

# **Institutional and organisational arrangements for consumer-oriented community-based aquaculture in South Africa**

by

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## **Declaration**

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## **Abstract**

The purpose of this study was to investigate the organisational and institutional arrangements for sustainable consumer-oriented community-based aquaculture in Hamburg, in the Eastern Cape, and Camdeboo and Saldanha Bay, both in the Western Cape. Without these factors the development of aquaculture will be impossible or unsustainable. The investigation will help in revealing whether markets exist or can be created, the required skills and investment, and the appropriate institutional arrangements.

Two major research strategies were used, namely qualitative methods and case studies. The results revealed that, in all three case studies, the products were not exported and had different target markets and marketing objectives. There was a potential market for some of the products overseas. Leading pioneering firms, such as those that have developed the technologies for aquaculture, control the value chain by setting, monitoring and enforcing the parameters under which other value chain members operate.

The results further showed that, in all three case studies, the beneficiaries had some form of schooling; some had matric, while others had lower levels of education. In some scenarios, Adult Basic Education and Training (ABET) training was offered, which combines aquaculture and life skills. Furthermore, unlike with koi, farming of species such as mussel, oyster and catfish did not require such onerously high technical skills and monitoring of parameters. There is no real need for high levels of education in the farming of these three species and, in most cases, people with less than matric are trained in the various aspects of fish farming on the job.

Aquaculture appears to be a very capital-intensive industry. Apart from the capital investments, operational expenses have to be incurred, even during the development phase. The absence of clear policy frameworks and legislation results in contradictory messages. Choosing the type of business ownership may depend on many factors such as financing, admin costs, tax implications, insolvency, business size and continuity.

The implication of the results of this study for community-based aquaculture is that investment from the public sector and private sector is required, both in terms of capital infrastructure and operational costs. Communities should start

with simpler forms of aquaculture, such as oyster and mussel farming. Kob farming, on the other hand, requires high technical skill. In all cases, the approaches initially require managerial, business and technical support and handholding for community empowerment groups. When the development is in its infancy, community-based aquaculture projects need to link and create distribution agencies that deal with marketing and distribution.

## **Opsomming**

Die doel van hierdie studie was om die organisatoriese en institusionele reëlins te ondersoek vir volhoubare verbruikersgerigte gemeenskapsgebaseerde akwakultuur in Hamburg, in die Oos-Kaap, en die Kamdeboo en Saldanhabaai, in die Wes-Kaap. Sonder hierdie faktore is die ontwikkeling van akwakultuur onmoontlik of nvolhoubaar. Die ondersoek sal help om te bepaal of markte bestaan of geskep kan word, en watter vaardighede, investering en institusionele reëlins vereis word.

Twee groot navorsingstrategieë is gebruik, naamlik kwalitatiewe metodes en gevallestudies. Die resultate van al drie gevallestudies het getoon dat die produkte nie uitgevoer word nie en dat daar verskillende teikenmarkte en bemarkingsdoelwitte vir die produkte is. Vir van die produkte is daar 'n potensiële oorsese mark. Toonaangewende maatskappye soos dié wat tegnologie vir akwakultuur ontwikkel het, beheer die waardeketting deur die opstel, monitering en handhawing van die parameters waarvolgens ander lede van die waardeketting funksioneer.

Verder het die resultate getoon dat die begunstigdes in al drie gevallestudies een of ander vorm van skoolopleiding gehad het; sommige het matriek gehad terwyl ander laer vlakke van skoolopleiding voltooi het. In sommige gevalle is Adult Basic Education and Training(ABET)-opleiding aangebied, waar akwakultuur en lewensvaardighede gekombineer is. Verder, in teenstelling met die kabeljoubedryf, vereis die teelt van spesies soos mossels, oesters en babers nie sulke gespesialiseerde tegniese vaardighede en die noukeurige monitering van parameters nie. Daar is geen werklike behoefte vir hoë vlakke van onderwys vir boerdery met laasgenoemde drie spesies nie en in die meeste gevalle ondergaan mense met minder as matriek indiensopleiding in die verskillende aspekte van visboerdery.

Verder blyk akwakultuur 'n kapitaalintensiewe bedryf te wees. Afgesien van die kapitale belegging moet operasionele uitgawes aangegaan word, selfs in die ontwikkelingsfase. Die afwesigheid van duidelike beleidsraamwerke en wetgewing gee aanleiding tot teenstrydige boodskappe. Die keuse van die soort onderneming kan afhang van baie faktore, wat finansiering, administratiewe koste, belastingimplikasies, insolvensie, ondernemingsgrootte en kontinuïteit insluit.

Die implikasie van die resultate van hierdie studie vir gemeenskapsgebaseerde akwakultuur is dat hoë investering vereis word, beide in terme van kapitaalinfrastruktuur en bedryfskoste. Gemeenskappe moet eers met eenvoudiger vorme van akwakultuur, soos oester- en mosselboerdery, wegspring. Kabeljou, aan die ander kant, vereis hoë tegniese vaardigheid. In alle gevalle vereis die benaderings aanvanklike bestuurs-, besigheids- en tegniese ondersteuning en daadwerklike bystand vir gemeenskapsbemagtigingsgroepe. Terwyl die ontwikkeling in sy kinderskoene is, moet gemeenskapsgebaseerde akwakultuurprojekte verspreidingsagentskappe skep en met sulke agentskappe skakel om bemarking en verspreiding te hanteer.

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## **Dedication**

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## **Chapter 1: Introduction**

### **1.1.Introduction**

The world population is expected to increase from the current 7.3 billion to 9 billion by 2050 and aquaculture is a sustainable option to supply the growing demand of fish and other aquatic organisms as there is a decline in the supply of capture fisheries. The basis of community based aquaculture is the provision of coastal communities with employment, poverty alleviation and food security.

According to the Food and Agricultural Organization (FAO, 2006:1),

[a]aquaculture is the farming of aquatic organisms: fish, molluscs, crustaceans, aquatic plants, crocodiles, alligators, turtles, and amphibians. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated. For statistical purposes, aquatic organisms which are harvested by an individual or corporate body which has owned them throughout their rearing period contribute to aquaculture.

In the past aquaculture remained isolated, each society's development of aquaculture followed its own pattern (Costa-Pierce, 2008). However in recent times with the evolving means of globalisation species are being cultured adopting a measure of standardised practices and sites when they are most suited. Aquaculture practise dates back as far as 2500 B.C where Egyptians are estimated to be the first in the world in culturing tilapia. Although China is believed to be the foundation of aquaculture where culturing of fish and shellfish was in traditional small scale systems for contributing in food security. The Chinese carried with them their traditional knowledge of fish farming to the countries they migrated to, such as Malaysia, Taiwan, Indonesia, Thailand, Cambodia and Vietnam (Costa-Pierce, 2008).

In South Africa, emphasis has been put on the development of aquaculture with initiatives such as Operation Phakisa. Aquaculture has been developing especially in the Western Cape Province followed

by Eastern Cape. This study investigates the appropriate institutional arrangements for community based aquaculture, markets and value chains for successful community based aquaculture, skills and investment levels that will be required for successful community based aquaculture in South Africa.

## **1.2. Problem statement**

In order for successful and sustainable community-based aquaculture, appropriate institutional arrangements are crucial, and food markets have to be consumer driven instead of technology driven, hence the value chain should cater for the needs and wants of the end market. Aquaculture is highly technical and capital intensive, and therefore requires highly skilled labour and know-how. High levels of investments such as capital, machinery and species development are needed for aquaculture to be effective.

## **1.3. Research questions**

The following questions guided this research:

1. What consumer markets exist or can be created for aquaculture products from community-based aquaculture?
2. What could be the most likely value chains for aquaculture products from community-based aquaculture?
3. Who (firms or individuals) are most likely going to govern the value chains for products from community-based aquaculture, and how are they likely to do this?
4. What are the technical requirements (skills and know-how) for community-based aquaculture in South Africa?
5. What are the investment requirements for community-based aquaculture in South Africa? and
6. What are the appropriate institutional arrangements for sustainable community-based aquaculture in South Africa?



#### **1.4. Research goals/aims**

The aim of the research was to investigate the organisational and institutional arrangements for sustainable consumer-oriented community-based aquaculture in South Africa.

#### **1.5. Research objectives**

The objectives of this research were:

1. To explore what consumer markets exist or can be created for aquaculture products from community-based aquaculture in South Africa;
2. To investigate the technical (skills and know-how) and investment requirements for community-based aquaculture in South Africa; and
3. To evaluate the appropriate institutional arrangements for community-based aquaculture in South Africa.

#### **1.6. Delimitations/scope**

This investigation was conducted using three case studies, namely Hamburg, Camdeboo (both in the Eastern Cape) and Saldanha Bay, where the DAFF has ongoing aquaculture projects that need to be handed over to the communities. Although the findings enhance our understanding of the requirements for institutional and organisational arrangements for community-based aquaculture in those specific projects, these findings may not be applicable to all areas in South Africa.

#### **1.7. Methodology**

This study used qualitative methods in investigating consumer (market)-oriented development, the technical and investment requirements and institutional arrangements for community-based aquaculture. The case study strategy was used for the study and this approach was chosen to meet the objectives of the study, namely to explore what consumer markets exist or can be created for aquaculture products from community-based aquaculture in South Africa; to investigate the technical (skills and know-how) and investment requirements for community-based aquaculture in South Africa; and to evaluate the appropriate institutional arrangements for community-based aquaculture in South Africa..

Questionnaires, semi structured interviews, secondary data, focus group discussions and observation were used in collecting data with the three selected community based aquaculture projects.

An extensive review of literature on the history of marketing, types of marketing and the dissimilarities between marketing and agricultural marketing was provided, as well as marketing theories and criticisms was carried out. Literature on institutional arrangements and organisational arrangements was reviewed. Secondary data on education levels attained and sex and unemployment levels by district municipality for each project was obtained from Statistics South Africa. Furthermore secondary data on marine and freshwater aquaculture enterprises in the value chain activities, aquaculture enterprise respondents in the value chain activities by province and market channels used by enterprises in the aquaculture subsector was based on surveys undertaken by Britz, Lee and Botes (2009) in 2007 and 2008. Finally, secondary material, on policies, laws and regulations that regulate the practice of aquaculture and will influence its development in the future were used. These included, for example, the Marine Living Resource Act, 1998 (Act No. 18 of 1998), the National Environmental Management Act (NEMA) (Act No.107 of 1998) and Communal Property Association (Act No.28 of 1996). These and others are likely to influence the progress and development of community-based aquaculture.

The analytical framework was done by following Schwandt's (2007) components of data analysis, which are “data reduction, data display and conclusion drawing and verification”.

## **1.8. Chapter outline of thesis**

An outline of the chapters of this thesis is given below.

Chapter 1 presents aquaculture, problem statement and also outlines the research questions and methodology used for the study. Chapter 2 presents the background to aquaculture globally, in Africa and in South Africa. Discusses aquaculture and briefly describes the three community based aquaculture projects. Chapter 3 reviews the relevant literature for this study. The literature reviewed looks at value chains, markets and institutions. Chapter 4 outlines in detail the research methodology used, the research design, research strategy, data collection instruments, data analysis techniques and ethical considerations. Chapter 5 provides the results the study. Chapter 6 discusses the findings and the

implications for community-based aquaculture. The last chapter provides some conclusions and recommendations arising from the study.

## **Chapter 2: Study context**

### **2.1. Introduction**

Aquaculture development has evolved in different patterns in each country and continent. The main objective of community based aquaculture development is poverty alleviation, job creation and providing food for the coastal communities. The purpose of this chapter is to give an outline on the global aquaculture industry, Africa aquaculture industry and South African aquaculture industry. The second part of this chapter gives a brief description on community based aquaculture definitions and lessons from Asian countries.

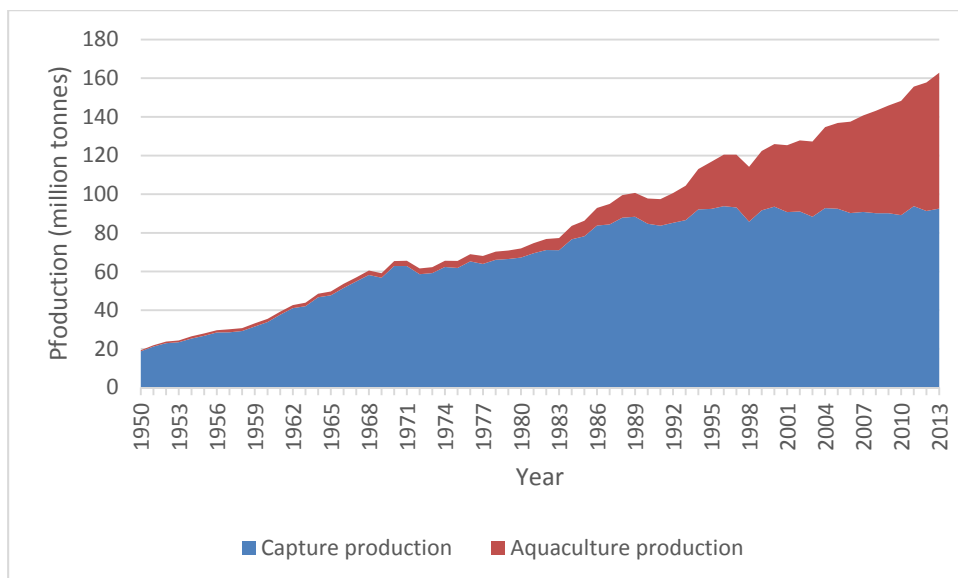
### **2.2. Global context**

Given that capture fisheries production has levelled and that most wild fish stocks are either being exploited at maximum levels or that production is actually declining, the inability of capture fisheries to meet the demand will have to be set off by aquaculture (Mcgoodwin, 2007; Subasinghe, Soto & Jia, 2009). As capture fisheries' supply decreases, this will result in higher prices for the product, making it difficult for the poor to afford fish, especially in developing nations. High- and middle-income groups will also feel the effects of the rise in fish prices, but more likely less than the poor. This is where aquaculture comes into play to help in off-setting the decline in supply of capture fisheries (Kent, 1997; Krouma, 2011).

Since the mid-1990s, when global capture fisheries<sup>1</sup> production started to level off, aquaculture has been the engine for the increase in fish production (see figure 1), (FAO, 2012). According to the Food and Agriculture Organization (FAO, 2014), total world fisheries production was 158 million tons in 2012, of which 66 million tons was from aquaculture (See Figure 1 below).

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<sup>1</sup> Refers to all kinds of harvesting of naturally occurring living resources in both marine and freshwater environments.



Source: Constructed based on FAO (2014)

**Figure 1:** World's capture fisheries and aquaculture

Between 1995 and 2011 aquaculture's contribution to global total fish production increased from 20.9% to 42.6% respectively. Most of this growth in production is attributable to China and Southeast Asia (Delgado, Wada, Rosegrant, Meijer & Ahmed, 2003a). At the same time, aquaculture's contribution to global fish production for human consumption increased from 9% in 1980 to 47% in 2010 (FAO 2012). 46% of fish produced for human consumption was in live, fresh or chilled forms. In developing countries these forms represented 54% of fish which was destined for human consumption in 2012. Since the early 1990s, the proportion of fisheries production used for direct human consumption has been increasing. In the 1980s, about 71 percent of the fish produced was intended for human consumption. It is estimated that the effect of higher demand, will lead to an increase in world fisheries production over the projection period (2013–2022) to 181 million tonnes in 2022, of which 161 million tonnes is destined for direct human consumption.

The world increase in fish consumption corresponds with trends in food consumption in general. In terms of nutritional standards there has been positive long term trends, with worldwide increases in the average global calorie supply per person and in the quantity of proteins per person. Fish is particularly important for the poor, as it provides a cheap, accessible and highly nutritious source of protein (HLPE,

2014; Ayoola, 2010). The benefits of consuming fish include reduction in the chances of dying from heart disease, it is vital for optimal development of a baby's brain and nervous system, reduction in the risk of stroke, depression, Alzheimer's disease, and other chronic conditions (Raji, Erikson, Lopez, Kuller, Gach, Thompson, Riverol & Becker, 2014; Mozaffarian & Rimm, 2006). Countries and regions of the world vary in terms of fish consumption depending on factors such as different eating habits and traditions, availability of fish and other foods, prices, socio-economic levels, and seasons. It is also evident that there are differences with fish consumption in coastal areas where consumption is usually higher (Green Facts, 2015)

It is expected that global demand for fish will rise to be 261 million tons and that there will be a shortage in production of approximately 50 million tons by 2030 (Child, 2013). Most of this shortage in supply is more likely to be in developing countries, where there is increasing population and urbanisation that will require increased consumption of animal products, including fish (Delgado et al. 2003a). This means that aquaculture has to grow sustainably and significantly in order for it to meet the expected increase in demand. This also means that communities must be self-sufficient in terms of production so that they can use it for their consumption and be able to supply the whole community.

### **2.3. African context**

In sub-Saharan Africa, aquaculture can be traced from the colonial period, when exotic fish such as trout were introduced for recreational purposes (Harrison, 1994). The drive to introduce aquaculture in Africa as a source of food took place in the 1950s and the 1960s. During this period fish farming expanded rapidly in the region. Over 320 000 ponds were estimated to have been built in 30 countries by the 1960s (Balarin, 1988).

Following independence Africa increased its contribution to global aquaculture production. Table 1 below shows the world aquaculture production of food fish by continent. Between 2001-2011 aquaculture production rose from 0.4 million tons to 1.4 million tons. Clearly, all the continents showed in Table 1 are still lagging behind as compared to Asia in terms of aquaculture production of food fish.

**Table 1: World aquaculture production of food fish by continent\*(million tons)**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Share in 2011
Africa	0,4	0,5	0,5	0,6	0,6	0,8	0,8	0,9	1,0	1,3	1,4	2,2%
Americas	1,7	1,8	1,9	2,1	2,2	2,4	2,4	2,5	2,5	2,6	2,9	4,7%
Asia	30,3	32,4	34,2	36,9	39,2	41,8	44,2	47,0	49,5	52,4	55,5	88,5%
Europe	2,1	2,0	2,2	2,2	2,1	2,2	2,4	2,3	2,5	2,5	2,7	4,3%
Oceania	0,1	0,1	0,1	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,3%
<b>Total</b>	<b>34,6</b>	<b>36,8</b>	<b>38,9</b>	<b>41,9</b>	<b>44,3</b>	<b>47,4</b>	<b>50,0</b>	<b>52,9</b>	<b>55,7</b>	<b>59,0</b>	<b>62,7</b>	
Annual growth rate	6,8%	6,3%	5,8%	7,7%	5,7%	6,8%	5,6%	6,0%	5,2%	5,9%	6,2%	

\*Food fish= fishes, crustaceans, molluscs, amphibians, reptiles (excluding crocodiles) and other aquatic animals (such as sea cucumber, sea urchin, etc) for human consumption

**Source:** FAO (2013)

Furthermore, Africa is also lagging behind in world aquaculture development. Some of the reasons why Africa is lagging behind are that, according to Brummett and Williams (2000), there is over eagerness and unplanned promotion of aquaculture that place its emphasis on technical research and technology transfer without regard to the natural resource base and the socio-cultural and economic context within which the technologies were being promoted. For example Kannemeyer catfish farm in Kimberley failed because of the factors such as technological driven, there were market problems, price, feed price was too small and poor market research. Another failure was Coetivy Prawn Farm, in Seychelles where there were high operational cost, had niche market but uncompetitive, slump in world shrimp price (Hecht, 2013). It is estimated that Africa's supply of fish will be 11 million tons but the demand will be 18 million tons by 2030 (Child, 2013). This shows that African aquaculture production has to increase

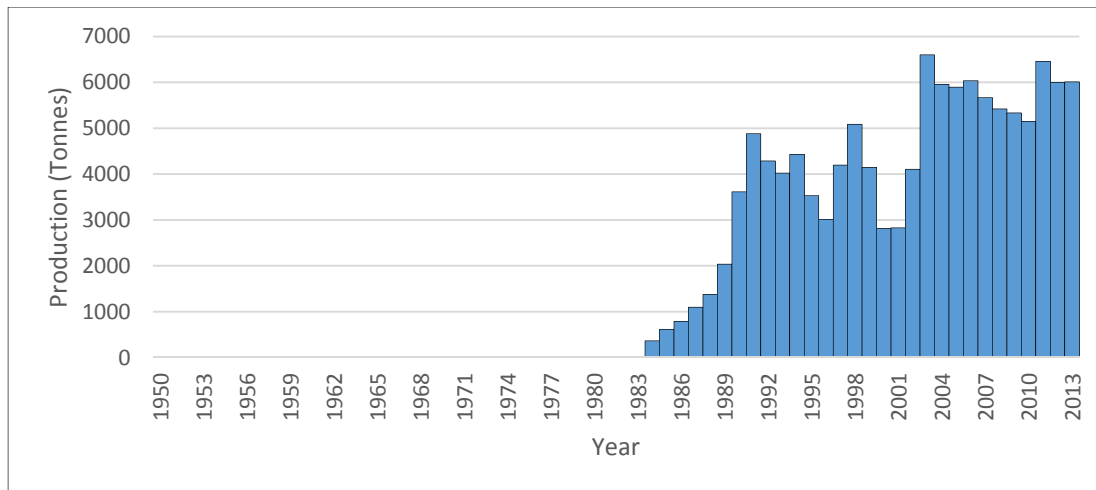
in order to meet demand. However countries such as Ghana, Nigeria, Uganda and Kenya have made progress in production levels in the sub-Saharan region.

According to Béné and Heck (2005a; 2006), fish can improve Africa's nutrition status and food security, seeing that 200 million Africans have fish as a regular portion of their diet in various forms, from smoked, dried, or being ingested in the form of powder, and it serves as a crucial source of protein and other nutrients for rural communities. Béné and Heck (2005) state, assuming sub-Saharan Africa achieves an average yearly population growth of 1.9% between 2002 and 2015, fish production would have to improve by 27.7% in order for sub-Saharan Africa to maintain its current level of per capita supply of fish at 6.6 kg per year.

#### **2.4. South African context**

In the 1980s there were state-led projects in which the main objectives of the government were to provide food security and income generation for rural communities (Britz & Hecht, 1990). In 1988 the sector's production was just 3 094 tons with a retail value of R45 million. South Africa's contribution to Africa's production remains less than 1% of the total. Figure 2 shows aquaculture production in South Africa from the 1950s up to 2010. We can see that aquaculture production started to increase gradually in the late 1980s. The oldest aquaculture subsector in South Africa is rainbow trout farming. A consignment of seed was imported in 1896, while the first dry pelleted feed imports were in 1956 (Britz & Hecht, 1990). Marine aquaculture started with oyster farming in the year 1673 and, in 1676, attempts were made to farm indigenous species (Britz & Hecht, 1990). In 1948, the first commercial operation proved successful. However, extensive aquaculture production started only in the 1980s with the use of several species such as oysters, trout, mussels, ornamental fish and catfish (Britz & Hecht, 1990). The largest aquaculture subsector is abalone, which started in the early 1990s.





Source: Based on FAO (2010a)

**Figure 2:** Aquaculture production in South Africa from 1950 to 2010

**Table 2: Total marine aquaculture production for human consumption per sub-sector and province: 2011**

Species	Western Cape	Eastern Cape	Northern Cape	Kwazulu Natal	Total
Abalone	903,96	125,77	6,28	0	1036,01
Finfish	0	7,99	0	0	7,99
Mussels	570,16	0	0	0	570,16
Oysters	150,37(21)	118,97	0(26)	0	69,34
<b>Total</b>	<b>1624,49</b>	<b>252,73</b>	<b>6,28</b>	<b>0</b>	<b>1683,50</b>

( ) Oysters sold or moved to other provinces for grow out to market size

Source: Based on DAFF (2012)

Table 2 above shows that total marine aquaculture production was 1 683 tons and estimated to be worth R379 million with seaweed excluded in 2011 (DAFF, 2012). The highest contributor to total production was the abalone subsector, at 55%, with mussels the second highest with 35.1%, followed by oysters

with 14.3% and finfish with 0.4%. Freshwater aquaculture production in 2011 was 2 921 tons. This was made up of trout, with a contribution of 49%, ornamentals at 23%, and koi carp at 20%, catfish at 5% and tilapia at 3%. The contribution of marine aquaculture to GDP was 0.029% in 2011 (FAO, 2010b). Freshwater aquaculture contribution to GDP not confirmed at the time of the study.

Traditionally, South Africans are not a fish-eating nation, although it is increasing in popularity (Child, 2013). Aquaculture presents great potential for growth in South Africa, given that most of the commercial capture fisheries species are already being exploited at their maximum sustainable yield levels. An increase in aquaculture production could contribute towards diversification in aquatic food products on the local market, food security, job creation, economic development and export opportunities. Aquaculture presents opportunities for increased food security and income for the poor in rural and food-insecure communities. The role that aquaculture can play in food security and economic development is in line with the National Aquaculture Strategic Framework (DAFF, 2012; Britz, 2013a).

According to the DAFF (2012), the aquaculture component in South Africa has yet to be fully developed, even though it provides the possibility of large increases in the production of highly valuable marine products such as oysters and abalone. Amongst others there are a considerable number of challenges that face the aquaculture industry; these include institutional structures that are inadequately coordinated, a lack of appropriate technology, difficulties in obtaining suitable culture sites, a lack of support from the government to develop farmers, rising costs of production, insufficient access to suitable water, the quality of freshwater aquaculture, overestimation of production capacity and poor management (Britz, 2013b; Hecht, 2013; Brummett, Lazard & Moehl, 2008). Unless these aspects are in place, the development of aquaculture that contributes towards food security and rural economic development will not be possible or sustainable.

The DAFF has a number of aquaculture projects that it would like to hand over to practitioners. The department would like to hand these projects over to communities in order to increase the participation of communities in aquaculture in line with the department's strategic objectives and goals which include rural development support, food security and the creation of

employment. Also the Department of Agriculture, Forestry and Fisheries (DAFF), as the lead agent for the management of the aquaculture sector, has prioritised the development of this sector, because it is seen as having the potential to supplement dwindling fish stocks. The government has to find a model that will ensure the projects will continue once it has discontinued its support

What needs to be investigated urgently is the appropriate institutional arrangements for community-based aquaculture if the DAFF initiatives are to achieve their objectives of food security, job creation poverty alleviation for the rural coastal communities. Moreover food markets are consumer driven. Thus the development of community based aquaculture community-based aquaculture in South Africa needs to be consumer driven rather than technology driven. This will require investigating the markets and value chains for successful community-based aquaculture. Also aquaculture is highly technical and capital intensive. There is need to investigate the skills and investment levels that will be required for successful community-based aquaculture. This project proposes to investigate these three main, interrelated aspects in order to provide evidence-based recommendations for the development of sustainable community-based aquaculture in South Africa.

## **2.5. Community-based aquaculture**

There have been initiatives in recent years to decentralise management authority and responsibility for fisheries. Where such authority and responsibility for capture fisheries have been devolved to communities completely, it is referred to as ‘community-based fisheries management’ (Hviding & Jul-Larsen, 1995). A related aspect is the empowerment of communities to practise aquaculture by giving them legal authority, skills and also sources of investment, hence the concept of community-based aquaculture. The rationale for community-based aquaculture is the intensification of fish production for local consumption, the generation of local employment and the reduction of malnutrition and poverty by means of aquaculture (SEAFDEC, 2007). In addition, community-based aquaculture can act to strengthen social cohesiveness and the self-help spirit of communities.

According to the Food and Agricultural Organization (FAO, 2013b:1), community-based aquaculture is “when user communities are ceded the rights and have the responsibilities for managing their own resources, typically using a mix of traditional or more formalised mechanisms of contract and enforcement to define access, exploitation methods and intensity”. Community-based aquaculture has advantages such as that it can be practised on communal land where the community can have the right to regulate it and exclude outsiders from using its land and other natural resources. Another advantage is that there is cooperation and coordination amongst the community members so as to achieve a common goal for their livelihoods, which in this instance is aquaculture. A community can work together because of factors such as culture, norms and tradition. However, according to Hardin (1968), community management will lead to the tragedy of resource overexploitation (known as the ‘Tragedy of the Commons’), although there have been cases where communities work together because of their common interest. Evidence shows that social groups can design, use and adapt creative devices so as to exclude non-members from user rights and include members with user rights (Feeny, Berkes, McCay & Acheson, 1990; Ostrom, 1990). Therefore, resources do not necessarily need to be managed privately or by the state. Community-based aquaculture therefore could be a viable option.

Community-based aquaculture has been practised for many years in countries in Southeast Asia and has been known to provide communities with a sustainable supply of fisheries and food security. In Southeast Asia, community-based aquaculture has been seen as a good way of organising people with a common interest in practising aquaculture in order to alleviate poverty, provide job opportunities and contribute to food security (SEAFDEC, 2007; Ahmed & Lorica, 2002). For example in Bangladesh Inland (floodplain) fisheries were managed so as to generate revenue for the government without concern for sustainability or for the poor users. Some of the lessons drawn from the case study were that: To empower coastal communities community based fisheries management is a viable solution, furthermore community based fisheries management is based on co-management so as to empower fishing communities, also the development of local fisher-based organisations is essential, local government support for community based fisheries is important for longer term sustainability,

establishing community based fisheries management is a slow process, strong facilitation is necessary, external threats are a strong limiting factor that cannot be overcome in some cases of powerful political interest, and it is essential that communities obtain clear use rights over government fisheries (Thompson, Sultana & Islam, 2003).

Moreover it was found that the fishermen lacked skills and technological capacity and at the same time they did not have equipment and training facilities. A training program with the support of experienced people on community based fishing in open water floodplain beels was organised, economic conditions of fish farmers were not good enough to support the costs of fish. Government policy and institutional coordination problems were hindering the sustainable growth of the success of the communities' livelihoods (Istiaque Hossain, Siwar & Alam, 2013)

In Bangladesh, Adivasi communities the promotion of aquaculture improved food and nutrition security, increased household incomes, improved livelihood assets and built social capital, even among the poorest sections (Pant, Barman, Mursher-E-Jahan, Belton & Beveridge, 2014). Another case study is based in Vietnam, Quang Tri and Quang Nam provinces where they established a local fisheries association. In total 14 fisheries associations were formed through which resource management as well as community livelihoods actions took place. Some lessons learned in the case study were that co-management needs time and commitment, without an enabling environment project initiatives will struggle, capacity building needs to be long-term and hands on.

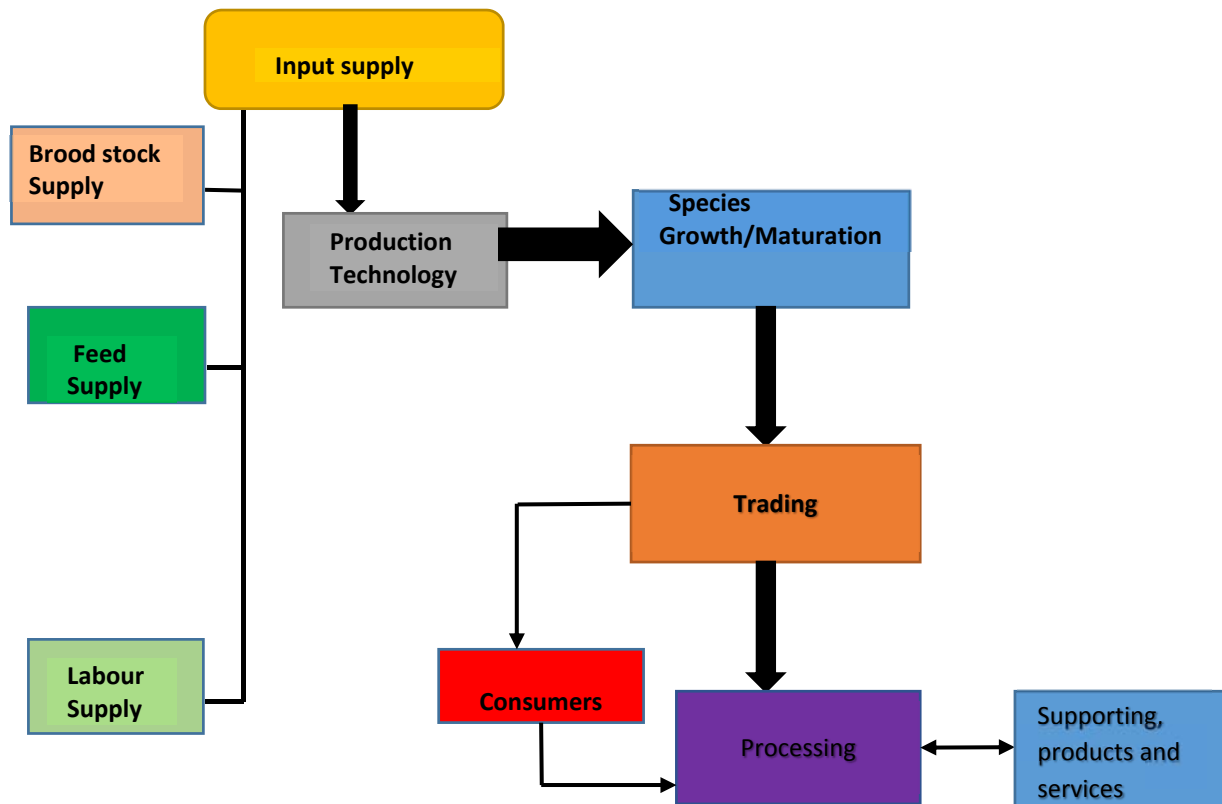
Even though these case studies above refers to fisheries the lessons or challenges and benefits affecting them also apply to community based aquaculture and can be applied in the community based aquaculture context. Also in all these 3 case studies some of the challenges are similar which means that this is a trend in communities that are involved in fisheries therefore lessons have to be drawn from them.

The development of community-based aquaculture in countries such as Thailand contributed to self-help initiatives, community ownership, decisions on exclusion, and regulation by to the community on their own (Nasuchon & Charles, 2010). In a community in Madagascar called Vezo community-based

aquaculture is not only about contributing to poverty alleviation, food security and providing jobs, but it also helps in relieving pressure on the fragile marine environment (Blue Ventures, 2006). Community-based management allows the community to be the ones participating, enforcing rules and monitoring, which is more effective and economical than when the rules are enforced by the central government (Pomeroy, 1994).

Other advantages of community-based aquaculture are that there is rational exploitation of resources, profits are shared equitably, the economy as a whole is helped and conflicts are solved through mutual terms and conditions (Radheshaym, 2001). The main aim of community-based aquaculture is to provide food security for rural communities and contribute to a sustainable supply of fish protein for rural people. In contrast, the main aim of the commercial aquaculture sector is profit. They sell their product with the aim of making a profit and therefore cater for those people who can afford their products (SEAFDEC, 2007).

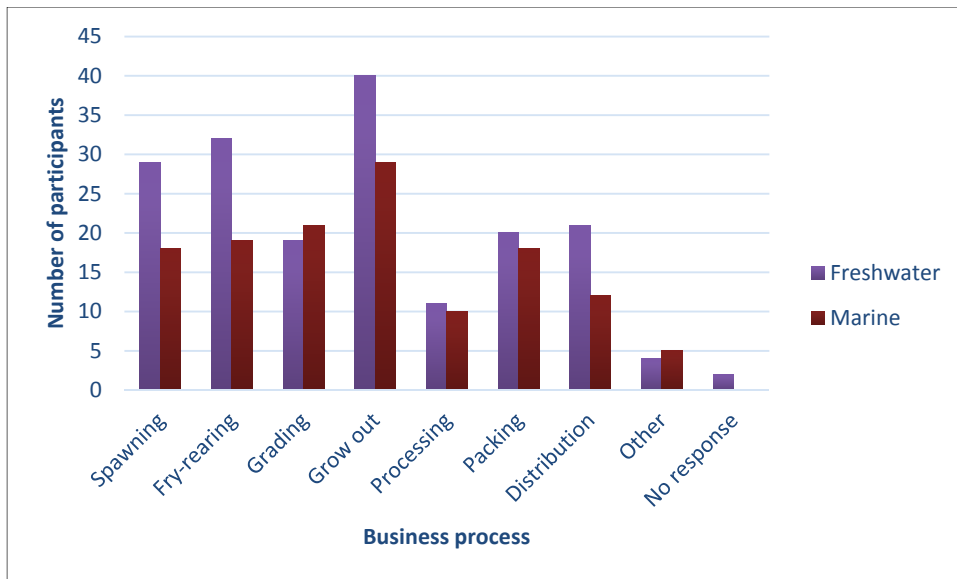
Aquaculture value chain in South Africa consists of several primary activities (DAFF, 2013a). The input supply stage comprises three features: (a) the provision of brood stock to hatcheries or nurseries; (b) feed that is supplied domestically or imported; and (c) the labour force, which performs numerous activities in the hatcheries and feed production (Figure 3). The second feature is of the technology used for production and depends on the aquaculture firm, for example the use of different production techniques such as cages, ponds and tanks, and different modes of transportation and capital equipment that are needed. The third element is the maturation of species for distribution and sale (Figure 3). This is followed by marketing the products to the international or domestic market (Figure 3). Then the sellers either process the species or trade the species to the processors, who then sell them to the end user. Supporting products and services consist of the research and technology element of the value chain.



**Figure 3:** Aquaculture value chain in South Africa

**Source:** Based on DAFF (2013a)

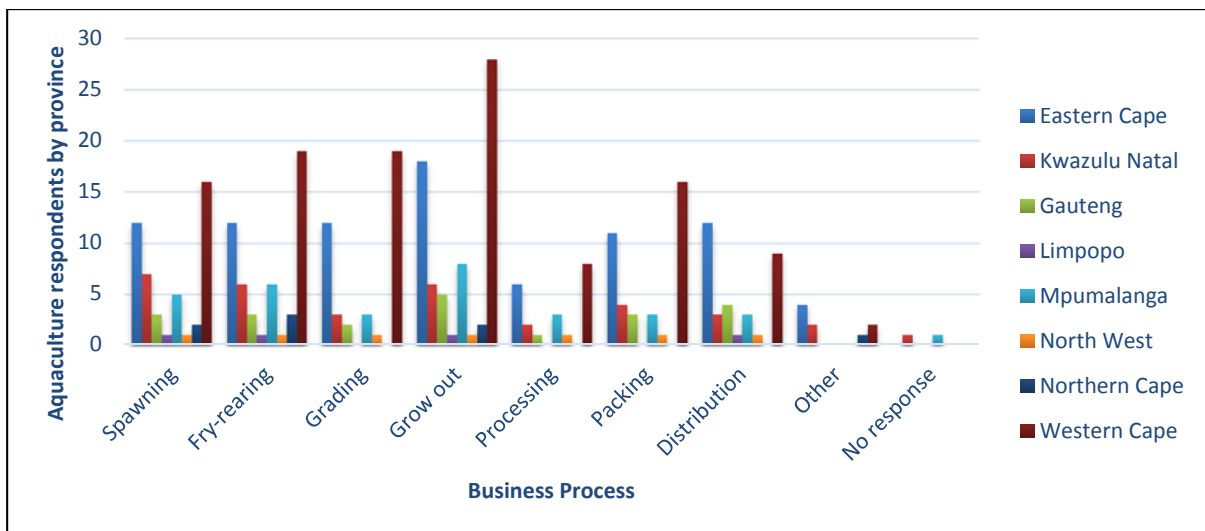
The information below (Figures 4 to 6) is based on surveys undertaken by Britz, Lee and Botes (2009) in 2007 and 2008. Primary producers of aquaculture were interviewed using a combination of methods such a questionnaire, telephone and face-to face interviews, aggregated production data from producer associations and government sources, and various reports and industry association minutes.



**Figure 4:** Marine and freshwater aquaculture enterprises in the value chain activities.

Source: Based on Britz *et al.* (2009)

Figure 4 shows that both the freshwater and the marine sector were involved in primary production and grow out. The highest number (40 of the fresh water sector and 29 of the marine sector) of aquaculture enterprises were involved in the grow-out phase activities, followed by fry-rearing. Producers in both sectors also were involved in the secondary (post-harvest) production activities of processing, packing and distribution



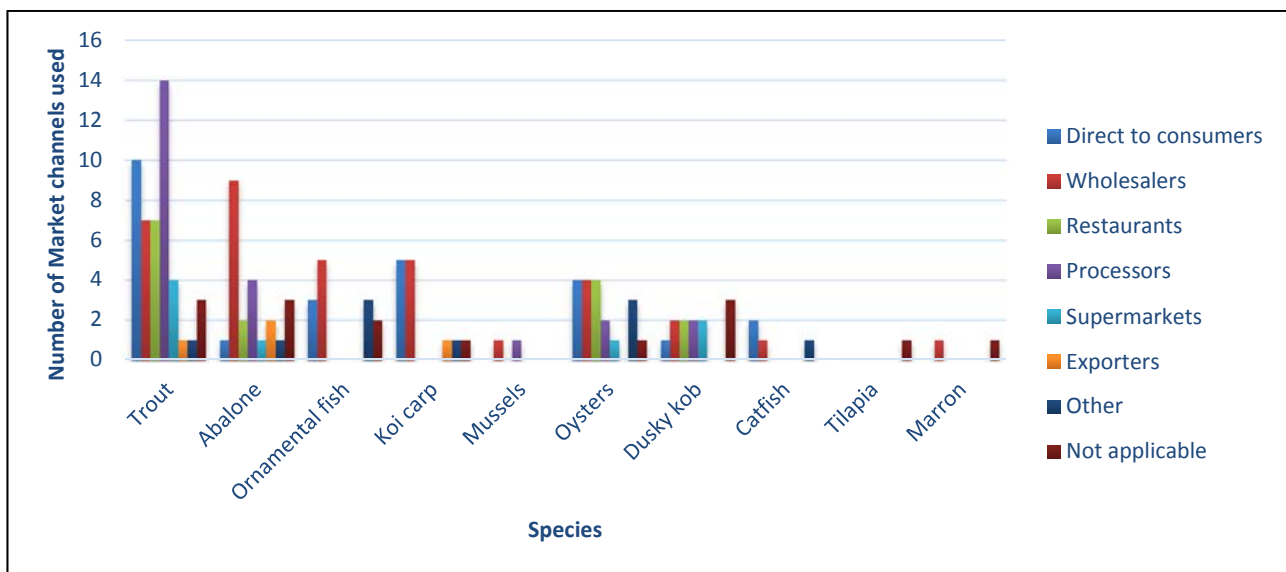
**Figure 5:** Aquaculture enterprise respondents in the value chain activities by province

Source: based on Britz *et al.* (2009)



Figure 5 above shows that the Western Cape province was the most highest province involved in the grow out activity followed by the Eastern Cape province. Aquaculture producers in every province were also involved in secondary production of processing, packing and distribution activities.

The survey showed that the most commonly used market channel was wholesalers, with 35 primary aquaculture enterprises using this option (Figure 6). Nevertheless, a relatively high number of enterprises sold directly to buyers, particularly trout and koi producers (Figure 6). A high proportion of trout and oyster producers sold their products to restaurants and hotels (Figure 6). For trout enterprises, the highest number of producers (14) sold their product to processors, whereas in the abalone sector, only four sold to processors, with most (11) selling to wholesalers or exporters. Where abalone processing was required, the farmers usually paid a factory a fee to can their product under their own brand, and then market it themselves.



**Figure 6:** Market channels used by enterprises in the aquaculture subsector

**Source:** Based on Britz, *et al.* (2009)

## **Chapter 3: Literature review**

### **3.1. Introduction**

The aim of this chapter is to provide a review of the literature on the history of marketing, types of marketing and the dissimilarities between marketing and agricultural marketing. The section further reviews literature on markets that exist in South Africa specifically for community-based aquaculture, as well as marketing theories and criticisms. Literature on institutional arrangements and organisational arrangements is reviewed, and institutions and organisations are explained utilising different theoretical approaches. . Regulatory, policy and organisational frameworks for aquaculture in South Africa are also evaluated.

### **3.2. Markets that are available for consumer based aquaculture**

Below are two definition of marketing:

“Marketing is defined as an organisational function and a set of processes for creating, communicating and delivering value to customers and for managing customer relationship in ways that benefit the organisation and its stakeholders” (Kotler, Burton, Deans, Brown & Armstrong, 2013:4) .

OR

“Marketing is an activity, set of institutions, process for creating, communicating, delivering and exchanging offerings that have value for customers, clients, partners and society at large” (American Marketing Association, 2008).

The first definition emphasises the value a customer has and the second definition also includes those that are indirectly involved in marketing, namely society as a whole. The first definition is the business-school approach which is narrow and the second definition is the economic approach that tends to be broader. The focus of the study is both the business and the economic approach of marketing.

Both these definitions are helpful in the South African context because they guide those involved in marketing on the importance of a customer and also the society as a whole. The second definition is also inclusive of not only customers but also the marketers and society at large and by including activity and institutions and processes captures the larger domain of marketing beyond the firm and reflects its

systemic nature. It also captures more fully the perspectives of those involved in marketing. Furthermore it addresses the role and responsibility of marketing in society by expressing that marketing does and should have value not only for customers and the firm but also for others, including society at large (Gundlach, & Wilkie, 2009).

According to Bartels (1976) and Baron, Warnaby and Hunter-Jones (2014), marketing thought developed from the 1900s up to the 1970s. Bartels divided the periods into decades, namely:

**1900-1910:** The period of discovery – the time when marketing was first taught in United States colleges. The training dealt with the distribution of agricultural products, and the term “marketing” emerged.

**1910-1920:** The period of conceptualisation – the period when the three approaches of marketing were developed (viz. commodity, institutional and functional). The commodity approach was centred more on products such as forestry, fisheries, mining and farming. The emphasis of the institutional approach was on the types of marketing organisations, such as agents, brokers and wholesalers. The functional approach focused on the activities of the marketing process, for example advertising, buying, selling and transporting.

**1920-1930:** The period of integration – the text were incorporating other sub disciplines such as advertising, sales management for the first time.

**1930-1940:** The period of development – the principles of marketing were revised. New books about marketing appeared on the market.

**1940-1950:** The period of reappraisal – two new approaches to marketing were established.

**1950-1960:** The period of reconceptualisation – new concepts, such as marketing management, were developed so as to supplement the existing concepts.

**1960-1970:** The period of differentiation – the traditional approach was replaced by new, specialised approaches such as consumer behaviour, international marketing and quantitative analysis of marketing.

**1970:** The period of socialisation – marketing was becoming more important in how it influences society and how society perceives it.

In order for business enterprises to be successful and competitive, they need to be customer oriented, winning consumers from competitors, keeping them and increasing the number of consumers by giving

value. For this to happen, a consumer analysis has to be done because companies cannot satisfy all consumers, as each consumer has unique tastes and preferences. Consumer behaviour is influenced by factors such as social, cultural, personal and psychological factors. The marketer has to study these factors in order to satisfy consumer wants and needs. Therefore a business enterprise must divide the total market and choose the right segment and strategy. This is possible by using three steps, which are market segmentation, target marketing and market positioning (Kotler & Armstrong, 2004).

Marketing's role should incorporate the cultural (corporate), strategic (business unit) and tactical (functional) levels. The role of marketing at the corporate level is to encourage customer orientation, evaluate market attractiveness so as to know the customers' needs and wants, the competition and to specify the mission and vision of the business on how it is going to satisfy consumer needs. At the strategic business unit level, strategic decisions about components, systems, procurement of materials and choosing a marketing partner should be taken by the marketing management. At the functional level, marketing specialists are responsible for market research, segmentation analysis, product management, pricing and sales promotion, communications and distribution (Frederick & Webster, 2002).

Nevertheless, there have been various criticisms of marketing, such as that marketing promotes materialism, unnecessary consumption and creates artificial needs and wants. (Alvesson, 1994; Pollay, 1986; Wilkie & Moore, 1999; Heath & Chatzidakis, 2012 ). Marketing gives incomplete information and the information given is biased and can be misleading (Wilkie & Moore, 1999).

When marketers mislead, lie, manipulate and misinterpret, it is unethical marketing (Sheth & Sisodia, 2005). However, the argument for the present marketing system is based on the neoclassical economists' assumption that individuals are rational consumers who have perfect information and have unlimited wants and needs that they indicate to the market (Heath & Chatzidakis, 2012).

### 3.3. Agricultural marketing

According to (Pritchard, 1969:78-79),

“agricultural marketing is defined as agriculturally oriented marketing. It embraces all operations and institutions involved in moving farm products from farms to consumers, in providing production and consumption incentives to producers, marketing firms, and consumers, and in distributing farm supplies – feed, seed, fuel, fertilizer, and machinery to farmers”.

Wollen and Turner (1970) define agricultural marketing as including everything that happens between the farm gate and the end user, with processing also included.

Agricultural marketing was developed in the first half of the twentieth century, while business marketing was developed in the second half of the twentieth century; business marketing or marketing therefore is part of agricultural marketing (Ritson, 1997). This is clearly stated in Kohl and Uhl (1990), where they define agricultural marketing as the performance of all business activities involved in the movement of agricultural products and services from the agricultural production point until they reach the end user. Therefore, the word marketing has been used descriptively to refer to a part of the economy. According to Webster (1992), marketing originated in about 1910, in the Midwestern American land-grant universities, where there was intense participation with the farm sector, which then forged agricultural markets and the processes by which products were brought to markets and prices determined.

Ritson (1997) claims that, in a survey of journals twenty years ago, only 4% could be described as writing on agricultural marketing. According to Bateman (1976), agricultural marketing has a longer history than that of marketing. Marketing is business oriented, while agricultural marketing comes with policy, hence the two approaches are similar in some aspects but differ in others. According to Ritson (1997), the farming sector has several small businesses supplying an agricultural commodity. There also are other sectors that have small enterprises, but in most situations they differ from farming because they are market related, whereas farming is product related. This is due to the fact that small businesses in the farming sector exist because of the land-based nature of production, rather than the requirement

to be situated nearer to the consumer. In most cases, farming products are homogeneous. For example, a farmer producing maize in the Western Cape is not different from the farmer producing maize in the Eastern Cape Province.

When the agricultural product has been processed into a final good and sold through marketing channels to reach the customer that is where marketing is of relevance. Marketing would be of relevance because branding – the advertising of the food product – can use the marketing mix so as to sell the product. The other way in which marketing could be of relevance to farming is by knowing the modern developments in food marketing that provide opportunities for farmers. Farmers can introduce differentiated products by the way they have been produced on each individual farm, for example self-pick sales, quality, variety, freshness and farm gate sales, through which a farmer can gain a monopoly advantage (Porter, 1985).

Furthermore, marketing could be relevant because there currently is a growing demand for food products that have green characteristics, such as organic, natural, animal welfare. Therefore a product could be differentiated using the abovementioned attributes, which could make the farmer gain monopoly power in a product (Ritson, 1997). Therefore, in my opinion, marketing is useful in agriculture because, when the agricultural product has been processed into a food product, marketing is needed in order to reach the consumer and in order to be attractive to a consumer. Another reason is that even if the agricultural product is not processed, farmers need to market their products in order to sell to foreign countries.

Wills (1974) and Zaltman and Kotler (1971) state that government's role in the economic context is to provide some goods and services and also regulate the effectiveness of the private sector in supplying goods and services. Both these roles leave the government with the difficulty of finding what the customer wants and ascertaining that the appropriate product marketing mix is given consideration.

However, Meulenbergh (1997) criticises this point of view, mentioning that agricultural products require a marketing management method that concentrates on analysing decisions centred around the marketing

mix. He further mentions that problems affecting the marketing of agricultural products resemble the problems affecting the marketing of industrial products. On the other hand, when referring to a limited marketing firm, when a number of small-scale firms are supplying homogeneous products, the ability of developing a marketing policy is inadequate.

### **3.4. Value chain**

Consumers determine what they want to buy or eat and thus whether a product is successful or not. Consumers have to be satisfied in terms of product type, form, quality, quantity, price and timing (Vermeulen, Woodhill, Proctor and Delnoye, 2008). Consumers thus are the main source of demand information. End markets (consumers) therefore should be the starting point for product development. Such analysis should focus on the end markets 'wants' and the evolving market trends and dynamics, and how to respond to these. Through such an analysis, one can identify the type of products that will sell, and the technological and investment requirements for production.

The value chain can be analysed in a narrow and a broad sense. The narrow sense of the value chain concentrates on a particular firm and tackles aspects such as conception, design, acquisition, production, marketing and distribution activities. The broad sense focuses on the general aspects of a firm by including various activities implemented by several actors in manufacturing raw materials into final goods. Furthermore, the broad sense also takes into account the association of activities, such as trading, assembling, processing and the development of services (M4P, 2008). The broader definition of the global value chain emerged in the early 1990s as a means to understand the dynamics of economic globalisation and international trade. Global value chains base their analysis on separate activities, such as the supply of inputs, production, trade and consumption, and how these become connected (Gibbon & Ponte, 2008). A value chain comprises a variety of activities and services that are required to move a product from the producer to the consumer and that will add value to the product as it is moved throughout the chain (Hellin & Meijer, 2006; Vermeulen, 2008).

Governance is crucial to value chains. Governance refers to the question of who controls the power relationships or sets and/or enforces the parameters within which actors in a given chain operate

(Humphrey & Schmitz, 2001). The firm(s) that set, monitor and enforce the parameters under which other members of a value chain operate are called lead firms. Lead firms decide, transmit and enforce the restrictions within which all chain actors operate. Value chain governance is critical, given the emphasis that increasingly is being given to product differentiation, food safety and product standards (United Nations, Conference on Trade and Development [UNCTAD], 2000). According to Humphrey and Schmitz (2001), five key parameters define and determine what needs be done at any point in a commodity chain. These are: what ought to be produced; how is it going to be produced; when the production is going to take place; what quantity has to be produced; and the product price.

Lead firms normally specify exactly how particular standards must be accomplished by wanting and sometimes helping to introduce particular production processes and monitoring procedures (Humphrey & Schmitz, 2001). The role of lead firms can be played by either producers or consumers. In this context, value chains can be producer driven or buyer driven (Gereffi, 1994; Gibbon, Bair & Ponte, 2008; Hempel, 2010 ). In the former, the key parameters are set by producers, while in the latter they are set by retailers.

Also important in value chains are the enabling environment (regulatory framework); vertical linkages; horizontal linkages; and support markets. These have an effect on the functioning and the behaviour of the value chain and its actors, both on one another and in reaction to the chain's external environment (Gereffi, 1994; UNCTAD, 2000; Trienekens, 2011.). According to Bui (2011), governance refers to rules and regulations that are set up by actors within the value chain or by institutions such as governments, and by organisations such as NGOs. Governance concern is centred on the formal rules of productivity and the processes of competition, which have an impact on how production is organised (M4P, 2008). The degree within which control by a specific enterprise in the chain may be interrelated to its relative size, normally, the leading role is executed by the larger enterprise. There are many factors that can lead to a firm being the most influential in the value chain. These include share of sales, value addition, profits, buying power, technology, rate of profit, unique expertise and marketing methods (Kaplinsky & Morris, 2002). Analysing the governance of the value chains for South Africa's



aquaculture products from communities therefore will be key to the development of the sector and the benefits that communities can derive from aquaculture.

According to (Moskowitz & Gofman, 2007), businesses have to use a systematic nature of experiments in order to promote or market their products. Moskowitz and Gofman further mention that by using Rule Developing Experimentation (RDE) it can help in creating, market and sell almost any product better and faster. “RDE is a systematized solution-oriented business process of experimentation that designs, tests, and modifies alternative ideas, packages, products, or services in a disciplined way so that the developer and marketer discover what appeals to the customer, even if the customer can’t articulate the need, much less the solution”(Moskowitz & Gofman, 2007:3).

Moskowitz and Gofman further state that the challenge is that consumers can-not articulate exactly what they need, want, or like. However the solution is to identify and experimentally scrutinize the factors that could drive consumer interest using systematically designed prototypes and combine features into the best possible combinations(even if consumers never tested those specific combinations).

Moskowitz and Gofman present seven steps in identifying and experimenting the factors that could lead to consumer interest, and they are: 1. Think about the problem and identify groups .2 Mix and match the elements according to a special experimental design.3.nd show them to the consumers and obtain their reaction. 4. Analyse each individual’s results. 5. Optimise so as to obtain the optimal product or ideas.6.Identify similar patterns of the utilities. , 7.Apply the generated rules to create new products, offerings, and so on.

By using RDE strength and weaknesses of competitors can be understood by using content analysis of ideas and to see which is more striking with the consumers. For example illustrates how RDE was applied to how teens think. It showed shows readers to see not only what works but also how RDE can synthesize new knowledge to generate new offerings. The sequence of steps were (1) gathering and categorizing competitive material into silos (with differing ideas that made sense to consumers in each silo; (2) mixing and matching elements in an RDE design; (3) gathering respondent’s ratings; and (4) analysing the results.

Other theoretical approaches to understand market operation and performance are mentioned by Caswell & Coterill 1988. These two approaches have similar emphasis on strategic behaviour in the context of particular markets, firm organizations, and information environments. However they differ in terms of the major economic questions to which they have been applied. These two approaches are game theory and the agency theory.

Game theory approach focuses more on firm's level decision making while the agency theory focuses on explaining individual and internal firm decision making process. It is mainly concentrated with institutional questions "regarding what, besides potentially ineffective competition with other firms in input and output markets, disciplines firm management. systems, and firm financial structure" (Caswell & Cotterill, 1988: 512)" Agency theory attempts to address internal and corporate control issues while the game theory addressed a framework for organizing thinking about those factors that are believed to be important to firm competition.

Agency theory uses transaction cost analysis to provide a general theory that encompasses several formerly separate theories on the relationship between ownership and control of large industrial corporations. Game theory with its emphasis on strategic position and pre-emptive actions would suggest market power or self-protection motivations for corporate restructuring. Agency theory with its emphasis on market mechanisms that reduce agency costs would suggest an efficiency motivation behind the same restructuring. Alternatively, the emphasis of game theory on the importance of strategic position and market power may prove to be a more powerful instrument than agency theory for understanding structural change within firms and industries and its performance implications.

These cases provides market researchers, economists on how to understand market operation and market performances and could be useful in understanding how the aquaculture market operates and its performance.

### 3.5. Institutional arrangements for aquaculture

Economists regard the discipline of economics to be lacking in examining factor coordination in the whole economy. This criticism has been expressed throughout the past centuries by economists from a number of diverse sub-disciplines of economics. One of the sub-discipline that has criticised the discipline of economics is institutional economics, which is referred to as “old institutionalism”. The founding fathers of old institutionalism (OIE) include Thorstein Veblen, Wesley Mitchell, John Commons, Clarence Ayres and Wesley Mitchell. More recently, old institutionalism has been associated more with Alan Gruchy (De Alessi, 1996). The greatest protagonists of new institutionalism include Coase (1998), McCloskey (1990), North (1986, 1990 and 1991). The OIE embodies two main ideas; firstly, it is associated mainly with Thorstein Veblen and in general looks at the influence of new technology on institutional arrangements and the extent to which customary, shared conventions and the beneficiaries to the arrangement are to respond to the particular change. Secondly, it is associated mainly with the works of John Commons and recently represented in works of Warren Samuels and Allan Schmid (Veljanovski, 1983).

Early works on institutional economics provided valuable insights into institutions and instilled critical thinking around institutions and economics. However, they failed to provide clear theoretical frameworks that could be used in institutional economic analysis. Institutionalists’ approaches to economic analysis focus on institutions, habits, rules and their transformation. The institutionalists’ aim is not to build a single, general model that is centred on habits, institutions, rules and their transformation; instead they try to facilitate a strong initiative in relation to particular and traditional methods of analysis (Hodgson, 1998a). To examine how people behave, institutionalism includes elements such as psychology, anthropology, sociology and other research. Overall, institutionalism advocates the historical investigation of social and economic rules and the contributions of their transactional costs to development processes. Institutionalism provides important economic explanations by understanding rules and their interactions that formal economic theories are unable to offer (Mbatha & Antrobus, 2008)

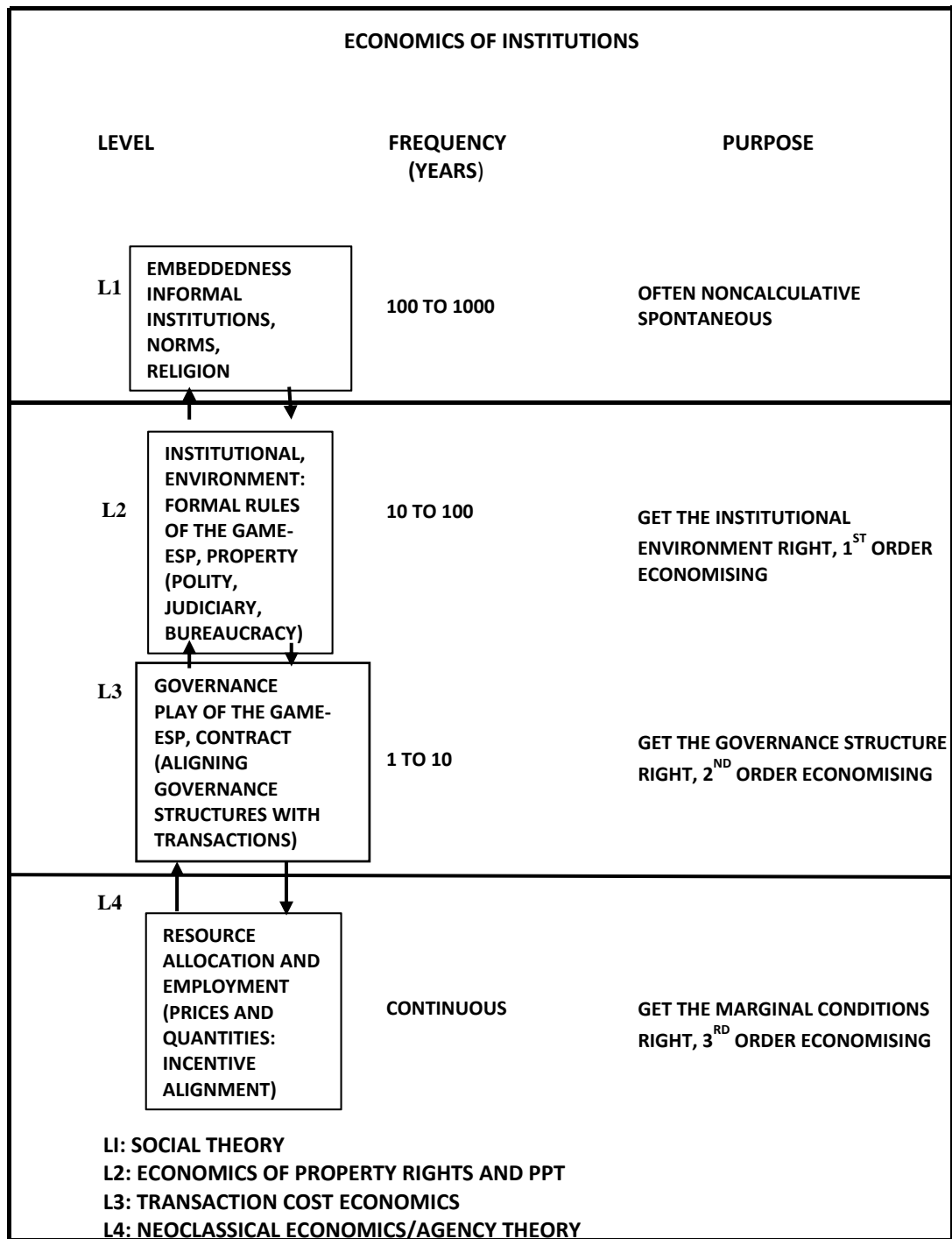
The new institutionalism builds from the old institutional economics, although it differs in some respects. The OIE differs from NIE in its scepticism about markets and individual preference sovereignty, and favours government intervention and public inspection of private endeavours. Markets are viewed with suspicion for their tendency to create inequities in income, welfare, power and economic opportunity. OIE is cautious of the influences in markets, consumer behaviour and technology, amongst others. Old institutionalists believe that institutions can mould individual aims and ideals and therefore reject orthodox individualism. With OIE there also is a rejection of formal methods of analysis, favouring holistic methods based on value judgements on issues such as fairness and social justice. The OIE also rejects rational-choice approaches. Old institutionalists consider the NIE as being too formal and abstract, and as a theory that is too reductionist, individualistic, rational choice oriented, ignoring welfare criteria in appraisals, trusting of markets, and anti-interventionist (Langlois & Robertson, 1989).

The differences between the OIE and the NIE focus on the following: (a) formal vs. non-formal approaches; (b) institutions as an outcome of individual action and *vice versa*; (c) rationalism; (d) invisible hand vs. deliberate design outcomes; and (e) the appropriate role of government (Karaan, 2006). The OIE is considered too descriptive, anti-formalist, holistic, behaviourist and collectivist (De Alessi, 1996). The NIE has developed into several strands, such as property rights, public choice, organisation, agency theory and transaction costs (Cook & Chaddad, 2000; De Alessi, 1996). The old institutionalists reject the widely held principles of classical economic theories, and the new institutionalists hold on to the useful elements of neoclassical theories (Mbatha & Antrobus, 2008). Institutional economic theory builds on a relationship of economics, jurisprudence and ethics. “Ethics deals with the rules of conduct arising from conflict of interests, which in turn emanate from scarcity that is enforced by the moral sanctions of collective opinion” (Commons, 1931:650).

The most useful definition of old institutionalism (OIE) is that “institutions are the way of thought or action of some prevalence and permanence which is embedded in the habits of a group or the customs of people” (Hodgson, 1998:179) or, according to Commons (1931:651), “institutions are collective

actions in control, liberation and expansion of individual action”. Otherwise, according to North, 1995:23), “institutions are the rules of the game of a society, or the humanly devised constraints that structure human interaction”. Institutions include informal and formal constraints and the enforcement characteristics of both.

The formal rules of institutions are common law, regulations and statutory law. Formal rules include the constitution, which distinguishes organisations like companies, business trusts, the executive, legislative, judicial and bureaucratic functions of government, as well as the distribution of powers across different levels of government enforcement. Formal rules also include the enforcement of property rights and of contract laws (Williamson, 2000). Enforcement is carried out by third parties (law enforcement, social ostracism), second parties (retaliation), or by the first party (self-imposed codes of conduct). Informal rules include conventions, norms of behaviour and self-imposed codes of conduct. According to Williamson (2000), informal institutions have mainly a spontaneous origin. According to North (1995), institutions are the rules while organisations are the players to whom the rules apply. Organisations consist of a group of individuals bound by one or more common purposes. Williamson concedes that the field of NIE often operates under constraint of ingrainedness. He then recommends four levels of analysis, as shown in Figure 7 below. Level 1 is linked to social theory, levels 2 and 3 to NIE, and level 4 to neoclassical economics. Developments in economics have been made mainly in levels 2, 3 and 4, and not that much on level 1.



**Figure 7:** Economics of institutions

**Source:** Based on Williamson (2000)

Welfare Economics is a sub-discipline of economics that was founded by Arthur Cecil Pigou in 1920. Its main emphasis is on social welfare and the maximisation thereof. There are two main theories that were provided by Arrow; firstly Arrow states that competitive markets produce Pareto efficient outcomes given that certain assumptions are satisfied. These assumptions are: firms are perfectly competitive, there are a large number of price-taking small unit firms that sell homogenous products, firms maximise economic products while households maximise utility and no households become satiated and that there are no externalities with regard to production and consumption. A Pareto efficient outcome exists when there is no feasible alternative to makes everyone better off in terms of individual utility.

The second theorem states that given further restrictions, any Pareto efficient outcome can be supported as a competitive market equilibrium. Therefore a social planner could use a social welfare function to pick the most equitable efficient outcome, then use lump sum transfers followed by competitive trade to bring it about. However the competitive equilibrium does not take into account external effects (divergence between private and social costs or benefits. Welfare economics developed a method in analysing what ways should the government intervene in an economy. These include public provision of goods and regulation of externalities and monopolies(Besley & Coate, 1999) .However there is an argument that the approach of welfare economics is flawed because it ignores policy determination via a political process .

However government intervention is required in specific situations where there are external effects. For example government can pass a law to regulate or limit the amount of pollutants discharged into the air by the firms. In the absence of transaction costs, if property rights are well-defined and tradable, then voluntary negotiations will lead to efficiency(Coase, 1960)

According to Coase if the law has clearly assigned and defined the rights of the parties, and there are no transaction costs (such as the time and effort needed to bargain, or hold-out problems); Voluntary exchanges between the parties will transfer rights to their highest-value use, and minimize the costs or harms from productive activity (negative externalities), thus maximizing the social surplus

When transaction costs would prevent surplus-maximizing exchanges, the law should assign rights in such a way as to maximize the social surplus. If transaction costs would stand in the way of the efficient solution, law should assign the right in such a way as to minimize the effect of transaction costs.

The concept of transaction costs in fisheries co-management does also apply. When many individuals are involved in environment conservation and fisheries management, complex activities need to be coordinated over time. Individuals may try to reduce the substantial uncertainties that they face through various forms of explicit or implicit institutional arrangements... Coase argues that: “Without the concept of transaction costs, it is impossible to understand the working of the economic system, to analyse many of its problems in a useful way, or to have a basis for determining policy (Coase, 1988). In fisheries co management, the transaction costs are divided into three major cost items including information costs; collective fisheries decision-making costs; and collective operational costs. .

Institutions matter to individuals, because individuals are rational when making choices, and their choices that they make may be voluntary or involuntary the choice maybe imposed by another individual or by collective action, and also free markets invite rent-seeking behaviour resulting in an individual’s attempt to maximise their own utility (Commons, 1931). This means that there would be costs of transacting because there are costs of information in the coordination and integration of any economic, political or social activity. However, individuals always want to maximise their own utility, rather than that of their organisation, because the markets allow for the self-interested behaviour of individuals to generate socially beneficial results. Institutions are required, meaning that the state has to play an essential part in enforcing contracts (Evensky, 2004). In order for society to cohere, it needs contracts and constraints by unanimity.

To prove that constraints should be constitutional, an example is used of a poker game, in which players have two choices, viz. rule of the game and a strategy each player comes up with (Evensky, 2004). The constitution is determined by the rule of the game. The several strategies that a player may come up with in the constitution signify post-constitutional choices any player in the game faces. For the game



to be played in a constructive environment, it is crucial that there be an impenetrable wall of separation between the rule-setting stage, the constitutional construction, the in-rule play and the post-constitutional strategic interactions. If the above wall of separation is breached, the self-interested pursuits of individuals will focus on rule manipulation (Evensky, 2004). In order to avoid this dilemma, it is necessary to create a wall separating the rule-creation stage, during which individuals function as a cooperative group, and the in-rule stage, during which individuals become players competing with one another within the context of the previously agreed upon rules. Institutions play an important role in individual understanding, providing significant stability in socio-economic systems by constraining and protecting the diverse and variable actions of many agents.

Furthermore, when conflicts of interest arise in an organisation institutions have to intervene because it might happen that individuals are not committed to their promises could cheat, and free ride. Monitoring and finding information about individuals' intentions is costly and difficult or impossible. This leads to problems of incomplete contracts, such as moral hazard and adverse selection. Therefore, institutions enforce rules such as property rights, laws and contracts to curb the problems, hence transaction costs are minimised (Lin, 1989). There should be well-defined property rights for each of the products and inputs, transaction costs should be low, and buyers and sellers should be well informed. Governments have important roles in the supply of each of these preconditions. Good property rights have the characteristics of exclusivity, transferability and enforceability (Freebairn, 2010).

The type of properties have public, private and common property rights. The first are rights held by the government, the next are rights held by individuals or organisations, and the latter are rights held by a group. Different stakeholders can have different rights over the same resources as a result of these three forms of property rights, and it usually is difficult to understand who has the property rights between the governments, private or common property, hence confusion is created. Individuals and communities often have rights to use, access and at times make decisions on land that is owned by the government. Also, individuals have rights to use common land, yet the government could be the one regulating and

making decisions on it. This also can happen on private property, where other people may have rights while the state has entitlement to the property (Mwangi & Meinzen-Dick, 2009).

The authority to use land by groups is regular and the group might be an extended family, lineage, clan, village or tribe. The group may have similar ancestry or a similar location, or both. The allocation of rights to use the land is exclusive for the members of the group. The rights are assigned and overseen by a local, indigenous authority, such as lineage elders, tribal chiefs, or land priests (Meinzen-Dick & Mwangi 2009). For example, in the rural areas in South Africa, an individual who wants to secure land has to go through a chief and, if the chief does not like a certain individual, that person might not get a property right. Even though the government has the right to enforce rules in rural areas, the chiefs are the ones that individuals have to go through before land can be secured. Moreover, public, private and common property cannot enforce rules on open access natural resources, because the land has no clear, distinct rights and thus everyone has access to it. Sometimes, property rights may serve those individuals who have specific interests, especially those who have the influence to create new rules. The change depends on the nature of conflicts over distribution.

How property rights change depends on the nature of conflicts over distribution, who the winners and losers are, and how conflicts between the winners and losers are resolved. Conflict over distribution is shaped by the formula used to allocate assets during privatization which often depends on social norms of equity and fairness that prevail in a community (Mwangi & Meinzen-Dick, 2009:307).

Since different allocation mechanisms distribute assets in different ways, the actors attempt to influence the process of property-rights change in ways that accord them maximum advantages. Those likely to be disadvantaged organise to oppose change. Those likely to benefit under the new arrangement support it. Actors engage those institutions, both formal-legal and customary, that they perceive will be responsive to and best express their claims. Conflict is reduced and change is more likely when the anticipated aggregate benefits are large, interests are more homogenous, and the distribution of wealth under the proposed change is equalised.

To end distributional conflict and realise new property arrangements, some actors may call on the authority of the state. Alternatively, powerful actors with a relative bargaining advantage may constrain others to comply with new institutional rules. Because of their resources, powerful actors can make credible commitments during bargaining and may even threaten retaliation. Weaker parties thus may be pressured to accept less preferred property rights.

According to Ostrom (2004:1), “[c]ollective action occurs when more than one individual is required to contribute to an effort in order to achieve an outcome”. Most of the time it becomes a problem to prohibit non-members from benefitting from the collective good. Human beings maximise their utility more than maximising collective action, and therefore they benefit without paying the costs. This leads to benefits for collective action not being achieved at all. Property right regimes may be able to assist in defeating the difficulties that may be experienced as a result of collective action, although aforesaid regimes do not consistently require external assistance (Hutton & Pitcher, 1998). Sometimes, instead of policymakers helping to assist in the collective action, problem they make it worse. Therefore, to overcome the collective action problem, participants firstly have to have an agreement that the problem is important. Secondly, some sort of independence is required, in which a group takes collective action on its own or within an enclosed institutional situation, although this may depend on the substantial political institutional environment in which the people find themselves. In previous attempts by a number of indigenous group to commence collective action, many were futile.

There has to be trust among the members about their reliability and readiness to use broad strategies of mutual benefit. If there is mistrust in the group, then they will not be willing to start collective action if people do not desire mutual benefit. Transaction costs that should be paid before considering the probable solutions are also curbed if there is support from local leaders and previous organisational expertise. “Imposing top-down, detailed prescriptions for ‘solving’ collective action problems by policymakers located far from particular collective action problems has rarely been a successful strategy” (Ostrom, 2004:2).

According to (Ostrom, 2004:2), authorities can nonetheless accomplish a great deal by

- “providing accurate information about natural resource systems, such as groundwater replenishment rates, geological structure, and long-term precipitation records;
- Recording key information about the behaviour of wildlife and fisheries not available to local users;
- Providing arenas for low-cost conflict resolution;
- Designing mechanisms for discourse and debate by local users in their effort to learn from one another and discover new strategies;
- Disseminating information about successful organizations and the design principles that characterize them; and
- Creating institutional mechanisms that local participants can use to organize themselves, such as through special districts, private associations, and local/regional governments.”

The key factors that lead to good management of common-pool resources to succeed include a community-wide understanding of the value and scarcity of the resource; good communication among community members; an effort to monitor whether rules are being followed; and a credible system of sanctions ( Kura, Revenga, Hoshino & Mock, 2004).

### **3.6. Regulatory, policy and organisational frameworks for aquaculture in South Africa**

In South Africa, different institutions have a mandate that has an impact on aquaculture. These organisations include government departments such as the DAFF, the Department of Environmental Affairs (DEA), the Department of Water Affairs (DWA) and the Department of Trade and Industry (DTI), as well as farmer associations such as the finfish farmers’ association, the abalone farmers’ associations, and research institutions. In 2009 and 2010, South African aquaculture management and administration went through some changes. The aquaculture sector was administered by two departments, viz. the Department of Environmental Affairs and Tourism (DEAT) and the Department of Agriculture (DoA), which were regulating marine aquaculture and freshwater aquaculture respectively (Hinrichsen, 2008). Nonetheless, both the departments were restructured, leading to one

chief agent for aquaculture management and administration called the Department of Agriculture, Forestry and Fisheries (DAFF, 2011). In terms of aquaculture as an industry in the Eastern Cape, the province currently ranks second, behind the Western Cape, in terms of the growth and development. Successful commercial operations have proved that the Eastern Cape is an ideal location for fin-fish aquaculture. In the past five years a number of investments into aquaculture in the province have proved the viability and potential for this type of production. The availability of suitable land-based sites for production, the water temperature and the location of industrial development zones (in East London and Port Elizabeth) all contribute to a favourable growth and production environment.

The Constitution and the Marine Living Resource and Administrative Justice Acts are essential in the governance of the aquaculture subsector, as they affect the public socially and economically. For instance, if the rights to fish are not clear to the public, then that conflicts with the Constitution and the Administrative Justice Act, which could result in resources not being distributed efficiently, hence the economy and welfare of the people will be affected negatively (Sauer, Hecht, Britz & Mather, 2003).

South African environmental legislation and regulations for the aquaculture sector are complex and difficult for the sector to implement. Producers are not satisfied by the regulations and legislation because of factors such as fragmented bureaucracy and inefficient permitting processes. There is nothing much that has been done by the institutional arrangements to help producers comply with the legislation, for example inefficient permitting, environmental impact assessment (EIA) processes, and strategic environmental assessments that take too long (Britz, 2007). Regardless of South Africa's inadequacy in broad aquaculture policy and legislation, the sector has organisational arrangements that are well developed and that fortify the mariculture sector, although in an uncoordinated way (Shipton & Britz, 2007).

### **3.6.1. Marine Living Resource Act, 1998 (Act No. 18 of 1998)**

The Marine Living Resources Act provides for the sustainable, long-term use of living marine resources while maintaining orderly access; and for these purposes to provide for the exercise of control over

marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith. It is stated in the Act that the Minister shall exercise any power under this Act with regard to the following objectives and principles:

(a) The desideratum to achieve optimum utilization of ecologically sustainable development of marine living resources; (b) the desideratum for marine living resources both to preserve the present and future generations; (c) the intent for mundane approaches to the management and development of living marine resources; (d) the desideratum to utilize marine living resources for economic magnification, development of human resources, capacity building within fisheries and mariculture branches, job engenderment and a sound ecological balance consistent with achieving the goals of the national regime development; (e) the desideratum to safeguard the ecosystem holistically, including species not for exploitation; (f) the desideratum for marine biodiversity; (g) the need to reduce marine pollution; (h) the desideratum to achieve to the extent practicable a broad and accountable participation in the decision-making process provided for in this Act; (i) any pertinent obligation of the national regime or the Republic in terms of any international acquiescent or applicable rule of international law; and (j) the desideratum to restructure the fishing industry for historical imbalances and equity within all branches of the fishing industry.

Clauses 13 and 18 of the Act require that individuals apply for a sanction to exercise commercial farming, subsistence farming, mariculture, fishing settlement and recreational fishing. The Minister may additionally require an individual to conduct an environmental impact assessment submitted by the applicant (The Marine Living Resource Act (18 of 1998a)).

### **3.6.2. National Environmental Management: Integrated Coastal Management (Act No. 24 of 2008)**

This Acts purports to establish a system of incorporated coastal and estuarine management in South Africa, with the inclusion of norms, standards and policies. This helps to promote the conservation of the coastal environment and maintain the natural features of coastal landscapes and seascapes. It also

ensures that development and the utilisation of natural resources within the coastal zone are socially and economically justifiable, that there is no dumping at sea, that pollution in the coastal zone is prevented, that there is no inopportune development of the coastal environment or other deleterious effects on this environment.

The Act's objectives are: (a) to determine the coastal region of the Republic; (b) to provide, within the framework of the National Environmental Management Act, for the coordinated and integrated management of the coastal zone through all levels of the regime in accordance with the principles of cooperative management; (c) to preserve, elongate and improve the status of coastal public property as held in trust by the State on behalf of all South Africans, including future generations; (d) equitable access to the opportunities and benefits of coastal environment a and (e) to implement the Republic's obligations under international law with regard to coastal management and marine environment. Chapters 7, 8, 9, 10 and 11 state to what the Act applies, how the coastal environment is managed and protected, what the actions are to be taken if there is noncompliance with the Act, and provides the general powers and duties the Minister and Member of the Executive Council (MECs) (The National Environmental Management: Integrated Coastal Management Act (24 of 2008)).

### **3.6.3. National Environmental Management Act (NEMA) (Act No. 107 of 1998)**

This Act aims to "provide for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environment functions exercised by organs of state; and to provide for matters connected therewith". Chapters 2, 3, 4, 5, 6, 7 and 8 deal with questions of how the abovementioned institutions are established, their objects and functions; the procedures for cooperative governance; the steps in fair decision making and conflict management; the objectives and implementation of integrated environmental management; the international obligations and agreements; compliance steps and enforcement if there is no compliance; and how the environmental management cooperation agreements are concluded (The National Environmental Management Act (107 of 1998b)).

#### **3.6.4. National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004)**

The goal of this Act is to provide for the management and conservation of South Africa's biodiversity, and furthermore to conserve species and ecosystems that necessitates national guidance. It also is intended to ascertain that there is sustainable utilisation of indigenous biological resources and that benefits that arise from bio-prospecting involving indigenous biological resources are shared fairly and equitably. Chapter 3 shows that the Act provides for integrated and coordinated biodiversity, monitoring the conservation status of sundry components and the promotion of biodiversity research.

Chapter 4 provides steps for how to preserve threatened species, obviation and the utilisation and introduction of exotic species and how to administer them. It also relates to the control of alien and invasive species and to warrant that the utilisation of biodiversity is managed in an ecologically favourable way to ascertain the maintenance of their ecological integrity; and protection to ascertain their survival in the wild.

Chapters 5, 7 and 9 designate how the introduction of alien species is restricted and managed. The chapters outline how an individual applies for to introduce alien and invasive species and what the penalties are in the case of an offence (The National Environmental Management: Biodiversity Act (10 of 2004)).

#### **3.6.5. Marketing of Agricultural Products Act (Act No. 47 of 1996)**

This Act "provides for authorisation for the establishment and enforcement of regulatory measures to intervene in the marketing of agricultural products, including the introduction of levies on agricultural products; to establish a National Agricultural Marketing Council; and to provide for matters connected therewith". This Act outlines that the Minister has a right to introduce levies on agricultural products and also mentions what procedures a business enterprise has to follow when it wants to export goods. The Act mentions what measures are to be taken when there is non-compliance. This is important for a community that will be practising aquaculture, as they may want to export their products in the near future (The Marketing of Agricultural Products Act (47 of 1996b)).



### **3.6.6. Animals Protection Act (Act No. 71 of 1962)**

This Act aims to consolidate and amend the laws relating to the prevention of cruelty to animals. The Act lists possible offences by any person and what action would be taken against him/her (for instance a person may be convicted or he/she may pay damages to the court). Some offences listed in the Act that are important for aquaculture activity, but are not limited to aquaculture, include that action will be taken against someone who: “(a) overloads, overdrives, overrides, ill-treats, neglects, infuriates, tortures or maims or cruelly beats, kicks, goads or terrifies any animal; or (b) confines, chains, tethers or secures any animal unnecessarily or under such conditions or in such a manner or position as to cause that animal unnecessary suffering or in any place which affords inadequate space, ventilation, light, protection or shelter from heat, cold or weather; or (c) unnecessarily starves or under-feeds or denies water or food to any animal; or (d) lays or exposes any poisoned fluid or edible matter or infectious agents except for the destruction of vermin or marauding domestic animals or without taking reasonable precautions to prevent injury or disease being caused to animals” (The Animals Protection Act (71 of 1962)).

### **3.6.7. Communal Property Association (Act No. 28 of 1996)**

The objective of this Act is to “enable communities to form juristic persons, to be known as communal property associations in order to acquire, hold and manage property on a basis agreed to by members of a community in terms of a written constitution; and to provide for matters connected therewith”. According to the Act, a community must register for the communal property association and then, if their application is successful, the agreement must be in accordance with their constitution. The constitution must accommodate everyone in that it must be fair and equitable for everyone, decision making must be done by all the members of the community and there must be accountability. If there are disputes between the members there have to be grievances procedures. This is very important for communities that are practising aquaculture as there will be conflicts among members, thus they should know what they should do when that happens (The Communal Property Association Act (28 of 1996a)).

### **3.6.8. National Water Act (Act No. 36 of 1998)**

The National Water Act, No 36 of 1998 is the primary legislation that regulates the use of water bodies for aquaculture. The Act gives the government the responsibility to ensure that water is fairly accessed and distributed and the mandate to ensure that water is used in a sustainable manner. This Act is essential for the aquaculture sector, as the sector depends primarily on water. It regulates the pollution of water in the coastal environment and shows what non-compliance measures are to be taken. These regulations and legislation summarily reviewed here may affect aquaculture positively or negatively. Positively it will encourage and develop the aquaculture industry, while negatively it will be influenced by the different and large number of these laws and policies that apply to the sector and the several government authorities that are involved in the administration of the sector. The general view is that this uncoordinated legal framework and overregulation might be hampering the development of the sector instead of being an enabling environment for the sector (The National Water Act (36 of 1998c)).

### **3.7.Operation Phakisa**

The government has identified the aquaculture sector as one of the priority sectors through Operation Phakisa. . Hamburg aquaculture Cooperative and other 24 aquaculture projects, forms part of Operation Phakisa: Ocean's Economy, which is an initiative by the government aims to implement priority economic and social programmes better, faster and more effectively The DAFF identified several aquaculture projects that aim to empower coastal communities through the transfer of technology, skills development and employment. The idea is to hand these over to communities as part of DAFF's strategic objectives and goals, which are rural development support, food security and the creation of employment. DAFFs aim is to empower these coastal communities through the transfer of technology, skills development and job creation.

### **3.8. Aquaculture provincial agencies**

#### **3.8.1. Eastern Cape Development Corporation (ECDC)**

The Eastern Cape Development Corporation (ECDC) is a dynamic economic development agency in the Eastern Cape. The agency works with provincial and national ministries, municipalities, chambers, private business, communities and other development agencies to implement the economic development policies of the Eastern Cape provincial government. The objective of the agency is to plan, finance, co-ordinate, market, promote and implement the development of the Eastern Cape Province and all its people in the fields of industry, commerce, agriculture, transport and finance. The Eastern Cape government owns ECDC facilitates a number of projects and investments in different sectors throughout the Eastern Cape. Regarding its role on aquaculture investment, ECDC facilitated the Seark shrimp farming project in the Coega Industrial Development Zone (IDZ); a kob hatchery in the East London IDZ; the expansion of a successful abalone farm on the Eastern Cape east coast; a marine caged fin-fish project in the Nelson Mandela Bay; and an in-land kob farming operation 30km outside East London (The Eastern Cape Development Corporation , 2015).

#### **3.8.2. Western Cape Aquaculture Development Initiative (WCADI).**

In the Western Cape the agency that deals with the development of aquaculture is the Western Cape Aquaculture Development Initiative (WCADI). It channels the implementation and coordination of aquaculture in the Western Cape. WCADI is a stakeholder created and driven Public Private Partnership (PPP) with ownership and control equally shared between the industry, labour, civil society and government (Shalala, 2013).

WCADI has multi-faceted and multi-year responsibilities, roles and functions. One of its roles is to make strategic interventions in the Aquaculture Value Chain. WCADI worked to implement the Western Cape Aquaculture Strategy (WCAS), and the National Aquaculture Strategic Framework (NASF). Some of WCADI successes and current projects include setting up a complete institutional entity and delivery mechanism which is implementing projects with the full cooperation of the aquaculture sector, the Matzikama Municipality worked with (WCADI) to assess and develop the

aquaculture potential of the Matzikama Municipality. An aquaculture project on the South of the Olifants River in the Doring Baai Node, worked with the FAO and DAFF on the overall development of the freshwater aquaculture sector in South Africa, facilitated the funding and establishment of five black owned aquaculture farms is also promoting and developing community-public-private sector aquaculture (Shalala, 2013).

### **3.9.Lessons from Small-scale Fisheries Policy of South Africa**

Some lessons within the Small-scale Fisheries Policy of South Africa (2012) with regard to the legal entity that would be useful for community based aquaculture setting are as follows: The policy for the small scale fisheries sector in South Africa addresses some, but not all, of the current challenges for small-scale fishers on the ground. The need for someone who is going to monitor the community has been integrated in the policy however, the policy does not state whether the monitors have the power to arrest or distribute fines, and it is not clear how they will be empowered in the absence of such authority. Co-management has been labelled an integral strategy to fisheries development for several years, and the policy proposes that ‘every small scale fishing community establish a community-based legal entity within which fishers can operate ‘and that the resources will be managed in terms of a community-based co-management approach to ensure that the resources are used in a sustainable way.

It further recognises that members of a community based legal entity should have flexibility in making decisions. Although the policy addresses some of the current challenges on the ground for small-scale fisheries, not all of them have been integrated. The policy was designed from a national level, but the context of small-scale fisheries in each of the provinces in South Africa varies significantly (Stern, 2013)

### **3.10. Skills and training in aquaculture**

A number of aquaculture fields use aquaculture systems and technologies that still are under development and changing rapidly. As such, in an emerging aquaculture sector, people who are qualified to use the systems and technologies utilised in aquaculture should be accessible. The transfer

of knowledge of and skills in aquaculture could be conducted through demonstrations, pilot projects and training courses focusing more on the practical side, and this possibly will be the most effective approach for transferring the skills and capacity needed in the sector (FAO, 2014).

Customary teaching approaches such as the theoretical approach to aquaculture being taught by one expert to a gathering of farmers is needed, although teaching should be restricted to this. Hands-on training would also be important, such as the trainer helping a small number of farmers to execute the production themselves, and also to use the technologies that are conducive for the programme. Not all the farmers have to be selected for training; a number of them who are influential in their communities can be selected. There is an urgency to train and capacitate human resources, such as technicians and graduates so as to support the farmer in areas such as disease management, feed management, and technology and seed production (Botes, 2007; SARNISSA, 2010). Some higher education institutions such as universities and colleges offer aquaculture training programmes (Botes, Thompson & Louw, 2006). It is essential that government offer support to the aquaculture sector by offering funding and other forms of assistance (FAO, 2014).

Support in the form of training and extension via the state and NGOs (non-governmental organisations) is usually obtainable. NGOs often are well placed to integrate aquaculture into their existing activities in communities. Alternatively, the private sector can be used to train independent farmers. Larger companies generally offer training to communities and develop new technologies in the aquaculture industries. Nevertheless, the overall health of the aquaculture sector depends on support from all the stakeholders. Well-informed small-scale farmers who produce efficiently benefit the whole aquaculture industry in the particular country.

In the Vezo community in Madagascar, for example, the community is trained in several key areas in order to minimise challenges such as management skills, marketing and other challenges. The key areas in which training takes place include i) basic accounting and financial management, ii) business

planning and development, and iii) leadership and team training to assist in managing shared tasks within farming groups (Blue Ventures, 2006).

Parker (2012) points out that aquaculture jobs range from those closely related to aquaculture, to those that support aquaculture, for example training, production, and marketing, inspecting and feeding. Therefore, this means training and skills differ according to the type of job that is done. Skilled and unskilled workers can do their jobs depending on the type of skill and training they possess.

## **Chapter 4: Research Methodology**

### **4.1. Introduction**

The aim of this study was to investigate the appropriate institutional and organisational arrangements for community-based aquaculture. Secondly, food markets are consumer driven. Thus the development of community-based aquaculture in South Africa should be consumer driven instead of being technology driven. Thirdly, aquaculture is highly technical and capital intensive. Therefore this study investigated the markets, value chains and the skills and investment levels for successful community-based aquaculture. This was undertaken mainly through the use of an empirical case study-based qualitative approach, semi-structured interviews, secondary data and focus group discussions. This subsequently led to evidence-based recommendations for the development of sustainable community-based in South Africa. This chapter outlines the research methodology, the research design, and provides the justification for the specific research design and methods utilised.

According to Kothari (2004), it is essential for a researcher not only to choose the appropriate method of research, but also to know the relevance of the method or technique and to justify why other methods are not appropriate. The location of where this study was undertaken, the design of the study, the population and sample are described. The method used in the collection of data and the clarification of procedures used in the analysis of data are discussed.

Denscombe (2011) states that researchers need to take decisions about the strategy of their research in order for their research project to be completed successfully. The author further states that a research strategy is a plan of action designed to achieve a specific goal. To decide on the strategy that is most appropriate, the researcher needs to assess the suitability, feasibility and ethicality of each strategy. Therefore a researcher needs to select a research strategy that will yield the best results for achieving the research objectives and give reasons for the choice of that particular strategy.

## 4.2. Research approach and design

Kerlinger (1986:279) defines a research design “as a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems”. According to (Babbie, 2007), a research design is a plan for how a researcher aims to carry out a research. Therefore a function of research design is to answer the research questions, the planning and results aimed at, and the evidence required to address the research question (Babbie, 2007; Kumar, 2005). A qualitative approach was applied when the conducting research. The qualitative approach used included semi-structured interviews, questionnaires and focus group discussions. “Qualitative approaches are used to address research questions that entail the explanation or understanding of social phenomena and their contexts (Ritchie, Lewis, Nicholls & Ormston 2013).

### 4.2.1. . The case study strategy

The use of the case study method is one of the qualitative research methods. Merriam (1988:9) defines a case study as an “examination of a specific phenomenon, such as a program, an event, a person, a process, an institution or a social group” Yin (2009:18) defines a case study as an “empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are indistinct”.

There are three types of case studies, namely intrinsic, instrumental and collective case studies (Stake, 1995). An intrinsic case study is when a researcher is only interested in one case when there are expectations that the results from the case will have implications for other case studies. An instrumental case study is a study of a single case while interested in understanding the general case of the study. A collective case study is when a researcher compares multiple case studies with one research study (Stake, 1995).

Yin (2009:8-9) classifies three types of case studies: “explanatory, descriptive and exploratory”. “An explanatory case study answers the questions of how, or why, the researcher’s control over actual events is minor and the focus of the research is on the phenomena in some real life context (Shields, n.d)..” Descriptive case studies look at a sequence of interpersonal events over time, describe a culture or sub-



culture and seek to discover key phenomena. Exploratory case studies usually answer questions of ‘what’ or ‘who’, often signalling a more in-depth study using other methods (Babbie, 2010; 2012). Case study research can be done on a single unit, for example an individual, or on multiple variables, such as a family, community, organisations and institutions, relationships, countries and nations (Babbie, 2007).

There have been criticisms or misunderstandings of case studies. These misunderstandings include that, general theoretical knowledge is more valuable than concrete practical knowledge, case study cannot contribute to the scientific development, and the case study is most useful for generating hypothesis while other methods are more suitable in hypothesis testing and theory building. The case study contains a bias towards verification. It is difficult to summarise and develop general prepositions and theories on the basis of case studies” (Flyvbjerg, 2006:221). Despite these criticisms, (Yin, 2009) argues that case studies are used for scientific generalisation. In studying events, the case study method uses multiple methods of data collection such as interviews, observation and documentary reviews. Moreover, case studies focus on a specific situation or phenomenon and offer insights into the phenomenon under study (Denscombe, 2011).

Three cases were selected so as to seek to uncover interpretive stance, which seeks to uncover truth by understanding the phenomena in their real-life context. Therefore this approach was chosen to meet the objectives of the study, namely to explore what consumer markets exist or can be created for aquaculture products from community-based aquaculture in South Africa; to investigate the technical (skills and know-how) and investment requirements for community-based aquaculture in South Africa; and to evaluate the appropriate institutional arrangements for community-based aquaculture in South Africa. The case study method was used because the researcher was able to use multiple methods of data collection such as interviews, observation and questionnaires. Also because the researcher knew ahead of time that the sample size is going to be small. The case study was used because it is possible to generalise from only one case or few cases.

#### 4.2.2. Location of the study sites

This study was conducted using cases studies of community-based aquaculture at three sites, namely the Siyazama Aquaculture Cooperative Project at Hamburg in the Eastern Cape, the Imbaza Mussel Farming Project at Saldanha Bay in the Western Cape, and the Camdeboo Satellite Aquaculture Project at Camdeboo, Graaff-Reinet in the Eastern Cape. Figure 8 shows the geographic location of the three sites. Summary descriptions of the three sites are given below.



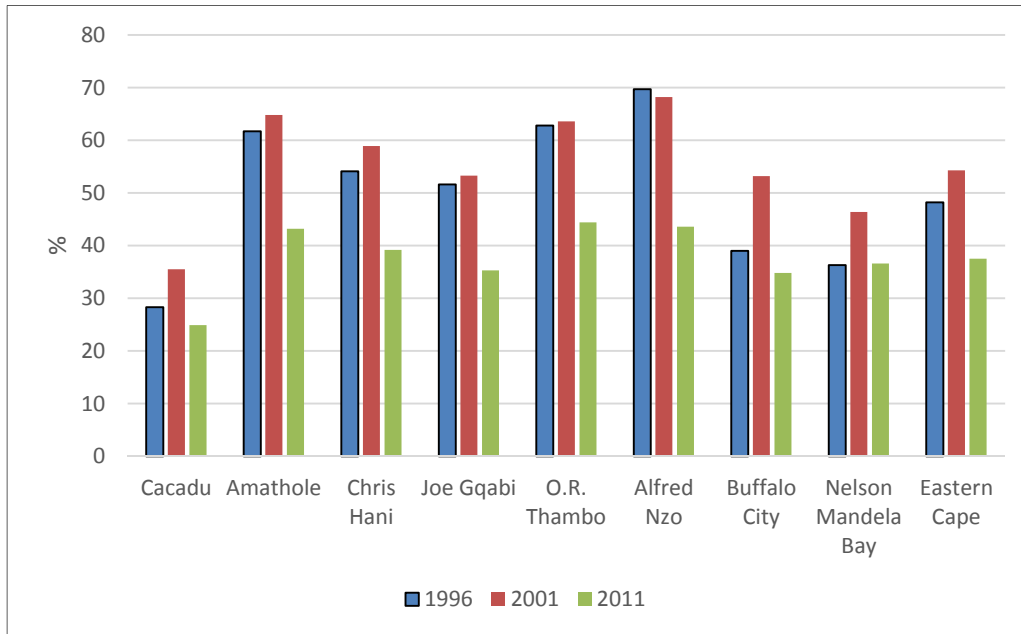
**Figure 8:** Study sites (Graaff-Reinet, Saldanha Bay and Hamburg)

Source: (AfriGIS, 2014)

##### 4.2.2.1. Hamburg

Hamburg is a small town situated on the coast between East London and Port Alfred. It is named after Hamburg in Germany and was established by the members of the British-German Legion. According to Statistics South Africa (2012a), Hamburg has 1348 inhabitants. Hamburg covers a total area of 10.85 km<sup>2</sup> and falls under the Ngqushwa local municipality (Statistics South Africa, 2012a). The town is situated approximately 85 km from East London. The majority of the members of the Hamburg community engage in a primarily subsistence lifestyle through herding cattle and small-scale agriculture. In addition, most of the local population practises fishing and collecting of other living marine resources in the intertidal zone, and also is involved in abalone poaching (ASCLME, 2011).

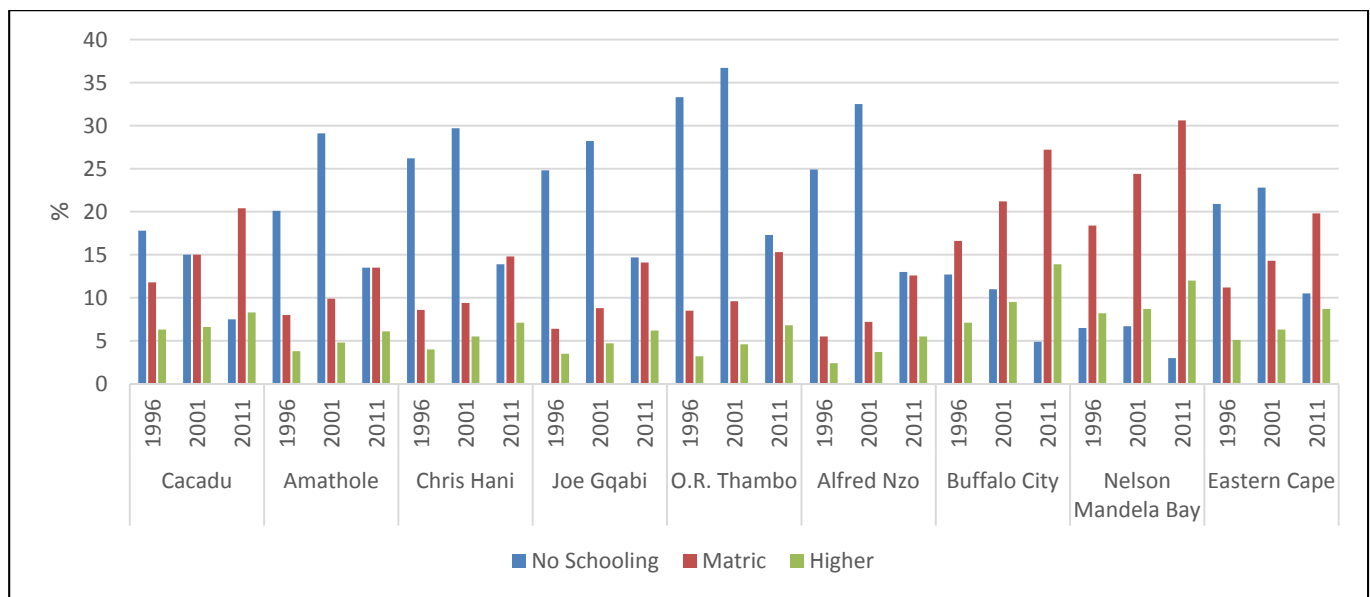
Figure 9 shows that the Amathole District's unemployment rate decreased by nearly 20% between 1996 and 2011, although it still exceeds the average rate of the Eastern Cape Province. The unemployment rate of the Ngqushwa local municipality is 53, 1% - higher than the average for both Amathole and the Eastern Cape in 2011.



Source: Based on Statistics South Africa (2012a)

**Figure 9:** Unemployment rate by district municipality (Amathole)

Figure 10 shows that, in the Amathole District under which the Ngqushwa Local Municipality falls, the population with no schooling aged 20 and older decreased between the years 1996 and 2011, and the number of people with Grade 12/Standard 10 and higher has increased.



**Source:** Based on Statistics South Africa (2012a)

**Figure 10:** Distribution of the population: education and district municipality (Amathole)

Table 3 shows that the number of people who have never been to school in the Ngqushwa local municipality has decreased and the number of people with some primary education and some secondary school has increased, although people with higher education decreased between 2001 and 2011.

**Table 3:** Ngqushwa local municipality education level attained and sex: 1996-2001 and 2011

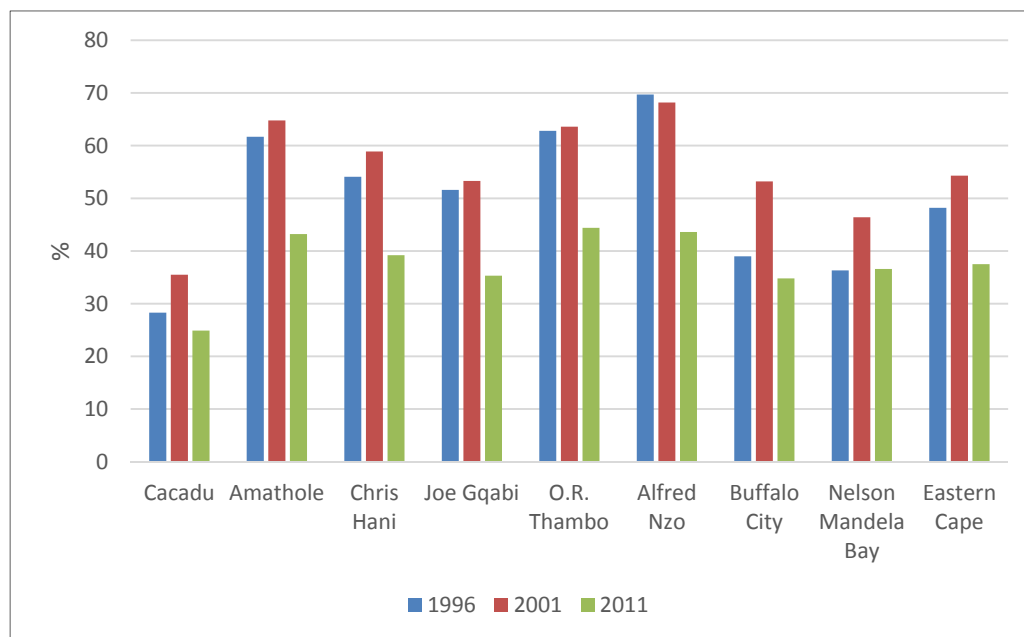
	1996			2001			2011		
Ngqushwa Municipality	Male	Female	Total	Male	Female	Total	Male	Female	Total
No schooling	4 624	8 535	<b>13 158</b>	4 961	8 971	<b>13 932</b>	1 899	4 015	<b>5 914</b>
Some primary school	5 023	4 974	<b>9 997</b>	4 768	4 629	<b>9 397</b>	5 118	4 985	<b>10 104</b>
Completed primary	1 941	2 478	<b>4 419</b>	1 705	1 942	<b>3 647</b>	1 727	2 025	<b>3 752</b>
Some secondary	5 374	7 393	<b>12 767</b>	5 378	6 333	<b>11 711</b>	6 890	8 280	<b>15 170</b>
Grade 12/Std 10	1 209	1 803	<b>3 012</b>	1 929	2 692	<b>4 521</b>	2 677	3 773	<b>6 450</b>
Higher	437	717	<b>1 154</b>	633	1 137	<b>1 770</b>	601	1 069	<b>1 670</b>
<b>Total</b>	<b>18 608</b>	<b>25 899</b>	<b>44 507</b>	<b>19 317</b>	<b>2 504</b>	<b>45 077</b>	<b>18 913</b>	<b>24 148</b>	<b>43 061</b>

**Source:** Based on Statistics South Africa (2012a)

#### 4.2.2.2. Graaff-Reinet

Graaff-Reinet is the fifth oldest town in South Africa. The town lies on the N9 between Middelburg and Aberdeen. The population of the town was 35 672 in 2011 (Statistics South Africa, 2012a). Graaff-Reinet covers an area of 203.6 km<sup>2</sup>. The local municipality of the town is Camdeboo. The Graaff-Reinet economy is based on tourism, game farming and traditional stock like Merino sheep and Angora goats. The aquaculture project is located in the Cacadu District. Camdeboo Satellite Aquaculture Project was started by Camdeboo Bream, which partnered with Aquaculture Innovations for technical expertise. The main economic sectors of the Camdeboo are agriculture (wool, mohair, crops and red meat production) and tourism (The Plains of Camdeboo, 2013). The unemployment rate in the municipality is 24, 9% (Statistics South Africa, 2012a).

Figure 11 shows that, in the Cacadu District in which Camdeboo Municipality is located, unemployment decreased between 1996 and 2011.

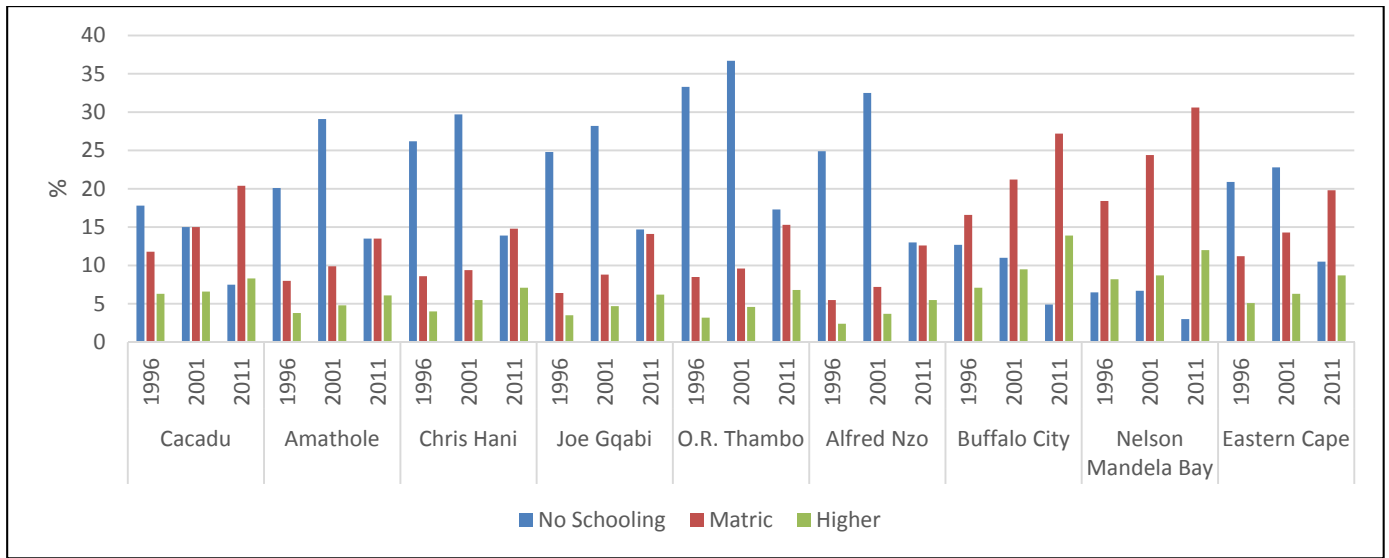


**Figure 11:** Unemployment rate by district municipality (Cacadu)

(Source: Statistics South Africa, 2012)

The unemployed population rely on government support grants. As a result, a high proportion of the local people, especially young school leavers and farmworkers, have never actually been part of a workforce nor attended the workplace every day, learning the self-discipline and team mentality necessary to hold down a job.

Of the population of Cacadu, 9% of the people who are 20 years and older have no schooling at all, and 9.50% are semi-literate. It can be seen in Figure 12 that the number of people in Camdeboo that have no education has decreased over the years, and the number of people with Grade 12 and higher has been increasing.



**Source:** Based on Statistics South Africa (2012a)

**Figure 12:** Distribution of the population: education and district municipality (Cacadu)

Table 4 below shows that the number of people who have never been to school, who have some primary education and who have completed primary school in the Camdeboo local municipality have generally been decreasing, while the number of people with matric and higher education increased between 1996 and 2011.

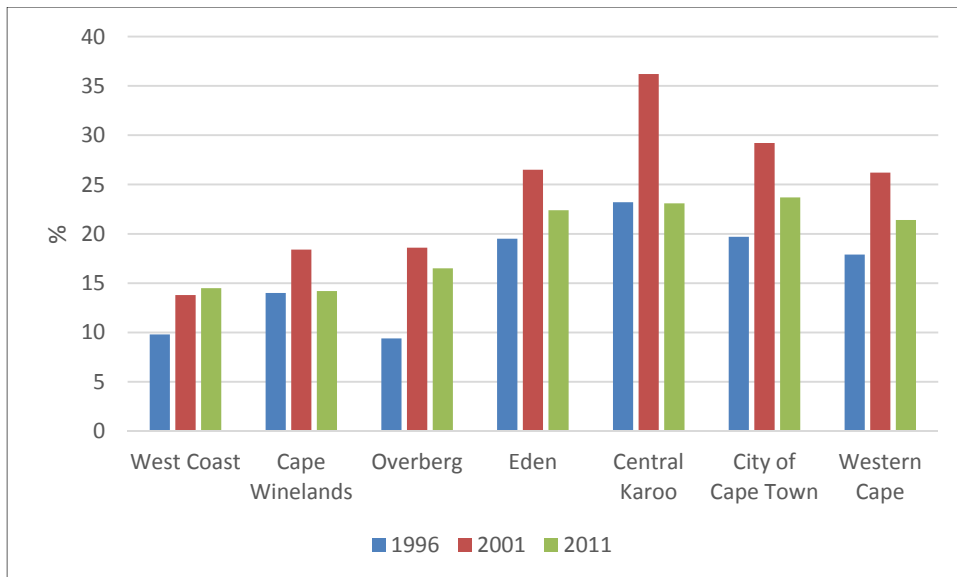
**Table 4:** Camdeboo local municipality – education level attained and sex 1996, 2001 and 2011

	1996			2001			2011		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
No schooling	1 975	2 412	<b>4 387</b>	1 784	2 091	<b>3 875</b>	1 248	1 350	<b>2 598</b>
Some primary	2 901	3 512	<b>6 413</b>	3 049	3 669	<b>6 718</b>	2 444	2 846	<b>5 291</b>
Completed primary	1 013	1 306	<b>2 319</b>	1 152	1 322	<b>2 474</b>	1 11	1 328	<b>2 445</b>
Some secondary	3 055	3 640	<b>6 695</b>	3 323	3 805	<b>7 128</b>	4 722	5 313	<b>10 035</b>
Grade 12/ Std10	1 510	1 470	<b>2 980</b>	1 972	2 104	<b>4 076</b>	2 796	2 838	<b>5 634</b>
Higher	761	758	<b>1 520</b>	713	831	<b>1 544</b>	1 234	1 504	<b>2 738</b>
<b>Total</b>	<b>11 215</b>	<b>13 098</b>	<b>24 314</b>	<b>11 992</b>	<b>13 822</b>	<b>25 814</b>	<b>13 562</b>	<b>15 179</b>	<b>28 740</b>

**Source:** Based on Statistics South Africa (2012a)

#### 4.2.2.4. Saldanha Bay

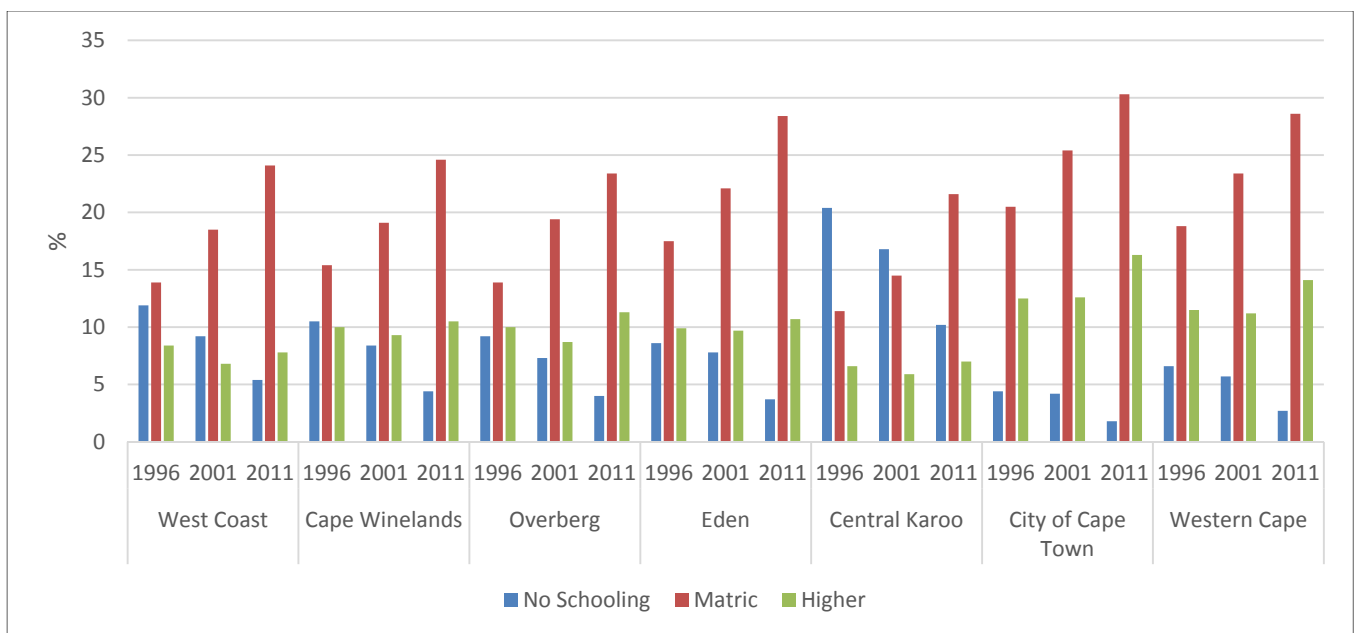
Saldanha, which is also known as Saldanha Bay, is situated on the West Coast of the Western Cape Province. Saldanha Bay is named after Antonio de Saldanha, who was a Portuguese admiral (Saldanha Bay Local Municipality, 2013). The town falls under the Saldanha Bay Municipality. Saldanha is important for the export of iron ore and offers industries such as crayfish, mussel, oyster and seaweed harvesting and also is home to the South African Military Academy and the SAS Saldanha Naval Base. Saldanha covers an area of 17.36 km<sup>2</sup>. The municipality had a population of 99 193 inhabitants in 2011 (Statistics South Africa, 2012). The percentage of unemployment in the municipality was 23, 1% in 2011(Statistics South Africa, 2012b). Figure 13 shows the percentage distribution of the population between the ages of 15 and 64 by unemployment status of the district municipalities in 2011, and it can be seen that the unemployment rate in the West Coast District, under which Saldanha Bay Municipality falls, has been increasing over the years. The 2011 census also notes that the unemployment rate for the Saldanha Bay Municipality (23, 1%) exceeded the average unemployment rate of the Western Cape Province (21, 4%).



**Source:** Based on Statistics South Africa (2012b)

**Figure 13:** Unemployment rate by district municipality (West Coast)

We can see in Figure 14 that the West Coast Municipality population that has no schooling decreased over the years from 1996 to 2011, while the number of people with matric and higher increased.



**Source:** Based on Statistics South Africa (2012b)

**Figure 14:** Distribution of the population: education and district municipality (West Coast)



**Table 5:** West Coast local municipality education level attained and sex 1996, 2001 and 2011

	<b>1996</b>			<b>2001</b>			<b>2011</b>		
	Male	Female	<b>Total</b>	Male	Female	<b>Total</b>	Male	Female	<b>Total</b>
No schooling	8 230	7 955	<b>16 185</b>	8 086	8 093	<b>16 179</b>	6 512	6 556	<b>13 067</b>
Some primary	15 728	14 966	<b>30 694</b>	19 617	18 552	<b>38 169</b>	20 070	20 108	<b>40 178</b>
Completed primary	7 470	7 738	<b>15 208</b>	5 571	9 628	<b>18 499</b>	9 397	10 409	<b>19 806</b>
Some secondary	21 874	21 730	<b>43 604</b>	28 714	29 849	<b>58 563</b>	45 832	46 272	<b>92 104</b>
Grade 12/ Std10	9 434	9 533	<b>18 968</b>	16 227	16 212	<b>32 439</b>	27 969	29 620	<b>57 589</b>
Higher	5 860	5 628	<b>11 488</b>	5 958	5 903	<b>11 861</b>	10 000	9 801	<b>19 802</b>
<b>Total</b>	<b>68 596</b>	<b>67 551</b>	<b>136 147</b>	<b>87 473</b>	<b>88 238</b>	<b>175 711</b>	<b>119 781</b>	<b>122 766</b>	<b>242 546</b>

**Source:** Based on Statistics South Africa (2012b)

Table 5 shows that the number of people who have never been to school in the West Coast local municipality have been decreasing, and the number of people who have some primary education, some secondary and higher education has increased over the years.

### 4.3. Data collection

The main data collection techniques used in this study were semi-structured interviews, group discussion, one-on-one interviews, observation, questionnaires and secondary sources.

#### 4.3.1. . Interviews

An interview is a good method of data collection, especially if the researcher is more interested in a one-on-one verbal interaction between the researcher and the respondent (Miles, & Huberman, 1994).

The advantages of using an interview are (Denscombe, 2011):

- Interviews are flexible, i.e. a researcher can ask questions as they come to mind on the issue being investigated
- In semi-structured interviews, the interviewer knows the issues to be addressed and questions to ask well and, at the same time, there is a clear list of issues to be addressed and questions to be answered. However, the interviewer is ready to vary the order in which the questions are asked;
- The answers are open ended, therefore the interviewee can elaborate on the answers if need be;
- Depth of information, i.e. topics can be dealt in depth and detail;
- High feedback rate because interviews are pre-arranged and scheduled for a convenient time, hence the high response rate;
- Validity of data, because it can be checked for accuracy and relevance as it is collected; and
- Interviews are more suitable for complex situations.

A focus group interview comprises a small group of people who are brought together to explore their attitudes and perceptions, feelings and ideas about a topic (Denscombe, 2011). The distinct features of focus groups are (Denscombe, 2011):

- There is a focus for the session, with the group discussion being based on experiences or items about which interviewees have similar knowledge;
- Emphasis is placed on the interaction within the group; and
- The researcher's role is to facilitate the group discussion, not to lead the discussion.

In this study, the farm officials were contacted and an agreement on the time and venue for the interviews was set. The researcher interviewed the beneficiaries, shareholders and owners. The interviews were conducted in Xhosa and English, depending on the interviewee's language preference and fluency. The individual interviews took between 30 minutes and an hour, while focus group

discussions took longer – up to two hours in some instances. The interviewees were told about the aim of the research and the origins of the research interest. Interviewees were asked about their background and their role as it relates to the project. The interviewees were then asked specific questions relevant to the research questions of this study. The researcher took notes during the discussions and interviews.

Figure 15 below shows the researcher with a focus group.



**Figure 15:** Focus group discussion at Hamburg

#### **4.3.2. . Simple/non-participant observation**

Kumar (2005:120) defines observation as a purposeful, systematic and selective way of watching and listening to an interaction or phenomenon as it takes place. Babbie and Mouton (2007) distinguish between two types of observation, viz. simple/non-participant observation and participant observation. In simple observation, the researcher remains an external observer, while a participant observer is where the researcher is a member of the group he or she is studying. A researcher may be interested in various things to observe, such as outside physical signs, salient movements, physical location, and language behaviour and time duration.

In this study, non-participant observation was done by observing the participants at work at the location where they farmed their species, and also how they farmed the species, and where and how they processed the aquaculture fish, by inspecting and asking questions about the infrastructure they used to

farm, etc. While doing observation, the researcher also took notes and photographs. The naturalness of the setting was not disturbed by the researcher, because the researcher did not intervene. This allowed the researcher to understand the practical issues and some of the everyday processes involved in fish farming. It may be worth pointing out that two farms allowed such observation and inspection of facilities, while one (Camdeboo) did not allow this as a matter of policy. Figure 16 below shows the researcher observing how kob is farmed using tanks, and inspecting the facilities and infrastructure at Pure Ocean in the East London Industrial Development Zone



**Figure 16:** Observation of kob farming at Pure Ocean

#### 4.3.3. . Questionnaires

A questionnaire is a printed list of questions that respondents are asked to answer (Goddard & Melville, 2001). Data was collected at the three project sites mentioned above using questionnaires, because questionnaires are (Miller & Brewer, 2003):

- Cheap.
- Problems associated with interviewers are avoided with questionnaires
- When the respondent must go and look up information, a mailed questionnaire is better because they can do this at their leisure
- Respondents may be shown to be more willing to give out personal information or embarrassing information or admit to unsocial opinions when filling out an anonymous questionnaire.

The questionnaire in this study comprised open- and closed-ended questions. In the open-ended questions the participants wrote their answers in their own words, and in the closed-ended questions the possible answers are set out in the questionnaire and the participant chooses the one that best describes the answer. Open-ended questions were used because they provide in-depth information, they allow the participants to express themselves freely and they do not allow for investigator bias. Closed-ended questions are easy to analyse and ensure that the information needed by the searcher is obtained. The questionnaire was written in English, but those who did not understand the language were helped by the researcher to translate the questions into the language in which they were comfortable, which was Xhosa. The researcher wrote down the answers for some participants, as some of them were not comfortable in writing in a language they were not proficient in, in addition to writing for them, the researcher also read and translated the contents of the questionnaire. The participants were informed of their right to participate or not in the study, and their anonymity was guaranteed. The questionnaire consisted of four sections, viz. sections A, B, C and D, which were for different participants. For instance, section A was compulsory for all the participants, as it asked about demographic data; section B was for the workers and the owners; and sections C and D was only for the managers, owners and shareholders. All the information obtained through the questionnaire helped the researcher in interpreting the results.

#### **4.3.4. Secondary sources**

Secondary sources refer to data that has already been collected by someone else and the investigator requires only to extract the required information for the purpose of his or her study (Kumar, 2005). Some sources of secondary data include government publications and official statistics, newspapers and magazines, records of meetings, personal records and earlier research. It is argued that secondary sources may have a problem of personal bias, the validity and reliability may vary from source to source and the meaning of words might be unclear and ambiguous. In this study, information about unemployment in each province, and the levels of skills and training in each province was obtained from Statistics South Africa (2012) and the relevant government publications such as the policy documents.

#### 4.4. Data collection procedure

The interviews were carried out by the interviewer face to face. The questionnaires were administered by the researcher and the observations were done by the researcher. This was done over a period of three months. Those who could not understand English were helped by having the questions translated for them. The participants were chosen according to their experience of community-based aquaculture and aquaculture in South Africa.

#### 4.5. Trustworthiness

Quantifiable yardsticks such as validity and reliability are not considered applicable to qualitative research, therefore qualitative research has to use trustworthiness criteria (Sinkovics, Penz & Ghauri, 2008). According to Keller (1987), qualitative researchers have to follow criteria to make sure the study is trustworthy. Guba and Lincoln (1985) mention that qualitative research should use the following four criteria:

- Credibility (alternatively to internal validity);
- Transferability (instead of validity/generalisability);
- Dependability (as an option to reliability);
- Confirmability (in preference to objectivity).

##### 4.5.1. Credibility

Credibility is the assurance that the findings of the study are reliable. To ascertain the credibility of the study or research, a researcher can follow different methods, such as prolonged engagement, persistent observation, triangulation, peer debriefing, negative case analysis, referential adequacy and member checking. However, the study will discuss only the methods that were chosen.

The following methods were used by the researcher in ensuring the credibility of the study:

- **Triangulation**

According to Patton (1999:1192), “triangulation involves using multiple data sources in an investigation to produce understanding”. Triangulation is discerned optically as a method for fortifying the

researcher's findings and as a test for validity. This means that, if one approach is found to have significant shortcomings, then an alternative method may be used to supplement or support the findings of the initial approach. Patton identifies four types of triangulation:

- i) Methods triangulation – “examining the consistency of findings generated by different data collection methods. Generally both qualitative and quantitative data can be found in a particular study. This can reveal corresponding characteristics which are of similar phenomenon. Usually when the data in these methods deviates it draws the attention of the qualitative researcher and provides the most insights;
- ii) Triangulation of sources – It is where a researcher probes the uniformity of various data sources from within the same method. For example, at different points in time, in public vs. private settings, comparing people with different viewpoints;
- iii) Analyst triangulation – Utilising a number of analysts to verify findings or several analysts and observers. This can help in reviewing selective perception and looking at things that a researcher might be uninformed or unappreciative in an interpretive analysis. The purpose is not to seek consensus, but to understand multiple ways of seeing the data;
- vi) Theory/perspective triangulation – using multiple theoretical perspectives to examine and interpret the data.”

- **Member-checking**

It is when data, analytic categories, interpretations and conclusions are tested with members of those groups or participants from whom the data were originally obtained (Guba & Lincoln, 1985). The testing can be done formally and informally, as chances for member checks may arise any time during observation and conversation. Member checking is the most essential element in checking for credibility. Normally, to justify the validity of research, member checking is regarded as a technique to use.

#### **4.5.2. Transferability**

The following methods were followed by the researcher in ensuring transferability of the study:

Transferability – Revealing that the findings of the research can apply in other situations. Thick description is described by Keller (1987) as a way of achieving a type of external validity. As a result

of describing an incident adequately, the researcher then is able to assess the degree to which the conclusions were reached if they are transferable to other circumstances, people, other times and settings. “Thick description refers to the detailed account of field experiences in which the researcher makes explicit the patterns of cultural and social relationships and puts them in context” (Holloway, 1997:9).

#### **4.5.3. Dependability**

An inquiry audit method was followed by the researcher to ensure the dependability of the study: Dependability is an indication that the findings remain invariable and could be repeated repetitive.

##### **Inquiry audit**

This is when you have a person or investigator who is uninvolved in the research process to examine the steps taken in the research and the product of the research study. The objective of the audit is to assess how accurate the research is and whether the findings, clarification and conclusions are corroborated by the data or not. External audits are done to encourage accuracy or validity, and they afford a chance for an external person to challenge the procedures used and the findings of the research analysis.

#### **4.5.4. Confirmability**

Confirmability is a degree of neutrality or the extent to which the findings of a study are shaped by the respondents and not researcher bias, motivation, and interest (Lincoln & Guba, 1985).

A researcher can verify confirmability by being audited externally, by an audit trail, triangulation or reflexivity. The study discusses the methods selected.

- **An audit trail**

This clearly describes the steps taken in research, from the beginning of the research project to the development and reporting of findings. This includes records that are kept regarding what was done in an investigation. Guba & Lincoln (1985:319-310) provides categories for reporting information when developing an audit trail:

- i) Raw data – including all raw data, written field notes, documents.



- ii) Data reduction and analysis products – including summaries such as condensed notes, unitized information and quantitative summaries and theoretical notes
- iii) Data reconstruction and synthesis products – including structure of categories (themes, definitions, and relationships), findings and conclusions and a final report including connections to existing literatures and an integration of concepts, relationships, and interpretations
- vi) Process notes – including methodological notes (procedures, designs, strategies, and rationales), trustworthiness notes (relating to credibility, dependability and confirmability) and audit trail notes. Materials relating to intentions and dispositions – including inquiry proposal, personal notes (reflexive notes and motivations) and expectations (predictions and intentions). Instrument development information - including pilot forms, preliminary schedules, observation format.

The results of the research were also triangulated for reflexivity.

- **Reflexivity** –

“is an attitude of attending systematically to the context of knowledge construction, especially to the effect of the researcher, at every step of the research process” (Malterud, 2001:484).

“A researcher's background and position will affect what they choose to investigate, the angle of investigation, the methods judged most adequate for this purpose, the findings considered most appropriate, and the framing and communication of conclusions” (Malterud, 2001:484).

The perception or position of a researcher influences any method of research a researcher chooses, whether quantitative, qualitative or laboratory science. Bias or inequality in a research study is inadmissible. Researchers conduct research from various angles, and this might result in the development of various, although equally valid, understandings of a specific situation under review. Although some may see different viewpoints as a reliability problem, others feel that these different ways of seeing provide a richer, more developed understanding of complex phenomena. Identifying

personal traits such as the position, perspective, beliefs and values of the researcher is a concern in all research, although specifically in qualitative research, where the researcher is often constructed as the “human research instrument” (Malterud, 2001) .

The researcher also could develop a reflexive journal – this is a type of diary in which a researcher makes regular entries during the research process. In these entries, the researcher records methodological decisions and the reasons for them, the logistics of the study, and reflection upon what is happening in terms of his/her own values and interests. Research perspectives, positions, values and beliefs in manuscripts and other publications also are reported in the journal.

#### **4.6. Strategies for ensuring trustworthiness in the study**

To ascertain the credibility of the findings of the study are reliable the researcher followed different methods such as: Methods triangulation, where different methods of data collection such as questionnaires, semi-structured interviews, secondary sources and observation were used. Member-checking, where results and interpretations were tested with some participants from whom the data was originally obtained.

To reveal that the findings of the research can apply in other situations thick descriptions of the results, interpretations and recommendations were assessed that they may be transferable or may apply to other communities .

The supervisor and co-supervisor provided supervision so as to ensure dependability of the findings of the study remain invariable and could be repeated. Also the research methods used in this study were described. Furthermore the internal and external examiners audited the study to check for accuracy, applicability and quality of this research paper and its findings.

To ensure the Confirmability of the study i.e. the degree of neutrality or the extent to which the findings of this study are shaped by the respondents and not researcher bias, motivation, and interest records of what was done in the field by field notes, documents used for secondary sources were kept. Moreover different methods of data collection were used (triangulation) and the identification of bias and reflection on what was happening in terms of the researcher’s values and interests so as to ensure that data was unbiased.

#### **4.7. Ethical consideration**

Research should be conducted in an ethical manner. Researchers should execute their research in a way that protects the interests of the participants, ensures that the participants participate voluntarily and that the research is based on informed consent. Also, the research should not be deceptive and should comply with the laws of the land. “Ethics refers to rules of conduct; typically to conformity to a code or set of principles” (Robson, 2002:29).

To ascertain that this research was conducted in an ethical manner, the rights to participate voluntarily, based on informed consent and research not being deceptive, as well as compliance with the laws and ethics of research of Stellenbosch University, were taken into consideration and followed. In this context, the participants’ consent was obtained before completing the questionnaires and doing the interviews. Participants were told they could withdraw from the study at any time they wanted if they felt uncomfortable. It was made clear that participation was voluntary, and the participants were provided with adequate information about what the research was investigating, why I was doing the research, what the objectives of the research were and the benefits that likely were to emerge for them from the study.

Anonymity and confidentiality were assured in that whatever the participants wrote in the questionnaire or said in the interviews would not be connected to the participant’s name. In this study, confidentiality was maintained by not revealing the subjects’ identities when reporting the study. The researcher did her best to provide a fair and unbiased interpretation of the findings. The researcher did this by recording truthfully the responses of the interviewees, including those who could not understand the English language. The researcher also conducted follow-on report-back sessions with interviewees to verify that what had been written and interpreted was correct. Thus honesty and integrity were important considerations in conducting this research and in dealings with the interviewees. Lastly, information was provided about the researcher and her supervisor and co-supervisor in the event of further questions or complaints.

#### **4.8. Data analysis**

The analysis of data was done by following Schwandt's (2007) components of data analysis, which are “data reduction, data display and conclusion drawing and verification”.

After the data was collected, the data mountain was reduced by making summaries and abstracts. A summary sheet was prepared that summarised the information obtained in the interviews. This is emphasised by Schwandt (2007) as being part of analysis and not a separate activity, because a researcher has to decide what to summarise and how to organise the content.

The data was coded into categories according to the research questions and themes. This was done by identifying the main themes and then assigning codes to the main themes by writing keywords. Responses were classified under the main themes. This was done by reading the field notes on the interviews and reading the questionnaire responses and then classifying them under different themes. After that, every theme was written into paragraph form for each case study. Some of the data was presented in graphs, maps, tables and photos – these also are way of reducing data. According to Schwandt (2007), data displays have a vital function both during the collection of data and afterwards, so that a researcher gets a feel of what the data is telling him or her.

Conclusion drawing and verification were done by noting patterns and themes, by contrasting and comparing the three case studies, by attempting to discover the factors underlying the issues under investigation, and by achieving theoretical coherence by moving from data to theories through analysis. Verification was done by using different methods of data analysis and giving feedback to some of the participants to verify the analysis.

## **Chapter 5: Results**

### **5.1. Introduction**

This chapter provides the findings of the surveys conducted on the three case studies used in this study, namely Saldanha Bay Mussel farming, the Hamburg Cooperative and the Camdeboo catfish farm. As indicated in the methodology, the results are given – as far as is possible – in the form of thick descriptions of the various key aspects of the case studies on community-based aquaculture. From these thick descriptions, lessons will be distilled regarding the key issues concerning community-based aquaculture and also the formulation of recommendations for viable and sustainable community-based aquaculture in South Africa. The results reported in this chapter touch on aspects such as background to the project area, main stakeholders or shareholders, investment, production technologies, markets and marketing, skills and training requirements, remuneration and other case-specific issues.

### **5.2. Hamburg Siyazama Cooperative Aquaculture Project**

The Hamburg aquaculture project site is situated on the Keiskamma River mouth, where the land-based aquaculture facilities and offices have been built and also where the cages (racks) for oyster mariculture are situated in the estuary in front of the offices. The oyster mariculture project and the live oyster-holding facilities belong to a private company called Mbasa Oyster Farm. Mbasa's business model was based on oyster mariculture only and, as such, the farm consisted of oyster racks in the estuary and an oyster-holding facility. Mbasa sold the company to DAFF. The government's plan was to revitalise the oyster farm so that it could produce 10 tons of oysters per year. 4.4.2 Camdeboo Satellite Aquaculture Project.

#### **5.2.1. . Siyazama Aquaculture Cooperative Project – Hamburg, Eastern Cape**

The Siyazama Aquaculture Cooperative is a project based on oyster and kob farming. It is a community project for the Hamburg community in the Eastern Cape funded by the Department of Agriculture, Forestry and Fisheries (DAFF). The following are the results of interviews with the members of the Cooperative and site visit observations undertaken on 2 June 2014. Visits and interviews were also

conducted with a number of people from Pure Ocean and Oceanwise, both private companies undertaking kob farming in the industrial development zone (IDZ) in East London.

“A cooperative is an autonomous association of persons who voluntarily cooperate for their mutual social, economic, and cultural benefit” (International Co-operative Alliance, 2005-2015). Cooperatives are formed primarily to provide a service to members rather than for financial gain (Schoeman, 2006). The cooperative model is based on the thinking that all shareholders have equal voting rights, regardless of their involvement in the cooperative. In addition, the assumption is that, if the cooperative is based on shareholdership, then all the members will have an equal share and therefore share the benefits/dividends equally. Regarding the Siyazama Cooperative, the members said that the proceeds from selling the wild oysters thus far had gone into the Cooperative’s bank account, as these were not yet enough to share among the members.

The DAFF appointed Jaymat Enviro Solutions as the project implementer in 2011. DAFF allocated R9.5 million for the period 2011 to 2013. This was for building the kob farming facility and for the maintenance of the oyster farm and holding facilities. A further R1.6 million was allocated for the 2013/2014. Mr Dave Krebsler, the current manager of Jaymat, was also the manager of Mbasa.

As project implementer, Jaymat Enviro Solutions acquired a long-term lease for land and an area on the Keiskamma estuary from the local municipality and the DAFF for the cultivation of the oysters. They ensured all permitting and legislation issues, acquired assets and infrastructure related to the holding facility, and were asked to facilitate the sourcing of a private partner to manage the project, facility and marketing of the fish and oysters.

According to the members of the community, Siyazama Cooperative originally had 52 members. When Jaymat took over in 2011, all 52 were employed, but this number was reduced to 20 when the contract was extended for a further year. These included six employees who previously were employed by Mbasa. Currently there are 48 members in the Cooperative. From 2013 to 2014, the number of employees was kept at 20. The contract for these 20 ended when the Jaymat contract expired on 31

March 2014. After Jay mat's contract ended, the Siyazama Cooperative (with 48 beneficiaries) continued with the project on their own (concerning the harvesting and sale of the wild oyster only). Of the 48 Cooperative members/beneficiaries, 20 (those who had been working until 31 March 2014) were volunteering at the time of our visit and the other 28 were not. At the time of our visit in early June 2014, the members of the Cooperative said that they were waiting for assistance in terms of funding for the project and that Jaymat had promised them that they were going to source funding for them. Since then, it is believed that the project has been funded again by the DAFF, with Jaymat continuing as the project implementer (pers. comm. Mr Belemane Semoli, 1 July 2014). Figure 17 showing some of the beneficiaries of the Hamburg project.



**Figure 17:** Some of the beneficiaries of the Hamburg aquaculture project

### **5.2.2. . Remuneration**

According to the members of the Cooperative, the workers were previously paid a basic wage of R307 per week (in 2009). When Jaymat Enviro Solutions took over in 2011, they paid the workers a basic wage of R75 per day, which amounts to about R1 500 monthly.

### **5.2.3. Oyster farming**

The original Hamburg project was based on oyster (*Crassostrea gigas*) farming. Oyster farming is done in the lagoon. Thus the oysters are not fed, which means they grow naturally in their natural sea environment. Even so, oyster spat (seed) is obtained from Alexandra Bay. The technology used to



cultivate the oysters are oyster racks built from PVC pipes. The oyster racks are fixed to the ground and imbedded in the estuary. The pipes hold up sack baskets in which the oysters are placed. There currently are 84 racks, each holding an average of 130 baskets. Once the oysters have grown to market size, they are taken to the oyster-holding facility, where they are purged for 48 hours before they are sold. There currently are three oyster-holding systems, each with its own sump and filtration system (i.e. biological filter and protein skimmer).

Although a batch of the cultivated oysters was ready for selling at the time of our visit, they could not be sold due to the requirement by DAFF that oysters should be tested every month by the South African Bureau of Standards (SABS) and the Council for Scientific and Industrial Research (CSIR) for bacterial and algal contamination. This has not been done since Siyazama started the project. One of the main problems has been that it costs about R80 000 to R 100 000 per annum for the testing. The Cooperative has not been in a position to afford this. Apparently, the current six-month extension of the project includes a budget for at least four tests (over a period of 12 months). Figure 18 below shows one of the beneficiaries showing the wild caught oysters.



**Figure 18:** One of the beneficiaries showing the oysters



In addition to the farmed oyster, certain community members have permits to harvest wild oysters from the sea. There is no requirement for testing of the wild oysters. Thus, at the time this study was undertaken, the Cooperative could only sell oysters harvested from the wild. The permit allows the harvesters to pick 25 oysters per person per day. The number of days in a month that they are able to pick oysters depends on the weather and phases of the moon (equinox/solstice). The average is about 10 days per month. The 12 active harvesters sell their oysters to the Siyazama Cooperative, which sells them to Clive Muller, who in turn distributes them to various restaurants in the East London area. Mr Muller has been the oyster buyer since the days of Mbasa. While Siyazama only have this one buyer, Mbasa had buyers other than Mr Muller, as they also had sources of wild oysters in other areas of the Eastern Cape, such as Tshani Mankosi. The price of the oysters depends on size and also whether it is wild or cultivated. In addition, price is determined by economic factors such as supply and demand, the Rand exchange rate fluctuations, etc.

#### **5.2.4. Kob farming**

The growth in the global aquaculture sector has been 9.2% per annum at a yearly compounded rate since 1973, and it is anticipated to grow at 4.5% per annum until 2030 (Brugère & Ridler, 2004). Even then, the finfish farming industry is still a growing subsector in South Africa. A rise in demand is anticipated to result in an increase of 15% in real terms of the price of high-value fish by 2020 (Delgado et al. 2003b), although the price will decrease marginally for other meat products. As a response to the rising of high value marine finfish, global mariculture industries are gradually developing technologies to breed and grow some of these fish in captivity. In South Africa, a growing shortage of traditionally harvested fish products, such as hake and “linefish” species (e.g. kob and yellowtail), has encouraged the development of aquaculture technology for indigenous marine fish species. Dusky kob (*Argyrosomus japonicus*) is seen as one of the prime candidate species in this endeavour. In this context, a number of private companies are pioneering technologies for kob farming in South Africa. Kob (local restaurant trade name – kabeljou) is reputed to be one of the finest tasting fish in South Africa. Dusky kob is naturally found along the Southern African coast. Its features are that it has a relatively large head, an elongated body with an evident lateral line, and is a dark silver-grey in colour (see Figure 19).



**Figure 19:** Dusky kob

**Source:** (Southern African Sustainable Seafood Initiative (SASSI) , 2010)

The Hamburg Aquaculture project will also involve piloting aquaculture for dusky kob in communities. This community-based aquaculture pilot project will be established on the 2 hectare site and is planned to have the capacity to produce 10 tons of kob per annum. The facility for dusky kob farming is constructed separately from the oyster holding facility. The key features of the kob farming facility include a recirculating system, biological filters, mechanical filters, protein skimmers, sump, etc. Nine tanks have so far been built for kob farming for the Hamburg project.

#### **5.2.5. Context: Kob farming industry in South Africa**

One of the outcomes of the visits and interviews with some of the pioneering companies for kob farming is the need to understand and appreciate the contextual issues involved in kob farming. Interviews were conducted with Mr Liam Ryan, Mr Guy Mousson and a number of other people at the operational level at Oceanwise, and with Mr Andre Bok of Pure Ocean on kob farming. Also interviewed was Ms Nangamso Thole, an intern at Pure Ocean. The two companies are among a number of local companies pioneering kob farming. In the photos below, the researcher was shown kob farming and processing at Pure Ocean and Oceanwise. The following are the key insights and observations from these interactions. Figure 20 showing the researchers with the manager of the processing section at Oceanwise (left) and how kob is farmed at Pureocean (right).



**Figure 20:** Processing of kob, with the manager at Oceanwise (left) and kob farming at Pure Ocean (right)

#### **5.2.6. State of technologies for kob farming**

Kob farming is still in its infancy and the technologies still are being developed. Thus the few companies that are developing the technologies for kob farming are still largely investing in the development of technologies for commercial farming for kob. Kob farming is still very capital intensive in term of investment. For example, Pure Ocean has already invested at least R40 million (R25 million for capital and R16 million operational) since it started, yet has still not started production. It is estimated that even with well-developed technologies, it would take about three to four years to start turning a profit. For example, Oceanwise started a commercial-level kob hatchery operation in the East London IDZ in 2009, but first production was only in 2011/2012. Oceanwise (Pty) Ltd was established in 2002. It started as Espadon Marine (Pty) Ltd in 1999/2000. So far, Oceanwise has already spent R50 million, with a further R200 million projected to be spent in the next few years on expansion to commercial production for 600 tons per annum (Liam Ryan, pers. comm., 3 June 2014, East London).

This also means that the intellectual property for most of what is known and is being developed for commercial kob farming resides with the technical people currently working on these projects. In general, there is shortage of people with knowledge and skills in kob farming. One of the companies had two interns who were attached to the company for a whole year. In this way, they hoped to grow

the number of skilled people over time. From visiting the projects and talking to the people working on the projects, it appears that kob farming is highly technical. Firstly, fingerlings are produced from kob that is harvested from the wild stock. This means that mature kob have to be harvested and kept and transferred in prime condition and with minimum stress, and then put in tanks where they can breed and produce fingerlings.

The environmental conditions in the tanks have to be re-created to emulate those of the kob's natural conditions in order to coax the wild kob to breed in captivity. Having developed this aspect of the technology, there then is a need to scale this up so as to produce enough fingerlings as seed for commercial aquaculture. Secondly, once the fingerlings have been put in tanks for growing, there is a long list of procedures that have to be monitored constantly and undertaken in a 24-hour cycle. For example, they have to monitor the temperature, pH, dissolved oxygen levels (four times per night and three times during the day), ammonium nitrates, carbon dioxide, etc. They also have to mix the feed, feed the fish the right amounts at the right time, clean the tanks, grade the fish into same sizes so that they do not start to cannibalise each other, etc. Thus there are many technical parameters and tasks that have to be performed in order to achieve and maintain the right environment for optimal growth of the fish. It also is important that equipment is sterilised all the time to avoid contamination. This long list of the required technical procedures and parameters means that, in order to run a successful kob farming operation, there are requirements for properly qualified and well-trained staff. The farming also requires highly committed and dedicated staff. Also, there is need for constant, close supervision. The point to be emphasised is that one mistake that causes the fish to die could ruin a whole production cycle. Lastly, there has to be a market for the commercial viability of the venture. At Oceanwise, the kob are grown in tanks of about 20 m<sup>3</sup> area. Each tank can be used to grow 1 to 1.5 tons of fish to market size. They currently have a total of 111 tanks, which can produce over 300 tons of fish annually.

One of the companies said that their targeted minimum production for profitability is 600 tons per year and that, currently, they are producing 159 tons/year. They estimated that a properly run Hamburg facility could produce 20 tons annually, which could create 20 fulltime jobs. The current harvesting size

is about 1.2 kg, which takes about 18 months (estimated conversion rate is 1.4 kg of feed to produce 1 kg of fish). Eventually, it is thought that the best table size for the market could be about 1 kg, which should take about 16 months in the best growth medium. The fish are fed rotifer (sea shrimp) and then pellets. Currently, most of the feed is imported. That is why feed price forms about 40% of the operational costs (at the moment feed costs about R17/kg – ideally it should cost about R14/kg). The approximate landed selling price for the harvested and processed kob in Johannesburg is R87.98/kg. Of this, R40/kg is for airfreight. One of the companies is in the process of inviting European Union food inspectors for trials for a health certificate to export fish to the European Union.

#### **5.2.7. Context: Community-based kob farming – Hamburg**

Given the preceding number of challenges, including the high technical requirements, faced by the Siyazama Cooperative kob aquaculture pilot project, one of the major issues will be getting the members of the Cooperative skilled and trained in kob farming. Also, there is likely to be a need for further investment in other technical equipment for operations, apart from the tanks and the basic infrastructure. One of the major factors that delayed the project was the electricity. What is required is industrial grade three-phase power supply for the recirculation systems. Although the project had paid for the electricity, this was not connected until early in 2015. Regarding electricity supply, the companies in East London pointed out that what is required is the undertaking and assurance from ESKOM that the right voltage of electricity supply (three-phase) to the kob farming facility in Hamburg will be maintained at all times, as in the agreement for the IDZ. Figure 21 below shows the tanks and the recirculation system that have been built for kob farming at Hamburg.



**Figure 21:** Production systems for kob farming in Hamburg

In terms of training and skills requirements, one of the two companies in East London expressed the willingness to assist in training staff from Hamburg. This would ideally involve having a selected number of people for the various roles and tasks attached to the right sections on a full-time basis at their facility for at least 12 to 24 months. They pointed out that most of their staff actually were trained on the job. Some of the tasks require a minimum of a matric certificate. So imparting skills and upskilling people is not such an impossible thing to do. Even then, they felt that it would be best to have someone who has the technical knowledge and managerial experience to be attached to the Hamburg project for a period of time so as to impart the knowledge and experience to someone from the community who eventually can take over full time. Such a person would cost about R35 000 to R40 000 per month in terms of salary.

Another alternative is to have a technical partnership agreement with one of the major companies. The two companies had different opinions on this. One did not want to invest in the Hamburg project, given that they also still were trying to develop their own venture into a profitable business, while the other indicated willingness to partner with the Hamburg project, provided that they would be the major shareholder. This condition (to be the major shareholder) was based on the need to be able to take business decisions and minimise their risks. If the partnership agreement was not an option, they



expressed the willingness to provide management consultancy to the Hamburg project. The clear view from both private companies was that they would be reluctant to absorb any possible risks involved in the Hamburg project unless they had full management control. One idea expressed by one interviewee was that he and a number of other people were forming an aquaculture management consultant company that could provide management support for projects such as the Hamburg project, or enter into business partnership agreements with such projects.

One of the benefits of going into a partnership agreement with a good technical partner would be that the bigger partner could provide the processing and marketing channels for the product from Hamburg. The bigger companies, for example Oceanwise, have already developed processing and marketing infrastructure, which could benefit the smaller Hamburg operation. Another benefit mentioned for a partnership agreement was that the Hamburg project could get fingerlings free from the bigger partner, given that they were now reaching a stage at which the production of fingerlings has become cheap and they actually can afford to produce fingerlings to sell to other companies.

The estimated production of about 20 tons annually for the Hamburg facility would require about R420 000 for feed, and 30 000 fingerlings per month at R2 per fingerling. It might take three to four years before the first produced fish could be sold while covering all the costs, and then probably another four years to break even. This is where grant funding could be ideal.

#### **5.2.8. Skills and training for Siyazama Cooperative**

There are disagreements about the cause of unemployment in South Africa. According to the Department of Labour (Muthethwa, 2013), South Africa's inadequate education system and lack of productivity is costing jobs. Illiteracy and the lack of appropriate skills characterise most unemployed people, and this limits their chances to be absorbed in the workplace.

Most members of the Siyazama Cooperative have some form of schooling. Some have matric, while some only have a lower level of education. The type of training offered to them for oyster farming was

on-the-job training. They therefore definitely would need thorough training for successful kob farming. Most of them are in their late 20s to 40s in terms of age.

Companies that are becoming established and developing the technologies, for example Pure Ocean and Oceanwise, could provide technical assistance or enter into technical partnership agreements. The two companies indicated that they had submitted proposals to the DAFF about the type of technical assistance they could provide for the Hamburg project and how much this would cost. Although the DAFF had not made an official decision at the time, one of their concerns was the reluctance to invest in the Hamburg project by either of the companies. While it may seem to be a lack of commitment from the DAFF, both companies are still in the development phase, which could account for their reluctance to invest financially in the Hamburg project. What this entails is that government would have to continue pumping grant money into the project indefinitely, which is not sustainable.

### **5.3.Imbaza and Blue Ocean Mussel Farms**

The two farms are located in the Langebaan Lagoon, which is within the Posberg Nature Reserve of the Saldanha Municipality. The area of the lagoon in which mussels are farmed belongs to Portnet. Imbaza was formed by six former workers of Blue Ocean. This case study gives the background to the area and then outlines the background to the formation of both Blue Ocean and Imbaza Mussels Farms.

#### **5.3.1. Blue Ocean Mussel Farm**

Blues Ocean was formed from an existing mussel farm that was bought from Sea Harvest and was established in June 2000 as a private company solely to farm mussels for the live and processed mussel markets.

#### **5.3.2. Species for mussel farming**

Mussel farming in South Africa is based on the *Mytilus galloprovincialis* (blue mussel), which originally came from Spain. There also is the indigenous species, *Chromytilus meridianalis*. A total of 95% of the mussels harvested are of the former species and only 5% are indigenous species. The reasons for the preference for the Spanish mussels is, firstly, that it has a faster growth rate (reaches market size



within six months) than the indigenous species and, secondly, that the flesh of the blue mussel has an orange/white colour, which most consumers prefer compared to the black/white flesh of the indigenous mussel. No feeding is done, thus the mussels grow naturally in this natural environment.

### **5.3.3. Shareholders**

The major shareholder in Blue Ocean is Terrasan<sup>2</sup>, which also provided the capital for the purchase of the original farm from Sea Harvest. The other two shareholders are Andre du Plessis, a mariculture expert, and Schalk Visser, the manager.

### **5.3.4. Production**

Blue Ocean uses an area of about 55 hectares of the ocean for farming. Blue Ocean Mussel Farm uses 50 old timber and asbestos rafts (some are 25 m x 15 m and others 15 m x 15 m) and 17 new plastic rafts that are about 48 m x 5 m in size. A total of 790 ropes of 6 m in length are suspended from each raft. It is to these ropes that the mussels attach and grow. During early summer, the larvae naturally settle on the ropes, and they reach their market size after twelve months. The farm also has a processing factory that is located at Velddrif, 30 kilometres from Saldanha Bay. Apparently, Blue Ocean is the only mussel-processing company in South Africa. In the factory the live mussels are cleaned, steamed, processed into various products and then packed for wholesale. The annual production of Blue Ocean Mussel Farm is 600 tons (95% blue mussels and 5% black mussels).

### **5.3.5. Imbaza Mussel Private Limited**

Imbaza mussel farm was formed by six people identified by Blue Ocean from its workforce and formed into an empowerment group called Masiza empowerment project. The six people were recruited in 2004. Each was given two rafts on loan from Bankfin but guaranteed by Blue Ocean. The six were formed into two teams of three each to work on the team's rafts. Over the next seven years they were trained and nurtured. Initially there were problems with loan re-payments, as the Masiza group were not putting money aside for monthly re-payments. Blue Ocean had to step in and start subtracting the

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<sup>2</sup> Terrasan is an investment group that holds investments in the pelagic fishing, mariculture, agriculture, hospitality and property industries.

amounts from the revenue from the sale of mussels by Masiza to Blue Ocean Factory before giving them the balance. The Masiza group slowly learned to budget and repay their loans on their own. One factor that had to be driven home to the Masiza group was that business has to be output driven, as this translates into higher revenues and income.

When Imbaza Mussel Pvt Ltd was formed in 2011, the Masiza group became independent as the major shareholding in the closed corporation (the name of the group changed from Masiza to Masake Close Corporation so that they would not carry over liabilities into the new company), Imbaza Mussel Pvt Ltd. The R10 million capitalisation for the company came from the National Empowerment Fund (NEF) as a loan payable over seven years at prime interest rate less 3%. Of the R10 million, R7 million was for the capital investment (buying the rafts and boat) and R3 million for operating costs. In addition, Imbaza received a 35% grant from the Department of Trade and Industry (DTI), which would make the real loan R6, 5 million. They also received a R300 000 grant from the Comprehensive Agricultural Support Programme (CASP) of the Provincial Government of the Western Cape's, which they used to build four plastic rafts. The shareholders of the company are Masake CC, NEF, Blue Ocean, the workers' trust, and Vos Pienaar (Manager Director, Imbaza)

The workers' trust comprises the factory workers of the Blue Ocean Mussel Factory Farm and the general workers of Imbaza Mussel Farm. These shareholders hold different percentages in terms of shares, but the share structure cannot be revealed in this study because of privacy issues. The plan is that, once the loan is paid off, the NEF's shares will be given to the workers' trust, which will increase their shareholding. The owners of Masake CC (the original group trained by Blue Ocean) continue working on the farm together with the general workers and also are paid as workers. At the moment, the shareholders are not collecting any dividends, as priority has been given to trying to finish paying off the loan as quickly as possible. It therefore is important that the Masiza group was retained (and accepted) to continue as employees of the company so that they can have a monthly income, even though they are the major shareholder. This lessens the need for them to demand dividends while the loan was still being repaid.

Imbaza has a farm area of 30 hectares. They have 25 rafts (new plastic type) of 50 m by 5 m. To each of these, 800 ropes of 6 m length are tied, and the mussels grow from these. Currently, 600 tons of mussels are being produced annually. The entire mussel harvest from the farm is sold to the Blue Ocean factory.

#### **5.3.6. Markets**

The Blue Ocean market does not export its mussels, as they do not even meet the domestic market demand. According to the director of Blue Ocean Mussel Farm, the imports from foreign markets are a big threat to the local mussel industry. According to Olivier, Heineken and Jackson (2013), South Africans prefer locally produced to imported mussels, although the imported mussel products are sold cheaper, which causes the producers to cut their prices to compete with the foreign competition.

In 2010, the mussel industry was the second highest contributor to total aquaculture production (DAFF, 2012). The annual production of Blue Ocean Mussel and the Imbaza mussel farm was 1 500 tons combined. The estimated market size for mussels in South Africa is currently about 2 000 tons per annum. The 500 ton shortfall is being met through imports from China.<sup>3</sup> The plan is that, in the next phase of the project (once they have funding for expanding the factory), production will go up to 2 000 tons (1 000 tons each by Blue Ocean Mussel Farm and Imbaza Mussel Farm) annually so as to capture the whole local market. At the moment, the International Trade Administration Commission (ITAC) of South Africa and South African Revenue Services (SARS) are helping keep the local mussel farming industry viable by charging higher import duties for imported mussels in order to keep the locally produced mussels competitive.

Blue Ocean Mussel Factory sells all its produce to BRECO Seafood, which then distributes the products to its regional markets, and directly to shops, wholesalers and restaurants. Blue Ocean Mussel Farm

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<sup>3</sup> Anybody can import mussels and, at the moment, these are being brought in by companies such as I&J, Sea Harvest, Snoek Wholesalers, etc.

negotiates directly with Ocean Basket seafood restaurant, because the restaurant buys 50% of the mussels produced by the farm. Even then, this passes through BRECO rather than directly to Ocean Basket. Given the size of the production taken by Ocean Basket, Blue Ocean would like to ensure that such an important customer is kept happy.

### **5.3.7. Price**

The mussel price depends on economic and environmental factors, such as supply and demand, exchange rate fluctuations, and the competitiveness of the market, production costs and climate. Currently, the farm gate price for mussels is R5.50 per kilogram and the wholesale price is R35.00 per kilogram.

The factory works with the Food and Beverages Sector Education and Training Authority (SETA) so as to develop the skills of the workers and improve their productivity. Blue Ocean Mussel Farm does not work with organisations such as ABET, because they believe that the workers only need to be equipped with the skills that they need on the farm. Another reason training is lacking on the farm is because it is expensive. Most of the training, both on the farm and in the factory, is ‘on the job’. Thus most of the skills are transferred once the people with potential have been identified, interviewed and employed. Farmworkers are given mandatory training in safety at sea as required by the South African Maritime Safety Authority (SAMSA). The workers are also trained in conflict management, financial management, firefighting and first aid. The factory workers are given two weeks of training based on the Food and Beverages SETA, given that they have to handle food. A manual has been developed for training the factory workers on procedures, the handling of equipment, and food handling procedures and techniques.

### **5.3.8. Remuneration**

Some employers base their remuneration offers on factors such as expertise, labour market conditions, geographic area, credentials, and type of career and salary scale. Blue Ocean Mussel Factory offers wages of about R900 per week. While those of Imbaza are said to be about R1 000 per week. The wages for factory workers is about 5% less, as this work is seen as being less tough compared to farm work.

Most of workers (Blue Mussel Ocean, Imbaza and Blue Ocean factory) have no matric and no experience in farming (there is excessive labour available, therefore there is a surplus in the labour market). It is argued that the characteristics that they look for in farmworkers are a person who is fit, healthy and willing to work. These people can then be trained on the job. For factory workers there is the requirement to be able to read English.

#### **5.3.9. Permits and Licencing**

Permits to farm are issued by the Department of Agriculture, Forestry and Fisheries in accordance with section 13 of the Marine Living Resources Act (MLRA) (DAFF, 2011). The DAFF issues permits such as permits for engaging in marine aquaculture activities, permits to transport live organisms, permits for keeping of certain endangered or exotic species, and permits for the import and export of organisms. Blue Ocean Mussel Farm has different permits, for instance a permit for engaging in mariculture activities, a permit for the transportation of mussels from the farm to the factory, etc. Portnet is responsible for granting licences for farming in their area in the Langebaan Lagoon. Blue Ocean and Imbaza have to pay lease fees of R700 per month per hectare.

### **5.4. Camdeboo Satellite Aquaculture Project**

The Camdeboo Satellite Aquaculture Project (CSAP) is a project of the Blue Karoo Trust (BKT), which aims to establish a freshwater fish industry in the Eastern Cape based on aquaculture. The Trust comprises the following members: the Camdeboo Aquaculture Trust; Sondelani Trust; Termorshuizen Trust; and out growers (satellite farms). These trusts are shareholders in the Blue Karoo Trust. The central farm is based on a smallholding that is approximately 5 km from the centre of Graaff-Reinet, and the processing facility will be located within the industrial area of Graaff-Reinet. The main aim of the projects is to reduce poverty by providing sustainable self-employment to women in the area.

#### **5.4.1. Species**

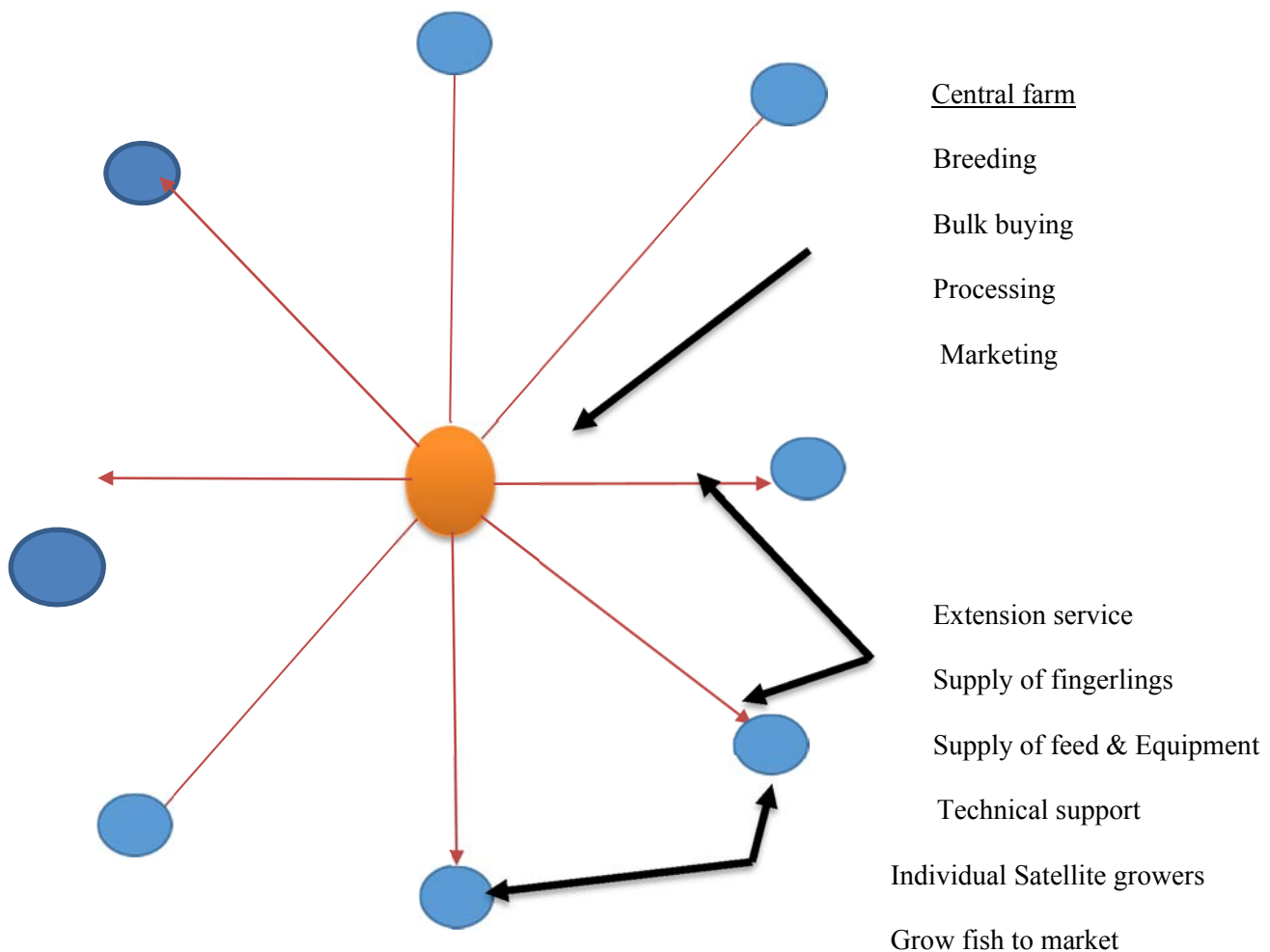
The specie being farmed at Camdeboo is the African catfish (*Clarias gariepinus*). The African catfish is a predominantly freshwater fish. The features of catfish are that its body colouring differs from “olive green, to brown and black with the flanks often uniform grey to olive-yellow with dark slate or greenish

brown back”(De Moor & Bruton 1988). “The underparts are pale olive to white and are dappled with dark brownish green or uniformly silvery olive”. It can grow to between 1.4 and 2 m long and can weigh anything from 8 kg to 59 kg (De Moor & Bruton, 1988:188). The farming of catfish bears a significant advantage over other types of fish, which are sensitive to any changes in the environment, because the fish is a robust creature that is able to survive in highly unfavourable conditions, such as polluted water and a lack of oxygen and sustenance.

The technology being used to farm these fish is a recirculating system. The overall concept of the Camdeboo Satellite Aquaculture Project (CSAP) centres on the establishment of aquaculture clusters, which encompass a central management farm and a network of approximately 50 satellite farms. Each aquaculture satellite farm is designed to produce 1 144 tons of fish. The project is divided into two phases: the first is an incubation phase and the second is a commercial phase. The incubation phase is the phase in which an aquaculture hatchery will be established, and there will be development of the technologies and training of the farmers. In the second, commercialisation, phase, the central farm will produce and provide fingerlings, feed and provide processing infrastructure for the satellite farms.

#### **5.4.2. Camdeboo Satellite Aquaculture Project**

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**Figure 22:** The Camdeboo satellite aquaculture model

**Source:** Liesl de la Harpe, pers. Communication

As seen from Figure 22 the model shows that:

- The central farm will be responsible for breeding and producing fingerlings, supplying of feed and provision of technical support to out growers.
- Once the fish reaches market size, the central farm will buy back the produce from the out growers for processing and marketing.
- The role of the out growers will be to grow the fish to market size and then sell them back to the central farm.

The central farm is based on a smallholding that is approximately 5 km from the centre of Graaff-Reinet, and the processing facility will be located within the industrial area of Graaff-Reinet. The main

aim of the projects is to reduce poverty by providing sustainable self-employment to women in the area. It is hoped that the aquaculture clusters will provide jobs to about 500 people, primarily rural women, as well as 1 700 indirect and 1 074 induced jobs. Hopefully, communities could use municipal land to establish the satellite farms. This project hopefully will have a positive impact on the livelihoods of people in and the economy of Graaff-Reinet in terms of food security, capacity building, job creation and SMME development, and there is potential to replicate the initiative in rural areas throughout South Africa.

The aquaculture clusters will benefit through economies of scale as a result of their collaboration, as well as from the support, training, mentorship and access to markets to be provided by the central farm and the processing facilities and infrastructure. The commercial-scale pilot project includes the establishment of the first commercial-scale central management farm, which is inclusive of the first 13 community-operated satellite aquaculture production systems, a hatchery and a processing facility with one production line operating.

Previously there was an irrigation scheme where the central farm is located, and a water storage infrastructure in the general area. This made it advantageous for an aquaculture venture to be viable, as the water was already in place and could be used for farming activities. The project has R22 430 000 in hand, as well as a commitment from the DBSA Green Fund to contribute R23.5 million towards the commercial phase once agreements are secured. This exercise was under way at the time of this study.

The Blue Karoo Trust also has received funding for the project from the following organisations:

- Thina Sinako (joint venture between the EU/EC Treasury)
- Camdeboo Local Municipality
- Cacadu District Municipality
- Development Bank of Southern Africa (DBSA)
- Industrial Development Corporation (IDC)
- Eastern Cape Development Corporation (ECDC)



- UK Department for Environmental, Food and Rural Affairs (DEFRA)
- United Nations Global Environmental Fund (GEF SGF)
- Agri-SETA
- DG Murray Trust
- Old Mutual Foundation
- Department of Agriculture, Forestry and Fisheries (DAFF)
- Department of Trade and Industry (DTI)
- Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)

#### **5.4.3. Shareholders**

“A trust is an arrangement of property in which the technical ownership is vested in one or more persons who are to hold, administer, or otherwise deal with the property, as may be directed, for the benefit of some other person or persons to whom the property beneficially belongs” (Long, 1992). The Blue Karoo Trust (BKT) is the umbrella body under which five separate legal entities have joined forces to develop and implement this initiative. Camdeboo Aquaculture Trust - Project Management, Finance and Administration. These are BKT trust is made up of the following:

1. Ter Morshuizen Trust - Technical
2. Sondelani Trust – Workers’ Trust (farm and factory)
3. Camdeboo Women’s Trust – Training
4. Out grower Trust – Future Satellite Farms

#### **5.4.4. Remuneration**

Information on the remuneration aspect could not be obtained, for two reasons: the satellite farms have not yet started operating, and we were not allowed to visit the central farm, where about 12 people are employed whom we could have interviewed. We were informed by the manager and shareholder who had been tasked to talk to us that it was company’s policy not to take visitors to the central farm.

#### 5.4.5. Markets

The domestic and foreign market demand for African catfish (including in European countries such as the Netherlands, Belgium and Hungary) varies widely (FAO, 2010a).

The market for catfish in sub-Saharan African countries is developing and the demand is increasing continuously. More than 70% of cultured catfish is currently traded fresh (FAO, 2010c-). According to the Food and Agriculture Organization (FAO, 2014), the catfish market will grow through the development of new product forms and value-added processing. The demand for catfish in the central African region, such as in Cameroon, Gabon and Democratic Republic of Congo, is very high. The fresh fish are regularly sold live in the markets of main cities at an average price of USD 3.3 to 5.2 per kg (FAO, 2014).

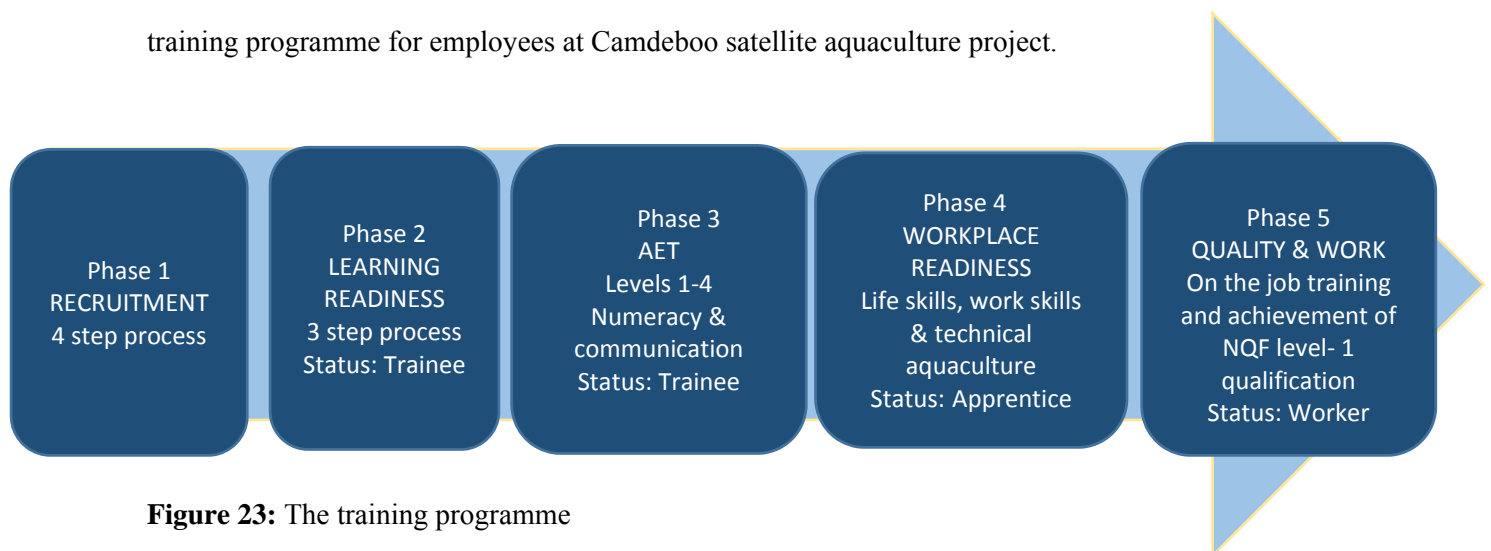
However, the demand for catfish in South Africa is insignificant, as the taste does not appeal to the South African market. Many people think of catfish as an ugly creature that exists in the depths of muddy rivers. There is religious dislike for the fish by some consumers (who do not eat fish without scales); others reject the fish due to its slightly darker flesh. This is despite the fact that farmed catfish are grown in clean, fresh water and fed a diet of grains (Stander, 2007). In 2011, the percentage contribution of catfish to total freshwater aquaculture production in South Africa was 5% (DAFF, 2012).

Over the years much work has been done by the entities that fall under the BKT in terms of research, product development and the market potential of catfish as an alternative protein and nutrient source to pilchards. The outcome of these efforts indicates huge potential for the successful farming, processing and marketing of catfish. The freshwater fish produced by the CSAP will be processed, bulk packaged (2 kg retort pouches) and sold under the brand name KAROO CATCH, at an affordable price to bulk markets including caterers, public sector kitchens (prisons, hospitals, schools, etc.) and feeding schemes (school feeding schemes, other community feeding schemes, etc.). The aim of the Trust is not to compete with established brands in formal markets, but rather to provide a sustainable and cost-effective bulk source of protein and essential micronutrients directly to kitchens.

The model that BKT uses has been refined, a processed freshwater fish product has been developed, an independent market acceptance study has been conducted, and a business plan has been compiled, indicating commercial potential for the successful farming, processing and marketing of preserved freshwater catfish in tomato sauce as an alternative to ocean-harvested fish and as a cost-effective bulk source of protein and essential micronutrients (Liesl de la Harpe, pers. communication).

#### 5.4.6. Skills and training

The Camdeboo Satellite Aquaculture Project commenced with a simplified version of the model with a small group of 12 trainees/employees and is now in Phase 3 of the model with a second group of trainees. The BKT compiled a structured training programme that takes 18 months to complete, based on the needs identified during the socio-economic analysis. This has been piloted successfully, resulting in empowered and self-reliant individuals who have the skills and confidence to gain employment and serve as responsible role models within their families and communities. The training being offered is of the ABET type, and combines aquaculture and life skills. The programme was developed to give everyone who was recruited into the project enough time to achieve all the educational, personal and vocational goals and enough support to make this not only possible, but enjoyable. Figure 23 shows the training programme for employees at Camdeboo satellite aquaculture project.



**Figure 23:** The training programme

(Source: Liesl de la Harpe, pers. communication)

### **5.5. The challenges for the projects**

The following are stated as the main underlying problems in the projects:

- Funding
- Low literacy rate and lack of aquaculture knowledge of community members
- High capital costs
- Keeping fish farmers focused until their first harvest

## Chapter 6: Community-based aquaculture: issues, problems and bottlenecks

### 6.1. A new, budding industry

The decline or plateauing of catches from traditional linefish species such as kob and yellowtail, and also the mainstay commercial species such as hake, has prompted the need for the development of aquaculture so that production from the latter could start bridging the gap between increasing demand and the stagnant or declining supply of fish in South Africa. This is not unique to South Africa, as aquaculture worldwide is seen as providing the hope for increased fish supply as catches from wild fish stocks reach their upper limits or even decline. As a result, aquaculture's contribution to fish production has grown steadily and dramatically in the last two decades, to the extent that aquaculture now contributes over 40% to world fish production. In the same context, there have been increasing initiatives in the development of commercial aquaculture in South Africa. For example, there are a number of companies undertaking abalone mariculture in the Hermanus/Hangklip area, a number developing technologies for dusky kob (*Argyrosomus japonicus*) aquaculture in the East London IDZ and in Richards Bay in KwaZulu-Natal, for mussel farming in Saldanha Bay and for land aquaculture in the Eastern Cape. In most instances, the initiatives in commercial aquaculture involve the development of new technologies by pioneering entrepreneurs.

By world standards, however, South African commercial aquaculture is still in its infancy, with most technologies still under development and total production from the sector still under 5 000 tons annually. The government views these initiatives as offering opportunities for involving communities in aquaculture, as this could help towards job creation, income and food security. The government therefore wants communities to be involved in aquaculture from the early stages of its development.

Given that aquaculture is still in its developmental stages, the pioneering companies and individuals still largely are investing both financially and intellectually in the technologies for aquaculture in South Africa. For example, the technologies for farming wild dusky kob require knowledge of how to catch the wild kob and domesticate it for fingerling production, and how to create the appropriate

environmental factors for the kob to breed in captivity, to grow the fingerlings to the right size for transfer to production level cages, to create the optimal growth medium for the fingerlings to grow to commercial size, the feed mix for optimal growth, etc. For mussel farming, this approach requires selecting the right species for commercial production (between local and exotic species), finding the right marine environment for optimal growth, developing the right technologies for growing the mussels to commercial size, etc. For catfish, this involves decisions about the right place in terms of weather for optimal growth of the species, developing the right size of dams and volume of fish for maximum growth rates, the feed mix for optimal growth, etc. Thus a lot of money has been and still is being pumped into developing technologies for aquaculture. For example, Pure Ocean estimates that it has thus far invested more than R40 million in the venture, yet it has not yet started actual production. Oceanwise,<sup>4</sup> which is involved in the commercial production of dusky kob, was formed in 1999/2000 and spent more than ten years developing its technology, with the first production only in 2011/2012. By then, the company had spent more than R50 million to get to the commercial production stage.

What is critical to note from the foregoing is that the intellectual property for aquaculture technologies resides with the pioneering companies and the individual technical people currently working on these projects. This is the core group, the size of which is still small, that has the knowledge and skills for aquaculture in South Africa. The growth and expansion of the industry therefore will depend on the willingness of those with this intellectual property to share or sell such knowledge and skills so as to increase it for critical mass production in aquaculture. Obviously, most communities start from a situation in which they do not have the knowledge, skills or the sources of investment for aquaculture that the pioneering companies and individuals have. Essentially, it will be vital to transfer such knowledge and skills to communities if this group is to participate actively and productively and be part of the budding and growing aquaculture industry in South Africa.

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<sup>4</sup> Oceanwise (Pty) Ltd was established in 2002, having started as Espadon Marine (Pty) Ltd in 1999/2000.

## 6.2. Investment requirements

Aquaculture appears to be a very capital-intensive undertaking. Apart from the capital investment, operational expenses also are incurred, even during the developmental phase. Thus Pure Ocean estimated R15 million (37.5%) as operational expenses out of the R40 million spent so far in developing the technologies for kob farming. Having already spent more than R50 million on the development of the technologies, Oceanwise estimated that they would need a further R200 million to expand viable commercial production to 600 tons per year (current production capacity is estimated at 159 tons/year) (Liam Ryan, pers. comm., 3 June 2014, East London). It is estimated that even with well-developed technologies, it takes about three to four years to start turning a profit.

For the Siyazama Cooperative Aquaculture Project at Hamburg, the DAFF has already invested over R11 million in building the facility. This comprises the infrastructure, operational costs, including the wages of twenty members of the Cooperative, and implementation fees for Jaymat Enviro Solutions. Based on observations at Pure Ocean and Oceanwise, there is likely to be a need for further investment in other technical equipment for operations (e.g. pH meters, oxygen meters, computers, etc.), apart from the tanks and the basic infrastructure. At the moment, one of the major factors that has delayed the Hamburg project was electricity, with ESKOM only providing the required industrial grade three-phase power supply for the recirculation systems in 2015. Based on their experience, Oceanwise estimated that a properly functioning and run Hamburg facility could produce 20 tons annually, which could create 20 fulltime jobs. This full capacity estimated production (of about 20 tons per annum) would require operational expenses such as R720 000 for fingerlings (30 000 fingerlings/month at R2/fingerling), R420 000 per annum for feed, R360 000 wages for twenty people (based on Jay mat's rate for 2011 of R1 500/person/month). What needs to be noted is that it takes three to four years before the first batch of fish is ready for harvest and sale, while covering all the operational costs. Oceanwise further estimated that it would probably take another four years of full capacity production after first harvest before breaking even.

For the Imbaza mussel farm, the R10 million capitalisation for the company was derived from the National Empowerment Fund (NEF) in the form of a seven-year loan at prime interest rate less 3%. Of this R10 million, R7 million was allocated to capital investment (buying the rafts, ropes and the boat) and R3 million (30%) was for operating costs. In actual fact, 35% (R3.5 million) of the required R10 million was paid by the Department of Trade and Industry (DTI) as a grant empowerment contribution to Imbaza, in effect making the real loan R6, 5 million. In addition, Imbaza received another R300 000 grant from the Western Cape Provincial Government CASP programme, which they used to build four plastic rafts. For the Camdeboo catfish project, Blue Karoo Trust received contributions for capital investment and operational costs from members of the trust shareholder, amounting to over R22 million, as well as a commitment from the Development Bank of Southern Africa (DBSA) Green Fund to contribute R 23.5 million towards funding for the commercial phase of the project. The Trust has also received funding from a number of organisations, as mentioned in the results chapter.

In all three cases, it is clear that a huge amount of investment is required, both in terms of capital infrastructure and operational costs (the latter even in the development phase, with the operational costs comprising over a third of the total project costs). In all instances, government grants have been used as part of empowerment deals with other main investors. The key question that arises is how to convert this arrangement into financially viable and sustainable business arrangements. The key issue is not to turn these into unsustainable ventures dependent on constant government bailouts. In the end this would be unworkable for both the development of aquaculture and the genuine empowerment of communities. For example, the Hamburg project had to obtain more money in order for Jaymat to continue its presence and try to formalise the Siyazama Cooperative, have the electricity installed and also keep the Cooperative group together through wage payments and daily chores. Given the technical issues involved in kob farming, it is unlikely that the project will start anytime soon, and in addition it will take a good number of years before the Cooperative can fully take over and run the project on their own. It therefore is likely that government involvement will be required for quite a while yet.



Although a batch of the cultivated oysters had been ready for sale at a certain stage in 2013, the Cooperative could not harvest and sell the oysters due to the legal requirement that the product should be tested by the South African Bureau of Standards (SABS) and the CSIR every month for bacterial and algal contamination. This had not been done since the project was handed over to Siyazama because the Cooperative could not afford to pay the fees for testing, which amount to between R80 000 and R100 000 per annum. It therefore is important that one of the exit strategies by government should focus on how to capacitate the community-based projects in such a way that they can deal with funding and financial issues on their own. According to the DAFF (2011), this really shows that aquaculture requires a large investment, as the capital investment from private and public institutions was approximately R179 million in 2011. This was an increase of 38% when compared with 2010.

### **6.3. Skills and technical requirements**

As a practice and undertaking, aquaculture can be highly technical. For example: kob farming requires knowledge and skills in terms of how to produce fingerlings from wild kob; how to create and maintain the right medium and ambience for wild kob to produce fingerlings in captivity; how to investigate, create and maintain the right medium for optimal growth of the fingerlings to commercial size in cages; and many other physical environmental and biological parameters and conditions for optimal breeding and growth so as to maximise production.

In addition, there is a long list of procedures that have to be monitored constantly and undertaken in a 24-hour cycle in order to maintain and ensure the required conditions in all the cages (those that are being used for the breeding stock, the larvae, fingerlings or growing). For example, parameters such as temperature, pH, dissolved oxygen levels, ammonium nitrates, carbon dioxide, etc. have to be checked several times in a 24-hour cycle. The composition of the feed mix also has to be right for the each growth stage, whether larvae, fingerlings or growing fingerlings. The amounts of feed and when to provide the feed need to be calibrated and controlled carefully. In addition, the cages have to be cleaned at specific points and the equipment sterilised as part of maintaining the right conditions. Thus there is a long list of technical procedures and tasks that require undertaking all the time in order to optimise

production. This also means that there is a need for well-trained and in some instances highly technically skilled and dedicated staff to run a successful kob farming operation, as one mistake could mean the death of all the fish in a cage, which could mean financial disaster. Good and constant supervision thus is an important factor. The need for undertaking and managing all these technical requirements means that Siyazama Cooperative faces enormous challenges in running a successful kob-farming venture. Unlike kob, the other types of aquaculture, such as mussel, oyster and catfish farming, do not require such onerous levels of technical skills and monitoring of parameters. In the case of these three types of farming, there is no real need for a high level of education and, in most cases, people with less than matric education are trained in the various aspects of fish farming on the job. The Imbaza managers pointed out that the characteristics they looked for in a potential farm worker were physical fitness, general health and willingness to work. If a person met these criteria, they easily can be trained in fish farming on the job.

Although most people are also trained on the job, even in the case of kob it was emphasised that some aspects require a minimum of a matric certificate and that for most of the tasks a long period of training (up to 24 months) would be necessary. In the case of the BKT, the type of training given to trainees that are seen as potential employees is ABET type, which combines aquaculture and life skills. It is assumed that some of the people who are given ABET education then can be selected successfully and be given skills for aquaculture. In addition, the satellite model is based on the provision of extension services by the central farm to all the satellite farms.

One of the key underlying questions therefore is whether communities should get into and be involved in a highly technical type of aquaculture practice such as kob farming, or whether they should start with simpler forms such as oyster and mussel mariculture until the technologies for the more sophisticated forms such as kob and abalone have been developed to the extent that it becomes cheap and easy to transfer the technologies. Government's role in this case would be to put in place policies and regulations that would incentivise technology transfer as soon as this is possible so as to discourage gate-keeping and red-lining more lucrative but sophisticated aquaculture technologies from

communities. Parker (2011) maintains that aquaculture jobs range from those closely related to aquaculture and those that support aquaculture, for example training, production, marketing, inspecting and feeding. This therefore means that the training and skills differ according to the type of job. Skilled and unskilled workers can do their jobs depending on the type of skill and training they possess.

The FAO (2014) supports this idea by stating that, for a newly developing aquaculture industry, there have to be people who have the capacity to operate the systems and technologies used in aquaculture. Many fields of aquaculture use systems and technologies that have been developed on recently and still are evolving fast. Aquaculture is a practical science and hands-on training through demonstrations, pilot projects and training courses with a strong applied component is likely to be the most successful way of effecting this transfer.

#### **6.4. Commercial aquaculture: a consumer-driven undertaking**

In developing technologies for aquaculture, those undertaking such developments have to ensure firstly that there are markets for such products, if these are new to the target market, and secondly, that commercial production will be achieved at competitive prices. For new target markets such as the export of kob, which is indigenous to South Africa and its consumers but might be new to potential consumers in foreign countries that are being targeted for export, the marketability of kob and the various products forms that are being developed have to meet the requirements of the new target markets in terms of product characteristics, size of the market, price competitiveness and other demand-side factors. Equally, the type of mussels farmed have to meet the requirements of the South African domestic market that is being targeted, and in future of potential export markets. In the case of mussel, these factors are the colour and texture of the flesh. A dynamic that also had to be argued for by the industry was the need for government (the ITAC and SARS) to protect the young new industry from cheap imports by limiting these. Catfish provides a different dynamic in that the industry knows that the typical consumer in South Africa generally is averse to eating catfish for various cultural and religious reasons.

The market research therefore had to look at developing new domestic markets, targeting institutions that could learn to tolerate and then like red fish, such as prisons and hospitals, and also introduce the fish to young clientele in terms of school children who could grow up getting used to such a new product. An important consideration also was not to compete with well-established brands such as 'Lucky Star' (South Africa's biggest brand of canned fish). Another target market has been the export market in central Africa and southern African countries to the north of South Africa, where people are already used to eating catfish and the demand for fish is growing as a result of declining or stagnant production from local sources in those countries and also the increasing prices of red meat. The industry is fairly confident that a market comprised of these domestic and export segments does exist and that it can result in viable and sustainable commercial catfish aquaculture.

Without such a market-oriented approach, the commercialisation of aquaculture would not succeed. This highlights the need for communities to form partnerships with bigger companies that have or are already doing the marketing research as part of aquaculture initiatives and also product development from aquaculture products. For example, Oceanwise already has a processing section that processes and packages the harvested kob into various appropriate product forms for its clients, which include restaurants, supermarkets such as Woolworths, etc. Oceanwise expressed willingness to partner with empowerment communities such as Siyazama in such a way that the Cooperative could use the processing facilities and market outlets of Oceanwise, provided that they meet the required SABS and client-based health and production process standards. Equally, the Masiza empowerment group, as part of Imbaza, processes and markets the production from its farm through the Blue Ocean processing factory and marketing outlets. The satellite farms that form part of the BKT will get fingerlings from the central farm and then supply their produce back to the central farm, which will process this and market all the produce from the satellite farms as produced by the BKT. An alternative that is being used by the Hamburg Cooperative in the sale of its oysters is the use of a designated buyer, who buys the product from them and then supplies this to the buyer's established client base.

All these various models that are being used by the communities in the case studies are based on arrangements that do not require the communities to get involved in marketing-related activities and dealing directly with the buyers of their produce. This is probably ideal in the current climate, given the complexity that marketing research, processing, packaging and delivery of final products can involve, especially for poorly educated and rural-based communities. On the other hand, it means that the communities cannot add value to their produce, thereby losing out on possible additional revenues and profits that could be derived from adding value.

### **6.5. Organisational arrangements for community based commercial aquaculture**

It could be argued that each of the three case studies looked at uses different basic types of organisational arrangements for the involvement of communities in commercial aquaculture, although there might be a mix of more than one in one or all of these. The Hamburg group is supposed to be formalised into a cooperative, the Masake group is a CC and the Workers' Trust are shareholders in Imbaza, while the Blue Karoo Trust is set up as a trust, with the planned use of independent satellite fish farms (made up of groups of farmers or individual farmers) as out-grower farms that will be linked to it through the provision of seed, feed, technical services and extension services, and then getting the produce back from the out-grower farmers for processing and marketing.

Masake CC (the empowerment group that was formed from workers at Blue Ocean Mussel Farm) is the majority shareholder in Imbaza, with 37% of the shares. The National Empowerment Fund holds 26% of the shares and will transfer these to the general farm workers and factory workers, who hold 10% of the shares in a 'Workers' Trust'. Eventually, therefore, the Workers' Trust will have a total of 36% of the shares. In the end, Masake and the other workers (through the Workers' Trust) will hold a total of 73% of the shares. Blue Ocean will continue to hold the current 22%, which will ensure that Imbaza Mussel Farm has an assured processing and marketing outlet. The farm management (Vos Pienaar) will also continue to hold 5% of the share, thereby ensuring continuity in terms of technical expertise and the quality of the management of the farm. The Workers' Trust comprises the factory workers of the Blue Ocean Mussel Factory farm, and the general workers of Imbaza Mussel Farm.

Masake and the workers (Trust) received the funding for the shares through a conciliatory loan (prime interest rate less 3%) from the NEF and grants from the DTI and Provincial Government CASP programme. All the shareholders, including Masake and the Workers' Trust, have undertaken not to collect any dividends until the loan is paid off. In order to cushion themselves from the undertaking not to collect dividends, the members of the Masake CC have continued to work on the farm as workers and earn wages just like the other general workers.

Camdeboo Satellite Aquaculture Project (CSAP) is a project of the Blue Karoo Trust (BKT). In theory, a trust is run by a trustee for the benefit of the trust's beneficiaries. The trustee is responsible for any debts taken by its members, thereby reducing personal liability for loans or debts. A trust is also supposed to allow flexibility in terms of the distribution of profits to beneficiaries and ease of changing ownership (Geach & Yeats, 2007). In this context, the BKT is the umbrella body under which five separate legal entities have joined forces to develop and implement this initiative. These entities, and their respective roles, are:

- Camdeboo Aquaculture Trust – Project management, finance and administration
- Ter Morshuizen Trust – Technical
- Sondelani Trust – Workers' Trust (farm and factory)
- Camdeboo Women's Trust – Training
- Out-grower Trust – Future satellite farms

It is not clear what proportions of shares the various partners hold. But, just like Imbaza, the project management and the technical manager have shares and an interest in the Trust, thereby ensuring continuity in terms of management and technical expertise. The project has been funded through loans, shareholder contributions and also government grants. The CSAP is based on a concept of establishing a cluster of about 50 satellite farms (out growers), all of which will be connected to the BKT central farm as the hub. In this context, the central farm will produce and provide seed fingerlings, feed and extension services to the satellite farms. Once the fish are harvested, they will be sold back to the central farm, which will process and market the products. The cost of fingerlings, feed and extension services

will be recorded and then deducted from the sales revenue of each satellite farm. In this context, the central farm appears to be absorbing most of the risks in that it will incur all the costs and only deduct the costs at the end of a production cycle. The central farm will also have to guard against satellite farms selling the product elsewhere. The costs to the central farm also include the training costs for the farmers during the incubation period, and the capital costs for building the hatchery and developing the technology.

The Hamburg Kob and Oyster farm is based on the use of the Siyazama Aquaculture Cooperative as the vehicle for the involvement of the Hamburg community in aquaculture. The Cooperative had 48 members, 20 of whom were employed on the project. Having bought an existing private oyster farm, the Mbasa Oyster Farm, a decision was taken to add kob farming to the existing oyster farm. The kob farming facility was constructed through the implementing consultancy firm Jaymat. In the meantime, government is in the process of trying to hand over the whole project to the Cooperative, with Jaymat facilitating this.

One of the critical issues regarding the Hamburg project was how to activate the kob farm. Apart from the issue of delays by Eskom connecting the right type of power for operating the facility, it is clear that it will take more than this to get the project going and also to make it sustainable in the long run. The main problem is that the technologies and intellectual property for kob farming are possessed by the pioneering companies, the nearest two of which are in the East London IDZ. A number of options exist, such as getting technical assistance from one of the pioneering companies, entering into technical partnership agreements with one of the pioneering companies, or selling shares to one of the pioneering companies. The two companies interviewed indicated that they had submitted proposals to the DAFF about the type of technical assistance they could provide for the Hamburg project and how much this would cost, but that the DAFF had not responded with a decision by 2014. The technical assistance that could be provided is in terms of training and skills provision through on-the-job training by attaching selected members of the Hamburg Cooperative to their facilities in East London, the selling of fingerlings, etc. It was emphasised that even with well-trained people, it still could be important that an

experienced technician be seconded to the Hamburg project to help with developing the procedures and processes, and ensuring that the staff have absorbed all the skills and techniques fully before leaving them to run the facility on their own. Another alternative would be the shareholdership option by one of the pioneering companies, which would include technology transfer, management and technical responsibility for the Hamburg facility. One of the companies was willing to go this route, provided that they would be the major shareholder as they would be responsible for taking the business risk decisions. The benefits of going into a technical partnership or shareholdership agreement include the utilisation of the established processing and marketing facilities. Given that the pioneering companies still are investing in the development of technologies, they are reluctant to risk capital investment in the Hamburg project, which it appears would be necessary in order to make the project financially viable. The final option offered by one of the interviewees was the provision of management consultancy to the Hamburg project.

Given all the foregoing, which is the organisational approach that could facilitate community-based aquaculture? Three business organisational approaches are being used in the three cases; private company, trust and cooperative. In all cases, the approaches require managerial, business and technical support and handholding initially for the community empowerment groups. The key question is how long such incubation should last, and whether communities eventually would be able to take over and run with things on their own.

## **6.6. Institutional arrangements**

Marine aquaculture is regulated by the MLRA, but freshwater aquaculture has no main legislative body. Existing guidelines, regulations and legal frameworks are not adequate for facilitating community-based aquaculture. For example, community-based aquaculture is not included in the MLRA. Some regulations, such as for permitting and certification of the species, are not conducive to community-based aquaculture. The absence of clear policy frameworks results in contradictory messages, e.g. acquisition of land and lack of procedures to restructure developments between the levels of government and government departments. A marine aquaculture permit is required for each mariculture operation



for a right-holder in terms of the MLRA. The operator of a mariculture operation must take reasonable, on-going measures to avoid environmental harm, including taking measures to avoid harm caused by the disposal of effluent and sludge.

Permits are also required for, amongst other things, the possession, sale, transportation, import and export of marine fish and aquatic plants. The permitting system needs to be revised so as to be conducive to community-based aquaculture. According to the participants in the study there are lots of permits that are required in order to practise aquaculture, and these need to be reduced because farmers sometimes only get these permits after long delays, which means they cannot farm legally until the permits are received.

## **Chapter 7: Recommendations and Conclusions**

Capital and technology are crucial, and technologies for aquaculture in South Africa are developed by the pioneering companies. Aquaculture is a growing industry in South Africa. There is a problem of an influx of unskilled workers in South Africa. Certain types of aquaculture are highly technical, so they require workers who are highly skilled and have knowledge. However, in rural communities there are a large number of unskilled workers with little knowledge and the beneficiaries in the study have never managed an enterprise before. In order for a business to be successful, an appropriate business model and appropriate institutional arrangements are crucial.

This chapter provides recommendations and conclusions to ensure successful and sustainable community-based aquaculture in South Africa. Finally gives future recommendations for future research

### **7.1. Capital and operational funding**

Clearly, aquaculture is capital intensive, especially in the set-up stages, when communities have to put up the infrastructure and also obtain the technologies. While some types of aquaculture practices are slightly cheaper to set up (for example those practised in the natural medium, such as mussels at Langebaan and oysters at Hamburg), some (for example kob farming) are highly capital intensive, both in terms of infrastructure and the development of technologies. The major type of capital required is financial capital, although physical capital is also required. However, communities are unlikely to be eligible for conventional financing such as from banks because of their inability to provide collateral. Hence, in most instances, communities have been assisted by development financial institutions or public sector funding to raise the capital for infrastructure and operational costs. The funding has been in two forms – as grants or as low-interest loans.

While receiving grants has the danger of developing an attitude of getting hand-outs, loans can give rise to the attitude that aquaculture is a business that requires investment that has to be paid back. To avoid

the dependency syndrome developing in communities, a bankable business plan needs to be developed and financed once-off. Therefore the government has to be careful in decisions about the type of funding to provide to communities, so that it breeds the attitude of running aquaculture as an investment-based business rather than a social programme. This means that there has to be a clear exit strategy, as in the case of the mussel project at Langebaan, unlike the existing arrangement for the Hamburg project. Contributions from the communities is critical, whether financially or in kind, because the government is creating future entrepreneurs by supporting these projects.

To reduce the amount of capital required, the communities also can collaborate with the pioneering companies, which have already developed technologies, and either lease or pay for the technology being developed. For example, the product can be processed by the pioneering company, rather than the community building a factory for processing. This would be a possibility in the case of Hamburg, for example, where they do not yet have a processing factory. One of the main problems for community groups is likely to be how to structure the business in such a way that they can continue paying for operational costs (including wages) while waiting for the harvesting to begin and revenue to start flowing in. Even then, the challenge would be how to apportion the revenue among the various required payments, such as capital loans, operational costs, profit, tax, etc. This will require business management training and also the discipline to run their operations as businesses based on loan investment that has to be paid back.

## **7.2. Capacity and competence building**

*Give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime.*

Rural communities are largely unskilled and lacking in knowledge about aquaculture, hence aggressive capacity-building programmes have to be undertaken. Aquaculture can be highly technical and requires skills and knowledge in different production phases. For example, kob farming is highly technical, and a worker has to know the different production phases such as spawning, egg hatching to fry phase, fry to fingerling, grow out, husbandry, monitoring and managing the system and technology. However,

mussels, oysters and catfish are not highly technical. Capacity building will differ according to whether the work is closely related to or in support of aquaculture.

- **Training** in the form of technical skills, business skills, project management skills and computer skills should be offered.
- **Initial skills** such as accredited skills programme should be organised for community members who are literate, whilst short practical programmes should be organised for those who are illiterate. Learnerships can be organised for selected members, especially the youth.
- **Capacity building** should be provided by providing training in intermediate and low technology, such as skype, emails and social media, so that communities can easily absorb and use it.
- **Mentorship** programmes should be arranged, whether by pioneering companies, for example Oceanwise and Pure Ocean in the case of Hamburg. Mentorship for mussel farming at the Imbaza Mussel Farm has been provided by Blue Ocean. Educational institutions such as Rhodes University and Stellenbosch University could also mentor the communities. Alternatively, government consultants could mentor the communities. Mentorship should be coupled with virtual incubation, for example television, projectors, where a technical specialist would periodically come on site for visual observation and assessment of the enterprise but most times use technology such as skype.
- There should be a policy for community-based aquaculture skills and training development: Government should establish a policy that is dedicated to the development and growth of community-based aquaculture skills and training. The policy should clearly define rules and regulations for training and skills in community-based aquaculture. Research and development, monitoring and review of community-based aquaculture skills and training policy should be put into place. This will assure the growth and development of community-based aquaculture.

### 7.3. Partnerships

One of the key success factors in the enterprise development framework would be to build a network of suppliers or agents and partners, especially those who can provide technology and technical input. In

the early stages of development, the community-based aquaculture project has to enter into agency or supplier and distribution agent agreements for the distribution of their products to national or regional markets. Agreements should be concluded on the inputs and outputs of production. For instance, the aquaculture community projects can enter into an agreement with the agencies regarding market research. Community-based aquaculture projects can also enter into agreements with distribution agencies so as to reduce costs, improve the quality of their products and simplify supply chain processes.

The projects can benefit from a partnership agreement because the agencies or companies can transfer their knowledge and expertise in husbandry, systems management, health management and financial management of the species with which each of the projects is involved. To ensure a steady flow of these services, technical partnership agreements have to be concluded with the concerned and relevant experts or companies. Therefore community-based aquaculture should collaborate with experts or agencies so as to pursue its objectives while offsetting costs.

#### **7.4. Channel communities into less technical aquaculture**

Given their level of skills and expertise, communities should rather be initiated into aquaculture start-ups that require less technology, for example mussel, oyster and catfish farming, which the findings show are less technical, particularly for those who are far from an enabling environment, such as in Hamburg. Kob farming in South Africa is new and highly technical, and most rural communities do not have the expertise to engage in highly technical aquaculture.

Most rural communities are poverty stricken and require projects that do not take years in order to come to fruition. It takes many years for aquaculture production to produce returns. If a project takes many years, the communities could become demotivated to continue with the project. By channelling communities into less technical aquaculture, the communities will not feel demotivated and there will be less failure and closure of projects, time will be saved, costs will be reduced and the government's objective of reducing poverty in rural communities will be achieved.

## **7.5. Value chain governance and value addition**

Governance is central to value chains. Lead firms are the ones that control the value chain by setting, monitoring and enforcing the parameters under which other members of a value chain operate (Chapter 2). During the early stages of the development of community-based aquaculture projects, there is a need to link and create distribution agencies that deal with marketing and distribution. The firms that set, monitor and enforce parameters are the pioneering companies that have already developed the markets and technology. Therefore communities have to follow what the pioneering enterprises enforce.

Value chain analysis for South Africa's aquaculture products from communities therefore will benefit the communities. By collaborating with the lead firms, community-based aquaculture can enter into negotiations about prices, markets, etc. that will also be beneficial to them. Government should create an enabling environment so that the communities can practise aquaculture successfully and be competitive, and also add value in the future as they acquire skills and technologies and become better linked to markets.

## **7.6. Enabling legislation for community-based aquaculture**

Government should create an enabling environment for the aquaculture industry by revising some of the aquaculture legislation so as to create a situation in which communities can be encouraged and be interested in aquaculture and start entering the industry. Government should create a friendly environment in which the aquaculture industry can generally thrive. The respondents in this study complained of too much red tape from the government, making the industry cumbersome and uninteresting to potential investors. For example, one of the respondents mentioned that there are lots of permits that have to be processed and obtained in order to be permitted to farm, and that this takes a lot of time. Another issue is that aquaculture is regulated by various departments, such as the Department of Water Affairs (DWA), the Department of Land Affairs (DLA) and the DAFF. Instead of all these different departments having a say in terms of regulation, there should be one department that authorises aquaculture, and the DAFF should develop a one-stop arrangement where all the permits and paperwork can be obtained and done.

## 7.7. External factors

Businesses can be affected by factors that they cannot control. These factors may have an effect on the internal functions, objectives and strategies of the business. The following factors can affect community-based aquaculture:

- **Government legislation and policies** – Changes in policy and legislation might affect the business negatively or positively. Therefore community-based aquaculture projects need to keep abreast of developments in terms of government legislation and policies, because these can create an opportunity for the venture to grow or it can affect the business negatively, for example the Consumer Protection Act, certain permits, etc.
- **Society** – Any business has to take cognisance of the society within which it operates. Society can assist the business to grow or create a negative climate that retards its growth. For example, most South Africans, especially in rural areas are not traditionally keen fish eaters, thus communities have to take that into account when going into aquaculture, with the caution that there might not be ready markets for their produce within the areas where they are practising it.
- **Economic climate** – Businesses can be affected by the state of the economy in terms of taxation, interest rates, exchange rates, government spending, demand and global economic factors. Therefore communities also have to take cognisance of the abovementioned economic factors in order to minimise the possible negative effects or to take advantage of the possible positive effects.
- **Competition** – The business can be affected by the way other businesses compete with the products that the business produces. Community-based aquaculture entities have to compete with the pioneering companies, which might be a disadvantage, as they produce in economies of scale and have already developed technologies. Therefore communities have to find ways to compete with the pioneering companies and other community-based aquaculture projects in order to survive in the business world.
- **Technology** – Changes in production processes and product innovation affect a business. Communities have to keep abreast of developments because disruptive technologies can wipe

out a lot of industries, in particular community-based aquaculture as it is still developing. Therefore communities should collaborate continuously with the companies that have already developed technologies in order to keep abreast of skills and knowledge of technology developments happening in the industry.

### **7.8. Government exit strategy**

The government exit strategy should ensure that:

- Structured training programmes and skills development have been completed so that people can handle activities completely on their own in the long run.
- Governance structures are in place and functioning well.
- Simple systems policies and standard operating procedures are developed and well monitored so as to ensure or strengthen control measures. A strategic business plan should be in place for each entity and reviewed periodically. It also should ensure that the execution of the business plan is monitored strictly and that a culture of continuity is inculcated.
- Networks of enablers are created and made to function, for example links with extension officers, business advisers from provincial development financial institutions, as well as officers from the Department of Economic Development.

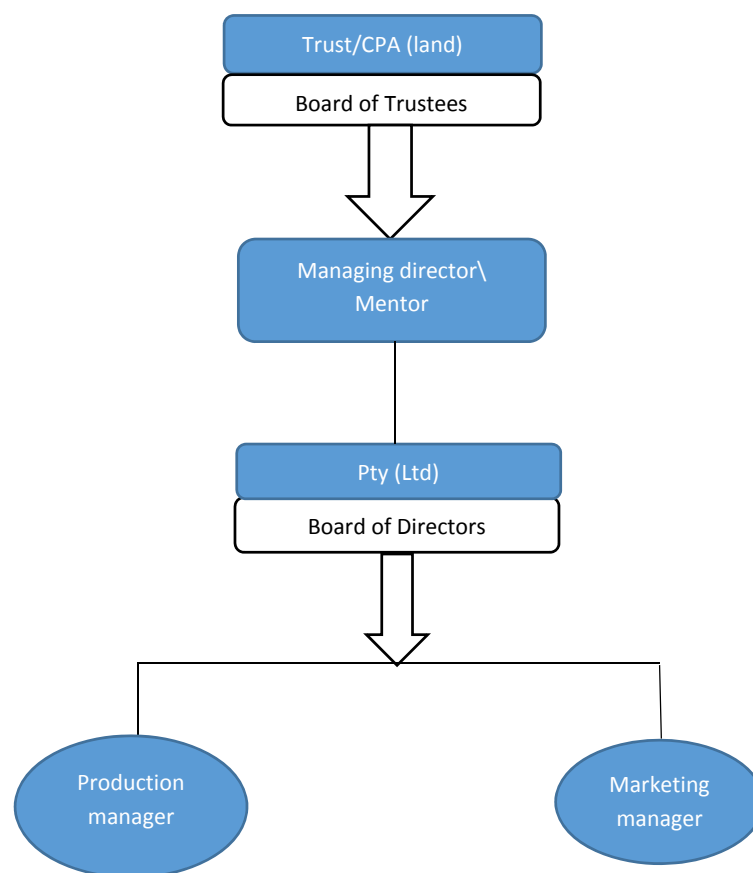
### **7.9. Appropriate organisational model**

Choosing the type of business ownership may depend on many factors, such as financing, administrative costs, tax implications, insolvency and business continuity, and what would happen to the enterprise if the owners decide to sell it. It also depends on the nature and size of the business. For example, administration costs for a company are higher compared to those of a cooperation or a trust. Again, the aim of a cooperative is not just to make a profit, but also to uplift the community, i.e. they differ from any other forms of ownership as their aim is to further both the economic and social interests of the members or community. However, a trust is mostly set up by people to protect their personal assets against the risk of the business failing, to ensure the continuity of a business and to limit estate duty and other taxes.



So, community-based aquaculture business could choose any organisational structure model, for example:

- For an entity in a rural setting: firstly, a community trust or community property association for land holding should be developed so as to ensure that the land remains with the community even if the enterprise becomes insolvent.
- A company should be developed to operate the aquaculture business.
- A private company or a cooperative should be developed for an entity that is in an urban area or near an urban area to lease land and operate the business.



**Figure 24:** Proposed organisational model

Figure 24 shows the proposed organisational model. The trust or CPA would be for land holding, the Pty (Ltd) would be for operating the business, and then the managing director would be a mentor for those projects like Hamburg, which have no skills for managing until they are trained by the mentor to manage the business. The production manager and marketing manager can be also chosen from those who have matric and are trained until they are able to manage the project. The aim here is to have a fully functional project that is run by the beneficiaries in the future. This study recommends that the most viable business arrangement for community-based aquaculture would depend on the factors mentioned above, and experts have to be consulted for the right form of business ownership that will suit the specific community-based aquaculture project. It should also be noted that there is no best organisational structure model; the best organisational structure model depends on the factors mentioned above and on what is best for the community.

In all the three cases, technical and marketing partnership would appear to be the most workable approach given the shortcomings that communities come into the industry with. Such an approach recognises the need and desire for managerial, business and technical support and handholding initially for the communities. The key question is how long such incubation should last and whether communities can eventually take over and run with things on their own. This is likely to vary from case to case depending on the type of aquaculture that is being practiced and also the competence base at which the communities are starting off.

### 7.10. Future research

From the previous analysis, a number of topics for further research were identified:

- **Research all community-based aquaculture in South Africa:** The study was limited to three farms in two provinces. Further research could be undertaken in other provinces and include more farms.
- The methodology and objectives could be prolonged so as to undertake a detailed analysis of community-based aquaculture.
- **Impact of the national policy framework on community-based aquaculture:** The impact of the recently approved national policy framework on aquaculture should be investigated. Is

community-based aquaculture included in the policy framework, does the policy benefit or harm community-based aquaculture? What can be done to revise it if it needs revision?

- **Market research:** In this study it was suggested that research should be done on the international markets. Therefore new markets, which products they like, their prices and export legislation, and how South Africa can benefit from these countries should be investigated.
- **Full value chain analysis:** In this study, the value chains of three community-based aquaculture projects were studied. A full value chain analysis of the aquaculture industry and all the community-based aquaculture ventures in South Africa needs to be undertaken.

Clearly, all the three cases studied here are being run or are eventually intended to be run as profit making enterprises. It can be assumed that government's the policy intentions are that community based aquaculture should be developed as successful and sustainable commercial enterprises. Where these have been initially funded through government grants or soft loans, they should weaned off such funding and become independent successful enterprises eventually. In this context, it is important therefore to be cognizant of the regulatory framework for businesses in South Africa.

One cannot definitively say which model is best among those that we found in practice in this study – cooperative, closed corporation, shareholdership and trust. All have their merits and also their problems. In practice, it is likely that communities entering the industry would have to select the model or a combination of legal arrangements that suits their capabilities and their situation best. Decisions about which model to use should therefore be taken case by case with the help and assistance of responsible government and non-governmental agencies.

The problem statement of this study has been proven to be true, and the hypothesis has been proven based on the analysis of this study. It has been shown that appropriate institutional arrangements are crucial for the sustainability and success of community-based aquaculture. It also has been demonstrated that the aquaculture industry is consumer driven, that highly skilled labour is required in most aquaculture jobs and that substantial investment is required for the development of community-based aquaculture.

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## **Annexures**

### **Annexure A**

University of Stellenbosch

7600

June-July 2013

Dear participant

I am Gugu Njokweni, a student at the University of Stellenbosch. I am doing a Master's in Agricultural Economics. I am undertaking a research project to investigate the institutional and organisational arrangements for consumer-oriented community-based aquaculture in South Africa. The study is done in collaboration with the Department of Agriculture, Forestry and Fisheries and the University of the Western Cape.

The results of this questionnaire will help in identifying what markets exist or can be created for aquaculture products for community-based aquaculture. It will assist the beneficiaries of the community based aquaculture projects to know the skills, know-how and investment requirements for community based aquaculture. It also will assist in the identification of the appropriateness of institutional arrangement for community based aquaculture in South Africa. Should you wish to know the results of the study they will be available to you.

I request that you kindly fill in and complete the following questionnaire. The questionnaire will take 15-20 minutes of your time. Your participation in this survey is voluntary. If you feel there is something that offends you in any way you have the right to stop the survey. Most of the questions have to do with your understanding and experience of community based aquaculture, institutional arrangements and your opinion, therefore there is no right or wrong answer.

Information provided in this questionnaire is confidential, your name will not be connected to your answers, and only combined data will be used in the report. I hereby certify that this is an honest interview taken in accordance with my academic needs only.

If you have further questions and comments, please contact my supervisor, Mafaniso Hara, at 021 959 3772 or [mhara@plaas.org.za](mailto:mhara@plaas.org.za), or my co-supervisor, Nick Vink, at 021 808 4899 or [nv@sun.ac.za](mailto:nv@sun.ac.za)

Thank you for your time and consideration.

Yours sincerely

Gugu Njokweni

Student Researcher

**PLEASE ANSWER THE FOLLOWING QUESTIONS BY WRITING DOWN YOUR ANSWER IN THE SPACE PROVIDED (if you are a retailer, skip sections A1-A3 and answer section B; if you are a government official, skip sections A1-B and answer section C).**

**A. PERSONAL INFORMATION:**

1.1. Place of residence

---

1.2. Name and surname

---

1.3. Gender

---

1.4. Age

---

1.5. Highest academic qualification

---

**A1. ORGANISATIONS FOR AQUACULTURE**

1. How is the group organised for aquaculture (e.g. CC, Cooperative, Traditional authority)?

---

2. Is the group undertaking the operation on their own or are they employing people?

---

3. Gender composition of group:

No. of women..... No. of men.....No. of people with disability.....No. of youth.....

4. How are the proceeds from production distributed or going to be distributed?

---



## **A2. AQUACULTURE OPERATORS**

2.1. Which species do you farm?

---

2.2. Where do you sell or intend to sell your fish?

---

2.3. How do you get your fish or fish products to retailers (self-delivery, middle person or collected by retailer)

---

2.4. If you deliver, how do you deliver the product?

---

2.5. In what form do you sell the fish?

---

2.6 Who does the marketing?

---

2.7. Are there other potential markets for your product?

---

2.8. How easy or difficult is it to find markets for your product?

---

2.9 How much investment is/was required?

---

2.10 Who is/are the source(s) of investment?

---

2.11 What are the operational costs and how much are they?



### **A3. TECHNICAL SKILLS**

3.1 What skills do you require to do aquaculture?

---

3.2 What training did you get in order for you to practise aquaculture?

---

3.3 Do you know of any training and skills programmes for aquaculture?

---

4. Do you have any other comments/suggestions regarding aquaculture practice by communities?

---

### **B. RETAILERS/MARKETER (MIDDLE PERSON)**

1. Name of retailer

---

2. Location

---

3. Form in which they being sold (fillets, whole, frozen or fresh)

---

4. Source (where do you buy your fish/fish products from: (wholesalers or direct from the farm)?

---

5. Which are the most popular fish and product forms?

---

6. What quality and handling standards do you require for your products?

---

7. Would you be willing to retail species from community-based aquaculture?

---

8. If yes, in which form would you like the fish?

(a) Kob	No/Yes
(b) Oyster	No/Yes
(c) Catfish	No/Yes

9 Would you collect the fish/fish products or do you require having it delivered?

---

10. What price would you be willing to pay for the fish?

---

11. Do you have any other comments/suggestions regarding aquaculture practice by communities?

---



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### **C. LEGAL FRAMEWORK AND INSTITUTIONAL ARRANGEMENTS**

1. Are there policies and legislation supporting community based aquaculture?

---

2. If yes, what are their objectives and aims?

---

3. What government departments and NGOs work in the sector?

---

4. What reforms and legislation could be required to support or improve support for community based aquaculture?

---

5. What is the government support to aquaculture/community based aquaculture?

---

6. Do you have any other comments/suggestions regarding aquaculture practice by communities?

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Thank you for you participation!!

**Annexure B****LIST OF RESPONDENTS****BLUE OCEAN MUSSEL FARM AND IMBAZA MUSSEL FARM****INTERVIEW DATE: 03 APRIL 2014**

NAME AND SURNAME	CELLPHONE/ TELEPHONE NUMBER	EMAIL ADDRESS
Mr Schalk Visser (Managing Director + shareholder: Blue Ocean )	0827803128	Schalk@blueoceanmussels.com
Mr Vos Pienaar (Manager + shareholder: Imbaza)	0834189748	bbmussel@mweb.co.za
Mr Andrew Wood (Manager)	0828977567	
Mr Bonilizwe Sweleni (employee)		
Mr Siyabonga Dawuse (employee)	0732633239	
Mr Mthobeli Ziyokwana (employee)	0786021055	
Mr Mpumelelo Yamile (employee)		
Mr Vincent Lelaletsi (employee)	0727442525	
Mr M.C. Mbudula (employee)	0780560231	

## HAMBURG AQUACULTURE COOPERATIVE

INTERVIEW DATE: 02 JUNE 2014

NAME AND SURNAME	CELLPHONE/TELEPHONE NUMBER	EMAIL ADDRESS
Mr Dave Krebsler (Manager)		dave.krebsler@pixie.co.za
Miss Ntombizanele Maku (employee)		
Mr Vusumzi Ndlondlo (employee)		
Mr Thembinkosi Halana (employee)	0810001341	
Mr Sipho Mbiyozo (employee)		

## BLUE KAROO TRUST

INTERVIEW DATE: 26 MARCH AND 05 JUNE 2014

NAME AND SURNAME	CELLPHONE/TELEPHONE NUMBER	EMAIL ADDRESS
Mrs Liesl de la Harpe (Project administration)	0767054731	Liesl@bluekaroo.co.za
Mr Leslie ter Morshuizen (Aquaculture trainer and consultant)	0834060208	leslie@aquaafrica

## PURE OCEAN

INTERVIEW DATE: 03 JUNE 2014

NAME AND SURNAME	CELLPHONE/TELEPHONE NUMBER	EMAIL ADDRESS
Mr Andre Bok(Development Manager)	0834898124	andre@pureocean.co.za
Miss Nangamso (intern)		

## OCEANWISE

INTERVIEW DATE: 03 JUNE 2014

NAME AND SURNAME	CELLPHONE/TELEPHONE NUMBER	EMAIL ADDRESS
Mr Liam Ryan (Director)	0827719507	liam@oceanwise.co.za
Mr Guy Musson (Director)	0836587391	guy@oceanwise.co.za
Miss Zimkitha Tofu(manager: processing section)	0738148347	zimkitha@oceanwise.co.za



Comparison of forms of ownership

TYPE	SOLE PROPRIETORSHIP	PARTNERSHIP	CO-OPERATIVES	CLOSE CORPORATION	COMPANIES				
					PROFIT COMPANIES				NON-PROFIT COMPANIES
					PRIVATE COMPANY	PERSONAL LIABILITY COMPANY	PUBLIC COMPANY	STATE OWNED COMPANY	
<b>Statutory regulation / Legislation</b>	No legal requirements,	There are some legal requirements	Subject to the Cooperative society Act 14 of 2005.	Subject to Close Corporations Act 1984 and Companies Act 71 of 2008.	Subject to the Companies Act 71 of 2008.	Subject to the Companies Act 71 of 2008.	Subject to the Companies Act 71 of 2008.	Subject to the Companies Act 71 of 2008 and PFMA No. 1 of 1999	Subject to the Companies Act 71 of 2008.
<b>Legal prescriptions</b>	None	Voluntary agreement between the parties. No formal	Application, the constitution and proposed name, all complies with the co-	Founding statement lays down the legal requirement in terms of the amended CCs	MOI represent the founding document for the companies in terms of the Act.	MOI represent the founding document for the companies in terms of the Act.	MOI represent the founding document for the companies in terms of the Act.	MOI represent the founding document for the companies in terms of the Act.	MOI represent the founding document for the companies in terms of the Act.
<b>Ownership</b>	Owned and managed by an individual	No limitation on number of partners or persons – 2 and more	Minimum of 5 persons primary co-operative; 2 or more primary co-Operatives for secondary co-operative; 2 or more secondary	Minimum of 1 and maximum of 10 members	1 or more persons	1 or more persons	1 or more persons	1 or more persons	3 or more persons
<b>Name of Owners</b>	Owner	Partners	Members / shareholders	Members	Shareholders	Shareholders	Shareholders	Shareholders	Company is not required to have members unless obliged by MOI.
<b>Formation documents</b>	No requirements	Partnership Agreement	Application and the co- Operative	Founding Statement <b>NOT</b> applicable.	Memorandum of Incorporation	Memorandum of Incorporation	Memorandum of Incorporation	Memorandum of Incorporation	Memorandum of Incorporation
<b>Registration requirements</b>	No legal requirements for registration except ensuring that owner is registered for income tax purposes	No legal requirements for registration except requiring a partnership agreement.	Application in accordance with the Act; Constitution complies with the Act and co-operative principles; and the proposed name of that co- operative complies with section	According to the Act 71 of 2008 no further registration of the CC.	Notice of Incorporation and signature of the MOI by number of persons and filing it with prescribed Notice of Incorporation at CIPC.	Notice of Incorporation and signature of the MOI by number of persons and filing it with prescribed Notice of Incorporation at CIPC.	Notice of Incorporation and signature of the MOI by number of persons and filing it with prescribed Notice of Incorporation at CIPC.	Notice of Incorporation and signature of the MOI by number of persons and filing it with prescribed Notice of Incorporation at CIPC.	Notice of Incorporation and signature of the MOI by number of persons and filing it with prescribed Notice of Incorporation at CIPC. It is incorporated for a “public benefit purpose”
<b>Directors</b>	N/A	N/A	Board of directors	N/A	1 or more directors	1 or more directors	3 or more for a public (Ltd)	1 or more directors	3 or more directors
<b>Name</b>	No specific suffix to be reflected in the name	No specific suffix to be reflected in the name	A co-operative must have the words- “co-operative” or “co-op” as part of its name	The name must end with CC	To be reflected as Proprietary Limited or (Pty) Ltd	To be reflected as Incorporated or Inc.	To be reflected as Limited or Ltd	To be reflected as SOC Ltd	To be reflected as NPC

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					PROFIT COMPANIES				NON-PROFIT COMPANIES
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<b>Legal person</b>	It does not have a legal personality	It does not have a separate legal personality	Incorporated as legal person with effect from the date of registration.	It is a separate legal entity that exists separately from its members	The company has a separate legal personality.	The company has a separate legal personality. unless MOI provides otherwise	The company has a separate legal personality.	The company has a separate legal personality.	The company and directors has a separate legal personality. It can indemnify to protect or indemnify itself against unlawful acts by
<b>Tax reliability</b>	He is taxed in his personal capacity	Taxed on partners personal capacity	Co-operatives pay taxes on income retained for reserves and patronage to individual members who also pay taxes on that income.	Taxed as company tax, i.e. subjected to double taxation. on the taxable income and Standard Tax on Companies (STC) payable on declared dividends	Subjected to double taxation. on the taxable income and Standard Tax on Companies (STC) payable on declared dividends	Subjected to double taxation. on the taxable income and Standard Tax on Companies (STC) payable on declared dividends	Subjected to double taxation. on the taxable income and Standard Tax on Companies (STC) payable on declared dividends	Subjected to double taxation. on the taxable income and Standard Tax on Companies (STC) payable on declared dividends	Company may qualify for tax exemption. It should satisfy the criteria laid down in the Income Tax Act
<b>Liability</b>	Unlimited. The owner is liable for all the debts in his personal capacity.	Partners are jointly and severally liable for the debts.	Limited. As a separate legal person.	Limited. As a separate legal person.	No one is liable for the debts of the company except if Act or the MOI provide otherwise.	The company, directors and previous directors are jointly and severally liable for the debts.	No one is liable for the debts of the company except if Act or the MOI provide otherwise.	No one is liable for the debts of the company except if Act or the MOI provide otherwise.	A director / directors will be liable for any loss, damage or costs sustained by the company if he/she was acting in the name of the
<b>Continuity</b>	Limited. The owner can sell his business or liquidate it during his lifetime.	Unlimited. Different situations can cause the dissolution of the partnership, e.g. the expiry of the term for which the partnership was originally formed.	Unlimited. Death, insolvency or lunacy of a member does not affect the existence of a co-operative.	Unlimited. A CC exists separately from the members and therefore enjoys perpetual continuation so that death, resignation, etc. of a member will not cause	Unlimited. The duration of a company is perpetual except if it is limited in terms of its founding statement, or if it is liquidated.	Unlimited. The duration of a company is perpetual except if it is limited in terms of its founding statement, or if it is liquidated.	Unlimited. The duration of a company is perpetual except if it is limited in terms of its founding statement, or if it is liquidated.	The duration of a company is perpetual except if it is limited in terms of its founding statement, municipal regulations or statute, or if it is liquidated.	Unlimited. The duration of a company is perpetual except if it is limited in terms of its founding statement, or if it is liquidated. It carries on with its work even if its members or
<b>Capital acquisition</b>	Contributed by the owner	Contributed or loans by partners	Contributed by members in the form of entrance fee, subscription fee, share held in the co-operative, member's	Contributed or borrowed by members	MOI must restrict the transferability of its securities and must prohibit an offer of its securities	MOI must restrict the transferability of its securities and must prohibit an offer of its securities	MOI allows the company to make an offer of its securities to the public	MOI allows the company to make an offer of its securities to the public	NPC has no securities and depends mainly on government and private sector funding.
<b>Availability of Financial Information</b>	Only available to the owner	Only available to the partners	Available to the members of the co-operative.	Only available to members of the CC	Only available to shareholders & perspective shareholders	Only available to shareholders & perspective shareholders	Information is freely available to the public.	Information is freely available to the public.	Info freely available to the members and interested stakeholders.
<b>Transfer of Ownership</b>	Owner can decide at any time to sell, close down to	Transfer is complicated unless stipulated	The constitution may provide for membership shares	Not influenced by the withdrawal of members Can be	The Act prohibits an offer of securities to the public and	The Act prohibits an offer of securities to the public and	Unlimited and free transfer of shares in a public company	Unlimited and free transfer of shares in a public company	The company do not have a share capital and cannot distribute shares.

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					PROFIT COMPANIES				NON-PROFIT COMPANIES
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	transfer to someone else The lifespan of the business is usually linked to the	In the partnership agreement. More members can be added	members and may transfer its assets, rights, liabilities and obligations to any other co-operative by mutual	individual if all members agree	The transferability of securities.	Transferability of securities.			Income and property are not distributable to its incorporators, members, directors, officers or persons
<b>Pre-emptive rights on issue of securities</b>	N/A	N/A	N/A	N/A	Shareholders have pre-emptive rights in respect of the issue of any new securities (subject to certain limitations) – this may be excluded by the MOI	Shareholders have pre-emptive rights in respect of the issue of any new securities (subject to certain limitations) – this may be excluded	No pre-emptive rights unless MOI provides otherwise	No pre-emptive rights unless MOI provides otherwise	N/A
<b>Management</b>	Owner	All/some partners	Managed by board of directors appointed by	All/some members	1 or more directors required	1 or more directors required	3 or more for a public (Ltd) company	1 or more directors required	3 or more directors required
<b>Payment to Owners</b>	All profits are paid to the owner	Divided between partners according to the Partnership Agreement	Co-operative pay to its members a portion of the surplus that is not transferred as a reserve to a reserve fund and is allocated in proportion to the value of transactions conducted by a member	Paid according to % interest held by each member	Distributions require board approval and need to satisfy the solvency and liquidity test. Include dividends and share buy-backs. They are according to the class, preferences, rights and limitations of shares held.	Distributions require board approval and need to satisfy the solvency and liquidity test. Include dividends and share buy-backs. They are according to the class, preferences, rights and limitations of shares	Distributions require board approval and need to satisfy the solvency and liquidity test. Include dividends and share buy-backs. They are according to the class, preferences, rights and limitations of shares held.	Distributions require board approval and need to satisfy the solvency and liquidity test. Include dividends and share buy-backs. They are according to the class, preferences, rights and limitations of shares	No part of the Company's income may be paid to an incorporator, member, or director unless obliged to do so by law.
<b>Voting rights</b>	N/A	N/A	Primary co-operative, each member has only one vote. The constitution of a secondary or tertiary co-operative may provide that the members have more than 1 vote: a secondary co-operative no member shall have more than 15%.	Voting rights should correspond with their respective member interest or ownership percentage	Each share has one general voting right unless class; preferences, rights and limitations in MOI provides otherwise	Each share has one general voting right unless class; preferences, rights and limitations in MOI provides otherwise	Each share has one general voting right unless class; preferences, rights and limitations in MOI provides otherwise	Each share has one general voting right unless class; preferences, rights and limitations in MOI provides otherwise	Each voting member has at least one vote. May have voting or non-voting members or both. The votes are equal.

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					PROFIT COMPANIES				NON-PROFIT COMPANIES
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Financial Statement	Optional	Optional	Must prepare annual financial statements	Must prepare annual financial statements.	Must prepare annual financial statements.	Must prepare annual financial statements.	Must prepare annual financial statements.	Must prepare annual financial statements.	Must prepare annual financial statements
Auditory requirements	Optional	Optional	Auditing of the affairs of a co-operative must be conducted annually unless exempted by registrar.	<b>MAY</b> be expected to audit its financial statements unless exempted or independently reviewed by the accounting officer', depending on its public interest score at the end of the year.	Voluntarily audited or Audit required only if prescribed by regulation.	Audited voluntarily	Compulsory audit	Compulsory audit	Audited voluntarily or Independently reviewed
Lodging of financial statements with the Commission	N/A	N/A	Annual financial statement to be lodged with the registered office of the co-operative for at least 21 days after approval.	N/A	Only required to lodge annual financial statements if it is a company that is required to be audited by regulation.	Only required to lodge annual financial statements if it is a company that is required to be audited by regulation.	Required to lodge annual financial statements.	Required to lodge annual financial statements.	Only required to lodge annual financial statements if it is a company that is required to be audited by regulation.
AGM	N/A	N/A	Requires an AGM	N/A	No requirement for an AGM unless required to be audited	No requirement for an AGM unless required to be audited	Requires an AGM	Requires an AGM	No requirement for an AGM unless required to be audited
Electronic participation at shareholder meeting	N/A	N/A	N/A	N/A	No requirement	No requirement	Required to provide a mechanism for electronic participation of shareholder meetings	Required to provide a mechanism for electronic participation of shareholder meetings	No requirement
Quorum	N/A	N/A	N/A	N/A	25% and at least 3 shareholders if the company has more than 2 shareholders	25% and at least 3 shareholders if the company has more than 2 shareholders	25% and at least 3 shareholders if the company has more than 2 shareholders	25% and at least 3 shareholders if the company has more than 2 shareholders	25% and at least 3 shareholders if the company has more than 2 shareholders
Whistleblower provisions	N/A	N/A	N/A	N/A	No requirement for reporting process	No requirement for reporting process	Public company required to implement a reporting process	State-owned company required to implement a reporting process	No requirement for reporting process
Governance	N/A	N/A	Require an audit, appoint an auditor.		Only require an audit if determined by regulation Only require audit committee and company secretary if	Only require an audit if determined by regulation Only require audit committee and company secretary if	Require an audit, audit committee and company secretary	Require an audit (but subject to Public Audit Act), audit committee and company secretary	Only require an audit if determined by regulation Only require audit committee and company secretary if

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					stipulated in MOI	stipulated in MOI			stipulated in MOI
<b>Disclosure of beneficial interest in securities</b>	N/A	N/A	N/A	N/A	No requirement to disclose beneficial interest of securities	No requirement to disclose beneficial interest of securities	Nominee required to disclose beneficial holder of securities	No requirement to disclose beneficial interest of securities	N/A
<b>Application of the takeover regulations and TRP and “affected transactions”</b>	N/A	N/A	N/A	N/A1	Only applies to a private company if provided for in MOI, or if there has been a transfer of more than 10% of the securities in the last 24 months	Only applies to a Personal liability company if provided for in MOI, or if there has been a transfer of more than 10% of the securities in the last	Applies to every public company	Applies to every SOC	N/A