



Business opportunities for aquaculture in Kenya

With special reference to food security

Key findings & Recommendations



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Preface

Early 2011 the Dutch Government published its new private sector policy. The primary aim is to strengthen Dutch companies that are active in nine sectors of the economy: water, agro-food, horticulture, high tech, life sciences, chemicals, energy, logistics and the creative industry.

The Netherlands is a major player in the global agro-food industry. This innovative sector is the second largest exporter of food and flowers in the world, and produces 10% of the national product and 25% of the total export of the country. This position can be largely attributed to the successful cooperation between the private sector, research institutions and the government, the so-called 'Golden Triangle' model.

Within the top sector Agro Food, 'internationalisation' has been set as a priority for further economic development. The Netherlands intends to become world leader in innovative, sustainable and efficient food production with high added value. From this position, the Netherlands is an attractive partner for the development of tailor-made systems for local food production. This will not only help countries to provide sufficient food for their growing populations, but also benefits the Dutch economy. What is needed is a combination of entrepreneurship, knowledge, and governmental support, aimed at the entire value chain, organised in the form of specific consortia.

With this in mind, a team of two scientists from the fisheries and marine ecology institute IMARES and from the agricultural economics institute LEI (both part of Wageningen University and Research centre) joined forces with the founder and owner of one of the largest fish farms in the Netherlands. They conducted a fact-finding mission to investigate the business opportunities in aquaculture with respect to food security. This report presents their key findings and recommendations.

The intensive collaboration between science and business for this project has led to new insights and business opportunities for aquaculture development in Kenya. As such, this approach could be a model for the new way of development cooperation.



Jan van Rijsingen (co-author and member top team Agro Food)



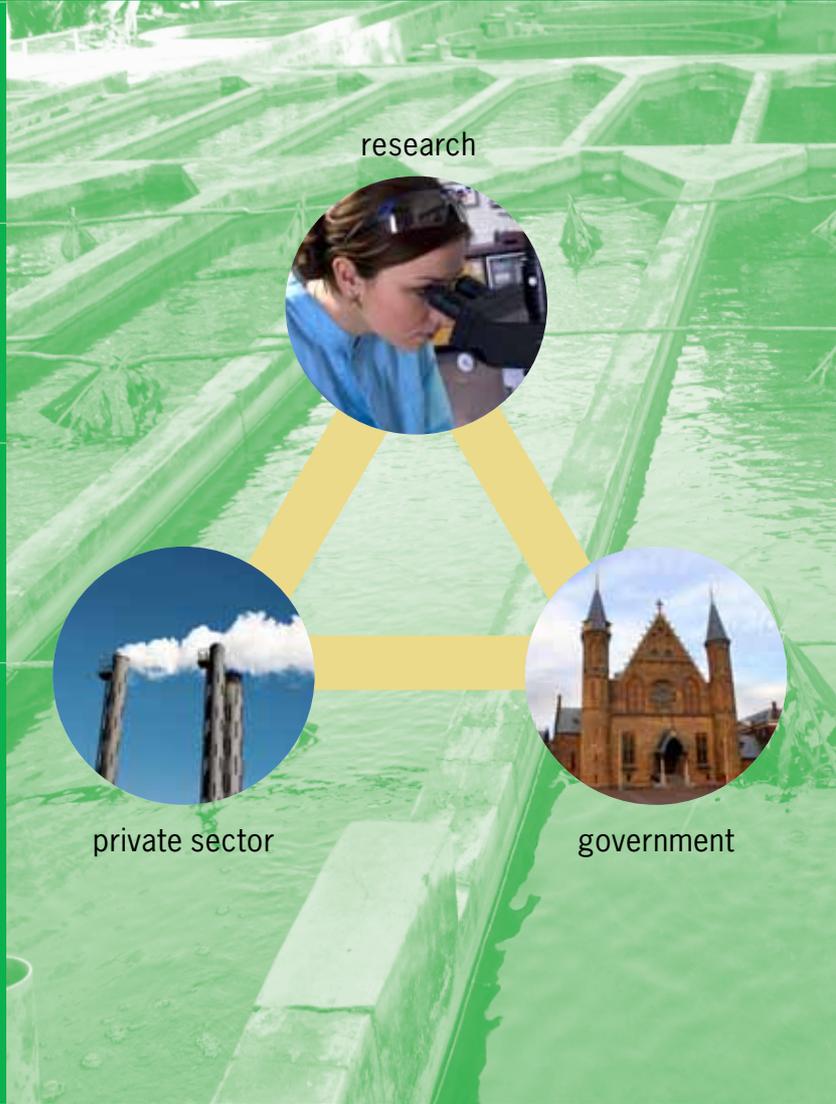
Dr. Martin Scholten (Director IMARES)



Dr. Ruud Huirne (Director LEI)

Introduction

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Rationale

In the policy letter for development cooperation dated 26 November 2010, the Netherlands government made a choice for food security and water as priorities. The choice for these two themes is accompanied by a shift from social to economic sectors. The Netherlands, through its companies, knowledge institutes and NGOs, has a clear added value in the area of food and sustainable production. When considering these issues, an increasing amount of attention is paid to the role of the private sector. Promoting entrepreneurship is seen as the major force shaping economic development, to create jobs and generate income.

Aquaculture is one of four priorities of the Netherlands Embassy in Nairobi to achieve the food security objectives of development cooperation in Kenya. The present research project was carried out in order to assess what the Netherlands can contribute effectively and where there is a recognisable Dutch added value through business development, knowledge and experience in order to support aquaculture in Kenya to help to achieve the food security objectives.

Aim & approach

This study aims to assess the potential role of aquaculture in improving food security in Kenya. It addresses current bottlenecks that prevent aquaculture from achieving its food security objectives and identifies possible

interventions. This study furthermore explores business opportunities for Dutch companies in supporting the sustainable development of the Kenyan aquaculture sector.

This research project was conducted on two levels:

- A desk study in order to acquire information on all related aspects important for aquaculture development based on public databases and reports
- A fact-finding mission in Kenya including interviews with key informants, followed by a validation workshop.

This document is the result of an intensive collaboration between business and science. This type of collaboration, both at project and sector level, has been the basis for the successful development of the Dutch agro-food sector. It is the interaction between the different partners that leads to new insights, innovations, business opportunities and economic development. As such, this approach can be used as model for the new way of development cooperation.

This document contains the key findings and recommendations. More background information on Kenya, the aquaculture sector, its potential for food security, and opportunities and constraints are elaborated on in the full report: Rothuis A.J., A.P. van Duijn, J.C.M. van Rijsingen, W. van der Pijl and E. Rurangwa. *Business opportunities for aquaculture in Kenya; With special reference to food security*. Wageningen UR, 2011.

Country profile

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Kenya is a country with a great diversity in geographical conditions. It exhibits extremes of altitude, rising from sea level to 5,200m at Mt. Kenya. Sheltered bays and estuaries can be found along Kenya's 640km coast. Elevation is the major factor in temperature levels, with the higher areas, on average, some 11°C cooler, day or night. Water resources are scarce and unevenly distributed within the country and over time. This constrains Kenya's agriculture and fish culture potential, and explains why the Kenyan population and agricultural activity are heavily concentrated in the southern half of the country. The northern half of the country is sparsely populated and characterised by fragmentary infrastructure coverage.

Kenya's population is growing fast, increasingly so in cities. This growth is set to continue over the next forty years. At the current rate, Kenya's population will reach 63 million by 2030 (up from an estimated 41 million in 2011). In 2009 the average Gross National Income per capita was USD760. Social inequality is significant, with 47% of the population living below the poverty line (2009 estimate). One third of Kenya's population live in urban areas, out of which 40% reside in slums. A large proportion of urban dwellers are unable to meet food needs on a sustained basis over an extended period of time.

Kenya has no proven hydrocarbon reserves and imports all its crude petroleum requirements from the Middle East. Only 8% of the Kenyan population is connected to the national grid. The power supply is expensive and unreliable.

In 2010, Kenya benefited from the global economic recovery as well as higher export prices. While the economy grew by 2.6% in 2009, it is estimated that the Gross

Domestic Product (GDP) growth rate nearly doubled to reach 5.0% in 2010. After two years of weak performances the agriculture and manufacturing sectors became Kenya's new growth drivers. The outlook for 2011 is promising and a combination of trends could contribute to ensure positive prospects in the short to medium term. However, the high inflation (17% last year) and the weak shilling are a major concern.

Although Kenya has recorded some improvements in the past four years Kenyan firms still face an adverse business environment. In fact, the total losses incurred by businesses because of power outages, theft and breakage during transport, payments of bribes, and protection payments are much higher than total losses experienced by middle-income countries in Africa and by China and India. The top constraints identified by Kenyan managers were tax rates, access to finance, corruption, security, infrastructure services (electricity and transportation), and business licensing. Despite this, Kenya's economy, one of Africa's most developed, has gradually emerged from political instability and the economic slowdown. Reforms in public finance management have continued. Despite Kenya's strong legal framework, there are problems with the length of arbitration proceedings and the enforcement of arbitration awards.

Land is the most important resource in Kenya. In densely populated regions, there is a major concern that land may have become too scarce to make any meaningful contribution to household incomes. Only companies that are 100% domestically owned can acquire agricultural land. Foreign companies seeking to access land in Kenya have the option to lease land from private and public landholders.

Aquaculture in Kenya



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The fisheries subsector plays a significant role in the Kenyan economy and for the health of its population. The sector supports about 80,000 people directly and about 800,000 people indirectly. In 2006, fisheries and aquaculture contributed 0.5% to the GDP. Per capita fish consumption is 5kg in Kenya, which is low compared with other countries in the region. The fisheries sector largely depends on capture fisheries from inland waters, which are concentrated on Lake Victoria (85% of captured volume versus only 4% from marine fishing). Major species from Lake Victoria are Nile perch (mainly for export), sardines and tilapia. Catches in Lake Victoria are declining.

Fish farming in Kenya started early last century. Despite favourable climatic and geographic conditions for a variety of aquaculture species and systems, there has been no spectacular progress in production until 2007. The rapid increase in aquaculture production in 2007 can at least partially be explained by government policies that supported the development of aquaculture operations as a means to increase the supply of fish to the domestic market and to create employment in rural areas. In 2009, the Kenyan government launched the Economic Stimulus Programme (ESP). The aquaculture component of the ESP was rather successful and elicited fresh interest and focus on aquaculture as a viable economic activity. The costs for construction of fish ponds are subsidised, as well as the costs for fingerlings and feeds. Although many of the new fish ponds were constructed at

unsuitable locations, the total aquaculture production in 2010 rose to approximately 5,000 tonne.

Aquaculture in Kenya consists of three sub-sectors: fresh water aquaculture in warm waters (mainly tilapia and African catfish in earthen ponds), cold fresh water aquaculture (trout in raceway culture systems) and marine aquaculture (underdeveloped). Fresh water aquaculture in warm waters is mainly practiced at semi-intensive levels using feeds and fertilizer as input, with production levels at about 3 tonne/ha. Ponds and farm size are usually small, catering for local markets. Mariculture farms are very limited in number and small in size (usually backyard ponds). There are only a few large-scale commercial fresh water fish farms and there are no commercial mariculture farms. There are a number of companies that supply inputs for aquaculture (feeds, fingerlings, materials), but still many fish farms produce their own feed.

The Kenyan government recognises the importance of aquaculture in relation to food security, poverty alleviation of rural populations, and reduction of fishing pressure in capture fisheries. It has realised that aquaculture must not solely be seen as a subsistence activity, but as a commercial activity with the aim of making economic gains. Therefore, in 2010, the Ministry of Fisheries Development published the “National aquaculture strategy and development plan 2010-2015”. This policy paper serves as a road map and framework for aquaculture development

in Kenya. Furthermore, the Kenyan government supports the development of aquaculture through an extensive supportive infrastructure: governmental fish farms for research purposes, fingerling supply and training; and fish farming extension officers throughout the country. Also, a number of bilateral and multilateral donor organisations support aquaculture development, but mostly directed towards smallholders.

The demand for fish is growing, yet supply is generally lagging behind. This offers great opportunities for aquaculture. However, one of the difficulties is the organisation of the aquaculture value chain. This is related to the variety and complexity of different fish value chains. For instance, some fish farmers sell their product directly to consumers or restaurants while other value chains include several more links, including traders, middlemen, agents, wholesalers and retailers. Furthermore, fish ponds were constructed at locations that were often not only unsuitable from an environmental perspective, but also from the perspective of market linkages.



Traditional tilapia ponds near Sagana.



Intensive catfish farm near Nairobi.

Fish and food security



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Fish is a critical source of dietary protein and micronutrients for millions of people in Africa, both for rural and urban populations. As a consequence, aquaculture can make a direct contribution to food security through the provision of high quality food, self-employment and income. It can also contribute indirectly to food security through food supply to communities, employment opportunities for communities and infrastructure improvement. In general, small-scale subsistence aquaculture contributes only to food availability for local communities, while large-scale commercial aquaculture not only provides food, but may also contribute to employment and economic growth.

In Kenya, the demand for aquaculture products is growing rapidly due to its fast growing population and declining natural fish stocks in Lake Victoria. The growing gap between demand and supply can be closed through the development of aquaculture or through the importation of fish from abroad. Domestic production of additional amounts of fish through aquaculture is preferred over importation of fish, provided that the fish can be produced at competitive prices.

To maintain the current low level of fish consumption (5kg per capita), in 2020 the total annual fish production has to increase by approximately 50,000 tonne. Theoretically, this increase can be achieved by digging an additional 418,000 (tilapia) ponds with a total area of about 12,500ha. Another option is the construction of fewer than 300 intensive (catfish) farms. This

requires a much smaller number of farms (<700) and also a comparatively smaller area of around 13ha. If it is desirable to increase the per capita fish consumption to 6kg in 2030, an additional 1.5 million tilapia ponds are needed.

Considering these scenarios, it seems doubtful that the current aquaculture policy aimed at small-scale tilapia farming will contribute sufficiently to food security. Therefore, a complementary business model (i.e. more intensive culture systems) will be necessary.

Aquaculture constraints and opportunities



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There are two basic requirements for successful aquaculture development:

- A market adapted to the local conditions.
- A suitable fish production system adapted to the local conditions.

In Kenya, the market potential for fish is high. This is mainly the result of Kenya's fast growing population, but also because of the active promotion of fish consumption by the Kenyan government. Most Kenyan people are unaware when it comes to a preference for a particular fish species. Although tilapia is currently the most commonly eaten fish, there are no specific objections to catfish consumption. When it comes to market differentiation, three main segments can be distinguished: low income, middle income and high income. The low income group, of which a large percentage is living in urban areas, prefers small-sized whole fish or small portions of a larger fish. At current prices, this allows them to buy one fish or piece for each family member. The middle-income group prefer small to medium-sized whole fish, while the high-income group prefer big fish, often purchased at restaurants or in processed form. Given this market differentiation, it may be more lucrative for fish farmers to produce small-sized fish as these fetch a higher price per kg than larger fish. Furthermore, value adding by smoking or frying, and awareness raising on fish and fish preparation is needed to enhance the market for cultured fish.

To improve or at the very least maintain the present level of fish consumption in Kenya, a dual approach is needed. On the one hand the productivity of current ponds should be increased, while on the other hand

fish farming in more intensive production systems should be encouraged. These approaches are complementary and similar in the sense that in both cases production should be market oriented and the private sector should play a central role in the implementation of both approaches.

The current major bottlenecks for more intensive fish farming are: fish feeds, sufficient numbers of fingerlings, water quality as well as quantity, farm management, organisation of the value chain, marketing, capital, supportive legislation and policy. To overcome these difficulties the following actions need to be considered:

- For fish feeds: the production of locally produced reasonably priced fish feeds; legislation and control on quality standards for feed; exemption of duties and taxes on imported fish feed and feed ingredients.
- For farms: information on the availability of suitable areas for intensive fish farming; improved standards for hatchery and breeding programmes; investigation of the feasibility for low cost closed recirculation systems for intensive catfish production; training of farmers through the private sector; importation of technology for intensive fish farming from abroad.
- For markets and value chains: investigation of better market linkages; the formation of fish farming, processing and marketing clusters; local and foreign investment capital.

For the overall sustainable development of aquaculture in Kenya an increased private sector involvement is crucial.

Business opportunities in aquaculture



6



Fish culture in the Netherlands is a small but unique industry, since almost all of the fish is produced in intensive indoor farms under controlled conditions with re-use of the effluent water. African catfish and European eel are the dominant species. Despite the relative small size of the fish farming industry, the Netherlands based supportive industry is large, international oriented, and includes multinationals such as Nutreco (feeds), Hendrix Genetics (breeding) and Intervet (vaccines and medicines). Besides, a number of small and medium enterprises supply complete fish farms, farming systems and farming materials such as water treatment systems. Technology and knowledge are other important products of the Dutch aquaculture industry. Besides large institutes such as Wageningen University & Research centre, there are also a number of small companies that provide technology and consultancy services.

Since some existing Dutch fish farms are confronted with limited possibilities for expansion in the Netherlands, they are looking for investment opportunities abroad. In Kenya horticulture is an important industry involving many Dutch companies. Some of these companies are interested in diversification and are looking at possibilities for fish culture. Fish culture could be an integral part of the horticulture operations, but the economics of such an integration needs to be further investigated. Alternatively, horticulture farms that use warm water from underground sources could, depending on the water quality, use part of this water directly or indirectly to grow fish.

Conclusions

7



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- The potential for aquaculture in Kenya is good, despite sub-optimal environmental conditions (altitude, soil conditions, access to water) in certain regions for aquaculture development. The major advantage is the high (and growing) demand for fish, the relative high market prices of fish, the concentration of consumers in urban areas, the well-developed infrastructure, and the importance given to aquaculture by the Kenyan government.
 - It is very unlikely that the present aquaculture policy will result in sufficient additional fish production to meet the demand of Kenya's rapidly growing population. This is the case even when fish consumption remains at its current relatively low level. This is mainly due to the emphasis that is given to smallholder development and the rather extensive farming systems being practised by these smallholders. Smallholders can play a role in the provision of fish protein for local markets. However, this business model will be unable to provide the quantities of fish protein that Kenya requires during this decade. Therefore we suggest a complementary model.
 - This complementary business model comprises the intensive culture of African catfish. Catfish is relative easy to grow in high densities, thus making it an ideal species for the provision of cheap fish protein under conditions of limited natural resources (available land and sufficient amounts of suitable water). In countries such as the Netherlands, Nigeria and Vietnam there is a lot of experience with the intensive culture of catfish. Therefore, a substantial production increase can be realised through the development of intensive catfish culture in Kenya. This can be done in land-based farming systems, but possibilities for intensive fish farming in cages should not be ruled out.
 - Compared with the current low productive forms of aquaculture, the development of intensive catfish culture requires an increased and stable supply of high quality inputs (e.g. water, feeds, fingerlings, technology and capital). As a result, it is more sensitive to fluctuations in cost price and the volatility of the Kenyan Shilling. Therefore, the production needs to be organised as part of an integrated value chain with access to different market segments. This makes catfish farming a full-fledged commercial activity - as opposed to a subsistence activity - that needs to be run by the private sector.
 - Dutch companies can provide feeds, farming and processing equipment and technology, know-how, value chain development expertise and investment capital. There is considerable interest from the Kenyan private sector (feed companies, fish farmers, horticulture farms) to link up with these Dutch companies.

Recommendations



8

Plan of action

To facilitate the development of this complementary business model we advise the Embassy of the Kingdom of the Netherlands in Nairobi to act on two levels:

1. influence Kenyan government policy and
2. facilitate Dutch and Kenyan private sector involvement. Both levels are interrelated and should be initiated in tandem.

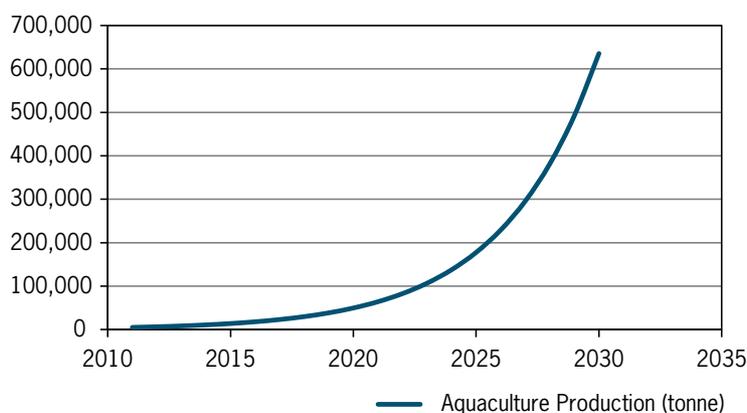
The most important policy issues are the taxes on imported fish feeds and feed ingredients, and the subsidised construction of fish ponds and the subsidised provision of fingerlings and fish feeds. The latter subsidies do not only result in the construction of fish ponds at unsuitable locations, but also create unrealistic expectations on the side of the fish farmer regarding the economic viability of the farm. Furthermore, the Kenyan government should set (and maintain) quality standards

for locally produced fish feeds. Some progress is currently being made with regards to the setting of standards for tilapia feed.

For the facilitation of the Dutch and Kenyan private sector involvement in commercial aquaculture we propose an approach that can be used as a model for aquaculture as a supplier of affordable fish protein in East Africa.

We anticipate that, through the development of intensive catfish aquaculture, Kenyan fish production can grow from approximately 5,000 tonne in 2010 to 50,000 tonne in 2020, and eventually to over 600,000 tonne in 2030. For this exponential growth in fish production, the first phase is the most critical. Therefore Dutch support is particularly needed during this phase (2012-2015), when production needs to grow from 5,000 tonne to 13,000 tonne.

A possible scenario for increased intensive catfish production in Kenya

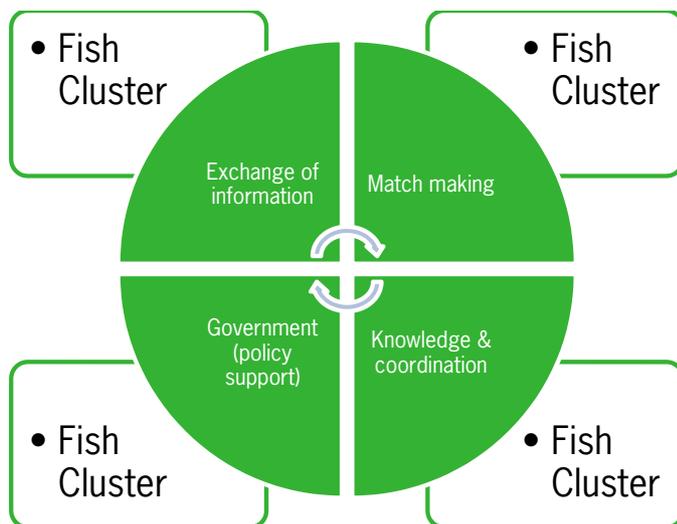


Supportive activities

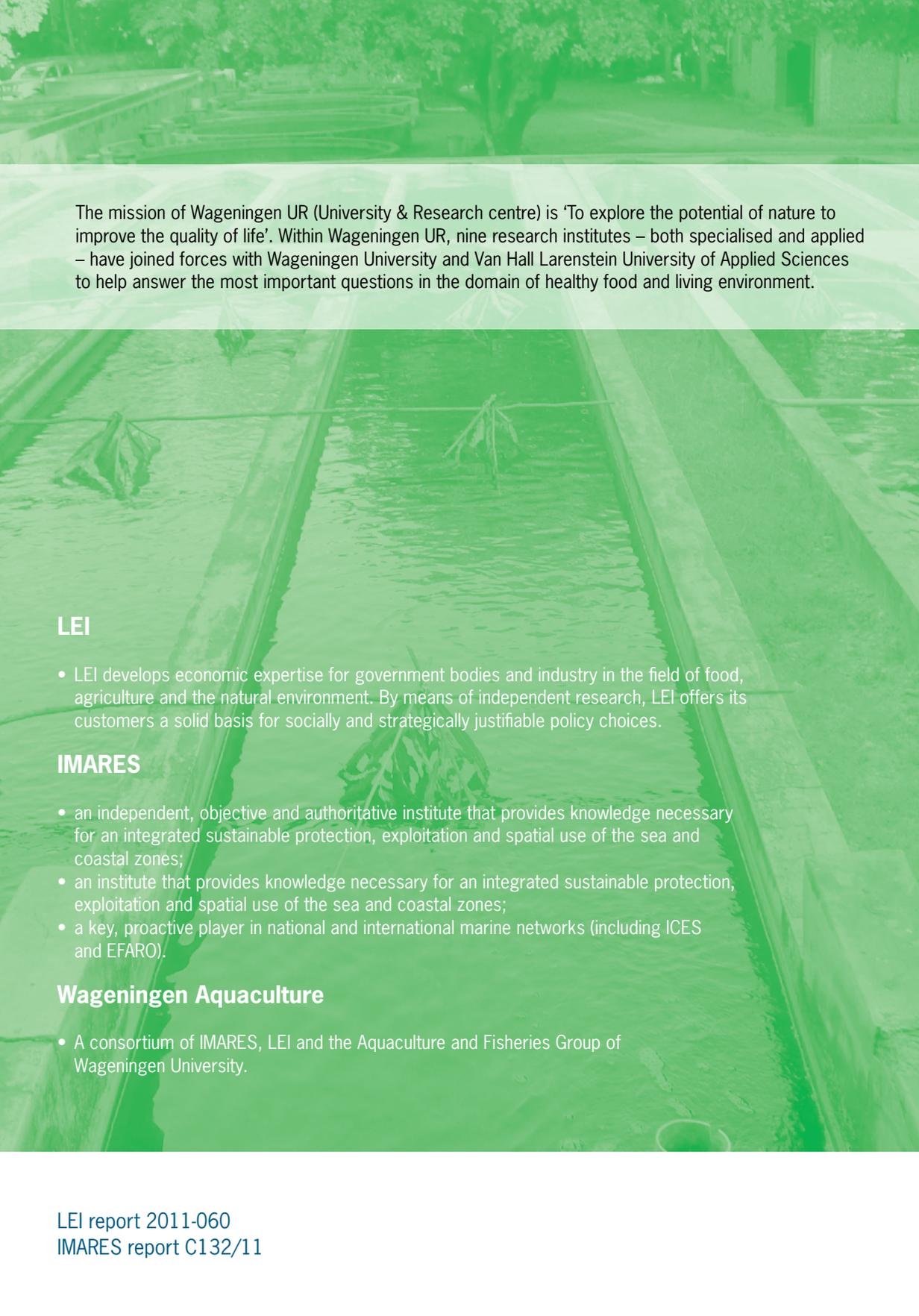
We propose to carry out the following supportive activities:

- To present our findings and distribute of our mission report to Dutch stakeholders (private sector companies and the Ministry of Economic Affairs, Agriculture and Innovation) (2011).
- To investigate the degree of interest and possible preconditions of Dutch companies to get involved in the development of commercial aquaculture in Kenya (2012).
- To gather necessary baseline information (2012). Most private companies will not engage in intensive aquaculture if there is no information on the available amount, quality and temperature of water, the availability, quality and price of fish feed, the number of farms that can be constructed, and the overall quantity of fish that can be produced in Kenya in the coming years. These factors determine which culture systems are the most feasible, and thus determine the cost price of fish produced. This in turn relates to the different market segments that can be supplied with fish with specific characteristics (e.g. size, volume, fresh). Fish feed, water resources and the organisation of the value chain are among the major constraints for intensive aquaculture in Kenya. Therefore, additional information is needed regarding the possibilities and the feasibility to produce high quality fish feed in Kenya, and on the locations where sufficient water of appropriate quality is available. Furthermore, current market imperfections need to be addressed: what is the current market structure, how can cultured catfish fit in, how should the value chain be organised, etc.
- To form 3-5 fish clusters (2012). Once the baseline information is available, the formation of a number of fish clusters can start. Each cluster consists of Dutch and Kenyan companies active in or along the fish value chain, and will supply the Kenyan market with fish and/or inputs for fish production. The clusters consist of fish farmers, input suppliers, processing and market companies. The clusters are initially supported by matchmaking, the exchange of information between clusters, policy support, knowledge and coordination. To encourage cluster formation, investment subsidiary programmes such as the PSI can be used.

The formation of fish clusters



- To coordinate and facilitate the visit of Dutch companies to Kenya, matchmaking with Kenyan companies and the formal launch of “Kenyan-Dutch Fish platform” (2012).
- To continue to support the fish clusters (policy, knowledge and coordination), depending on the progress, existing bottlenecks and new occurring problems (2013-2015).



The mission of Wageningen UR (University & Research centre) is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine research institutes – both specialised and applied – have joined forces with Wageningen University and Van Hall Larenstein University of Applied Sciences to help answer the most important questions in the domain of healthy food and living environment.

LEI

- LEI develops economic expertise for government bodies and industry in the field of food, agriculture and the natural environment. By means of independent research, LEI offers its customers a solid basis for socially and strategically justifiable policy choices.

IMARES

- an independent, objective and authoritative institute that provides knowledge necessary for an integrated sustainable protection, exploitation and spatial use of the sea and coastal zones;
- an institute that provides knowledge necessary for an integrated sustainable protection, exploitation and spatial use of the sea and coastal zones;
- a key, proactive player in national and international marine networks (including ICES and EFARO).

Wageningen Aquaculture

- A consortium of IMARES, LEI and the Aquaculture and Fisheries Group of Wageningen University.