Exploring Economic Opportunities in Sustainable Shrimp Farming in West Africa: Focus on South-South Cooperation

Regional Roundtable
Conakry (Guinea), 6 - 8 June 2006

— Meeting Report —

August 2006
Revised December 2006

Le Seine Saint-Germain
4, Boulevard des Iles
92130 ISSY-LES-MOULINEAUX
Tél. : +33 (0) 1 45 24 89 87
Fax : +33 (0) 1 45 24 90 31
http://www.oecd.org/sah

Adresse postale :
2 rue André-Pascal
75775 Paris Cedex 16

MEETING REPORT

Exploring Economic Opportunities in Sustainable Shrimp Farming in West Africa: Focus on South-South Cooperation

Regional Roundtable
Conakry (Guinea), 6 - 8 June 2006

Sahel and West Africa Club/OECD
Development Perspectives Unit
4 Blvd. des Îles
92130 Issy-les-Moulineaux France
Direct: +33(0)1 45 24 84 83 / Fax : +33 (0)1 45 24 90 31
sara.minard@oecd.org

Table of Contents

Acronyms

CNSHB	**National Centre of Halieutic Sciences of Boussoura, Ministry of Fisheries and Aquaculture (Guinea)**
CRESCOR	**Centre for Aquaculture Research, State University, Conakry (Guinea)**
CRODT	**Centre de Recherches Océanographiques de Dakar-Thiaroye (Senegal)**
ECOWAS	**Economic Community of West African States**
ENDA	**Environmental Development Action in the Third-World (West Africa)**
EU-ACP	**European Union - Africa Caribbean Pacific**
FAO	**Food and Agriculture Organization of the United Nations**
FISON	**Fisheries Society of Nigeria**
GAIPES	**Groupement des armateurs et industriels de la pêche au Sénégal**
HAACP	**Hazard Analysis and Critical Control Point**
ISRA	**Institut sénégalais de recherche agricole**
IUPA	**Institut Universitaire de la Pêche et de l'Aquaculture**
NACA	**Network of Aquaculture Centres in Asia-Pacific (Thailand)**
OECD	**Organisation for Economic Cooperation and Development**
SWAC	**Sahel and West Africa Club**

1. Executive Summary

As a stated objective to promote South-South cooperation and private sector development in West Africa, the Sahel and West Africa Club (SWAC), a Directorate within the OECD[1]'s Development Cluster, obtained financial support in 2004 from the Japanese government to begin work in aquaculture as an area of potential importance for economic development and South-South cooperation in the region.

Aquaculture is of particular interest to the SWAC given the current OECD fisheries policy coherence debate, as depleting wild fish stocks in West Africa are affecting local production and consumption. Consequently, economies in several of the 18 West African countries where the SWAC's work is focused, like Senegal which can depend on seafood products for up to 40% of their export revenues, are searching for sustainable ways to maintain production levels. Thus, in light of the world's growing demand for seafood products, especially for shrimp products, the SWAC Secretariat spearheaded an initiative to identify the economic opportunities in sustainable shrimp farming in West Africa.

The SWAC launched a regional study in 2004-2005 entitled "Economic opportunities in sustainable shrimp farming in West Africa" which exposed the region's strong potential for shrimp farming. The study's findings were recently shared at a Regional Roundtable held in Conakry, Guinea, 6-8 June 2006, with over 40 shrimp farming experts, investors, producers and decision-makers from the public and private sector from Asia, Africa and Europe.

The Roundtable offered an opportunity to examine shrimp farming activities in several West African countries over the last decade. Wherever possible, the attempt was made to link the probable causes of failure, or lack of commercial success, to lessons learned from Asia's shrimp farming industry.

Discussions during the Roundtable underscored the importance of a regional approach to aquaculture development, as shrimp producing zones exploit natural resources along shared coastlines and waterways and thus, share associated environmental risks. Discussions also outlined why investments in the sector need to meet international standards for sustainable best practices in shrimp farming if they are to be competitive in EU markets, as evidenced by Asia's previous difficulties with disease from non-sustainable shrimp farming. Illustrating this are examples from Thailand and India.

Asian participants demonstrated their vast experience and expertise in shrimp farming over the years. They expressed a willingness to provide training and technical information, and to help West African producers develop investment opportunities. They also emphasized the importance of a stable investment climate necessary to secure Asian private investments, for example through guarantees and incentives, improving existing infrastructure, and the establishment of jurisdictional cooperation in West Africa.

Building on the positive outcomes of the Roundtable, the SWAC will continue to work alongside its partners to carry forward the Roundtable's short- and medium-term recommendations to promote South-South cooperation and private sector investment in sustainable shrimp farming and aquaculture in West Africa.

Through these types of regional forums, the SWAC seeks to promote public-private dialogue, information exchange and decision-making on issues of sustainable development and investment in West Africa. Cooperation between the public and private sectors, between local and regional actors, and between Asia and West Africa in aquaculture and fisheries management is, therefore, an important part of the SWAC's broader efforts to develop working partnerships with decision-makers on regional issues of strategic importance to West Africa's medium and long-term economic and social development.

[1] Organisation for Economic Cooperation and Development, www.oecd.org/sah.

2. Introduction

The Regional Roundtable on *"Exploring Opportunities in Sustainable Shrimp Farming in West Africa: Focus on South-South cooperation"* was organised by the Sahel and West Africa Club (OECD) to present the results of the 2005 regional study entitled "Economic Opportunities in Sustainable Shrimp Farming in West Africa". The Roundtable meeting was held in Conakry, Guinea from 6 - 8 June 2006 at the invitation of the Minister of Continental Fisheries and Aquaculture. Institutional partners such as the UN Food and Agriculture Organization (FAO) and NACA (Network of Aquaculture Centres in Asia-Pacific, Thailand) played a key role in its success and will be instrumental in helping to implement the recommendations outlined in this report.

The Roundtable brought together 40 high-level participants from West Africa, Asia and Europe including individuals from the private sector, representatives from the National Departments of Fisheries and Aquaculture and Export Promotion agencies, local and international shrimp farming experts and shrimp farm owners, NGOs, international organizations, and fisheries and aquaculture researcher centres and institutes.

For three days the participants' discussions, presentations and debates contributed to raising the level of shared knowledge among all stakeholders and identified some short and medium-term actions for investment and technical cooperation. Using the SWAC's Regional Study as a starting point, discussion topics ranged from the history of shrimp farming around the world; market trends, species and site selection; different methods of production best suited for the West Africa region; lessons learned from Asian shrimp farming including risk management and public sector intervention; and Asian-West African cooperation opportunities. On the last day, the participants visited a local shrimp hatchery on the Island of Tamara, part of the Guinean government's Sakoba shrimp farming operation, which provided some immediate insight into the development and investment challenges facing shrimp farming in the region.

A leading theme during the Roundtable was the importance of developing specific national and regional policy frameworks, in particular for improving the investment environment, to encourage the financial, environmental and social investments that are needed to sustain successful shrimp farming ventures. Another central theme was how to mobilise public-private partnerships to jump-start activities in the sector, including opportunities for West Africans to learn from and partner with Asian shrimp farming experts and public and private institutes.

The Roundtable addressed a clear need for actors like the SWAC, and regional and international partners such as ECOWAS and FAO, to help West Africans obtain the best technical information, access business opportunities and tap into existing networks in order to develop sustainable aquaculture activities in the region.

This report presents the main findings and recommendations from the different presentations and debates held during the Roundtable in Conakry in June 2006. Although the SWAC's regional study served as a basis for discussions, each participant brought his/her own experiences and knowledge to the table. This meeting report reflects these discussions and debates, with the double aim to translate these ideas into concrete actions and to encourage others to become involved in developing this sector and in building Asian-West African cooperation for West Africa's economic development.

The technical reports, presentations and working papers are available on the SWAC website at www.oecd.org/sah/devperspectives/shrimpfarming where information on related follow-up activities can also be found. Informational inquiries can also be sent directly to the SWAC Secretariat.

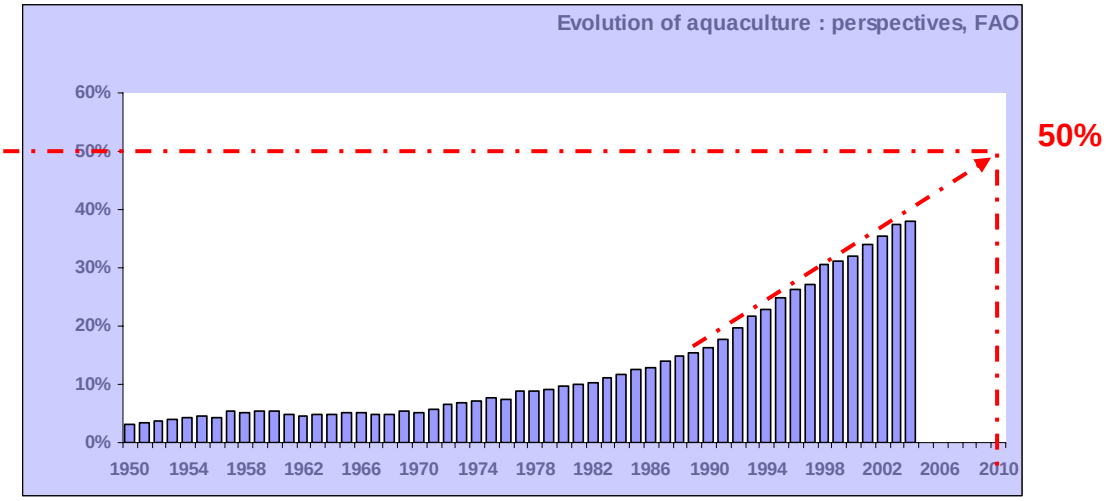
3. World Shrimp Production Trends and West Africa's potential for shrimp farming

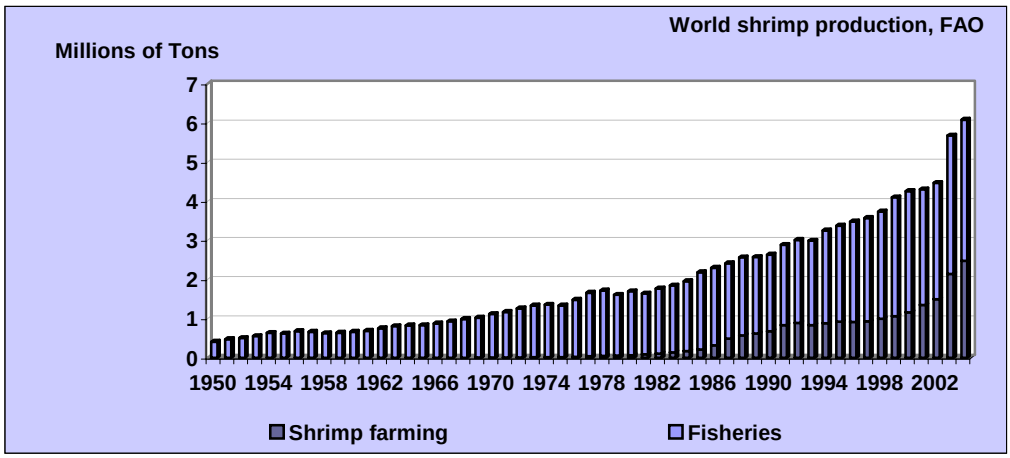
Shrimp in world consumption

Shrimp is the world's most consumed seafood commodity with about 16% of international trade in value terms, or US $12 billion. Shrimp trade is very important for developing countries, principally in Asia where about 80% of world shrimp exports originate.

World shrimp production

World shrimp production is growing quickly. This growth is part of a larger trend of increases in world aquaculture. The proportion of aquaculture products as the total of world fish products will most likely reach 50% between now and the next decade, against 37% today (see graph below).





In 1976, total shrimp production was 1.5 million tons, and has risen by over 1 million tons in the last 10 years from 5.6 million tons in 2003 to 6 million tons in 2004 (FAO FIGIS). Wild fishing capture is now stable at around 3 to 3.5 million tons per annum and unlikely to increase.

Shrimp aquaculture production started back in the early 1980s, and has been growing ever since. At present aquaculture accounts for nearly 40% of total shrimp production (2.6 million tons in 2004). Asia dominates the world supply of farmed shrimp at 88 % for which 85 % originates from 7 countries, 41 % coming from China. It should be noted that shrimp capture fisheries includes a huge quantity of paste shrimp produced in China which does not enter international trade.

Shrimp aquaculture production provided 2.6 million tons in 2004, or 5 % of world aquaculture production in tonnage and 17 % in value. Predictions are for increased aquaculture production from major producing countries, particularly Brazil, China, Indonesia, and Vietnam. An additional 1 million tons could become available in 10 years. Shrimp diseases are now under better control with improved husbandry practices. The recent large increase in white shrimp production: *Penaeus vannamei* (13 % of world supply in 2000 against 58 % in 2004) – especially in South East Asian countries – the home of black tiger shrimp *Penaeus monodon,* has contributed significantly to increased shrimp supplies.

Perspectives on shrimp culture

Despite increased production, 2006 shrimp farm-gate prices are falling and will continue to fall – probably reaching US$3.00 – US$3.50 before becoming more stable. Many producers globally are facing difficulties with rising feed and operation costs against falling market prices. Production prices for white shrimp species (ex-farm) need to be US$2.00-2.50/kg to a high of US$4.50 to $5.50/kg to be profitable in competitive markets. Producers in South East Asia and other major producing countries are only able to remain competitive by being highly efficient in management and inputs (feed, fuel, pumping, etc). The need for efficiency is changing the structure of shrimp farm businesses and driving industry integration.

Expanding markets and higher standards mean that as demand is increasing so are market access difficulties. Alternative marketing strategies (Fair Trade labels; organic; size differentiation; product development) are showing better returns. Strong indications show niche market demand, e.g. “shrimp from Madagascar”, now attract significantly higher prices. However, with prices falling, emerging markets are being found in the booming economies of South East Asia and China. In the higher price markets, food safety standards are becoming more and more stringent – from “farm to fork” – requiring increased investment in food safety and quality standards.

Position of farmed shrimp from West Africa

In 2004, total farmed shrimp from Africa represented 8000 tons, or a little less than 1% of total world supply of aquaculture production. Since then, it is certain that the proportion to global supplies has decreased due to the stagnation of African production and a strong increase in production of other areas, notably in Asia. There is currently only one producing farm in West Africa, “West Africa Aquaculture”, situated in an estuary in The Gambia River. With a production of about 50 tons of large *Penaeus monodon* of very high quality, this production is currently the only operating farm with the capacity to rapidly develop the *savoir faire* in West Africa.

Other operating shrimp farm sites which produce in Africa are situated principally in Madagascar (7 farms produced 7000 tons in 2005) and in Mozambique (3 farms produced 3500 tons in 2005).

There is also a shrimp farm in the Seychelles which produced 1100 tons in 2005. This farm is the only production system in Africa using a strictly intensive system, whereas the others prefer semi-intensive systems.

In addition, the majority of current African production uses the species *P.monodon* which is placed very high on the world market. Notably, in Madagascar they have adopted two quality products: organic shrimp and “*label rouge*” (red label).

The strategic positioning in niche markets of West African shrimp farming will have implications which far exceed the basic marketing aspects for production. Successful marketing of West African shrimp requires a particularly high level of zoological and technical know-how, intensive environmental protection and socio-economic management skills, especially if we consider the fact that no industrial farm in West Africa is at present capable of serving as a model of a large-scale industrial, sustainable shrimp farm. The gaps in the social, political, environmental and financial sectors of the economy must be addressed for a sustainable shrimp farming industry to develop.

4. Main findings from the SWAC's Study on Sustainable Shrimp Farming in West Africa and information shared during the Roundtable

Study purpose

The longer-term objective of the "*Regional study on economic opportunities in shrimp farming in West Africa: An initial review"* was to begin to map out for all concerned stakeholders how West Africa can benefit from the income potential of sustainable shrimp farming methods which, when managed appropriately, strike a balance between economic and the broader social and environmental values and resources that local livelihoods depend on. The study results identified two possible investment opportunities in the region and suggested development strategies to "close the gap" on missing links along the supply chain that may preclude shrimp aquaculture from becoming the region's sustainable compliment to wild catch. Technical and financial South-South cooperation opportunities are highlighted to help connect these links. Asian investors, who are keenly aware of the social, political, environmental and ethical issues involved in shrimp farming, have been and continue to be a valuable resource to help West African entrepreneurs and researchers to develop strategies to sustain the sector, and eventually render it competitive in niche markets.

Marketing and processing

Understanding the different market requirements for West African shrimp produced for the world's main niche markets (Europe and US) is the key to successful economic development of the sector. Key factors for marketability identified in the study and discussed during the Roundtable are:

- *Demand:* Demand for shrimp is increasing and wild shrimp fisheries in West Africa are stagnant or declining.
- *Quality, including taste*: Infrastructure is needed to ensure good on-farm and post-harvest handling and processing to ensure quality. Good environments are essential for maintaining the image of "clean" shrimp.
- *Reputation*: Existing traders have created a "name" for West African shrimp: the Atlantic Black Tiger.
- *Product types:* Frozen, with similar or better quality than wild shrimp.
- *Processing skills:* An experienced workforce experienced in handling and controlling quality is essential. West Africa has companies potentially able to meet and sustain these levels, but further capacity building is essential to support industrial growth.
- *Hygiene standards:* Local health and veterinary staff have some skills; intensive training programs and equipment are needed to attain international standards.
- *Export facilities*: The region has ports for exportation of shrimp products to world markets. Infrastructure from the hinterlands and project location still presents limits for exporting and servicing the project with raw materials.
- *Infrastructure and services*: Large shrimp farming projects may need to be based as self contained units. This approach may require substantial investment.
- *Marketing*: Market links created by West African fishing companies can be capitalised upon for the shrimp farming sector. The removal of wholesalers and other elements of the distribution chain is an essential step to commercial success.

Marketing strategy

The marketing strategy for West African shrimp products will be to target mainly international markets for frozen shrimp, primarily the European Union where West African countries benefit from preferential market access though the EU-ACP trade agreements. African domestic markets for fresh and frozen shrimp are presently limited, although they could develop over time, in particularly to supply the growing tourist industry.

Marketing strategies will need to capitalise on the existing positive market perceptions of its locally caught shrimp for both a "mainstream" product and a product that meets the criteria for niche, organic or fair trade markets (e.g. The Gambia's organic Atlantic Black Tiger Shrimp). Shrimp cultured in environmentally controlled conditions, with the appropriate certification, could attract high niche market prices and can present potentially high returns for the investor. The existing market links and post-harvest/processing capacity in West Africa exists and can be further developed to deliver such high quality organic, or eco-labelled, products to these markets.

Presentation and continuity of the products as well as the many different ways to produce shrimp must be carefully considered in light of the current fall in world shrimp prices (2005-2006) which are expected to continue. This will require extensive business contacts between the buyers and traders to ensure that products satisfy their demands, and that they can generate sufficient returns.

Accessing international markets for West African shrimp products will also require implementation of stringent quality and safety standards and investment in order to meet HACCP requirements, traceability and quality assurance. Although some government departments appear to have the capacity to implement such controls, streamlining procedures and providing training is required. The countries involved with shrimp aquaculture will also need to invest in veterinary inspection services with necessary capability to inspect and control products.

Environmental aspects and sustainable development

Environmental sustainability is a fundamental requirement for the development of shrimp farming in West Africa. From a basic geographical standpoint, West African countries from Senegal to Cameroon have many characteristics that make them environmentally suitable for shrimp farming. All along the coast, land areas can be found that could be physically suitable for shrimp farming. Extensive areas of flat land behind mangrove areas exist, as well as more open coastal flats where shrimp ponds might be constructed. However, detailed feasibility studies at potential sites are essential to make the critical decision about the suitability of different sites, and aerial maps of the region's coastline are needed to locate these potential sites.

Limited action has been taken to identify or designate sites or incorporate shrimp farming within coastal zone management plans, with some exceptions (Senegal). Governments can facilitate development by identification and legal designation of suitable shrimp farming sites for investment. A similar initiative originating at the regional level, i.e. from ECOWAS, would allow countries to monitor sustainability of connecting shrimp farming sites along the West African coastline.

Shrimp farming must be developed without impacting ecologically sensitive mangrove forests. Mangroves are found extensively in the region, and particularly in Guinea Bissau, Guinea, the Niger delta and Cameroon. The Niger Delta mangroves are the single most extensive mangrove system in Africa, and third worldwide after India and Indonesia. In adherence to internationally recognised Codes of Conduct, shrimp farming must be developed without impacting on the livelihoods of people living in coastal areas of West Africa dependant on mangroves and other coastal resources.

Apart from the rice and mangrove areas, are so-called "tannes" or the non-exploited zones that are recognised as having aquaculture development potential, making use of areas that cannot be used for agriculture.

Other environmental characteristics that need to be examined include:

- *Climate*: Countries in West Africa have many characteristics that make them environmentally suitable for shrimp farming, but further studies exploring the compatibility of specific shrimp species with climate are required.
- *Water quality:* Coastal areas of the West African region have water suitable for farming *Penaeus monodon*, and other shrimp species. Water salinity can be found within acceptable limits throughout the region, although the large delta areas are subject to wide fluctuations in salinity that impact shrimp

farming. Close proximity to urban areas should be avoided due to pollution risks. Shrimp hatcheries require full strength seawater – there are fewer sites but some island locations are available.

- *Soil:* Problematic acid sulphate soils are common throughout the West African region, particularly near mangrove areas. Whilst suitable soils exist, careful site selection is required to properly assess soil conditions, and site farms in areas with suitable soils.

Shrimp aquaculture – species, technology and farming systems

There are several marine shrimp species with potential for aquaculture in West Africa, but only one that is actually being cultivated and capable of successfully reaching export markets *in the short-term*:

- Black tiger shrimp (*Penaeus monodon*): This species is initially exotic to the region, but has localised itself, and is now well-established in the wild. As a result, it should be treated as an indigenous species that can be grown with existing technology and retains good market potential.

The Roundtable confirmed the study's conclusion which recommends that the development of semi-intensive shrimp farming be based on *Penaeus monodon*. Research is also encouraged, although past efforts have not been favorable, for culture of *P. notialis* and *P. karathurus.*

Besides the need to do some basic research on the "marking" of the "community" strain of *Penaeus monodon* in West Africa and the baseline measurement of the lack of disease, the missing links in the supply chain such as developing reliable seed stock, feed issues, transportation and communication infrastructure, and energy costs and reliability can be addressed, as are suggested in the recommendations of this report, with the appropriate public-private partnerships and investment.

Other species which require further research

- *P. notialis*: This local West African species forms the bulk of fishery catches, but there is currently no known culture technology. Market potential is good, but will compete with other white shrimp products where there is a trend towards lower prices.
- *P. karathurus:* This local West African species is also extensively fished and of high quality and superior taste. It can grow to large sizes but there is no known technology that is available for this species in aquaculture. The markets are similar to that of *P. monodon.*
- *Parapenaeopsis atlantics*: This local West Africa species is also part of the trawl fishery catch but no known aquaculture development.
- *P. vannamei*: This species was apparently introduced earlier with some reports of catches in Guinea and other adjoining countries. Low prices for this species are expected to remain low.

Potential freshwater "prawns"

Apart from marine shrimp, two species of freshwater prawns have potential for aquaculture in West Africa.

- *M. rosenbergii:* This exotic species is apparently available in West Africa. The complete culture systems are available and could readily be utilized for commercial aquaculture.
- *M. vollenhovenii:* This indigenous species has technology available for aquaculture development and is available throughout the region, though it does not grow to the sizes achievable by *M. rosenbergii* and thus, it will have poorer marketing capabilities than *M. rosenbergii*, but could have potential for local in-country marketing.

Consideration should be given to the feasibility of extensive culture of local freshwater prawns *(Macrobrachium vollenhovenii)* or semi-intensive culture of the exotic species *M. rosenbergii*. Potential exists for polyculture production with other fish (e.g. tilapia) and part of subsistence and local market developments.

All developments should endeavour to emphasize indigenous species and accordingly greater research and development efforts should be directed towards achieving this goal, and attempts to introduce new species should be discouraged.

Farming systems
There are many diverse shrimp farming systems worldwide – from low input extensive to high input super-intensive farms. The technology for sustainable shrimp farming is readily available but not necessarily freely circulating in West Africa. In the current situation, the region needs adequate support infrastructure and skills for super-intensive or intensive shrimp farming. Market information indicates that prices are likely to remain highest for the largest shrimp and semi-intensive systems which are the most reliable systems to produce large, healthy, good quality shrimp in West Africa at present. However, with the right site location and sufficient investment and human capital, intensive farming systems can be a sustainable and viable option.

West Africa represents almost the last opportunity in the world to establish low intensity farms that can also reliably produce local shrimp species at large sizes that will command high prices at no or very little environmental cost. One option to ensure intensity levels are kept at a sustainable semi-intensive level might be to advocate the use of low input organic farming methods and products.

Shrimp aquaculture also requires certain inputs necessary for the sustainable development of the sector:

- Shrimp seed: Shrimp farming requires a reliable supply of quality disease free hatchery seed. *Penaeus monodon*, is a non-indigenous species widely found in Asia, but has localised and is now found wild along the west coast of Africa, probably the result of an earlier introduction. This resource provides the potential for the development of a *P.monodon* hatchery system based on local resources, avoiding the need to introduce shrimp from other regions, and risks of importing disease. The advantage of *P. monodon* is that hatchery technology is readily available in Asia and eastern Africa and sufficiently well-understood and thus, it is amenable to adaptation for aquaculture in West Africa. Two hatcheries already exist in West Africa, although only the hatchery currently functioning is The Gambian farm "*West African Aquaculture"*.

- Shrimp feed: Shrimp feed is not widely available in the region (The Gambian farm has developed some of its own feeds, but also imports some commercial diets for grow-out). The development of feeds based on imports is of questionable sustainability, and will add costs and problems associated with customs and import procedures. In some countries, local fish feeds are being produced, such as in Senegal. Some research, or perhaps cooperation with an Asian business with experience in shrimp feed, may help develop locally suitable feeds, based largely on local resources. Use of "semi-intensive" farming systems can reduce costs of feed. The development of shrimp farming in West Africa must avoid diverting "fish for humans" to shrimp feed.

Shrimp disease
Shrimp disease is one of the major risks to shrimp farming worldwide. No definitive information is available on the exact disease status of shrimp in West African waters, but there is a high probability that the region is – so far – free of the known shrimp pathologies, the deadliest being the White Spot Syndrome Virus. Lack of serious shrimp disease in Madagascar, for example, is one of the key factors contributing to success in this leading shrimp producer in Africa. A major comparative advantage for shrimp farming in the West Africa region, then, is its disease-free status. As a result, there is vital to keep the region free of any major shrimp diseases.

Strengthening capacity for shrimp disease control, monitoring and management requires both government-level control and private sector compliance on the introduction of new species and new stocks of existing species. Regional dialogues and cooperation on this important issue for shrimp farming have begun and should be encouraged by governments, private sector and international partners alike.

Socio-cultural aspects

Community involvement and sustainable livelihoods received special attention in the study. The examination of the reactions of communities to possible establishment of a shrimp farm is necessary to evaluate the potential impacts of a shrimp farm on community livelihoods and to measure the potentialities and qualifications of populations, entrepreneurs and governments to manage development and operation of a shrimp farm as well as existing training schemes. Generally, socio-cultural analyses at the field level

help to identify approaches to establishing shrimp farm projects within a local process of sustainable development.

***Land uses**:* In all of the West African countries, mangrove areas are used traditionally as rice growing areas for local populations. As the foundation of local food supply and national food security, rice farming has been and remains a major activity for people living in or around mangrove areas. The activity structures the social organization of work and the rhythm of life in many coastal communities. Consequently, shrimp farm establishment is recognised as sensitive in relation to traditional land uses. On the other hand, the use of the "tannes" or the non-exploited zones is recognized by communities as an opportunity to make the most of the vast expanses inadequate for other agricultural uses.

***Artisanal fishing activities**:* Artisanal fishing sectors in West Africa are all confronted with serious imbalances, particularly with regard to the local exploitation of these resources and the lack of development policies for sustainable management of the sector. The majority of coastal demersal stocks with high commercial value, intended mainly for export, are fully overexploited. Shrimp processing plants work clearly below their capacity, and some are near to closure due to a lack of raw material, as evidenced in The Gambia and Senegal.

In The Gambia and the Casamance region of Senegal, fishing communities perceive that land-based shrimp farming activities will induce indirect competition with fishing activities. The collection of juvenile shrimp from the natural environment is a particular concern, because of perceptions such practices may affect the production of wild shrimps, which is already in difficulty. Fishing communities are in general favourable to shrimp farming, provided that the juveniles do not come from the sea.

The development of freshwater prawn farming in partnership with traditionally farmed fish constitutes, according to communities, an easy step to take. The activity is associated with the possibility of increased income and of improving food supply in the community.

***Socio-cultural issues and the natural environment**:* The construction of a shrimp farm on a site already occupied by people since birth can generate serious socio-psychological disturbances. More important than potential job creation, it is fundamental for any shrimp farm to be accepted by the communities concerned because it touches at the core of their socio-cultural values, and the participative element of their identity. In general, though, there do not appear to be any customs or habits incompatible with shrimp farming. However, in Guinea Bissau, animist beliefs among coastal populations hold certain mangrove areas as worship places; the establishment of shrimp farms is not acceptable on sites having a religious or sacred function or belonging to a ritual process.

In order to reduce these risks, shrimp farms must be conceived with the participation of the local communities. Only the local communities can know to what extent a mangrove or piece of land has specific socio-cultural value that one should not transgress. Moreover, only a concerted approach with the populations will allow for the choice of a site that minimizes socio-cultural impacts and maximizes social collaboration and benefit. This last point requires significant research efforts before shrimp farm planning can begin.

Prospects for a win-win relationship between the community and a shrimp farm developer can be high, given proper planning. One of the fundamental points raised by communities during the study consultation is the obvious general lack of information on shrimp farming. Information sharing, transfer of knowledge on sustainable shrimp farming and sincere community involvement in project development and implementation are, therefore, essential activities for further development of shrimp farming in the region.

Investment promotion

Despite the very favourable geographic situation of West Africa, shrimp aquaculture will develop only if West Africa closes a number of gaps, and perceived gaps, in its investment environment.

Generally, foreign direct investment (FDI) interest is determined by a combination of so-called "push" and "pull" factors. The macroeconomic situation in the potential investor's country can "push" him to invest outside the home country. These factors include availability of surplus funds, opportunity cost associated

with held capital, and the situation and returns on the home capital market. Capital that is made available through existing “push” factors can be attracted to one country rather than another by the “pull” factors that exist in that country, such as expected returns, investment risks, trade regime, and growth of the domestic economy. When serious gaps are perceived in the business environment, they reduce the strength with which the country can “pull in” foreign direct investment.

Perceived and real gaps related to shrimp aquaculture investment inflow to West Africa were identified as:

- *Legal framework:* At present, nearly no legal framework or coastal zoning schemes exist that are dedicated to aquaculture. In the absence of clear regulations and guidelines, medium- and long-term investment will be slow in coming, especially when questions of the right of land use are not settled because purchase or lease follows traditional patterns that are incompatible with continued presence of a foreign investor.

- *Infrastructure*: In many areas that are suitable for shrimp farming, communications and electricity coverage is poor or non-existent.

- *Lack of technical competence*: Although trained staff can be recruited at the labour level, at the management level, qualifications and competence in the fields of aquaculture and shrimp farming are lacking in most cases. If an investment project relies too heavily on expatriate staff, it may be both less enticing for the investor and meet with less responsiveness in local communities.

- *Lack of political stability and unfriendly investment environment*: West Africa, rightly or wrongly, has a reputation for high-risk investments. There is a perception that socio-political conditions are unpredictable, that authorities are wilful and corrupt, and that procedures to establish a business are too slow. In addition, real problems of political unrest or civil war in one part of West Africa may be perceived indiscriminately as applying to all West African countries. Therefore, West Africa should be prepared to attract investment interest before it endeavours to attract investment.

- *Lack of regional co-operation*: Many aspects related to the development of a shrimp farming sector are best handled on the trans-national level for all West African countries. As there are Rules of Origin and “*de facto”* tariffs despite the existence of ECOWAS, foreign investors may be dissuaded from investing in West Africa.

Institutions

Institutions and legal frameworks are required for sustainable development of shrimp and other types of aquaculture in West Africa. Present policies cover some key issues, under fisheries or environment laws, but longer-term development of the sector requires well-formulated and focused aquaculture legislation. The capacity to manage and regulate aquaculture appears to be very limited at the moment in almost all countries in West Africa. A concerted regional capacity building effort will, therefore, be needed to support start-up efforts and accompany existing activities in sustainable shrimp farm development.

Aquaculture promotion will affect all countries in the West African region, as natural resources along coastlines are shared. A common concerted action plan and management system on the regional level between Ministries, export promotion agencies, research centres and local stakeholders will allow countries to fully reap the potential benefits from the development of the sector.

5. What has been learned?

Best practices and accumulated knowledge from Africa and Asia on West Africa's potential

West African shrimp farming experiences: Key issues presented, key questions asked

Four shrimp farms have been constructed in West Africa:

1. 1982, The Gambia: industrial farm, *"West Africa Aquaculture"* (WAAq)
Semi-intensive farm raising *P.monodon* includes a hatchery and a processing plant producing to EU standards. Of the original 200 hectares, only 50 are being used for production today. With a production of 50 tons in 2006, this farm is the only one in West Africa today with the capacity to serve as a base for modeling production methods adapted to the local context.

2. 1983, Senegal, Casamance: pilot farm, *"Katakalousse"*
The objective of this pilot station was to demonstrate the feasibility of shrimp farming in the region. After 9 years of activity, the main conclusions which relate principally to the semi-extensive farming conditions of *P.monodon* were not favorable to begin a shrimp farming activity. The unfavorable site caused by an excessively long winter season justified the closing of the pilot phase in 1992 and the abandonment of the station.

3. 1989, Côte d'Ivoire, Grand Lahou: pre-industrial farm, *"Blohorn Aquaculture"*
This intensive farm of 16 hectares including a hatchery had the goal of being an industrial farm along the lines of the Thai production model. Despite encouraging initial results, the project was closed mainly due to high water pumping costs linked to the inappropriate production location along with a change in investment strategy by the investor.

4. 1995, Guinea Conakry: industrial farm and hatchery, *"Sakoba"*
Despite important investments - even by today's standards - this industrial farm built by the Guinean Government includes 400 hectares of ponds with a processing plant and hatchery did not produce more than 250 tons. Among the serious problems of poor management and the choice of an inadaptable site, production has never been operational to date. A large scale hatchery was located on the isolated island of Tamara, offshore of Conakry, while the farm was located over two hours by road up the coast of Guinea in the region of Koba. From its concept, the project was plagued by cost over-runs and poor management. These problems were compounded by logistical issues (proximity of the two integral facilities), and unmanageable technical problems (acid soil, and silted water on the farm). During the following eight years, the facilities were maintained for security and basic maintenance and were carefully examined by several potential international investors who all finally declined a complete take-over.

During the Regional Roundtable many questions on the history of the Sakoba farm were raised. From this discussion, the participants pointed out the importance of site selection, as 3 of the 4 shrimp farms in the region have been placed at unsuitable sites. Discussions included the fact that site selection should be made by technical experts and driven by politics or by private investors with little real experience in shrimp farming. The site visit to the Sakoba hatchery during the Roundtable by the international experts from Asia and West Africa supported this conclusion: site selection is critical to success of shrimp hatcheries and farms. Not only should the hatchery be proximal to the farm, but sites for the farm must meet strict environmental and technical requirements.

Lessons drawn from West African shrimp farming experiences

During the Roundtable participants confirmed that the main lessons to be drawn from the first attempts at shrimp farming in West Africa can be grouped into three themes:

a) Choice of the farm site should be made after a multidisciplinary study is done by a team with real experience and know-how in the creation of shrimp farms. Necessary competencies require calling upon experts in zoology, engineers of coastal environments and socio-economists.

b) Management of the operation must conform to the management rules applicable to all types of major agro-industrial projects. In other words, the zoological issues should not take precedent over the running of the business as the investor, or shrimp farm promoter, must be surrounded by different players with experience in managing independent business operations who are not necessarily experts in aquaculture. Only the technical director is required to prove his/her expertise in shrimp farming.

c) The investor or promoter must be particularly well integrated into the local context. He/she is, in fact, the only one who can assure the steady evolution of his/her project in an administrative and socio-cultural environment specific to the select region or country.

Artisanal versus Industrial Shrimp Farming

These operating principles are essentially applicable to industrial-type aquaculture. A debate began during the Roundtable discussions, however, on the opportunity to create a sub-sector in artisanal aquaculture. After comparing the two models of development, industrial versus artisanal, it was suggested that for the time being in West Africa the first production efforts should be industrial-type models which are entirely autonomous. This level of autonomy, especially concerning logistics such as infrastructure, is only possible with an annual production of hundreds of tons of shrimp. Thus, artisanal shrimp farming would be more sustainable once the industrial farms were already up and running. The concept of a "*nucleus estate system"* was brought to the table: it is a system whereby an installation of artisanal shrimp farms surrounds an industrial farm which serves as a support and technical reinforcement center for the artisanal farms, notably for monitoring and evaluation of sustainable shrimp farming practices, for providing larvae and for processing to market standards.

Asian and African Best Practices: Key issues presented, key questions asked

In Asia, aquaculture and notably shrimp farming is a traditional activity dating thousands of years, and thus deeply rooted in the cultural environment which depends on rice culture and coastal fishing for livelihoods. Aquaculture traditions of this profundity simply do not exist in West Africa. This was brought to the group's attention during the Roundtable as one of the reasons to explain the lack of successful aquaculture activity in the region. To fill the gap in endogenous knowledge, therefore, continual training is required at every step of the shrimp farming process.

In the framework of South-South cooperation, adapted training programmes would permit individuals interested in shrimp farming to benefit from Asia's diverse range of knowledge and experience.

Two key concerns raised during the Roundtable discussions were the choice of species and maintaining the quality of production.

a) **Species selection**: taking into account the market constraints mentioned above, it seems most opportune to promote production of *P.monodon*, a widely appreciated species but less and less seen on the global market, notably in EU markets. For this reason, keeping production models up-to-date and adapted to the specific eco-climatic context in West Africa seems to be a top priority.

b) **Quality**: For a number of years, mass production has favoured products on the market with inconsistent levels or just mediocre quality. A West African differentiation, however, based on proven experience, notably in post-harvesting, is equally perceived as top priority.

Lessons drawn from Asian and African Best Practices

The recent history of international shrimp farming, as well as the few but difficult experiences undertaken in West Africa, call for prudence and *savoir faire* when developing this activity in the region.

Four major considerations were debated and retained as essential:

a) An orientation towards semi intensive of *P.monodon* production, capable of generating 2 to 4 tons of quality shrimp per hectare, per year. These production outputs constitute an appropriate balance between the legitimate concern of farmers and the necessary environmental limitations, particularly in terms of efficient land use, management of disease risks and limiting the impacts of effluents in the receiving waters.

b) The problem of site protection and its surrounding environment was also underlined. The West African coastline still has vast areas still largely undisturbed by industrial developments. Industrial shrimp farming that provides a model for environmentally-integrated aquaculture into this natural environment is, thus, important to promote. In particular, mangrove destruction should be illegal and rigorously monitored and environmental best practices for farm siting and operational management followed.

c) At the same time, coastal communities are densely populated and extremely diverse throughout the region, and development projects should be planned in order to integrate and benefit the local population. The importance of respecting local rights and customs was also reiterated.

d) Finally, wild shrimp populations in the region, notably *P.monodon*, have not developed the pathologies which ravished Asia and South America. Thus, it is imperative to forbid the introduction of any foreign living shrimp into the West African region. This recommendation should be a prerequisite for anyone who wants to develop shrimp farming in the region.

6. What has been recommended?

Short-term and Medium-term Actions for Shrimp Farming Development in West Africa

General recommendations

With the aim of developing productive and sustainable shrimp farming activities in West Africa, the following two propositions were agreed to at the Roundtable as essential next steps.

1. **Create a Master Plan at the regional level** which provides identification of priority production sites and details about each site's strategic position. Such a Plan should be able to quantify the available surface area and as a result the production possibilities in hierarchical order of their development potential from one country to another, and if possible, on the regional level.

2. **Promote, in the short-term, the restoration and privatization of existing installations.**
   - *As a first priority*, the installations at the "West African Aquaculture" farm in The Gambia are prepared to rapidly increase their production capacity to adapt to regional demand and within the regional context. Strengthened management techniques, even for the owners, seem a priority for any major expansion. Such an inexpensive but concrete action (e.g. nomination of a senior expert) will, by nature, rapidly transfer knowledge learned in The Gambia and elsewhere to the rest of the West African region.
   - *Secondly*, concerning the "Sakoba" farm in Guinea, the hatchery, once privatised, could serve as a means of restoring some of the existing Sakoba installations to a functional level, and could become a regional post-larval production center for shrimp farms to be developed in the region as outlined in the Master Plan. It could also become a regional teacher-training centre.

Specific Recommendations

Roundtable participants also held a highly productive discussion that identified various actions and potential partners to facilitate future development of shrimp farming in the region.

5. Disseminate Roundtable findings and conclusions

The Roundtable agreed on the importance to widely diffusing the results and recommendations of the discussions to a large number of economic and political actors, in particular the lessons learned on the positive impacts of shrimp farming as a sustainable alternative to supply fish products to meet local demand and for export.

Shared experiences from the Roundtable which will be disseminated first in the form of the present report, will help raise awareness, build consensus and business partnerships in the short-term, and most importantly, help facilitate public-private dialogues aimed at implementing a regional plan for promoting sustainable shrimp farming, and aquaculture in general, in West Africa in the medium-term.

Partners and actions:

International partners

- FAO can assist its member governments, along with the SWAC and ECOWAS in preparing a regional plan for shrimp farming.
- FAO encourages West African governments to attend the FAO's Aquaculture Sub-committee meeting of FAO, to be held in India during September 2006. The meeting would provide an opportunity for sharing experiences in sustainable aquaculture between West Africa and Asia, and further strengthening South-South cooperation.
- OECD is requested to prepare a summary of best practices based on the experiences presented during the Roundtable for wide dissemination.

Research Organizations

- Research institutes (including ISRA, Senegal; CRODT, Senegal; Institute of Fisheries and Aquaculture, University of Cheikh Anta Diop; CERESCOR, Guinea) will help disseminate the study findings and reach out to all concerned actors.

NGOs

- ENDA agrees to help disseminate the Roundtable results and use the learning that took place regarding positive impacts of shrimp as a sustainable alternative to convince economic actors that it can work with the right planning.

Public sector

- Ghana will use training and conferences to raise awareness on shrimp farming and would like to share resources to promote this activity and asks FAO and OECD for support

6. Support business development initiatives in the sector

Generating the necessary public support and private investment for existing initiatives, such as The Gambian farm "*West African Aquaculture*", is essential for developing the shrimp farming sector as lessons learned from this farm and techniques adapted and developed for sustainable production using semi-intensive systems, on marketing and export, will be applicable to other new ventures in the region. In addition, the "*West African Aquaculture*" shrimp farm has the capacity and interest to serve as the Regional Centre for Excellence and be a site used for training in the region.

Partners and actions:

Private sector

- Private sector should investigate new sites and their potential as part of a regional plan
- Establish a franchising and labeling system for the local Atlantic Black Tiger Shrimp
- Build as a priority on existing projects or facilities is recommended where technically feasible.
- Encourage private sector partners to rehabilitate and develop the Sakoba shrimp hatchery and farm.
- Investment should be made in the further development of The Gambian shrimp hatchery and farm as an ongoing example of successful shrimp farming in the region. Use the farm to demonstrate that sustainable shrimp farming is possible in West Africa.

- Prepare guidelines on shrimp hatcheries, site selection and shrimp farming methods to disseminate to interested shrimp farm investors in Nigeria.

International partners

- Investigate potential for investment in artisanal shrimp farming in Senegal as a possible example of small-scale shrimp farm development for the region, taking special care to integrate the shrimp farm developments into coastal ecosystems and livelihoods. NACA is willing to cooperate and assist in sharing experiences in artisanal shrimp farming in Asia.

Regional organizations and private sector

- Support farmer exchanges (e.g. from Nigeria to The Gambia) to provide incentives for pioneer investors to enter the shrimp industry.

6. Promote enabling policy and institutional environment for National and Regional sustainable shrimp farming

Policy and institutional development is an area of extremely high priority in the short-term, as initiatives are being launched in the region for shrimp farming without any policies for ensuring their sustainability in terms of environmental and socio-cultural impact. The Roundtable concluded that all actors need to consider the investment environment as a priority along with the natural environment. In addition, government policy is important because it has cost implications. The necessary reforms for investment and for mitigating ecological problems should be made *in the short-term*. Producers and technical experts must make clear arguments for these considerations which should be inserted into political dialogues and debates on sustainable aquaculture and shrimp farming.

Partners and actions:

Public and private sectors, regional and international organisations

- Public and private sector partners, regional and international organisations should assist in preparing regional regulatory, legal and institutional policy frameworks for adoption by West African states
- A regional policy should be prepared to maintain the (apparent) status of the West African region as free of major shrimp diseases.
- A sub-regional framework of environmental regulations needs to be prepared and then adopted at the national level.

Public sector

- Governments should prepare guidance and support capacity building and awareness-raising for local governments on planning and implementation of shrimp projects as a basis for sustainable investment decisions.
- Investments should be made in existing agro-industries to support industrial shrimp farming development.

5. Develop Research and Studies

“It’s not just research for research’s sake”, but the region also needs immediate initiatives that will attract investment. Therefore, research studies should be conducted to provide a sound policy environment and basis for sustainable investment in the shrimp farming sector in West Africa.

Research needs to provide potential producers with information on how shrimp farming can be planned so as not to disturb the natural environment and yet be financially viable, applying lessons learned from past and current experiences in Africa and Asia.

Partners and actions:

Public sector

- Public sector with support from donors should identify suitable coastal sites for investment by the private sector in shrimp farming in the region and carry out studies on the potential socio-economic and environmental impacts of shrimp farming projects.

- Research and development should explore the potential for indigenous species, and attempts to introduce new species should be strongly discouraged.
- National Governments should prepare a list of what national and local governments are prepared to do in terms of research, and share this information with the private sector. One suggestion was to establish a development fund for potential actors to have access to capital for research and pilot programmes, based on the example of India.
- Public sector should inform interested private sector investors where the viable sites exist in the region.

Private sector and international partners

- Possibilities exist to develop a small scale farming opportunity (possibly in the Casamance) with NACA, focused on research that would fit into the overall model of shrimp farming development in West Africa.

Research organisations

- Research is needed on the quality criteria for farmed shrimp in West Africa, and to develop criteria for specificity and demarcation.
- Research institutions should conduct a study of the characteristics of male *Penaeus monodon* shrimp populations in the region. Scientific Research Centre of Conakry Rogbané (attached to the Ministry of Advanced Teaching and Scientific Research) and CNSHB: National Centre of Halieutic Sciences of Boussoura, attached to the Ministry of Fisheries and Aquaculture of Guinea, offers to cooperate on such studies.
- Regional research networking by Guinean and Senegalese Institutes is offered as a start to linking research institutes and scientific communities on local and regional levels. The networking should be expanded by involving interested institutions from other parts of West Africa, and with linkages experienced institutions in Asia for South-South cooperation.
- Research should be conducted on the social and environmental impacts of aquaculture projects in the region. The Gambia was suggested as an ideal potential location, due to the existence of an operational shrimp farm from which important lessons can be learned and shared.
- One suggestion by the Lyceum Group in Guinea, in partnership with the Institute for Biomarine Sciences in Canada, is to transform the Sakoba shrimp farm in Guinea into a regional research and teacher training centre for West Africa with a focus on Black Tiger shrimp (*P. monodon*).

5. Market development

The quality image of West African shrimp and existing market access arrangements, with the EU in particular, should be used to develop market interest and investment in shrimp farming in the region.

Partners and actions:

Private and public sectors

- Complete market studies should be carried out on the potential commercialisation of West African shrimp *P. monodon* in numerous markets, both niche and mainstream.
- Collaborate with interested shrimp importers to identify investors.
- Build on existing channels and processing facilities for export of West African farmed shrimp.
- Consider the possibility of building the brand image of West African shrimp, such as the one created by “West African Aquaculture” called Atlantic Black Tiger Shrimp.

6. Mobilisation of resources

The private sector in West Africa is typically under-funded, with generally very limited access to investment or venture capital funds. This is especially true when examining the past performance of shrimp farming ventures and their success or failure rate. It is difficult to find sufficient funding for a wholly autonomous farming system that includes jurisdictional approval, a hatchery, viable transportation and services, and a world-class output farm. The funding of small-scale industrial operations to establish precedent activity could be funded by the private sector and local and international bodies in a joint

venture. Some of these activities could include pilot projects and address some of the limiting factors observed and experienced to date.

Partners and actions:

Public and private sector

- An investment guide should be developed for regional investments into shrimp farming, working with Asia to fine-tune this guide for specific markets.
- Financial partners should be identified to invest in West African shrimp farming.
- A development fund should be set up for shrimp farming. Negotiate with financial institutions for a fund to be made available for business under specific conditions.
- Participate in investment fairs (e.g. Switzerland's ITC/UNCTAD investment fairs) to raise investor interest.

8. Develop a Network of Asian-West African Partners

The Roundtable revealed the wealth of knowledge that exists from many years of experience in shrimp farming in Asia. The links between Asia and West Africa in many areas of commerce are growing and aquaculture is an ideal area for collaboration given West Africa's coastal geography and the increasing demand for halieutic products. For technical training and knowledge-sharing, such cooperation can already be seen, for example, between Thailand, Korea and Senegal, and between China and Guinea. However, opportunities exist to strengthen these links to include support for sustainable principles, and for investment and trade through a network, similar to NACA in the Asia-Pacific region, but which could include interested West African and Asian countries.

Partners and actions:

Private sector and Research organisations

- Form an association of shrimp farmers and experts in West Africa with rules and networking opportunities to exchange ideas and experiences. Use the Institute IUPA in Senegal as a launching pad for this association.
- A West African association of shrimp producers could assist in building brand image and investment interest in West African shrimp farming.

International partners, Research organisations, public and private sectors

- NACA offers assistance to the development of an Asia-West Africa specialist network of researchers, private investors and producers to facilitate technical exchanges, training and knowledge-sharing between the two regions.

Regional organisations and International partners

- NACA invites ECOWAS and interested West African partners to visit Asia to identify practical ideas for cooperation and a special program of South-South cooperation in shrimp farming, and other areas of aquaculture development.

9. Training and Education

West African participants at the Roundtable agreed that there was a strong need and interest in training and development in shrimp farming, and in aquaculture in general. Although there are some university departments and technical institutes in various parts of the region, they are largely under-funded with very few physical resources. One idea for discussion was part of a "Regional Plan" proposed for sustainable shrimp farming in the region, whereby research institutes could develop, along with necessary support from public and private institutions, an "asset map" of human resources, technical capacity, analytical capability, and potential cost-sharing opportunities which, once mapped out, would provide a qualified list of extant assets in the region.

Partners and actions:

Research organisations and International partners

- West Africa research and training institutions of fisheries and aquaculture should cooperate more fully with the large shrimp producing countries in Asia (such as Thailand, India) and in Africa (Madagascar) to acquire the practical experience necessary and to ensure high level practical training for their students.

Private sector

- On training, private sector needs to put a strong emphasis on *quality* of skills available. There is a need to develop a skilled workforce for shrimp farm development in Africa, including government, private sector managers and researchers.
- Reinforcement of technical and organisational capacity is needed by all implicated partners interested in the promotion of shrimp farming in the region.

International partners, Research organisations and NGOs

- The Thailand Department of Fisheries offers to cooperate and provide training for the Aquaculture Training Institute *(University Institute of Fisheries and Aquaculture of Dakar)* in Senegal and others.
- Nigeria (FISON) requests information on shrimp farming training opportunities and course materials to be made available.
- The Research and Training Institute in Dakar (IUPA) can send students for on-the-job training in shrimp farming and to work on shrimp farming management issues. They request support for the establishment of a regional training centre at the University of Dakar.
- Students are available from Universities around the region for research on social and environmental impacts of aquaculture projects in West Africa, and should be mobilised for such research.

Private sector

- The shrimp farm in The Gambia (West African Aquaculture) offers to assist with practical training in shrimp farming for people from West Africa.

International partners

- NACA offers assistance with basic information and ideas exchange and capacity building with eventual technical and investment cooperation. NACA could also provide information to participants on training opportunities in aquaculture.
- NACA invites interested partners to come to Asia to experience Asian shrimp farming, and prepare a programme of South-South cooperation together with the OECD and FAO.
- NACA is willing to assist with training programs and identify areas where Asian expertise and institutions could help build capacity.

Public and private sectors

- It was suggested that public and private institutions work together to set up a specific programme for skills development in shrimp farming and other forms of aquaculture, for the national and regional levels.

7. Moving the agenda forward

South-South cooperation and Public-Private Partnerships for sustainable shrimp farming

Shrimp farming, as part of the larger movement towards aquaculture development, is and will continue to be inextricably linked to the issues of fisheries management, and production of fish products for consumption and export in West Africa, as off-shore wild fish stocks continue to be overexploited, a trend estimated to continue well into 2025[2].

The SWAC's Regional Study on Economic Opportunities in Shrimp Farming and the Roundtable's recent discussions have developed a solid base of shared information and compiled a concrete set of short and medium-term recommendations for sustainably developing the shrimp farming sector in West Africa. The sharing of information occurred on many levels: West African–Asian, West-African–West African, Public-Private, and the Public-Private-Donors. Roundtable participants agreed concerted actions are needed in the short-term involving West African partners and that South-South cooperation is a critical motor in helping drive private sector initiatives.

Representatives from West African countries and international participants voiced concern that legal issues and political positioning would be difficult to avoid when looking at the broader West African picture for the development of sustainable shrimp farming. These perceptions can also an impediment to international investors. Thus, the SWAC with ENDA, FAO, NACA and other partners working on shrimp farming and aquaculture in the region have been asked by the Roundtable participants to carry forward the conclusions of the Roundtable by facilitating public-private dialogues and linking a network of Asian and West African producers and public sector actors working on developing the sector in West Africa[3].

In the short-term, **it was recommended that a "West Africa Regional Plan for Development of Sustainable Shrimp Farming" be developed**. This process would promote cooperation and transparency among concerned member states and would use as a starting point the International Principles for Responsible Shrimp Farming developed by a consortium which includes FAO, UNEP[4], World Bank, NACA and WWF[5]. A regional policy dialogue would have to include all stakeholders in the process for it to be successful. Private sector actors, research and training institutions including those who attended the SWAC Roundtable such as ISRA (Senegal), CRODT (Senegal), Institute of Fisheries and Aquaculture, University of Dakar Cheikh Anta Diop (Senegal), CERESCOR - Centre for Research on Fisheries and Aquaculture, National University (Guinea), and NGOs such as ENDA (Senegal), GAIPES (Senegal) and FISON (Nigeria) as well as the many other private and public leaders interested in the sector would have to be involved, and of course institutional partners. Regional and international organizations (ECOWAS, SWAC, FAO) could help facilitate a national-to-regional dialogue to share and debate the international guiding principles in order to develop specific guidelines for West Africa.

Moving forward, if West Africa is to tap into its potential for sustainable shrimp farming, it will require greater private sector tenacity, innovation and investment, public sector reform and flexibility, improved fisheries policy coherence and a strong commitment by all stakeholders to the basic tenets of sustainable development in aquaculture. The SWAC's study and regional discussions have demonstrated that international partners, particularly in Asia and Europe, are prepared to contribute to both public sector and private sector initiatives in West Africa to encourage sustainable shrimp farming, as well as other forms of aquaculture. The potential social benefits of shrimp farming for the local population need to be better explored. However, in terms of increased food security and local income, benefits will most likely instead come from other forms of aquaculture, such as fish farming, and not shrimp farming. Nevertheless, in terms of economic development and trade, the region of West Africa is strategically poised to be able to reap the benefits associated with productive, sustainable shrimp farming. With the right levels of investment, partnership and planning, successful operations in this increasingly important sector could have positive impacts on developing sustainable aquaculture as a whole for the region.

---

2 FAO (2003)

3 For example, during the recent Third Session of the FAO Sub-Committee on Aquaculture held in India (4-8 September 2006) the SWAC helped facilitate with FAO and NACA an informal dialogue with West Africa and Asian delegates on sustainable shrimp farming and South-South cooperation in West Africa.

4 United National Environment Programme

5 World Wildlife Fund

List of Participants

Benin / Bénin

Victor AHOMLANTO
Halieutic engineer, Head of Quality
Société CRUSTAMER
Carré 576 YZ Dédokpo
05 BP 650 Akpakpa – Cotonou
Bénin

M. Sylvain TOSSOU
Inspecteur du Control
Direction des Pêches
01 BP 383
Cotonou
Bénin

Canada

Dr. Ken KEIRSTEAD
Director
The Lyceum Group
51 Charlotte Street
Fredericton
N.B., Canada E3B IMI
Canada

France

Mme Bernadette LEFORT
Ambassadeur auprès de la Guinée
Ministère des Affaires Étrangères
Grand rue Bieille
04300 Mane
France

M. Jacques TRICHEREAU
Directeur
IDEE
39 rue Jean Giroux
34080 Montpellier
France

Gambia / Gambie

Mrs. Margo HANSSON
Owner West African Aquaculture
Kotu Stream Rd
Kotu
Gambia

Mr. Lennart HANSSON
Owner West African Aquaculture
Kotu Stream Road
Kotu
Gambia

Ghana

Mr. Erasmus Ashun
Ghana Export-Import Promotion Council (GEPC)
Executive Secretary
Republic House Annex
Tudu Road
P.O. Box M146
Accra, Ghana

Mr. Boniface MULONDA-KALENDE
Aquaculture Specialist
Food and Agriculture Organization (FAO), Fisheries Group
Regional Office for Africa
Gamel Abdul Nasser Road

PO Box 1628
Accra
Ghana

Mr. Benjamin Kyem SENCHEREY
Beekay Enterprises Ltd.
Trinity House
Ring Road East Accra
PO Box C4063
Accra
Ghana

Guinea / Guinée

Mme. Sangaré Aissata BAH
Directrice Nationale Adjointe
Ministère de la Pêche continentale et de l'Aquaculture
BP 307
Conakry

M. Abdoulaye Foula BALDE
Coordinateur National, SAKOBA
Ministère de la Pêche continentale et de l'Aquaculture
BP 307
Conakry

Dr. Selly CAMARA
Chef du Laboratoire d'Aquaculture
CERESCOR
State University
Conakry

Dr. Béatrice DE GAULEJAC
Projet Appui à la recherche
Conseilleur scientifique
CNSHB
Conakry

Mr. Ari Toubo IBRAHIM
FAO Representative in Guinea
Km 4, Moussoudougou
BP 633, Conakry

M. Claude LORCY
Directeur Général
BCEIP
BP 1850
Conakry

M. Moustapha Mohamed LY
Directeur National de la Pêche continental et de l'Aquaculture
Ministère de la Pêche continentale et de l'Aquaculture
BP 307
Conakry

Mr. Maréga MADANI
Directeur Général Adjoint
MAI Telecom
BP 4822
Conakry

M. Xavier MALARET
BCEIP
Commune Dixinn
BP 1850
Conakry

Minister Ibrahima Sory TOURE
Ministre de la Pêche et de l'Aquaculture
République de Guinée
BP 307
Conakry

India / Inde

Mr. Sudarsan SWAMY
National President
All India Shrimp Hatcheries Association
7-1-44. Kirlampudi,
Visakhapatnam
530017, AP
India

Mozambique

M. Marcos MOYA *(could not attend due to travel conflict)*
General Manager
Indian Ocean Aquaculture SARL
Rua do Aeroporto S/N
Pemba Cabo Delgado
Mozambique

Nigeria

Ms. Deaconess FOLUKE AREOLA
Federal Department of Fisheries
Fisheries Society of Nigeria (FISON)
Wilmot Point Victoria Island
Lagos
Nigeria

Switzerland / Suisse

Mr. René BENGUEREL
Partner
BLUEYOU
Consulting
Zentralstrasse 156
8003 Zurich
Switzerland

Mr. Thomas SPORRER
SIPPO - Swiss Import Promotion Programme
Stampfenbachstrasse 85
PO Box 492
8035 Zurich
Switzerland
www.sippo.ch

Senegal / Sénégal

M. Dougoutigui COULIBALY
Secrétaire Général
Groupement des armateurs et industriels de la pêche au Sénégal (GAIPES)

M. Mamina DAFFÉ
Chercheur
Université Cheikh Anta Diop
Institut Universitaire de Pêche et d'Aquaculture
BP 5005
Dakar
Sénégal

M. Moustapha DEME
Chercheur Économiste
Centre de Recherches Océanographiques de Dakar-Thiaroye

(CRODT)
Dynamique des Systèmes d'Exploitation
BP 2241
Dakar
Sénégal

Dr. Vaque NDIAYE
Docteur Vétérinaire, Chercheur, Biologiste
Institut sénégalais de recherche agricole (ISRA)
Centre de recherche océanographique de Dakar-Thioroye
Km 10,
5 Blvd. du centenaire de la commune de Dakar
BP2241
Dakar
Senegal

Prof. Omar THIOM THIAW
Professeur
Institut Universitaires de Pêche et d'Aquaculture
Université Cheikh Anta Diop
BP 5005
Dakar
Senegal

Sierra Leone

Mr. S.I.S. DEEN *(could not attend due to travel conflict)*
Senior Fisheries Officer
Ministry of Fisheries and Marine Resources
Brookfields Hotel
Jomo Kenyatta Road,
Freetown
Republic of Sierra Leone

Mr. Ousman KAMARA*(could not attend)*
Senior Fisheries Assistant
Ministry of Fisheries and Marine Resources
Brookfields Hotel
Jomo Kenyatta Road
Freetown
Republic of Sierra Leone

Sri Lanka

Mr. Joseph Vasantha Kumar JAYASURIYA *(could not attend due to travel conflict)*
Chairman/Managing Director
Jaysons Group of Companies,
357, Galle Road, Mt-Lavinia
Sri Lanka

Thailand / Thaïlande

Dr. Lila RUANGPAN
Senior Expert in Marine Shrimp Aquaculture
Department of Fisheries
Kaset-klang, Chatuchak
Bangkok, 10900

United Kingdom / Royaume Uni

Mr. Pierre Failler
University of Portsmouth
Centre for the Economics and Management of Aquatic Resources
Foster Building, Locksway Road
Hampshire, PO4 8JF - United Kingdom

Economic Community of West African States (ECOWAS) / Communaute Economique des Etats de l'Afrique de l'Ouest (CEDEAO)

Dr. Aubin SAWADOGO *(could not attend)*
Programme Livestock Officer
ECOWAS
P.M.B.401
60 Yakubu Gowon Crescent,
Asokoro District
ABUJA
Nigeria

ENDA Tiers Monde

M. Pape Gora NDIAYE
Socioéconomiste, chargé de programme pêche
ENDA, Réseau des Pêches en Afrique de l'Ouest (REPAO)
BP 7329
Liberté IV Villa No. 5000
DAKAR
Senegal

FAO / FAO

Dr. Rohana SUBASINGHE
Senior Fishery Resource officer (Aquaculture)
Food and Agriculture Organization of the UN (FAO)
Fisheries Department
Viale delle Terme de Caracalla
00100 Rome
Italy

JICA / JICA

Mr. Tadashi MURAI
Conseiller Technique
Japanese International Cooperation Agency (JICA)
Ministère de la Pêche et de l'Aquaculture
BP 307 Conakry
République de Guinée

NACA / NACA

Mr. Michael PHILLIPS
Environmental Specialist and Program Manager
Network of Aquaculture Centres in Asia-Pacific (NACA)
Department of Fisheries
Suraswadi Building
Kasetart University Campus
Bankok
10900 Bangkok
Thailand

OECD / OCDE

M. Normand LAUZON
Director
SAHEL AND WEST AFRICA CLUB/OECD
2, rue André Pascal
75016 Paris
France
Tel : +33 (1) 45 24 90 13

Mrs. Sunhilt SCHUMACHER
Deputy Director
SAHEL AND WEST AFRICA CLUB

Ms. Sara MINARD
Socio-economist, Medium and Long-Term Development Perspectives Unit
SAHEL AND WEST AFRICA CLUB

Mrs. Soura DIOP
SAHEL AND WEST AFRICA CLUB