in value terms for South America were: Atlantic salmon (US\$1 536 million), whiteleg shrimp (US\$803 million), rainbow trout (US\$608 million), Peruvian calico scallop (US\$324 million), Coho salmon (US\$298 million) and tilapia (US\$281 million).

7.2.1 Brazil

Whiteleg shrimp, tilapia and common carp are the main aquaculture products in volume terms produced in Brazil. In 2004 the country produced some 76 000 tonnes of whiteleg shrimp, 69 000 tonnes of tilapia and 45 000 tonnes of common carp. Compared to 1995 the industry has grown at a remarkable pace. In 1995 the total aquaculture production volume of Brazil was estimated at 46 000 tonnes, while in 2004 production volume reached almost 270 000 tonnes.

Brazil's aquaculture production value increased between 1995 and 2004 from US\$172 million to US\$966 million. Just under one-third of this value in 2004 came from whiteleg shrimp production; followed by tilapia production valued at US\$221 million and common carp production with an estimated value of US\$144 million. Other aquaculture species with a production value in 2004 of over US\$100 million are Cachama (also called Pacu) and characins. While most species report higher values in recent years, the production value of common carp shows a decreasing trend from US\$175 million in 2002.

7.2.2 Chile

In 1995 the aquaculture production of Chile was estimated at 206 000 tonnes, including 98 000 tonnes of salmon and 43 000 tonnes of rainbow trout. By 2004

⁹ Please see Chapter 2, section 2.2, footnote 2.

the total production figure had increased to 695 000 tonnes. This figure includes 439 000 tonnes salmon (of which 347 000 tonnes are Atlantic salmon]) and 126 000 tonnes of rainbow trout. Thus in one decade the production of salmon quadrupled and that of trout, tripled. It should be noted that not all aquaculture activities saw an increase in recent years in Chile. Since 2001 the seaweed production decreased from 65 000 tonnes to less than 20 000 tonnes in 2004. The culture of Chilean mussel increased from 35 to 77 000 tonnes over the same period. The volume of production of Peruvian calico scallop in 2004 was estimated at 24 000 tonnes.

Chile's aquaculture production in 2004 had an estimated value of US\$2.8 billion, of which over 53 percent originated from Atlantic salmon culture. In 2004 the Atlantic salmon production in Chile alone had an estimated value of over US\$1.5 billion. Chile's rainbow trout production in the same year was valued at US\$568 million. Other products with estimated production values of over US\$100 million in 2004 were coho salmon (US\$294 million), Peruvian calico scallop (US\$240 million) and Chilean mussel (US\$131 million). The aquaculture industry has grown tremendously since 1995 when the total production value was estimated at US\$584 million.

7.3 THE AQUACULTURE INSURANCE MARKET

7.3.1 Brazil

There are neither public organizations nor commercial insurance companies offering aquaculture insurance in Brazil. Enquiries revealed that one company is investigating the industry but is far from reaching a decision to get involved. Any cover offered will undoubtedly follow the methods and processes widely used in the world market, including similar application forms, providing comparable terms and conditions, and employing the claim handling processes that are employed throughout the industry.

7.3.2 Chile

Aquaculture insurance has been available in Chile for over ten years. The Chilean subsidiaries of multi-national aquaculture companies are most likely to be insured under their groups' worldwide insurance policies. However, there are also many relatively smaller national aquaculture entrepreneurs that buy insurance. Confidential insurance industry estimates put the premium volume in the Chilean market at around US\$8 million to US\$9 million annually.

7.4 DEMAND AND SUPPLY ISSUES

Supply is obviously a problem as far as Brazilian aquaculture producers are concerned, because as of July 2005, no insurers are willing to insure Brazilian aquaculture producers. In Chile, however, a well-developed aquaculture insurance market covers many farms. Where insurance is available, the main complaint of producers is that the terms and conditions of insurance services offered do not meet the economic conditions of the producer. This may occur because insurers decide that some farms are not of an insurable standard, and if not refusing

insurance outright, will apply substantial terms and conditions to them which may prove to be uneconomical for producers.

7.5 POLICIES CURRENTLY IN FORCE

7.5.1 Brazil

It is believed that no Brazilian aquaculture operations are insured.

7.5.2 Chile

According to information obtained from Chilean insurers, between 300 and 400 policies are in force in the country.

7.6 PERILS COVERED

Policies in Chile generally protect against named perils. "All risks" cover is not generally available, except possibly to subsidiaries of multinational companies under their group policies.

7.7 SPECIES INSURED

Atlantic salmon, coho salmon and rainbow trout are the main species insured in the Chilean market. However, there are many other species that are likely to be brought into cultivation in Chile. As they go into production, the insurance industry will undoubtedly attempt to develop suitable terms and conditions for them, according to the normal procedures of insurers.

7.8 GROWING SYSTEMS INSURED

The growing systems insured are onshore, gravity flow systems and marine cage culture systems. Hatchery and nursery operations of subsidiaries of multinational companies are insured as well under their group policies.

7.9 UNDERWRITING

7.9.1 Brazil

Although there is presently no aquaculture insurance market in Brazil, there is a developing aquaculture industry that could benefit from the risk spreading and managing facilities offered by the insurance industry. Insurers should therefore be encouraged to consider making their services available in Brazil.

7.9.2 Chile

The insurance needs of the indigenous aquaculture industry are met by a consortium of local insurance companies, backed by reinsurance from the European market. These insurers have developed substantial expertise in the field.

7.10 RISK MANAGEMENT SURVEYS

Most specialist insurers use site surveys to assess the physical risks inherent in production units and to ensure that high standards of operation are always maintained on farms that they insure.

Surveys are generally carried out by individuals who have either been trained in aquaculture inspection techniques or who are drawn from the insurance industry's worldwide inspection force of professional surveyors. Though the latter are unlikely to have experience of the peculiar risks and hazards of aquaculture, many of their skills are directly relevant to the physical arrangement and components of aquaculture systems. This especially applies in the case of marine sites, sites that use extensive pumping and aeration technology, and those that rely on sophisticated alarm systems.

The insurance industry's marine surveyors in Chile are familiar with the extremes of wind and wave forces, and with the currents and tides that occur along local coastlines, and they can materially assist in locating and maintaining cages and their moorings. The insurance industry's electrical and mechanical engineering surveyors can evaluate generators, pumps and alarm systems used in aquaculture operations to see that they are appropriate for each job, and ensure that they are properly installed and maintained. In addition, there are specialist insurance surveyors in numerous other disciplines, including health and safety, fire and food processing.

7.11 CLAIMS HANDLING

Aquaculture claims handling in Chile is well developed and there are very experienced aquaculture loss adjusters who can be used by insurers to handle losses anywhere in the country. There are also a number of sophisticated academic organizations and institutes capable of providing excellent disease diagnosis facilities, and high-level research. As with all other areas, claim handling relies on prompt reporting and the level of mitigation efforts.

7.12 UNDERWRITING EXPERIENCE

7.12.1 Brazil

No aquaculture underwriting experience is available for Brazil.

7.12.2 Chile

Private insurance industry sources advise that the insurance results over the eight years from 1996 to 2003 were as follows: 1996, 1997 and 1998, "very bad", followed in 1999 with a very good year. The start of the new millennium then brought two bad years, 2000 and 2001, which were followed by two "very good" years, 2002–2003. This indicates that underwriting Chilean aquaculture business is moving towards profitability. This is essential if insurers are to maintain their commitment to the Chilean industry.

7.13 CONCLUSIONS

Aquaculture insurance can become much more widely established in South America if demand for the service is expressed more widely. Ultimately, it is up to aquaculture producers to approach the insurance industry for cover, and in this respect Chile is well served by a flourishing insurance industry. Inquiries directed

to the international insurance companies and brokers in the Brazilian market will most likely be taken up by the aquaculture insurance market.

7.14 RECOMMENDATIONS

The authors' recommendations to the industry in South America are similar to those listed already under chapter 5.14 for Europe. These recommendations are the following:

- to review lessons learned and establish an international programme for awareness-raising and capacity building to promote the use of aquaculture insurance;
- to improve the collection and analysis of information on the aquaculture insurance market as part of a risk management strategy to sustain an increasingly global aquaculture industry.

8. The current state of aquaculture insurance in sub-Saharan Africa

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8.1 INTRODUCTION

Aquaculture insurance is not widely used in sub-Saharan Africa. A small number of operations in South Africa may be insured, however, but no information is available on the claims experience.

8.2 SHORT SUMMARY OF AQUACULTURE PRODUCTION IN SUB-SAHARAN AFRICA¹⁰

Aquaculture production in sub-Saharan Africa in 2004 was estimated at around 93 000 tonnes. This figure implies a considerable increase compared to the 39 000 tonnes estimated in 1995. The main aquaculture species in sub-Saharan Africa in 2004 are catfishes (with a production volume of around 33 000 tonnes), tilapia (around 20 000 tonnes) and giant tiger prawn (over 7 000 tonnes). Nigeria is the largest producer, assuming 44 000 tonnes of the total estimated for 2004. South African production was estimated at 6 000 tonnes, consisting mainly for 45 percent of aquatic plants, 1 000 tonnes of rainbow trout, some 760 000 of abalone and around 700 tonnes of Mediterranean mussel. Other important aquaculture producer countries in the region in 2004 were Madagascar (8 700 tonnes), Tanzania (6 000 tonnes/mainly seaweeds), Uganda (5 500 tonnes) and Zambia (5 000 tonnes).

The value of the total aquaculture production of the sub-Saharan African was estimated in 1995 to be around US\$91 million. This amount has increased since. In 2004 the estimated value was US\$252 million. The main products in value terms in 2004 were North African catfish (US\$50 million in Nigeria), torpedo shaped catfishes (US\$35 million in Nigeria), giant tiger prawn (US\$31 million/Madagascar) and Perlemoen abalone (US\$25 million in South Africa). With regard to the latter product, it should be noted that the South African abalone production was valued only US\$22 000 in 1995. The value of production of the main sub-Saharan African aquaculture species continues to show an increasing trend.

¹⁰ Please see Chapter 2, section 2.2, footnote 2.

8.3 THE INSURANCE MARKET

The African Insurance Organization (AIO), established in 1972, has a membership of insurers, reinsurers, brokers, supervisory authorities, as well as institutions and associations throughout the continent. Its objective is to promote and develop a healthy insurance industry and reinsurance industry in Africa.

With the exception of South Africa, and only to a small degree, aquaculture insurance does not appear to be widely used across the African continent. Almost all countries in sub-Saharan Africa are in theory served by local offices of the major national and international insurance brokers, so that the international aquaculture insurance market should be accessible to producers in each of the countries. However, in practice this is not the case.

8.4 DEMAND AND SUPPLY ISSUES

It was not possible to conduct a survey of the demand for insurance among African aquaculture producers. However, it is reasonable to assume that the demand for insurance services among commercial aquaculture enterprises is similar to that of aquaculture producers everywhere else. Aquaculture entrepreneurs seek competitive cover and premiums, appropriately designed application forms and procedures, policy wordings that are well drawn, free of ambiguity, clear and understandable, and finally effective claim handling and payment, all supported by a comprehensive risk management framework.

8.5 POLICIES CURRENTLY IN FORCE

A very limited number of policies have been issued in South Africa, but no precise information is available on the number of farms insured. Less than ten shrimp farms in Madagascar are currently insured, but it is believed on a very limited “named perils” basis, as part of a trial to see if insuring shrimp farms is viable. It is believed that no insurance policies are in effect in Nigeria, Zambia and Zimbabwe, the other countries reviewed.

8.6 PERILS COVERED

The cover offered by insurers to aquaculture enterprises in sub-Saharan Africa is not much different from that in other regions. Aquaculturists in South Africa have a choice of “all risks” or “named perils” terms and conditions, with rates, self-insurance factors and excluded perils, which is structured to meet the physical location, layout and management standards of each individual insurance applicant. As is the case in other regions and countries, in certain situations individual perils will assume a higher profile than in others, and insurers will structure their policy terms and conditions accordingly.

8.7 SPECIES INSURED

The international aquaculture insurance market will provide cover on most of the species being farmed, including the most commonly cultured species in sub-Saharan Africa, which are catfish, tilapia, shrimp and carp. However, so far shrimp

in pond culture systems is insured only in Madagascar and on a trial basis; in other countries of the region no shrimp insurance services are provided. Extensive shellfish operations and very new candidate species will also be difficult to insure. No comprehensive information is available on the species insured in the region or the percentage of the production insured. It is believed, however, that a small portion of the abalone and trout production in South Africa is currently insured.

8.8 GROWING SYSTEMS INSURED

International aquaculture insurance companies will provide cover on species reared in most intensive and semi-intensive aquaculture systems, again, with the possible exceptions of prawns/shrimp in ponds and extensive shellfish operations. Information on the systems insured in the region does not appear to be available.

8.9 UNDERWRITING

Insurers require extensive information on every production operation offered for insurance, and all applicants are required to complete specialist application forms as part of the insurance. When these forms are properly completed, together with underwriting and risk management surveys, insurers will analyse the risks and hazards that are relevant to the sub-Saharan African aquaculture enterprises. Insurers will adjust their underwriting approach accordingly.

8.10 RISK MANAGEMENT SURVEYS

Risk management surveys are regularly carried out by insurers everywhere. In the region and countries concerned, insurers use local aquaculture experts and/or experienced general insurance surveyors to inspect fish farm sites. In the case of large or sophisticated operations, insurers may bring in surveyors from outside with specialized experience.

8.11 CLAIMS HANDLING

Insurers will deal with claims in sub-Saharan Africa in exactly the same way that they deal with them in all other regions reviewed.

8.12 UNDERWRITING EXPERIENCE

No information is available on the general underwriting experience, particularly the loss experience of aquaculture in the countries reviewed.

8.13 CONCLUSIONS

Any lack of appropriate transport, utility, veterinary or other infrastructures, or any shortfall in management and operational standards would impede the insurance of production operations in all regions. Africa suffers from unfavourable issues in various areas, each of which must be addressed by each producer when making an application for insurance to insurers.

8.14 RECOMMENDATIONS

The authors' recommendations to the industry in sub-Saharan Africa are similar to those listed already under chapter 5.14 for Europe. These recommendations are the following:

- to review lessons learned and establish an international programme for awareness-raising and capacity building to promote the use of aquaculture insurance;
- to improve the collection and analysis of information on the aquaculture insurance market as part of a risk management strategy to sustain an increasingly global aquaculture industry.

9. The current state of aquaculture insurance in Oceania

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9.1 INTRODUCTION

This survey covers the interaction between the aquaculture industries of Australia and New Zealand, and their respective insurance industries.

Whereas some zones of these two countries are similar and unsurprisingly support similar types of aquaculture, Australia, an island continent stretching well into the tropics, can provide a much wider range of climatic conditions, and therefore can support a greater variety of farmed species.

One feature shared by Australia and New Zealand is an awareness of the dangers of uncontrolled aquaculture and unsustainable farming practices, which in many countries have led to poor water quality, disease and the resultant serious production losses. Another shared feature is well-educated populations, with strong community awareness of environmental issues.

This awareness is reinforced by the close relationship that Australians, and especially New Zealanders have with the coast and other bodies of water, having important recreational uses, including fishing. These community characteristics mean that in these two countries there is a particularly close governmental involvement in the aquaculture industry, starting with the selection and licensing of sites. In Australia the responsibility is shared between the federal and state authorities; in New Zealand, the central government frames overall legislation and regulation, with implementation now largely in the hands of regional councils.

The involvement of the public sector is further strengthened in New Zealand as strong elements within the Maori population claim special rights over the seabed and foreshore. Aquaculture legislation passed in December 2004 gives Maori the right to 20 percent of aquaculture licences, while the ownership of the seabed and foreshore is largely vested in the Crown (i.e. the government on behalf of the general population).

This report deals with each country in turn due to the differences between them. First, there will be a description of the structure of the aquaculture subsector, and then the directly relevant governmental (local, regional, national) agencies, together with a brief note on the structure of the insurance industry. A supply and

demand approach is then taken for the main part of the report, covering current aquaculture insurance practices.

9.2 SHORT SUMMARY OF AQUACULTURE PRODUCTION IN OCEANIA¹¹

Oceania's aquaculture production in 1995 was estimated at 99 000 tonnes. Since then an increasing trend has been visible. In 2004 the production was estimated at 139 000 tonnes. Mussel and Atlantic salmon production saw the largest increase in volumes produced in this decade. The total value of Oceania's aquaculture production in 2004 was estimated at US\$447 million. A decade earlier in 1995 the value of aquaculture production was around US\$208 million. Although the value doubled in this decade, the main species remained the same.

9.2.1 Australia

Australia's aquaculture production increased between 1995 and 2004 from 22 000 tonnes to 39 000 tonnes. Over this period the Atlantic salmon production more than doubled, from 6 000 tonnes to almost 15 000 tonnes annually. Sydney cupped oyster production remained fairly stable over the same decade. Considerable increases could also be viewed in Southern bluefin tuna and giant tiger prawn production, whose figures doubled as well since 1995.

In 2004, Australia's aquaculture sector generated an estimated total output value of US\$260 million. Five species reached production levels worth more than US\$10 million: Atlantic salmon (85 million), southern bluefin tuna (48 million), Giant tiger prawn (37 million), Sydney cupped oyster (27 million) and Pacific cupped oyster (13 million). Barramundi and rainbow trout production value was estimated at just under US\$10 million in 2004. While Atlantic salmon, giant tiger prawn and Sydney cupped oyster showed increasing trends in the new millennium, this was not the case with some other species. Since 2001, the production in value terms of Southern bluefin tuna, which was estimated at nearly US\$106 million, has decreased dramatically. In recent years, large fluctuations were also observed in Pacific cupped oyster.

9.2.2 New Zealand

The aquaculture production of New Zealand was estimated at 70 000 tonnes in 1995. More than 62 000 tonnes of this volume originated from New Zealand mussel culture. In 2004 New Zealand's production volume was 30 000 tonnes higher than in 1995; however, this production increase can be attributed to one species only – New Zealand mussel. The production volume of Chinook salmon and Pacific cupped oyster showed limited fluctuation over the last decade.

In 2004 New Zealand's aquaculture production value was estimated at US\$166 million. This value is more than triple that of 1995, when the aquaculture production value was estimated at US\$53 million. Of the three important aquaculture products of the country in 2004, New Zealand mussel accounts for

¹¹ Please see Chapter 2, section 2.2, footnote 2.

73 percent of the total value generated by the sector, followed by Chinook salmon and Pacific cupped oyster, with US\$36 million and US\$9 million respectively.

9.3 THE INSURANCE MARKET

9.3.1 Australia

Most aquaculture enterprises are small; however, the bulk of marketed production of major species is accounted for by a few major firms. This applies in particular to salmon, tuna (capture-based aquaculture), barramundi and prawns.

Important amalgamations in the industry have been observed in recent months, which impacts on the demand for insurance in the market. For example, one rapidly expanding company operates its own in-house (or “captive”) insurance arm.

The insurance industry in Australia comprises some 50 primary insurers, with a number of reinsurers also represented and very active in both treaty and facultative contractual arrangements. Of these primary insurers there is only one underwriter specializing in aquaculture risk. Two other underwriters are known to have insured aquaculture. One of these has withdrawn following a big loss on a cultured pearl operation. The other insures a very minor piece of aquaculture business “as a favour to a valued client”. It is clear that the insurance industry’s attitude in Australia towards aquaculture risk is very cautious, with only one company deeming it worthy of special effort.

Nevertheless, one of the major insurers is now preparing to re-enter the market, having decided that aquaculture is a potentially viable area of business, provided that the interface between the insurer and the clientele is technically adequate. This insurer is part of a large, international insurance company and the aquaculture venture is similarly driven from its head office abroad.

Brokers have traditionally been the interface between underwriters and clients, which continues for much of the insurance business transacted. There are at least three specialist underwriting agencies/brokers handling agricultural insurance, but as far as is known, only one broker is making aquaculture risk a special part of its business. This broker is gearing itself up technically to be able to undertake this role.

Surprisingly, the major specialist Australian agricultural underwriters/agencies have no aquaculture risk on their books. The attitude of these insurers is summed up by the CEO of one of these firms who stated forcibly that he “has no intention of entering this class of business”.

The strong aversion among most of the CEOs and senior underwriters originates in a number of loss events in recent years in aquaculture, which have become well-known in the industry:

- A major loss on a pearl farm policy. The insurance company involved has withdrawn from covering aquaculture.
- Several losses with caged salmon in Tasmania due to algal blooms.
- Some losses due to viral disease in the nascent prawn industry, against a background of very substantial losses in a major prawn-producing country,

Thailand. Currently, the Commonwealth Scientific and Industrial Research Organization (CSIRO) position is that Australia is “not well prepared against prawn diseases”.

9.3.2 New Zealand

The aquaculture industry in New Zealand has taken a direct approach to managing risk. The resulting measures range from the constant monitoring of disease, biotoxin and pollutant situations to location issues such as rearing salmon in cleaner waters, and the use of predator barriers. This approach has gathered pace over the last five to six years.

Perhaps because of the effectiveness and extent of these measures, insurance is beginning to be regarded by some aquaculturists as a useful back-up to the primary measures to control losses. This attitude is more common with salmon farmers than with those farming mussels, oysters and abalone.

A new species to aquaculture in New Zealand, yellowtail kingfish (*Seriola lalandi*) – also known as the yellowtail amberjack and goldstriped amberjack – is now being produced at three facilities in the country. One of these, a large land-based, recirculation water plant in the far north of the country, is designed to produce 50 tonnes of harvested fish per month. This facility, which is highly capital-intensive, is also covered by insurance, not only for plant, equipment, public and statutory liability, but also for the growing fish stock while in transit from the hatchery, growing in onshore tanks, and also for processed fish. Interestingly, the growing fish policy responds only to standard mortality losses and not to compulsory slaughter orders.

9.4 DEMAND AND SUPPLY ISSUES

9.4.1 Australia

On the demand side, most industry participants and representatives contacted cited the cost of insurance as being a major constraint. At the time of writing, market prices for most aquaculture products were lower than in the recent past, and for this reason farmers are cutting costs wherever and whenever possible. Insurance premiums fall into the category of “optional expenditure” for many farmers and are therefore a category where cost savings are made.

The exception to this is the group of heavily-borrowed aquaculturists, whose bankers insist on insurance of the growing stock.

9.4.2 New Zealand

As with agricultural insurance, many aquaculture insurance policies are purchased in New Zealand because of pressure from banks and/or other investors. Here there is an interesting difference between the Maori incorporations that have aquaculture investments, and other entrepreneurs. With a few notable exceptions, the Maori Incorporations rarely insure the growing fish in their aquaculture operations. It is believed that this is because their funding base is very secure. They have little need to borrow from institutions or raise funds through the issue of shares.

9.5 POLICIES CURRENTLY IN FORCE

9.5.1 Australia

Only one UK-based specialist insurer covers growing aquatic organisms in Australia. This company, with its main office for Australia/New Zealand in Nelson, New Zealand, operates a specialist business, with significant in-house expertise in aquaculture risk and in aquaculture generally. Further, a number of firms cover related risk such as breakdown of onshore machinery (pumps, generators, freezers). In addition to policies written by Australian underwriters, it is possible that some business is being passed by brokers? directly back to the London market, but the extent of this is not known.

9.5.2 New Zealand

It has not been possible in the time available to survey all 1 051 farms in the country. What is clear is that the major aquaculture enterprises accounting for the bulk of production are generally insuring growing finfish, but not mussels and oysters. The smaller producers whose views were canvassed maintain that their interest in insurance is constrained by the costs. Premiums are believed to be in the range 3 to 5 percent of the insured value, typically with a 20 percent deductible.

In contrast with the small producers, the large operators carry insurance on their growing fish as part of their normal business operations. At least 90 percent of New Zealand's farmed salmon is insured.

9.6 PERILS COVERED

9.6.1 Australia

The bulk of aquaculture insurance currently in force in Australia is of the "all risks" type. As such this covers mortality from: oxygen depletion due to competing biological activity; attacks by predators including seals, sharks, birds and jellyfish; storms, freeze and super-cooling; electrical breakdown; changes in the normal chemical constituents of water including pH and salinity; disease; and toxic algal bloom.

An additional peril, which may prompt legal action by an insurer and/or the insured farmer, is chemical spray drift.

In keeping with its specialist nature, the major insurer covers onshore aquaculture equipment in addition to boats and offshore equipment, but not other related risk areas. It should be noted, however, that these related areas, i.e. onshore property, public liability, employer's liability, product liability and marine liability, are available with other companies in the market. Four of these kinds of companies, all major players in the Australian market, claimed to write policies for aquaculture entrepreneurs for perils to assets other than growing fish stocks.

9.6.2 New Zealand

The situation in New Zealand is similar to that in Australia, i.e. the bulk of aquaculture insurance on growing species currently in force in New Zealand is of the "all risks" type. As such this covers mortality from: oxygen depletion due to

competing biological activity; attacks by predators including seals, sharks, birds and jellyfish; storms, freeze and super-cooling; electrical breakdown; changes in the normal chemical constituents of water including pH and salinity; disease; and toxic algal bloom.

Perils impact aquaculture enterprises in different ways. For example, oyster cultivation, which is largely uninsured, suffers from two main perils, polluted water from shore discharge, and in some areas, theft.

An additional peril, which may prompt legal action by an insurer and/or the insured farmer, is chemical spray drift. In New Zealand it is thought that the incidences of this peril are not great because aquaculture areas are usually distant from intensive horticultural zones.

In keeping with its specialist nature, the major insurer covers onshore aquaculture equipment and boats and offshore equipment, but not other related risk areas. However, these related areas, i.e. public liability, employer's liability, product liability and marine liability, are readily available with other companies in the market.

9.7 SPECIES INSURED

9.7.1 Australia

The following species are currently insured in Australia (2004-2005):

Species	Percentage insured (%) ¹²
Salmon	70
Rainbow trout	70
Abalone (paua)	?
Southern bluefin tuna	30/40
Murray cod	?

Species likely to be insured in the future are: kingfish, snapper and Moreton Bay bugs.

9.7.2 New Zealand

Species presently insured are:

- Pacific salmon – most (estimated at over 90 percent) of the growing stock is insured, as well as the sea cages in which they are held;
- greenlip mussels – there is no insurance of growing shellfish, just of boats and gear;
- abalone (paua) – about 50 percent of producers insure their stock;
- yellowtail kingfish – currently there are only three operators. One of these operators, by far the biggest, insures all stock; the others are understood to

¹² These estimates are based on an interview with one of the leading Australian brokers of aquaculture insurance, based in Sydney. Because he may not necessarily be aware of all policies written by the Lloyd's market, for example, it is possible that the estimates are slightly conservative. However, they are regarded as indicative and therefore useful for the purposes of this study.

be still at the early, developmental stage, but have enquired about insurance for the future expanded phase.

Snapper is likely to be insured in the future.

9.8 GROWING SYSTEMS INSURED

9.8.1 Australia

The following growing systems are currently insured:

- floating (moored) sea cages, including capture-based rearing of tuna;
- long-line culture of mussels and oyster;
- pump-ashore land-based farms;
- re-circulation (freshwater) units;
- freshwater flow-through hatcheries.

Growing systems that may be insured in the near future are offshore, submerged farms and ship-based aquaculture farms.

9.8.2 New Zealand

Growing systems currently insured in New Zealand are:

- floating (moored) sea cages;
- long-line culture;
- pump-ashore land farms;
- re-circulation (freshwater) units;
- freshwater flow-through hatcheries.

A growing system that may be insured in the near future is aquaculture in offshore submerged farms.

9.9 UNDERWRITING

9.9.1 Australia

As with other classes of insurance, reinsurance plays a key role in creating the capacity to undertake aquaculture business. The major specialist insurer in Australia retains up to 50 percent of the risk, for a maximum of US\$250 000 in any one location. With higher levels of reinsurance the same company can write up to US\$7 million per farm, or US\$15 million per 15 km². As a market leader this company sets its own terms and conditions for policies.

Despite the huge expanses of suitable locations for aquaculture enterprises in Australia, problems have begun for insurers in the form of aggregation of risk in a single locality, e.g. Port Lincoln.

9.9.2 New Zealand

Broker activity is strong in meeting the overall insurance needs of aquaculture units. This is necessary since underwriting of growing fish is largely undertaken only by one company, although another major insurer is gearing up to re-enter the market. However, this underwriter's policies do not include onshore equipment and buildings, liability and business interruption, *et alia*, which are covered by other insurers.

Reinsurance plays a key role, with the main insurer of growing fish operating with a 50 percent global RI treaty. Clearly, this reinsurance arrangement plays a key role in creating the capacity to undertake aquaculture business. The major specialist insurer in New Zealand retains up to 50 percent of the risk, up to a maximum of US\$250 000 in any one location. With higher levels of reinsurance, the same company can write up to US\$7 million per farm, or US\$15 million per 15 km². As in Australia, the same company, being a market leader, sets its own terms and conditions for policies.

9.10 RISK MANAGEMENT SURVEYS

9.10.1 Australia

Risk management surveys are an important part of the business of aquaculture insurance. Again, the major insurer uses both in-house and independent surveyors.

9.10.2 New Zealand

Risk management surveys are dealt with similarly as in Australia.

9.11 CLAIMS HANDLING

9.11.1 Australia

Independent loss adjusters are used in the assessment of claims against the policies following incidence of an insured loss.

9.11.2 New Zealand

Independent loss adjusters are used in the assessment of claims against the policies following incidence of an insured loss.

9.12 UNDERWRITING EXPERIENCES

9.12.1 Australia

Over ten years of operations in Australia, from 1994 to 2003, the main aquaculture insurance company rates its experience as “good” or “very good” for seven years, “bad” for one year, and “very bad” for two years.

9.12.2 New Zealand

From 1994–2003, thus after ten years of aquaculture insurance operations in New Zealand, the company rates its experience as “good” or “very good” for eight of the past ten years, “neutral” for one year, and “very bad” in one year.

9.13 CONCLUSIONS

The major lesson to be learned from the Australian and New Zealand experience is that aquaculture insurance cannot be handled in the same manner as property insurance. On the contrary, it requires a risk management approach to the perils in any one farm or type of farms. Risk management surveys lead to the introduction of procedures designed to reduce the frequency of loss events, and to minimize losses when a peril situation occurs. Such techniques require considerable technical

expertise and include the monitoring of systems, the water and the health of the farmed species on a regular basis.

When the farmed species is insured, not only does the insurer insist on an *a priori* risk management survey, but also requires farming practices to allow for reduction in losses in the operation. Such requirements convey direct benefits to insured farmers by ensuring that high-level expertise is available to them.

Closely associated with this is that the insurance industry constitutes a useful pool of information. Loss events are carefully assessed since claims are involved, so that the information on losses and the associated peril events is far more accurate than sources such as newspaper reports. One insurance industry professional claimed that insurers have effectively acted as a useful cog in the research and development (R&D) machinery of the nascent aquaculture industries in both Australia and New Zealand.

Over the last ten years, in both Australia and New Zealand, on-farm equipment and management practices have improved significantly to the extent that loss containment has been greatly improved. However, the incidence of toxic algal blooms, diseases and losses due to adverse environmental events has not diminished, driving the industry towards onshore facilities, where perils can be more readily controlled.

Finally, it is notable that new technology is increasingly being developed in order to cut losses and to safeguard the health of products being harvested. It should be noted that when linked to losses, automatic recording devices measuring such variables as rainfall and salinity might provide the basis for index-type insurance products in the future.

9.14 RECOMMENDATIONS

A major area of concern to aquaculturalists and to their insurers in Oceania, is water pollution arising from land-based operations. These range from industrial processes to sewage leakages from both established and new housing developments. The trend in recent years for population movements towards coastal areas creates a potential conflict situation with those earning a livelihood from the tidal or near-tidal zones of the coastal area.

With the growing maturity of the aquaculture industries of Australia and New Zealand, it should be possible for effective dialogue to be fostered between the aquaculture industry and government, regional councils and other local body guardians of the seabed and foreshore. Unfortunately, there is some distance to go in this direction, as is evidenced by recent court actions brought by aquaculturists against local authorities over the alleged failure of the latter to properly control polluted water run-off into the ocean, close to oyster racks, which resulted in harvest bans. Failure to satisfactorily address the issues involved will carry a very serious threat to the viability of the aquaculture enterprises in certain parts of the two countries concerned.

10. Conclusions and recommendations

10.1 CONCLUSIONS

The main conclusions that can be drawn from this review study are the following:

- The demand for aquaculture insurance has never been as high as it is now.
- The share of world aquaculture production covered by insurance has shown a decreasing trend in recent years. The gap is widening between the demand for and supply of aquaculture insurance in the world.
- On the supply side of the market, the number of aquaculture underwriting companies is fairly limited and a large share of the companies is concentrated in the centre of the international insurance market (London, the United Kingdom), while on the demand side, there are hundreds of thousands of both small- and large-scale aquaculture entrepreneurs located in distant areas where farms are widespread.
- The number of aquaculture insurance policies in force is estimated at around 8 000 worldwide.
- Aquaculture insurance policies in force in Asia are generally of the “named perils” type, while those in other regions are often of the “all risks” type.
- The range of species and culture systems covered under aquaculture policies worldwide is diverse; however, many insurers simply focus on a small number of traditional aquaculture species and are reluctant to include “new” species and culture systems.
- Reinsurance possibilities are important both for initiating aquaculture insurance activities in a country and for developing and disseminating the service. Without reinsurance, most insurers are not willing to enter aquaculture insurance.
- Risk management practices applied by aquaculturists and aquaculture underwriters are diverse and the practices used often depend on the availability of in-house expertise and skills, availability of an efficient government support apparatus in support of aquaculture sector management and development, and the availability and access of well-functioning laboratories to enable health monitoring.
- Aquaculture insurance capacity has to compete with insurance capacity for other sectors, often more profitable, and due to the bad records in the 1980s and part of the 1990s, there is reluctance to increase capacity for aquaculture insurance.

- The underwriting experiences of aquaculture insurance companies largely differ between years, companies and regions. Since the start of the new millennium it seems, however, that the experiences are improving and that the aquaculture insurance activity is becoming profitable.
- Although mutual insurance schemes in marine capture fisheries are fairly common (e.g. in China, Japan and Viet Nam), similar schemes for aquaculture are still insignificant.
- The awareness of aquaculture entrepreneurs, particularly in Asia, of insurance and the opportunities that it offers to aquaculture production processes is increasing through products offered by life and health insurance companies.
- Investments in modern aquaculture techniques together with implementation of better management practices in aquaculture tend to decrease the risks involved in aquaculture production and will ultimately decrease the insurance premiums, which in its turn will increase accessibility of and demand for aquaculture insurance services.
- The lack of enabling policy and regulatory frameworks for aquaculture and fisheries insurance is negatively affecting the development of insurance services and the sustainable development of the aquaculture sector.
- Asymmetric information, moral hazard and adverse selection remain among the major constraints to entering aquaculture insurance activities for international and national insurance companies. These constraints negatively influence the results of new entrants in the aquaculture insurance sector during the first few years of business.

10.2 RECOMMENDATIONS

The recommendations that came forward from the various regional reviews and the desk study largely confirm that the suggested actions in the 1996 Zengyoren/FAO/APRACA *Regional Conference on Insurance and Credit for Sustainable Fisheries Development in Asia*¹³ (FAO, 1999) still need to be properly addressed.

Recommendations originating from the study are directed towards different stakeholders, hence are here divided into general recommendations (concerning all stakeholders, thus including policy- and decision-makers, banking institutions, insurance agencies, and aquaculturists), recommendations at various levels – government, aquaculture underwriters, aquaculturists and development agencies.

General recommendations

- Since many stakeholders are still not yet fully aware of the merits and value of aquaculture insurance to increase sustainability of the sector, production processes and the aquaculturists' livelihoods, there is scope for more awareness-raising. This should be carried out as a joint effort by insurance companies, governmental agencies and aquaculture producer associations and cooperatives.

¹³ This document, including its recommendations, can be accessed at: http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/005/X4363E/X4363E00.HTM

- The development of legal and policy environments at the national level in support of aquaculture insurance should be undertaken in the short term in a participatory manner, with the involvement of the main stakeholders in the sector.
- The stakeholders involved in aquaculture insurance should focus on long-term relationships and involve other stakeholders that are active in the market chain of aquaculture products as well in order to reduce variations in policy conditions and premium levels, and to work together towards producing consumer demanded sustainable products.

Government level

- Recognize aquaculture insurance as an integral part of aquaculture development and management policy and legal frameworks.
- Evaluate the socio-economic costs and benefits of aquaculture insurance programmes.
- Conduct technical seminars and training courses on insurance matters within the government institutional setting that deals with aquaculture, targeting aquaculture policy- and decision-makers, extension officers and technical and administrative staff.
- Assist insurance agencies in carrying out feasibility studies for the establishment of pilot insurance programmes for aquaculture.
- Increase awareness and build capacity among “new” insurers on the state of aquaculture and its development needs.

Aquaculture underwriters level

- Recognize the benefits of providing and disseminating information on the underwriters’ insurance programmes for aquaculture and promote the aquaculture insurance services more widely in close cooperation with other stakeholders.
- Invest in capacity building on aquaculture insurance of own staff and of others involved in addressing the insurance needs of the aquaculture sector (such as extensionists and representatives of aquaculturists’ associations and cooperatives).
- As the major part of aquaculturists worldwide consist of small- to medium-scale farmers, it is required that insurers widen their focus from large-scale companies to address the needs of these small- and medium-scale enterprises.
- Speed up the design of aquaculture insurance policies that better suit the needs of aquaculture entrepreneurs, including the use of comprehensive policies write-ups, straightforward claim and loss confirmation procedures, rapid handling of claims, compensation for partial losses, premium reductions when implementing BMPs and coverage of polyculture practices.
- Improve the network of offices that facilitate the promotion and dissemination of aquaculture insurance so that the services are made widely available and accessible (for instance, though collaboration with rural microfinance and credit institutions coverage can be increased at limited costs).

- Linkages with microfinance and credit agencies should be developed for joint marketing of products and development of “new” products such as loans with insurance premiums for repayment failures.
- Search actively for insurance capacity and reinsurance for aquaculture in the international market.
- Support initiatives such as the Aquaculture RiskWatch project¹⁴ and the Natural Hazards Assessment Network (NATHAN),¹⁵ which provide valuable database functions in mapping risks, hazards and losses, and links to major expertise in the sector.

Aquaculturists level

- Keep records of the activities carried out in support of their production processes so that historic data are available and management practices and risks involved can be better assessed by aquaculture underwriters when applying for the service.
- Organize into aquaculturists’ associations, groups, cooperatives, among other groups, to facilitate the exchange of information and make it easier for governmental agencies and insurers to establish relationships with farmers, working towards sustainable development of the sector and providing the necessary advice and services.

Development agency level

- Encourage and assist governments to establish the legal, policy and institutional frameworks necessary for including an aquaculture insurance component in national aquaculture development programmes.
- Advise governments and insurance agencies on the design and implementation of guidelines, improved strategies and policies, and incentives for the development of aquaculture insurance in support of sustainable development of the sector.
- Organize international seminars to identify constraints to and opportunities for increasing the contribution of aquaculture insurance to the sustainable development of the sector, the sustainable use of resources, food security and to the alleviation of rural poverty.
- Take a lead in the participatory development of international guidelines in support of meeting insurance needs in aquaculture development and management through the organization of international workshops on this subject.
- Provide more frequently overviews of the state of aquaculture insurance in the world to further increase the awareness of aquaculture producers worldwide on the opportunities that aquaculture insurance can offer and inform decision-makers at national government levels as well as in international agencies about the current status and role of aquaculture insurance in the sustainable development of the aquaculture sector.

¹⁴ Aquaculture Risk Watch Project information is accessible at: <http://www.aquacultureriskwatch.com/>

¹⁵ NATHAN can be found at: <http://mrnathan.munichre.com/>

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ANNEX 1

Review of the current state of world aquaculture stock mortality insurance

QUESTIONNAIRE FOR PRIMARY INSURERS

Conducted on behalf of the Food and Agriculture Organization of the United Nations (FAO), Rome.

The information that you provide in this survey will be treated in the strictest confidence, and will not be made available in any format that can identify your information with your company. Your answers will be combined into a single section of an overall review, a copy of which will be made available for free to those who provide the information requested.

Please provide as much information you can, in answer to the following questions:

Your Company's name:

The information in this box will only be used in case follow-up for possible clarification is needed, and will not be published or released beyond the team of FAO consultants and staff.

About the growing systems that you will insure:

List the growing systems that you currently insure:

List any other growing systems that you believe you will be insuring in the reasonably near future:

List any growing systems that you are not prepared to insure:

About your underwriting capacity:

What is your Company's net capacity (in US\$) on any single risk (i.e. at any single location or in respect of an aggregation of locations): \$

What is your Company's gross capacity (with reinsurance), in US\$, on any single risk (i.e. at any single location or in respect of an aggregation of locations): \$

Are you restricted to underwriting aquaculture risks in your own country only: YES ☐ NO ☐

If "NO", list the other countries in which you provide these services:

Is your capacity available to follow the terms of other specialist underwriters or will you only support your own terms and conditions? Will follow other underwriters ☐ Only our own: ☐

Handling claims:

Do you handle your own losses or do you use independent loss adjusters?

Use own adjusters only ☐

Use independent adjusters ☐

Risk management surveys:

Do you do your own risk management surveys or use independent experts?:

Use own surveyors only: ☐

Independent surveyors ☐

Basic terms and conditions:

Will you underwrite "all risks" terms and conditions or are you only prepared to underwrite "named perils" terms? "All risks" ☐ Only "named perils" ☐

Have you developed your own Application Forms? YES ☐ NO ☐

(If you answer "YES" to this question, please provide a copy of your Application Forms.)

Have you developed your own policy terms and conditions? YES ☐ NO ☐

(If you answer "YES" to this question, please provide a copy of your policy wording.)

Your Company's experience:

For how long has your Company been underwriting aquaculture crop insurance? _____ years.

How would you describe your Company's aquaculture underwriting results since it started underwriting aquaculture business, or over the last ten years?

	Very bad	Bad	Neutral	Good	Very good
2003	☐	☐	☐	☐	☐
2002	☐	☐	☐	☐	☐
2001	☐	☐	☐	☐	☐
2000	☐	☐	☐	☐	☐
1999	☐	☐	☐	☐	☐
1998	☐	☐	☐	☐	☐
1997	☐	☐	☐	☐	☐
1996	☐	☐	☐	☐	☐
1995	☐	☐	☐	☐	☐
1994	☐	☐	☐	☐	☐

Your name:

Your position:

Your office address:

- 1.
- 2.
- 3.

State/county/province:

Postal/zip code:

Country:

Your tel. no.:

Your fax no.:

Your e-mail:

Your Department's Web site URL:

The information in this box will only be used in case of need for follow up on possible clarification, and will not be published or released beyond the team of FAO consultants and staff.

Your comments: *If you have any comments that you would like to make, or if you have any other information or experiences you wish to share that you feel would help the survey, please feel free to enter them here and on additional paper if needed.*

Risk management is increasingly gaining attention within the aquaculture sector, as reflected in the development and increasing implementation of better management practices, codes of conduct and codes of good practice, standard operational procedures, certification and traceability. Aquaculture insurance is one of the tools used in the management of risks in aquaculture. This publication provides an overview of the current status of aquaculture stock insurance in the world. Seven syntheses covering Asia, China, Europe, North America, Oceania, South America and sub-Saharan Africa show the specificities of the situation with regard to aquaculture stock insurance. The publication also presents a summary of these syntheses, together with conclusions and clear recommendations at various levels to increase the contribution of aquaculture stock insurance to the sustainable management and development of the aquaculture sector.

