Boosting Skills for Greener Jobs in the Western Cape Province of South Africa

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Acknowledgements

This report was prepared by Nathalie Cliquot (Policy Analyst, Local Economic and Employment Development (LEED) work programme) and Andrew Dean of the Marchmont Labour Market Observatory, University of Exeter (UK) and under the supervision of Jonathan Barr (OECD) and Sylvain Giguère (OECD) with statistical support from Michela Meghnagi (OEDC) and editorial support from Lindsey Ricker (OECD). The work was undertaken with the support of the European Commission’s DG Employment, Social Affairs and Inclusion.

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This project would not have been possible without the participation and co-operation from the Western Cape Province. The Western Cape Government Department of Environmental Affairs and Development Planning assisted OECD LEED with the delivery of an accompanying online business survey. The project and report also benefitted from the active contribution from a steering committee (in alphabetical order):

- Dean Impson (CapeNature)
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- Michelle Pretorius (Republic of South Africa Department of Agriculture Forestry and Fisheries)

Finally, John Bostock from the Institute of Aquaculture of the University of Stirling kindly contributed to the project roundtable.
Acronyms and Abbreviations

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<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>AASA</td>
<td>Aquaculture Association of Southern Africa</td>
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<tr>
<td>ABET</td>
<td>Adult Basic Education and Training</td>
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<td>ACP</td>
<td>African, Caribbean and Pacific Group of States</td>
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<td>ADEP</td>
<td>Aquaculture Development and Enhancement Programme</td>
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<td>AFD</td>
<td>Aquaculture Development Fund</td>
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<td>Agri-SETA</td>
<td>Agriculture Sector Education Training Authority</td>
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<td>AIF</td>
<td>Aquaculture Intergovernmental Forum</td>
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<td>ASWG</td>
<td>Aquaculture Sector Workgroup</td>
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<td>CASP</td>
<td>Comprehensive Agricultural Support Programme</td>
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<td>CHE</td>
<td>The Council on Higher Education</td>
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<td>CITIES</td>
<td>Convention on International Trade in Endangered Species</td>
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<td>CSIR</td>
<td>Centre for Scientific and Industrial Research</td>
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<tr>
<td>DAFF</td>
<td>Department of Agriculture, Forestry and Fisheries</td>
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<td>DEA</td>
<td>Department of Environmental Affairs</td>
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<td>DEADP</td>
<td>Department of Environmental Affairs and Development Planning</td>
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<td>DEDAT</td>
<td>Department of Economic Development and Development</td>
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<td>DHET</td>
<td>Department of Higher Education and Training</td>
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<td>DIFS</td>
<td>Department of Ichthyology and Fisheries Science</td>
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<td>DFI</td>
<td>Development Finance Institutions</td>
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<td>DoA</td>
<td>Department of Agriculture</td>
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<td>DWS</td>
<td>Department of Water and Sanitation</td>
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<td>EC</td>
<td>Eastern Cape Province</td>
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<td>EFA</td>
<td>Enviro-Fish Africa</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EPWP</td>
<td>Extended Public Works Programme</td>
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<td>EU</td>
<td>European Union</td>
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<td>FAO</td>
<td>Food and Agricultural Organisation of the United Nations</td>
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<td>FET</td>
<td>Further Education and Training</td>
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<tr>
<td>FIFO</td>
<td>Fish-in-fish-out ratio</td>
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<td>FS</td>
<td>Free State Province</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GEIM</td>
<td>Green Economy Investment Mapping</td>
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<td>GHG</td>
<td>Greenhouse Gas</td>
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<td>GIZ</td>
<td>Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)</td>
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<td>HEQSF</td>
<td>Higher Education Qualifications Sub-Framework</td>
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<tr>
<td>HIK</td>
<td>HIK Abalone Farm (Pty) Limited</td>
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<td>IDC</td>
<td>Industrial Development Corporation</td>
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<td>IGTT</td>
<td>Intergovernmental Task Team</td>
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<td>ILO</td>
<td>International Labour Organisation</td>
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<td>IPAP</td>
<td>Industrial Policy Action Plan</td>
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<td>KZN</td>
<td>KwaZulu Natal Province</td>
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<td>LEED</td>
<td>Local Economic and Employment Development</td>
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<td>LP</td>
<td>Limpopo Province</td>
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<td>LUANAR</td>
<td>Lilongwe University of Agriculture and Natural Resources</td>
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<td>MAIL</td>
<td>Marine Aquaculture Industry Liaison</td>
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<td>MAWG</td>
<td>Marine Aquaculture Working Group</td>
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<td>MFFASA</td>
<td>Marine Finfish Farmers Association of South Africa</td>
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<td>MP</td>
<td>Mpumalanga</td>
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<td>NAWG</td>
<td>Northern Aquaculture Workgroup</td>
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<td>NC</td>
<td>Northern Cape Province</td>
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<td>NCCR</td>
<td>National Climate Change Response Policy</td>
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<td>NDP</td>
<td>National Development Plan</td>
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<td>NEMA</td>
<td>National Environmental Management Act</td>
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<td>NP</td>
<td>North West Province</td>
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<td>NQF</td>
<td>National Qualifications Framework</td>
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<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>OHAS</td>
<td>Occupational Health &amp; Safety Act</td>
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<td>OQSF</td>
<td>Occupational Qualifications Sub-Framework</td>
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<td>PSG</td>
<td>Provincial Strategic Goals</td>
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<td>PSP</td>
<td>Provincial Strategic Plan</td>
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<td>Acronym</td>
<td>Full Form</td>
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<td>PS</td>
<td>Photovoltaic</td>
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<td>QCTO</td>
<td>Quality Council for Trades and Occupations</td>
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<td>REFIT</td>
<td>Renewable Energy Feed-in Tariff</td>
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<tr>
<td>REIPPPP</td>
<td>Renewable Energy Independent Power Produce Procurement Programme</td>
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<tr>
<td>SAGEM</td>
<td>South African Green Economy Model</td>
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<td>SAKTA</td>
<td>South African Koi Traders Association</td>
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<td>SASSI</td>
<td>South African Sustainable Seafood Initiative</td>
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<td>SAQA</td>
<td>South African Qualifications Authority</td>
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<tr>
<td>SME</td>
<td>Small and Medium-sized Enterprise</td>
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<td>SMME</td>
<td>Small, Medium and Micro-Enterprise</td>
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<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
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<td>WC</td>
<td>Western Cape Province</td>
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<td>WCTA</td>
<td>Western Cape Trout Association</td>
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<td>WWF</td>
<td>World Wide Fund For Nature</td>
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<td>ZAR</td>
<td>South African Rand</td>
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Executive Summary

The transition to a low-carbon, resource efficient and green economy can only be made by developing the right skills, knowledge and competencies. Such skills can be defined as “the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society” (Cedefop, 2012). While green growth is expected to create a number of new jobs, there may be severe economic and social adjustments for communities with energy- and emissions-intensive production. The structural economic changes required for the shift to a green economy will necessitate careful planning and effective implementation at the local level.

The OECD Local Economic and Employment Development (LEED) Programme recently undertook an international project on ‘Boosting skills ecosystems for greener jobs’ in four countries: Belgium (Flanders), Poland (Pomorskie), Greece (Attica) and South Africa (Western Cape). The project aims to analyse the local skills dimension of the transition to the green economy and to explore how selected local areas/industry clusters identify the specific skills needed to support green growth. Further, it considered how related skills policies and practices can be made more effective in supporting and accelerating the transition to a green economy.

This report looks specifically at the work undertaken in the Western Cape (South Africa) within the aquaculture sector. Although the aquaculture sector is still relatively small in the Western Cape, it presents important new opportunities for the region’s labour market through business growth, innovation, increasing food production, addressing environmental challenges and job creation. The sector is also benefited by a national programme, Operation Phakisa, which aims to facilitate investments by creating a fast-track process to alleviate administrative burdens and backlog. Strategies and policies at the national and local level in South Africa also seek to link to education and training institutions to boost the necessary skills. Aquaculture has been identified as a priority sector, but does not yet fully benefit from the mechanisms to foster green growth.

Internationally, the aquaculture sector’s contribution to total global commercial and subsistence fish for consumption is growing. There is high growth potential for South Africa’s aquaculture industry to serve local, regional and global markets. In 2010, fish provided more than 2.9 billion people with almost 20% of their intake of animal protein, and another 4.3 billion people with approximately 15% of their animal protein intake (FAO, 2014[1]).

As part of this work, an in-depth review was undertaken, which included an analysis of the policies and strategies supporting the transition to a green economy and the need for associated skills development in the aquaculture sector. The methodology was a combination of semi-directed interviews with individual companies and a telephone survey of aquaculture companies. The company survey reveals that aquaculture companies perceive themselves as environmentally-minded businesses that can provide an alternative to unsustainable fishing practices. Companies are highly dependent on environmental factors, such as water quality. Around two-thirds of companies have already taken measures to green their businesses, particularly in relation to energy efficiency and water quality. Company’s values such as corporate social responsibility, as well as CEO vision and saving operational costs are the main
drivers for greening but obstacles exist especially in relation to costs and lack of associated finance.

The green transition is having an impact on skills and occupational profiles. Businesses signalled an increasing need for technical skills alongside managerial and leadership skills. To assist in greening their businesses over 80% of the firms had already up-skilled or retrained employees, 70% had hired consultancy services and 53% had hired additional employees. A shortage of artisans and technicians (plumbers, electricians) has been identified. Aquaculture companies are also confronted with high skills deficits in basic skills (such as literacy and numeracy) for their lower-skilled operators. In depth-interviews highlighted that some aquaculture companies face difficulties in retaining lower skilled workers.

The Western Cape aquaculture businesses are already well-connected to universities and research institutions. They are also actively collaborating with other businesses. Many of those not already active in research and business clusters indicated that enhanced knowledge sharing activities would be useful to help them green their operations.

Although the aquaculture sector in the Western Cape is small, it is supported through a number of public and private mechanisms. However, a need to scale-up this support has been identified, in particular to help the greening of the sector. This report has also identified that there is significant opportunity to streamline the permitting processes and institutional support for aquaculture, building on the successes of Operation Phakisa and other strategic initiatives being undertaken at national and provincial levels.
Foreword

The Organisation for Economic Co-operation and Development (OECD) and its Local Economic and Employment Development (LEED) Programme has conducted a research project on ‘Boosting skills ecosystems for greener jobs’ in four countries Belgium (Flanders), Poland (Pomorskie), Greece (Attiki) and South Africa (Western Cape) with the support of the European Commission. The project was carried out under the LEED Programme of Work 2013-2014 and builds on previous OECD LEED projects on “Greening jobs and skills: Labour market implications of addressing climate change” (2009-2010) and “Measuring the potential of green growth: Indicators of local transition to a low-carbon economy” (2011-2012).

We have followed the OECD definition of green growth policies as policies “that favour the transition to a low-carbon, resource efficient economy, that improve the management of the natural asset base, that raise the environmental quality of life, and that create opportunities associated with changes of production and consumption” (OECD, 2013).

The Boosting skills ecosystems for greener jobs project aimed to analyse local trends in skills within the transition to a green economy. In particular, it aims to explore how selected local areas/industry clusters identify the specific skills needed to support green growth, and how related skills policies and practices can be made more effective in supporting and accelerating the transition to a green economy. A mixture of transversal and specific skills are needed by different industry sectors, and the project investigated how flexible and responsive the education and labour market system is to developing these skills that are needed to meet business objectives, both now and in the future.
Greening the Economy of the Western Cape

Background

In this chapter we analyse the socio-economic and political context of the Western Cape province of South Africa, outlining current resources and challenges and examining the need to develop more sustainable production processes while simultaneously boosting economic development and job creation. We begin by discussing the potential for green growth and jobs, as assessed in national and subnational research, highlighting opportunities in the agriculture and agro-processing sectors. An overview is provided of the national and the Western Cape Government’s policy and strategy to support the transition to a low-carbon, green economy. Finally, the aquaculture sector’s planned development is explored within this context.

The Western Cape Province in South Africa is a unique region with a wealth of natural resources, rich biodiversity and a long and economically valuable coastline. This southernmost province in South Africa is characterised by significant economic and agricultural opportunities and complex socio-economic challenges. With an unemployment rate of 23% there is significant emphasis at both a subnational and national level on driving resource efficiency and developing opportunities for growth and employment in the green economy. Additionally, 28.7% of 15-24 year olds in the labour force are unemployed. Matching education and skills supply to available employment opportunities and the demand of growing economic sectors remains a problem for policymakers, who are still negotiating the apartheid legacy of unequal education and other entrenched social problems (Western Cape Government Provincial Treasury, 2015).

Economic output in the Western Cape is dominated by the service sector (Western Cape Provincial Treasury, 2014[2]). Nonetheless, potential for expansion in both agriculture and manufacturing has motivated provincial programmes to support both of these sectors and in each case, green opportunities have been developed. For example, a green industrial park has been established in Atlantis, incentivising companies to invest in green technology manufacturing (GreenCape, 2015).

While agriculture, forestry and fisheries contribute to a relatively small percentage of Gross Domestic Product (GDP) for the country as a whole, this does not reflect the sector’s importance to the economy of the Western Cape. Furthermore, the sector contributes to food security and exports whilst providing significant employment, particularly for unskilled labour. While commodities at a national level drive South Africa’s exports, the Western Cape relies significantly on agricultural products.

Within South Africa, the Western Cape has a comparative advantage in terms of agricultural production and processing. This, along with the province’s strategic commitment to developing the green economy, outlined in the “Green is Smart” strategy framework, has resulted in the prioritisation of opportunities in the sector (Western Cape Government Department of
Environmental Affairs and Development Planning, 2015). Development of the aquaculture\(^1\) sector is one of these opportunities, which is also supported by a renewed focus on the development of the coastal or 'blue' economy as an engine of employment creation. As the Western Cape has the longest and most fertile coastline of all nine provinces in South Africa, it is not surprising that many coastal economic development projects are being established.

South African aquaculture production is currently relatively low. However, it has become a point of focus for policymakers over the past few years as businesses have been established for both freshwater and mariculture\(^2\) farming. This focus has been sharpened by the prioritisation of aquaculture under a national strategic initiative of the Presidency, “Operation Phakisa” (Republic of South Africa, 2014b). This initiative has been devised to unlock barriers to development and growth, targeting measurable results over the short, medium and longer term.

While aquaculture is sometimes cited for environmentally-unsympathetic features, there are also opportunities for it to address environmental risks such as overfishing, which is itself a challenge for the Western Cape Province. To ensure that the sector delivers on the promise of environmental benefits as well as job creation it is important to understand how it can develop in an environmentally, socially and economically sustainable direction. In this context, the role of the subnational government in facilitating this expansion is pivotal to ensuring that aquaculture supports the local economic development goals of the region without undermining the natural systems and resources on which social, commercial and industrial development depends. The mechanisms for intergovernmental co-operation are therefore crucial.

Green growth and employment potential in South Africa

South Africa is one of the most energy and carbon intensive economies in the world (OECD, 2015b). The Government of the Republic of South Africa has committed itself to greening production and consumption to further reduce greenhouse gas emissions (GHG) by 34% by 2020 and 42% by 2025, against a business as usual baseline (OECD, 2015c). The energy and carbon intensity of the economy has been recognised as a risk to national productivity, as well as potentially undermining international trade (Cosbey & Wooders, 2011). Spurred on by concerns of national energy security as well as rapidly escalating electricity costs over the past decade, South African businesses across economic sectors have actively pursued greening practices, predominantly focused on energy efficiency (CDP, National Business Initiative, & Incite Sustainability, 2013).

Agriculture is particularly exposed to indirect regulatory and market-related risks, increasing energy prices and related changing preferences in South Africa’s main export markets. If realised, these risks could impede the maintenance and expansion of employment opportunities, curtailing the role that the sector can play in achieving inclusive growth (Western Cape Provincial Treasury, 2014).

Recognising both the risk of a high-carbon growth trajectory to the economy and the opportunities for new processes, products and services in a green economy, South Africa has centred its green economy approach on job protection and job creation. National and subnational research and policy development has been undertaken to drive public and private investments in

\(^1\) Aquaculture is the farming of fish, crustaceans, molluscs, aquatic plants, algae, and other aquatic organisms.

\(^2\) Mariculture is a specialized branch of aquaculture involving the cultivation of marine organisms for food and other products in the open ocean, an enclosed section of the ocean, or in tanks, ponds or raceways which are filled with seawater.
resource efficiency and new value chains to create ‘green jobs’ informed by global practice, including that of the International Labour Organisation (ILO).

Priority green economy sectors have been identified and their employment potential has been modelled in the South African Green Economy Model (SAGEM). These sectors include: natural resource management, agriculture, emissions and pollution control, transport, energy and energy efficiency (Borel-Saladin & Turok, 2013; UNEP, 2013a; UNEP, 2013b). SAGEM employs a system dynamics modelling approach to assess the impacts of green economy investments in selected sectors of the South African economy (UNEP, 2013a; UNEP, 2013b). Importantly, the United Nations Environment Programme (UNEP) study found that directing investments into green opportunities in priority sectors up to 2030 will deliver more jobs than continuing along a ‘business as usual’ investment trajectory.

As a subnational government, the Western Cape Government has been especially active in working to identify the regulatory, skills, knowledge and finance barriers to growth and employment in the green economy. National policy directives need to be realized at a local level to develop the most appropriate opportunities. The Western Cape Government has been carrying out its own green economy research and programme development in line with the Green is Smart strategy framework (Western Cape Government, 2013). In 2014, it undertook the Green Economy Investment Mapping (GEIM) Project in 2014 to better understand the needs of particular green economy sectors in the province, with an eye to supporting these sectors to enable private sector-led job creation. A key finding of GEIM was that most businesses did not record green investment.

At a national level, under the management of the national Department of Environmental Affairs, South Africa has nine green economy focus areas, which are captured in Table 0.2 (Department of Environmental Affairs, (2018b)). Within South Africa’s four tiers of government, the green economy agenda has been embraced in policies and programmes at all levels. Within the Western Cape, specifically, it is prioritised in specific programmes often implemented in partnership with local authorities including the City of Cape Town, its largest municipality. In terms of further stimulating resource efficiency in the private sector, the Western Cape Government is also currently undertaking work to mainstream sustainable public procurement as a lever to further incentivise green product and service development.

Both national and subnational assessments of green job potential have identified agriculture as an area of significant growth and employment potential in the green economy. This sector has important ties to natural resource management. The Western Cape Government has forecast that agriculture will continue to be a major employer in the province, especially in rural municipalities, even though growth in agricultural production has lagged behind other sectors.

The Western Cape region is particularly exposed to significant climate change related risks, potentially impacting its trade balance because of the relative importance of agricultural exports. Risk mitigation strategies include increased resource efficiency in production and processes and the diversification of agricultural products. The expansion of aquaculture also helps the region meet this imperative.

South African national strategies to support green growth and employment

South Africa has actively supported global initiatives seeking a low carbon future. At the national level, there have been attempts to develop locally appropriate strategies to protect its natural resources and to green systems of consumption and production. A summary of national green economy policy is detailed in Table 1.1 below.
Table 1.1. National green economic policy

| National Development Plan (NDP), 2011 | The NDP promotes renewable energy and energy efficiency. It states that South Africa will transition to a low-carbon economy by 2020. To achieve this, the NDP states that South Africa will need clear climate change mitigation and adaptation strategies. The green economy agenda is identified as a mechanism to achieve further industrialisation, energy efficiency and employment. |
| National Climate Change Response Policy (NCCRP), 2011 | The NCCRP promotes investment that will result in more resource efficient patterns of production and consumption, and job switching from energy intensive to green employment. |
| Industrial Policy Action Plan (IPAP), 2013 | The IPAP includes strategies to scale up industrial policy by developing and designing sector-specific incentives, including incentives for green industry. |


The country’s most up to date Integrated Resource Plan attributes 45% of carbon emissions to electricity generation (Republic of South Africa Department of Energy, 2013). Consequently, despite the wide range of opportunities identified above, much of the focus at a national level has been on the energy system. Electricity generation is dominated by Eskom, a wholly state-owned enterprise that produces 95% of all electricity, predominantly from coal-fired power stations (OECD, 2015b). The Renewable Energy Independent Power Produce Procurement Programme (REIPPPP) is introducing competitive renewable energy generation, as well as increasingly cost-efficient green energy technology, into this system. Encouragingly, REIPPPP has already led to new business activities, manufacturing, and jobs (Eberhard, Leigland, & Kolker, 2014). REIPPPP has been implemented with stringent local content requirements for all developers in line with South Africa’s Local Procurement Accord (also under the New Growth Path), a strategic accord supported by leaders in government, business, labour and civil society (Republic of South Africa Economic Development Department, 2011). In the Western Cape, this has led to the local manufacturing of green technologies, incentivised by government.

Looking to the greening of commerce and industry, there are specific interventions that require participation from both government and the private sector. The New Growth Path 2010-2020 Economic Strategy provides an overarching framework for a more inclusive and greener economy. This strategy was conceived in response to the country’s poor record of job growth throughout the 2000s, which was further depressed by the global economic downturn in 2008. It aims to create five million additional jobs by steering economic growth towards more labour-intensive industries by 2020 (Borel-Saladin and Turok, 2013).

Under the auspices of the New Growth Path, the Green Economy Accord was launched in November 2011 to promote partnerships between the public sector, private sector, labour unions and civil society to green the economy and create employment (OECD, 2013). The main aim of this nationwide initiative is to create a minimum of 300 000 jobs in activities that contribute to greening the economy by 2020 (Borel-Saladin and Turok, 2013). Parallel to this policy, the 2013 Industrial Policy Action Plan (IPAP) also supports green industry, concentrating specifically on the potential of expanding manufacturing activities.
At a national level, under the management of the Department of Environmental Affairs, South Africa has nine green economy focus areas (see Table 1.2) (Department of Environmental Affairs, 2018b). Within South Africa’s four tiers of government, the green economy agenda has been incorporated in policies and programmes at all levels. Within the Western Cape it is also prioritised regionally in partnership with local authorities, including the City of Cape Town, its largest municipality.

<table>
<thead>
<tr>
<th>Table 1.2. National green economy focus areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Green buildings and the built environment (Greening private and public buildings)</td>
</tr>
<tr>
<td>2. Sustainable transport and infrastructure (Promoting non-motorised transport)</td>
</tr>
<tr>
<td>3. Clean energy and energy efficiency (Expanding off-grid options in rural and urban communities; REFIT (Renewable Energy Feed-in Tariff) optimisation for large scale renewable and localisation; and Up-scaling Solar Water Heater rollout)</td>
</tr>
<tr>
<td>4. Resource conservation and management (National payments for ecosystem services; Up-scale “Working for” programmes (for example Working for Water); Infrastructure resilience and ecosystems; Offset programme; Wildlife management)</td>
</tr>
<tr>
<td>5. Sustainable waste management practices (Waste beneficiation; Zero waste community programme for 500 000 households)</td>
</tr>
<tr>
<td>6. Agriculture, food production and forestry (Integrated sustainable agricultural production)</td>
</tr>
<tr>
<td>7. Water management (Water harvesting; Alternative technology for effluent management; Comprehensive municipal water metering (Demand side management); Reduce water losses in agriculture, municipalities and mining)</td>
</tr>
<tr>
<td>8. Sustainable consumption and production (Industry specific production methods; Industrial production technology changes)</td>
</tr>
<tr>
<td>9. Environmental sustainability (Greening large events and legacy (COP21 and Tourism); Research, awareness and skills development and knowledge management)</td>
</tr>
</tbody>
</table>


Transitioning to a green and inclusive the Western Cape

Because of the Western Cape’s climate, geography and demographics, the risks and opportunities it faces as it transitions to a low-carbon economy are distinct. Aligned to the National Development Plan, the Western Cape Government has developed a local vision for 2040, to create ‘A Highly skilled, Innovation-driven, Resource-efficient, Connected, High Opportunity Society for All’ (Western Cape Government, 2012). The Western Cape Government attempts to develop inclusive growth that embeds job creation as a mechanism to alleviate poverty. There are particular challenges associated with the province’s high levels of inequality (income, opportunity and skills).

The Provincial Strategic Plan (PSP) 2014-2019 is informed by the national vision, but focuses on the practical achievement of visible gains under five provincial strategic goals (PSGs), to be achieved within the current political cycle (Western Cape Government, 2015). The PSGs frame the Western Cape Government’s main budget allocation, programmes and projects.
PSP seeks to grow employment opportunities that match the skills profile of available labour (Western Cape Government, 2015).

The Green is Smart Western Cape Green Economy Strategy Framework preceded the development of the PSP. This framework guided the province’s first steps for this new policy agenda in 2013. It sets two of its own goals: to make the Western Cape the lowest carbon province, and leading green economic hub of Africa (Western Cape Government, 2013). Policy and practice is oriented to ensure economic value protection through conservation of natural resources and to catalyse the creation of new economic value through investment and business development opportunities in, for example, resource efficiency, natural resource conservation, green agribusiness and manufacturing (Western Cape Provincial Treasury, 2014). Central to the strategy framework are five crosscutting enablers (infrastructure, capabilities, knowledge management, rules and regulations, and finance) that can be utilised by stakeholders in both the public and private sector to stimulate activity in six priority areas, namely: smart living and working, smart mobility, smart ecosystems, smart agri-production, and smart production.

The broad aims of the green economy agenda within the Western Cape Government are supported through specific interventions under the strategic goals to boost growth and jobs and develop a sustainable living environment. Concrete programmes to realise this ambition include initiatives to green energy supply, particularly by facilitating the uptake of solar photovoltaic (PV) systems in the private sector. Ensuring sufficient water of a quality to support human and economic development is also an important focus, especially as the Western Cape is a water-stressed region.

By addressing key challenges, agri-processing could add an additional 100 000 jobs between now and 2019 (Western Cape Government, 2015). The barriers to this expansion include market access; water and energy security; knowledge and skills shortages; logistics and infrastructure deficits; and barriers to entry for small, medium and micro-enterprises (SMMEs).

The opportunities identified by the Western Cape Government, to support and stimulate growth in the sector include:

• Developing physical and institutional infrastructure such as agro-processing parks;
• Improving water management; and
• Strengthening support for local products in local and foreign markets.

While these opportunities have been identified to stimulate agricultural production and processing in general, they also apply specifically to the development of aquaculture in the province.

Green growth of the aquaculture sector is highlighted in the Green is Smart Green strategy framework. The aquaculture industry’s relatively small size, along with consensus on its potential for significant expansion and planned investment over the next decade, make it a useful and interesting lab for understanding the skills requirements for a transition to a greener economy in the province. Though quite progressive, the framework is not clear on how to operationalise this strategy in the aquaculture sector. Consequently, the key challenge addressed in this study is how stakeholders in the aquaculture sector can operationalise, scale and sustain ecologically friendly aquaculture production in the Western Cape while simultaneously addressing the complex problems of unemployment, skills development, food insecurity and low economic growth.
Policy conclusions

With its Green is Smart strategy, the Western Cape has developed a vehicle for greening its economy placing employment at the heart of the green economy transition. Its goals have been translated into subnational action through the Provincial Strategic Plan and projects such as Green Economy Investment Mapping programme which helped identify the main challenges for the Province. The Provincial Strategy aligns with the broader national strategies. The South African 2020 New Growth Plan identifies the green economy as one of the priority and the Green Economy Accord highlights the need for green industries and manufacturing to create local industrial capacity, local jobs and local technological innovation.

Despite this apparent alignment of strategies for the transition to a green economy, the implementation of concrete schemes remains an enormous challenge in a province with high levels of poverty and with an unemployment rate of 23%. Consequently there is a danger of viewing all developments and new programmes that could deliver growth (green or otherwise) primarily as a solution to unemployment and inequality. Matching education and skills development to available employment opportunities and the needs of growing economic sectors remain a key driver.
Green Opportunities in the Aquaculture Sector of the Western Cape

Context

As aquaculture in the Western Cape emerges as a growing and vibrant sector for potential job creation, it is increasingly important to ensure that its growth makes sustainable use of local coastal resources. This chapter begins by providing an overview of aquaculture in South Africa, and in the Western Cape, specifically. It then examines the legal framework for development, describes key stakeholders for sector development, and identifies several other challenges inhibiting the expansion of the sector. In response to these challenges, Operation Phakisa has focused on implementing sector-wide solutions. This is an innovation by the Presidency of South Africa to accelerate economic growth and development, and the first phase focuses on unlocking value in the coastal economy.

Fish represents around 20% of the animal protein consumed worldwide and plays an important role in global food security and nutrition (OECD, 2015a). The OECD-FAO (Food and Agricultural Organisation of the United Nations) Agriculture Outlook projects that by 2023 (compared to a baseline of 2013) aquaculture will grow by 38% compared to 2% growth of capture fisheries (OECD/Food and Agricultural Organisation of the United Nations, 2014). The aquaculture sector is increasingly contributing to total global commercial and subsistence fish for consumption. These trends are expected to continue into the future, but rather unevenly, with emerging markets and coastal communities dominating global fish demand (Finegold, 2012) (FAO, 2014).

Globally, aquaculture has also been an important sector for job creation. Africa’s fisheries sector is labour intensive and employs 12.3 million people. Approximately 27% of the people engaged in fisheries and aquaculture are women, with marked differences in their occupations. Only 3.6% are ‘fishers’ whilst processors count for 58% of female employment (de Graff & Garibaldi, 2014). The sector is therefore important for increased and inclusive job creation in often densely populated regions.

In South Africa, aquaculture has the potential to address poverty and reliance on wild fisheries, ensure food security and create skills-based employment (DAFF, 2014). To this end, South Africa has undergone many changes with regard to aquaculture management and administration (FAO, 2014). These changes took effect between 2009 and 2014. The Western Cape Province hosts the majority of aquaculture farms in South Africa. The province is home to a total of 50 aquaculture farms and produces a combined total output of 2 527 tonnes. The Western Cape Province alone accounts for 64% of the total mass of aquaculture production in South Africa.

The global expansion of the aquaculture sector

Global aquaculture production is estimated at 97.2 million tonnes (FAO, 2015[3]), with China producing 62% (FAO, 2014[1]). Due to the dramatic expansion in aquaculture production, China has been responsible for most of the growth in global fish availability. Conversely, developed countries like the United States of America and Norway, have reduced their
aquaculture output in recent years, mainly owing to competition from countries with lower production costs. A sizeable and growing share of fish consumed in developed countries consists of imports, due to steady demand and declining domestic fishery production (Finegold, 2012[4]). In this regard, the European Union countries are currently the largest market for imported fish and fishery products and its dependence on imports is growing.

The Aquaculture sector’s contribution to total global commercial and subsistence fish production has expanded exponentially from 15% to 35% in the last decade (Dent, 2013[5]). Africa has the lowest aquaculture produce output at 1.79% (FAO, 2015[3]). See Table 2.1 for a summary of global fish production by continent.

Table 2.1. Global Aquaculture Production by Continent

<table>
<thead>
<tr>
<th>Continent</th>
<th>Volume</th>
<th>Percentage of global output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>1 737 802</td>
<td>1.79</td>
</tr>
<tr>
<td>Europe</td>
<td>2 822 160</td>
<td>2.90</td>
</tr>
<tr>
<td>Americas</td>
<td>3 082 079</td>
<td>3.17</td>
</tr>
<tr>
<td>Asia</td>
<td>89 357 606</td>
<td>91.93</td>
</tr>
<tr>
<td>Oceania</td>
<td>202 225</td>
<td>0.21</td>
</tr>
<tr>
<td>Total</td>
<td>97 201 872</td>
<td>100</td>
</tr>
</tbody>
</table>


When managed well, aquaculture has the potential to contribute to economic growth, employment creation, foreign exchange revenues, food security and sustainable development. The potential can be examined by comparison with Vietnam, a country that almost doubled its aquaculture production over a ten year period. In Vietnam the sector is now a significant contributor to national income and was crucial in cushioning the Vietnamese economy amid declines in traditional exports.

The potential in the Western Cape

While Asia is dominating global aquaculture production, there is high growth potential for South Africa’s aquaculture industry to serve local, regional and global foreign markets. The development of the aquaculture sector is complex. Worldwide, the sector is highly regulated because aquaculture activities carry serious potential risks to the environment. South Africa has comprehensive laws and regulations for environmental management, covering all issues pertinent to the sector, such as land-use, water-use and biodiversity. This legal framework can be complex and time-consuming for aquaculture operators to navigate. Compliance burdens can increase the cost of doing business.

As African emerging markets develop, a growing middle class is seeking better quality food and a more diversified diet. As a result, demand for value-added, processed food products is likely to increase. According to AGRA (2017), the African food market will increase from USD 300 billion to USD 1 trillion by 2030. The Western Cape, with its developed and diversified agricultural sector, is well-positioned to play a key role in this development. The Western Cape exported food and beverage products worth ZAR 4.2 billion (EUR 250 million) to Africa in
2012, 14% higher than the previous year and accounted for 26% of South Africa’s total food and beverage exports to Africa (Western Cape Provincial Treasury, 2014).

However, despite South Africa’s abundance of aquatic resources, the local aquaculture sector has performed far below its potential and remains a minor contributor to national fishery products and the country’s GDP (FAO, 2014). South Africa has the potential to develop its fisheries and aquaculture to play a much greater role in promoting food security, providing livelihoods and supporting economic growth.

Aquaculture in South Africa is still in its developmental stage. The total output of the South African Aquaculture Sector was estimated at 39,267 tonnes (excluding sea weed, carp and ornamentals) in 2012, with marine aquaculture recording 2,261 tonnes (DAFF, 2014). The Government of the Republic of South Africa recognises the need to fast-track growth and development in aquaculture by rapidly increasing the scale of production, and stimulating demand in local and international markets (Republic of South Africa, 2014a).

Aquaculture operations can be found across every province of South Africa, producing a few species using a variety of culture methods (see Table 2.2). The sector’s potential to contribute to income generation for the inland and coastal communities in South Africa is clear. Nationally 2,227 people are currently employed in the aquaculture sector, while half a billion rand annually, in direct and indirect economic activities, is generated through aquaculture operations (DAFF, 2014). Marine aquaculture is growing significantly faster than freshwater aquaculture.

Freshwater fish culture within the Western Cape Province is severely limited by the supply of suitable locations with appropriate water supply and limited risks for compromising water quality and biodiversity. Trout and salmon farming is, however, practised in the Western Cape and other highland areas of South Africa. Other freshwater species cultivated on a small scale include catfish, freshwater crayfish and tilapia. After reaching a record level of 2,200 tonnes in 2003, the total freshwater aquaculture production has declined to a level around 1,400 tonnes in recent years.

Species cultured in the aquaculture industry in South Africa include the following:

- Marine aquaculture species: Abalone (*Haliotis midae*), Pacific oyster (*Crassostrea gigas*), Mussels (*Mytilus galloprovincialis* and *Chromomytilus meridionalis*); Dusky kob (*Argyrosomus japonicus*); Seaweed (*Ulva* spp and *Gracilaria* spp).
- Fresh aquaculture species: Trout (*Onchorynchus mykiss* and *Salmo trutta*); Tilapia (*Oreochromis mossambicus*, *Oreochromis niloticus* and *Oreochromis rendalli*); Catfish (*Clarias gariepinus*); Carp (*Cyprinus carpio*); Marron crayfish (*Cherax tenuimanus*) and Ornamental species (e.g. koi carp).

Table 2.2. Number of marine and freshwater aquaculture farms by province in South Africa

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Aquaculture Type</th>
<th>No. of Farms</th>
<th>Province*</th>
<th>Generic Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trout</td>
<td>Freshwater Aquaculture</td>
<td>52</td>
<td>EC, FS, GP, KZN, MP, NP, WC</td>
<td>Trout</td>
</tr>
<tr>
<td>Mozambique</td>
<td>Freshwater Aquaculture</td>
<td>28</td>
<td>EC, GP, KZN, LP, MP, WC</td>
<td>Mozambique</td>
</tr>
<tr>
<td>Tilapia</td>
<td>Freshwater Aquaculture</td>
<td>19</td>
<td>All provinces</td>
<td>Tilapia</td>
</tr>
<tr>
<td>Ornamentals</td>
<td>Freshwater Aquaculture</td>
<td>19</td>
<td>All provinces</td>
<td>Ornamentals</td>
</tr>
</tbody>
</table>
Table 2.2 illustrates that the marine South African aquaculture sector is focused on high value species such as abalone, oysters, mussels, finfishes and trout. The major cultured species for freshwater aquaculture are rainbow trout, koi carp, ornamental species and tilapia. These species are generally farmed in recirculating systems, earth ponds or raceways, whereas marine molluscs are farmed on raft or long-lines, and abalone are produced in tanks through which marine water is pumped (DAFF, 2014).

Aquaculture products from the Western Cape Province are marketed both locally and internationally. The abalone industry exports the bulk of its produce to South-East Asia (DAFF, 2014). The trout industry markets the bulk of its products locally, but some products have successfully penetrated European markets. Products, such as crocodile skins, are exported, while many of the other experimental species such as kob are marketed locally.

Mariculture operations within the Western Cape Province are illustrated by subsector and compared to other regions in Table 2.3. Abalone production, in terms of volume and employment contributions, is very valuable to the province and a fast developing sector. The most recent data shows South Africa’s contribution at 21% of the global market for farmed abalone (WWF, 2014). Abalone culture is well established, largely centred in the Hermanus area of the Cape south coast.

Table 2.3. Marine aquaculture production in 2012 per subsector and province

<table>
<thead>
<tr>
<th>Species</th>
<th>Western Cape</th>
<th>Eastern Cape</th>
<th>Northern Cape</th>
<th>KwaZulu Natal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abalone</td>
<td>935.21</td>
<td>176.20</td>
<td>0</td>
<td>0</td>
<td>1111.41</td>
</tr>
<tr>
<td>Finfish</td>
<td>0.66</td>
<td>47.8</td>
<td>0</td>
<td>0</td>
<td>48.46</td>
</tr>
<tr>
<td>Mussels</td>
<td>589.77</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>859.77</td>
</tr>
</tbody>
</table>
There are also experimental offshore farms, growing ocean-going trout and salmon in cages off the coast of South Africa. There is an established grow-out facility for fingerlings in Gansbaai as well as developing land-based cultures for finfish in East London. In 2012, mariculture production increased by 21% from 2011. This was mainly due to the abalone, finfish and mussels subsectors achieving the highest production levels for the country to date (DAFF, 2014). With the introduction of finfish culture, mariculture production is expected to increase substantially.

**Responding to environmental risks in the Western Cape**

With most capture fisheries worldwide considered fully exploited or overexploited, aquaculture will be critical to meeting current and future fish demand. It can help ensure future fish availability and affordability in emerging markets, while simultaneously improving global food security and the integrity of marine and river ecosystems.

About 65% of South Africa’s marine biozones are threatened and living marine resources are either maximally exploited or over-exploited (UNEP, 2013). Within this national context, the marine ecosystems around the Western Cape coast are highly productive and support most of the country’s 22 fisheries (Turpie and et al, 2014). These fisheries are diverse in size and economic contribution, ranging from the large-scale industrial pelagic and demersal fisheries that account for most of the economic contribution of fisheries, to low-cost small-scale inshore fisheries such as West Coast rock lobster, traditional line-fish and seine-net fisheries.

Traditional methods such as line-fish and seine-net fisheries are important for income distribution and supporting livelihoods. The combination of collapsing fisheries and associated strategies to rehabilitate marine eco-systems disproportionately impact rural, coastal communities where economic opportunities are often limited. Securing a future with fish and fishing is a necessary part of feeding a growing population and providing inclusive economic opportunities for those who need it most (OECD, 2015a). South Africa has recognised the need to provide alternative livelihoods for vulnerable small-scale fishers, not least to combat poaching. While there are policies to mitigate social and environmental risk, facilitating new economic opportunities for historical fishing communities is not a simple process. The potential for aquaculture to play a role in this regard merits serious consideration.

In the Western Cape constraints on aquaculture development are currently being addressed by national, provincial and municipal government departments and through public-private cooperation under Operation Phakisa. Key issues include the management of significant environmental impacts that can allow for the sustainable development of freshwater and mariculture farming and processing. Most of the Western Cape’s eco-systems and natural resources are under threat (Western Cape Government Department of Environmental Affairs and Development Planning, 2013). Socio-economic development must be integrated with sustainable management, rehabilitation and protection of natural capital. Pertinent environmental issues for

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<table>
<thead>
<tr>
<th></th>
<th>190.28</th>
<th>51.3</th>
<th>0</th>
<th>0</th>
<th>241.58</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oysters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1985.92</td>
<td>273.3</td>
<td>0</td>
<td>0</td>
<td>2261.22</td>
</tr>
</tbody>
</table>


---

3 This refers to fish that live neither close to the bottom of the sea nor near the shore.
4 This refers to fish living on or closed to the bottom of the sea.
the aquaculture sector are energy, water, land and biodiversity. South Africa’s current energy insecurity has been identified as a significant constraint on economic growth (OECD, 2015b). Because of the water properties and temperature controls needed at aquaculture farms, production is particularly sensitive to unreliable energy supply. As water availability and quality are increasingly stressed in the Western Cape, the development of the sector will need to pay particular attention to the management of water coming into and flowing out of production systems.

This report highlights that there are a number of environmental risks that may affect the sector. These environmental issues are not just a compliance issue; there are implications for product quality, costs, and business viability. Companies with the scale of production, market and access to capital are able to respond to these challenges. For example, larger, energy-intensive mariculture firms in the Western Cape have been successful in supplementing energy consumption with renewable energy technologies.

The legal and regulatory framework for aquaculture in South Africa

South Africa has comprehensive legal and regulatory requirements to manage the potential environmental impact of the aquaculture sector, specifically concerning issues such as land-use, water-use and biodiversity. A summary of applicable legislation is provided in Table 2.4.

At the facility level, there are legal obligations related to the establishment, operation, and the import and export of feeds, products or spat. Three key departments responsible for regulating the aquaculture sector in South Africa fall under the national government. These are the Department of Agriculture, Forestry and Fisheries (DAFF), the Department of Environmental Affairs (DEA), and the Department of Water and Sanitation (DWS). Collectively, these departments are responsible for the development of the aquaculture sector and coastal management. The aforementioned departments work in concert with the Department of Public Works, which is mandated to manage all national fixed assets, including infrastructure related to the aquaculture sector (Department of Public Works, 2009).

<table>
<thead>
<tr>
<th>Category</th>
<th>Relevant Legislation</th>
<th>Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td>Marine Living Resources Act, 1998 (Act No. 18 of 1998)</td>
<td>DAFF</td>
</tr>
<tr>
<td></td>
<td>The Animal Diseases Act, 1984 (Act No 35 of 1984)</td>
<td>DAFF</td>
</tr>
<tr>
<td></td>
<td>The Genetically Modified Organisms Act, 1997 (Act No.15 of 1997)</td>
<td>DAFF</td>
</tr>
<tr>
<td>Environmental Impact</td>
<td>Conservation of Agricultural Resources Act, 1983 (Act No.43 of 1983)</td>
<td>DAFF</td>
</tr>
<tr>
<td></td>
<td>The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)</td>
<td>DEA</td>
</tr>
<tr>
<td></td>
<td>The National Environmental Management: Protected Areas Act, 2003 (Act No. 10 of 2003).</td>
<td>DEA</td>
</tr>
<tr>
<td></td>
<td>The Seashore Act, 1935 (Act No. 21 of 1935).</td>
<td>DEA</td>
</tr>
</tbody>
</table>
The DAFF through the Directorate Aquaculture and Economic Development is responsible for the management, regulation and development of the aquaculture sector in South Africa. Importantly, some of the key acts governed by the DAFF, such as the Marine Living Resources Act, overlap with other acts not governed by the DAFF. For instance, the National Environmental Management: Biodiversity Act, 2004, governed by the DEA, deals with matters relating to restrictions on species that can be farmed, a matter also addressed by the Marine Living Resources Act. Having similar pieces of legislation governed by two different regulatory authorities can be challenging for farmers in the aquaculture sector.

Managing environmental impacts

The purpose of DEA is to protect and improve the quality and safety of the environment as stipulated under the National Environmental Management Act (NEMA). With regard to aquaculture, the regulations of this NEMA Act have an influence on activities such as facility design, impact and risk assessments that have to be performed, water discharge, species treatment and transport, species cultured and site selection (Republic of South Africa, 2014a). A crucially important role of the DEA is that of prescribing the aquaculture industry’s Environmental Impact Assessment (EIA) regulations. This role is enshrined in the National Environmental Management Act.

In addition, other authorities also have the legislative authority to govern specific aspects of the environment. The municipalities are responsible for zoning, the Department of Public Works is responsible for managing public property, the provincial governments are in charge of ordinances and the DAFF is responsible for sub-dividing agricultural land, including the land used for aquaculture (Republic of South Africa, 2014a). Consequently, other authorities have the mandate to govern acts that are also addressed under the regulatory framework of the DEA.

Managing water resources

The DWS’s key priority is to protect water resources. More recently, discussions on water management have focussed not only on water access and equity issues, but also on ensuring sufficient water for the economic development goals of the country. Because water risks depend on local factors, effective management of water resources demands locally appropriate strategies and the involvement of local authorities as well as national line ministries (Department of Water and Sanitation, n.d.).

The DWS is mandated to issue licenses for water use and to provide access permits to farmers. However, the DEA is responsible for legislating matters relating to biodiversity while municipalities have the authority to issue municipal discharge permits. The complexity arising from this is that the three regulatory bodies all have mandates to regulate various aspects relating to fresh water in South Africa. This results in delays in the issuance of various permits to farmers.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agri-production</td>
<td>Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No.36 of 1947)</td>
<td>DAFF</td>
</tr>
<tr>
<td></td>
<td>The Animal Improvement Act, 1998 (Act No.62 of 1998)</td>
<td>DAFF</td>
</tr>
<tr>
<td></td>
<td>Animals Protection Act (Act No.71 of 1962)</td>
<td>DAFF</td>
</tr>
<tr>
<td></td>
<td>Agricultural Pests Act, 1983 (Act No.36 of 1983)</td>
<td>DAFF</td>
</tr>
</tbody>
</table>

as they have to deal with different regulators in order to have access to fresh water. This overlap in legislation could impede the development of the sector and emphasises the fact that some key pieces of legislation conflict rather than complement one another.

**Municipalities**

Municipalities also play a number of important roles in South Africa with regard to the growth of the aquaculture sector. Some of these roles are zoning and rezoning, issuing health permits, confirming electricity supply, enforcing municipal by-laws, and issuing discharge permits.

**The permitting process**

South Africa’s Environmental Impact Assessment process for aquaculture, while ensuring adequate environmental protection in the development of activities in the sector, is time consuming and costly. It requires authorisation from different line functions at different levels of government with mandates to government specific aspects of production and processing. A detailed summary of the aquaculture authorisations required is outlined in Table 2.5.

**Table 2.5. Summary of aquaculture authorisations required**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Activities regulated</th>
<th>Authorisations that may be required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Environmental Affairs and Development Planning</td>
<td>All activities listed in the National Environmental Management Act (NEMA)</td>
<td>Environmental authorisation</td>
</tr>
<tr>
<td>National Department of Environmental Affairs</td>
<td>Engaging in a mariculture activity</td>
<td>Approval to engage in mariculture activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mariculture permit (valid for a period not exceeding 12 months)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Convention on International Trade in Endangered Species (CITES) permit (in the case of abalone farming)</td>
</tr>
<tr>
<td></td>
<td>Rezoning on, from, or to agricultural land</td>
<td>Rezoning approval</td>
</tr>
<tr>
<td></td>
<td>Importing live aquaculture organisms</td>
<td>Approval for the Importation of animals and genetic material</td>
</tr>
<tr>
<td></td>
<td>Exporting live aquaculture organisms</td>
<td>Approval for the exportation of animals, embryo’s, ova and semen</td>
</tr>
<tr>
<td>Department of Water and Sanitation</td>
<td>The taking of water from a water source</td>
<td>Schedule 1 Use</td>
</tr>
</tbody>
</table>
The storing of water
The impedance or diversion of water in a watercourse
The discharging of waste or water containing waste into a water resource through a pipe, canal sewer, sea outfall or other conduit
The disposing of waste in a manner that may detrimentally impact on a water resource
The disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process
The altering of bed, banks, course or characteristics of a watercourse

<table>
<thead>
<tr>
<th>Cape Nature</th>
<th>Choosing an aquaculture species</th>
<th>Angling licence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning aquaculture development activities that could potentially impact sensitive areas</td>
<td>Permits for the exporting, importing and transporting of aquaculture organisms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permit for the captivity and keeping of wild fish and other aquaculture organisms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Municipalities</th>
<th>Earmarking land for aquaculture activity</th>
<th>Correct zoning of earmarked land</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning construction for aquaculture activity</td>
<td>Approval of building plans</td>
</tr>
<tr>
<td></td>
<td>Utilising essential services</td>
<td>Approval for the provision of essential services</td>
</tr>
</tbody>
</table>


These overlaps result in multiple requirements being placed on the sector, making it difficult for both new and existing operators to grow. Streamlining the permitting process could improve participation in the aquaculture sector. In this regard, a medium to long-term solution would be the promulgation of a dedicated Act to manage and grow the sector (Republic of South Africa, 2014a).

In summary, the sector is currently governed by numerous pieces of legislation and policy and administered by several different organs of state. As such, the general perception is that the legal framework is hampering development of the sector. Overregulation, an un-
coordinated institutional framework and an unintegrated authorisations process are some of the problems that have been identified (Department of Environmental Affairs, 2015).

**Aquaculture norms and standards**

The process of obtaining an approved Environmental Impact Assessment is complex. This is primarily because the assessment is comprehensive and involves inputs from actors in various line ministries and tiers of government, covering the management of critical resources such as water and land. However, the example of the European Union shows that it is possible to streamline and expedite this process, by introducing standardisation at certain stages (European Commission, 2015). One of the ways in which this can be done, explicitly for the aquaculture sector, is through the introduction of norms and standards for specific priority species. The national government, with extensive input from provincial authorities, is currently drafting such norms and standards for abalone and trout farming.

**Mapping stakeholders to support green aquaculture**

For the public sector to facilitate green growth in the aquaculture sector a significant public sector input, from many areas is needed. Our legal-institutional analysis has identified parallel and overlapping mandates. Co-operation and co-ordination between the levels of government is required to streamline efforts and reduce the cost of doing business. Operation Phakisa (further described in Government unlocking value in the sector through Operation Phakisa) has brought about greater co-ordination, while simultaneous efforts from provincial government have been to develop formal guidelines and decision-making protocols to enable more streamlined decision-making. A detailed summary of the aquaculture stakeholders is provided (see Table 2.6).

<table>
<thead>
<tr>
<th>Stakeholder Organisation</th>
<th>Role and Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Government</td>
<td></td>
</tr>
<tr>
<td>The Department of Agriculture, Forestry and Fisheries (DAFF)</td>
<td>Responsible for the management, regulation and development of the aquaculture sector in South Africa.</td>
</tr>
<tr>
<td>The Department of Environment Affairs (DEA)</td>
<td>Responsible for the management and protection of the environment, including South Africa’s oceans and coastal resources, and the promotion of conservation and the sustainable use of natural resources to contribute to economic growth and poverty alleviation.</td>
</tr>
<tr>
<td>The Department of Water and Sanitation (DWS)</td>
<td>Responsible for the protection of the environment and water resources</td>
</tr>
<tr>
<td>Provincial Government</td>
<td></td>
</tr>
<tr>
<td>Department of Agriculture (DoA)</td>
<td>Responsible for the promotion of agriculture in the province through the provision of development, research and support services to the agricultural community of the Western Cape region.</td>
</tr>
<tr>
<td>Department of Economic Development and Development (DEDAT)</td>
<td>Mandated to create opportunities for business and facilitate partnerships between government and external stakeholders in the economy.</td>
</tr>
<tr>
<td>Department of</td>
<td>Mandated to carry out environmental management and</td>
</tr>
<tr>
<td>Local Government</td>
<td>Environmental Affairs and Development Planning (DEADP)</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Statutory bodies</td>
<td>District and Local Municipalities</td>
</tr>
<tr>
<td>Statutory bodies</td>
<td>The Council on Higher Education (CHE)</td>
</tr>
<tr>
<td>Statutory bodies</td>
<td>Quality Council for Trades and Occupations (QCTO)</td>
</tr>
<tr>
<td>Other stakeholders</td>
<td>Umulusi</td>
</tr>
<tr>
<td>Other stakeholders</td>
<td>Agri-SETA</td>
</tr>
<tr>
<td>Other stakeholders</td>
<td>Stakeholders in the aquaculture value chain</td>
</tr>
<tr>
<td>Industry Associations</td>
<td>These include: (a) The Aquaculture Association of Southern Africa (AASA); (b) The Marine Finfish Farmers Association of South Africa (MFFASA); (c) Catfish South Africa; (d) The Mussel and Oyster Forum; (e) The South African Koi Traders Association (SAKTA); (f) The Western Cape Trout Association (WCTA); and Ornamental Fish Producers</td>
</tr>
<tr>
<td>Financial Institutions</td>
<td>These include: (a) Commercial banks; (b) Development Finance Institutions (DFI); (c) Government funding</td>
</tr>
</tbody>
</table>
programmes; and (d) Public Private Partnership funding

Other Stakeholders

These include: (a) Aquaculture researchers / academics; (b) Consumer groups (c) Public Interest represented by environmental groups; and (d) Local communities


Negotiating environmental protection and business development can be complicated. While greater co-ordination and formal structures to support this may be necessary, simply improving communication between officials and with industry would also be beneficial. Co-ordination costs are often not reflected on government budgets and officials’ time required to co-ordination this collaborative approach is a significant cost to already stretched departments, especially at provincial and municipal levels.

Challenges for the development of the sector

Complexity of regulations and permitting

In South Africa, aquaculture has not been coherently regulated. This could be addressed by the introduction of an Aquaculture Act or Bill that would harmonise the various pieces of legislation pertaining to the growth of the sector. One has been drafted and can be viewed on the South African Government’s website. This seeks:

To promote the development of an equitable, diverse, viable and competitive aquaculture sector; to create a harmonised enabling regulatory environment within a framework of sustainable development; to improve coordination in the regulation of the aquaculture sector; to promote the participation of historically disadvantaged individuals in the aquaculture sector; to establish an aquaculture development fund; and to provide for related matters (DAFF, 2016b).

Other complications include:

- Permits issued by the different spheres of government may be issued for varying periods of time;
- Each province may have a different set of criteria and impose different conditions on a similar aquaculture facility undertaken in another province;
- Marine aquaculture is treated differently to freshwater aquaculture.

Skills

The OECD LEED aquaculture company survey (see Chapter Three) has identified the lack of skills at various levels as a significant constraint on growth. This was also identified in and during the roundtable stakeholder discussions. The main skills shortages are:

- A lack of people with suitable technical/craft/artisan skills and competences, and;
- A lack of basic skills
Product safety and quality

An aquaculture industry certification regime (namely, authority and standards) is missing due to a lack of capacity and mandate for certifying authorities. There are also few standards for certifying authorities to rely on. There is a need for a system where the government creates standards for certification in keeping with international standards with independent certifying bodies. Whilst there is a legal framework for tracing and labelling products (the Consumer Protection Act), there are no examples of the legal implementation of standards and regulation. It would be useful to publish standards and regulations for traceability and labelling of aquaculture products under existing legislation with international standards in mind (Department of Environmental Affairs, 2015).

Operational issues

There is currently no list of approved drugs for aquaculture in South Africa. Consequently, farmers and businesses in the sector are free to use any drug available to them. It would be useful for the DAFF to prescribe a list of drugs, taking into account international precedents and standards, which can subsequently be published under existing legislation. The regulation of aquaculture feeds and fertilisers is also lacking. Laws relating to medicines and feeds used in aquaculture are also not fully developed and where there are regulations, they are not consistently applied and monitored. Specific standards with regard to the import and export of aquaculture related products or species need to be developed and certification standards acceptable at an international level will need to be imposed, to ensure that South Africa can compete in the international market.

Government unlocking value in the sector through Operation Phakisa

Operation Phakisa is a results-driven approach to fast-track policy implementation by setting clear plans and ambitious short- medium- and long-term targets. The approach is modelled after the Malaysian Big Fast Results Methodology to achieve significant government and economic transformation within a short period of time. Operation Phakisa was initiated to enable the South African Government to more effectively implement policies and programmes in support of the National Development Plan 2030. The first phase of Operation Phakisa focuses on unlocking the economic potential of South Africa’s oceans and coastline. Sectors for intervention comprise: marine transport; offshore oil and gas exploration; aquaculture and marine protection services; and ocean and coastal governance. The combined estimated potential contribution to GDP of these sectors is estimated at ZAR 177 billion (EUR 10.5 billion) and a potential of approximately a million new jobs (Department of Environmental Affairs, 2018).

For aquaculture, the main aim of Operation Phakisa is to ensure that the country benefits from the sector’s high growth potential, resulting from increasing demand for fish, combined with South Africa’s wealth of marine and freshwater resources (Republic of South Africa, 2014b). To meet this objective, an Aquaculture Lab was established targeting an expansion of aquaculture and increasing:

- production by 20 000 tonnes;
- jobs from 2 227 to 15 000;
- sector revenue from ZAR 670 million (EUR 39.8 million) to ZAR 3 billion (EUR 178.2 million);
- participation to support transformation in the sector (Republic of South Africa, 2014b).
Eight initiatives aimed at stimulating the growth of the sector were identified and implementation has commenced (Republic of South Africa, 2014b). Operation Phakisa provides a platform for South African Government to fast-track new aquaculture development site-approvals and permitting throughout the country. A key feature of this process is the establishment of government-wide, multi-tier and cross-functional teams that are identifying bottlenecks and resolving pertinent issues in partnership with private sector stakeholders.

Operation Phakisa is also providing support to new entrants into the fish farming market. Support is targeted at various stages in aquaculture value chain. Start-up aquaculture farmers access funding from financial institutions and the Aquaculture Development Fund (ADF). Government extension officers also provide technical assistance to farmers from the start of operations to their first harvest and beyond. Additionally, extension officers advise farmers on compliance, and access to markets. There is also a mechanism for government to procure a portion of the produce from these operators through the Preferential Procurement Scheme, allowing farmers to some security for repayment of loans.

While Operation Phakisa is making significant progress in unlocking barriers to growth in the aquaculture sector, it is not without challenges. The model creates a dual system of approvals for new private developments and because it is results-orientation, only selected well-coordinated developments tend to be fast-tracked, while other new aquaculture developments that are equally strategically important but less co-ordinated, are not. As a result, Operation Phakisa is not a panacea for sector development over the long term. Formal institutional support still needs to be improved and expanded to ensure future sustainability of the sector.

Green opportunity conclusions

There is growth potential for aquaculture in the Western Cape, in terms of expansion of operation, increased output and revenues, and job creation. Because of the province’s geography and more established aquaculture operations, there are new opportunities to increase production for high value species such as abalone and trout. The sector’s expansion is not without challenges. Aquaculture presents significant environmental risks and is therefore subject to Environmental Impact Assessments and to a permitting system. Streamlining of the permitting process and standardising aspects of EIAs could help operators and boost the sector as the process is often perceived as cumbersome.

Operation Phakisa has already begun to address some barriers to growth in the aquaculture sector and to stimulate new projects and innovation. Ensuring co-ordination between different supportive strategies and environmental protection measures across levels of government and between national line ministries is critical in effectively facilitating green growth in aquaculture and the blue economy.
Greening Company Practices in the Aquaculture Sector in the Western Cape

Methodology

Company surveys were carried out in a number of countries and regions, including the Western Cape Province of South Africa, as part of ongoing OECD LEED research to identify the extent to which businesses are greening their practices, products and services and the related impact on skills and jobs. The results of these surveys are dealt with in a parallel report (Cliquot et al, 2017 in prep) and most of the questionnaire was common to all case studies, while some questions were adapted and tailored to the local contexts. Companies were contacted by phone by provincial staff in the Western Cape. Though the number of respondents (26) is not huge, the survey gives useful indications of company perceptions (see Table 3.1).

Table 3.1. Boosting skills for greener jobs – Company surveys description

<table>
<thead>
<tr>
<th>Region</th>
<th>Sectors Covered</th>
<th>Number of companies contacted by phone</th>
<th>Number of responses to questionnaire</th>
<th>Number of companies operating in the sector in the region covered</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Cape</td>
<td>Aquaculture / Blue economy</td>
<td>60</td>
<td>26</td>
<td>60 according to Western Cape listing of aquaculture companies</td>
<td>Feb-April 2015</td>
</tr>
</tbody>
</table>

Source: OECD LEED Company Survey

In the Western Cape the survey results were complemented by interviews with selected firms and stakeholders and further roundtable discussions and events were organised. The roundtable event took place in Cape Town on 13 March 2015 and was preceded by a study tour to aquaculture sites in Hermanus on 12 March 2015. Of those responding to the survey, as shown in Figure 0.1, slightly more than a third of firms have between 10 and 49 employees; 27% of the companies between 50 and 250 employees; 19% have 3 employees or less; 18 are in the mariculture sector; and 8 in the fresh water aquaculture sector.

Survey findings

In terms of markets for trading products, the majority of firms traded either locally or within the Western Cape Province. 23% of firms exported their products internationally. Further investigation of the sector revealed strong demand for locally cultivated abalone, whose market is concentrated in China. 64% of firms surveyed were planning a substantial expansion in production over the next three years and a further 24% were planning a more limited expansion. These planned expansions are in keeping with the support and streamlining of investment into the sector provided through Operation Phakisa and related mechanisms.
The scale of operations of the respondent companies is not large by international standards. Around 80% produces less than 200 MT tonnages of fish, with 42% producing less than 50 MT of fish and 38% between 50 MT and 200 MT. The vast majority (64%) of firms are planning to substantially expand production; indicating expected growth within certain sectors (see Table 3.1).

Figure 3.1. Distribution of firms by employment size

Source: OECD LEED Company Survey

Aquaculture companies already greening their business

Confirming the insights offered by interviews at individual firms, companies revealed a clear understanding of their main environmental risks. The environmental challenges that seem more prominent among firms are related to water used and water quality (73%) and energy use (69%). Aquaculture companies have an interest in maintaining good environmental practices in respect to water use discharge because they depend heavily on the quality of this resource. Energy security is also a concern in a context when the energy grid suffers from regular power cuts.

In Western Cape, more than two thirds of the aquaculture firms have already implemented green measures, with a third completely reshaping their business. As shown in Figure 3.2, green measures mainly relate to ‘energy efficiency and renewable energy’ (67%) and ‘water efficiency and water quality’ (55%), which accurately reflects industry perceptions of its environmental challenges.

The main drivers for company greening

The survey identified that in the Western Cape the main drivers to green companies appear to be the company’s values (100% of the firms) and the director/CEO vision (94%). These responses are probably related as the director/CEO of the company has a strong influence on the values of the companies and consequently on the implementation of green measures. At the other end of the spectrum, the pressure from NGOs, local government and unions seems to have a limited influence on company’s choice related to greening.
Both mariculture and freshwater aquaculture are extensively regulated under different environmental legislation and agencies. Complying with regulation was not reported as an important driver for greening. Instead, cost saving was much more important to companies. A possible explanation is that compliance is seen as part of the companies’ normal operations and part of the administrative. Those companies that have implemented green measures have done so in accordance with identified environmental risks, mainly addressing (in order) energy, water efficiency and quality, and waste management. Most of the environmental initiatives reported were energy-related, and companies link these to cost savings, in the context of national increases in energy consumption and associated energy insecurity.

Among the green economy energy efficiency interventions mentioned by companies, the shift from fossil-fuel based electricity generation to hydro-electric onsite generation, harnessing the kinetic energy of waves at Abagold (see Box 3.1) was key. The planned use of other renewable energy sources such as solar photovoltaic panels was also reported. Similarly, re-engineering of pump systems and use of wastewater for irrigation, seaweed culture, and electricity generation are some of the green economy interventions that have been implemented by farms in the Western Cape Province to enhance water efficiency. Other small-scale green innovations include increasing efficiency in in-house fish tank cleaning processes and production of alternative aquaculture feeds. Despite cost-saving incentives a majority of companies reported the high cost and/or lack of financing of green technologies as the main obstacle to greening (see Figure 3.3).
Figure 3.3. Main drivers to green companies

Note: The chart is based on 18 responses corresponding to firms having implemented green measures and shows the share of firms that noted ‘strong influence’ and ‘very strong influence’.

Source: OECD LEED Company Survey.
Box 3.1. Good Practice examples of green measures in the aquaculture industry: Energy security and water quality

**Abagold**

In 2014, interviews were held with management from Abagold. As per discussions with the administration, this project learned that Abagold is a company that harvests and processes close to 495 tonnes of abalone (almost half of South Africa’s total abalone production) on its four farms, Sea-view, Bergsig, Amaza Waves and Sulamazi. Initially incorporated as Hermanus Abalone (Pty) Limited 1995, Abagold’s operations centred around the work of Hermanus-based Veterinarian, Dr. Pierre Hugo, who had been experimenting with growing Abalone in captivity following poaching of the species in its natural habitat. Currently, Abagold has a highly diversified shareholding structure through listing and equity investment from an investment management firm, Inspired Evolution. Abalones at Abagold are cultivated in on-shore land-based tank systems. Though capital intensive, on-shore land-based tanks provide for temperature regulation and increased abalone spawning. All four of Abagold’s land-based farms are situated very close to the shoreline where they have access to large quantities of seawater that is pumped ashore and pre-treated to improve water quality (FAO, 2015). Waste water from all four farms is partially recirculated using new filtration and water treatment systems before being discharged into the ocean. This allows Abagold to reduce its green footprint and improves growth and survival of its abalone stocks.

Abagold’s management recognises the importance of sustainable development. While the business is reliant on the ocean, it is vulnerable to the effects of storms and pollution. Conversely, the activities of the Company could have significant potential impact on the environment should effluent water or waste and water discharges not be carefully controlled, or energy not used in a responsible manner. For this reason, Abagold monitors and evaluates samples of its effluent to ensure compliance with the relevant regulations.

Abagold has also reduced its green footprint by leveraging the benefits of renewable energies. In this regard, Abagold has reduced its reliance on fossil-fuel generated electricity and establishing the world’s first wave energy converter power plant. Prior to this Abagold piloted and installed an effluent waste turbine over and above retrofitting all its water pumps as a means of containing escalating electricity costs and an increasingly unreliable electricity supply. Currently, Abagold’s 20MW wave energy converter power plant and retrofitted water pumps save the company approximately ZAR 36 million in coal generated electricity cost per year. This number will increase once Abagold begins to sell its surplus electricity from the wave converter plant to neighbouring aquaculture farms.

Another innovation at Abagold has been the arrangement of land-based water tanks along the shoreline. The tanks are placed at an incline to allow the waste water used to clean one tank to be re-used to clean the adjacent tank. This flow-through system has optimised water usage.

Abagold has also been innovative in its production of formulated feed. Abagold’s abalone is fed a combination of natural seaweeds and formulated feeds.
Since 2011, Abagold’s fishmeal component - cultivated and wild kelp - in the formulated feeds has reduced. The fishmeal is sourced entirely from a supplier who conforms to the World Wide Fund For Nature’s (WWF) fish-in-fish-out ratio (FIFO) sustainable standards (WWF, 2014).

HIK

HIK Abalone Farm (Pty) Limited (HIK) is a privately owned small- to medium-sized mariculture company located in Hermanus in the Western Cape Province of South Africa. This company was also approached with interviews by this project in 2015. HIK began aquaculture operations in 1997 in response to growing demand for South African abalone (Haliotis midae) in Asia. The firm produces and exports about 170 tonnes of abalone per year with a staff complement of about 100 people, 28% of whom occupy the highly specialised mid to senior management positions. While abalone farming is generally a capital intensive undertaking in South Africa, HIK’s production technology is considered quite labour intensive in comparison to Abagold.

Like Abagold HIK uses on-shore land-based tanks systems to produce its abalone. To date, HIK has been more reliant on government support programmes. As an exemplar, HIK has implemented a comprehensive biosecurity programme to protect stock from diseases or pests. The programme’s measures include: water filtration, age separation, optimal water and air supply, disinfection of hands and boots upon entering the farm and high levels of internal health surveillance (HIK, 2015). The biosecurity programme is supplemented by a government driven food safety component called the “Shellfish sanitation programme” whereby incoming seawater and abalone flesh samples are routinely monitored for disease causing bacteria and bio-toxins (PSP, DSP and ASP). Incoming seawater is screened for bio-toxin producing phytoplankton on a daily basis.

Like many small- to medium-sized aquaculture firms in South Africa, HIK relies on the national electric utility, Eskom, for its electricity supply. With recent load-shedding and electricity tariff increases threatening medium to long-term viability, HIK has scaled-up operations. Though HIK has successfully secured an alternative site for planned expansion, other smaller aquaculture firms may not be as successful.

Major obstacles to greening businesses

A high cost and lack of funding is perceived by far as the major obstacle for greening business by the respondents of the survey (77%). This confirms the outcomes of the March 2015 stakeholders’ workshop. The aquaculture sector has to face high start-up costs. Closed systems for hatcheries are more appropriate to limit environmental risk of escapees but are also more expensive. Maintenance and energy costs are also considered high and energy insecurity can cause serious production losses. There was also limited awareness among companies of possible sources of financing and funding initiatives. Finally a lack of feed-in tariffs for renewable energy generation does not help to make these investments financially viable (see Figure 3.4).

Administrative and legal aspects are perceived as important barriers by 27% of companies. Business participants in the March 2015 workshop confirmed this and referred to the excessive red tape related to establishing or expanding aquaculture operations (e.g. delays for processing Environmental Impact Assessments by public authorities). The ongoing elaboration of norms and
standards for aquaculture operations was presented as a lengthy process which could delay investments.

**Figure 3.4. Perceived obstacles to greening businesses**

The lack of knowledge, employee qualification and awareness of possible green measures are also perceived as obstacles by approximately one in four survey respondents.

**Impact on skills**

Among aquaculture companies that have implemented green measures, most have implemented at least one measure related to skills. Over 80% have up-skilled or retrained current employees, 70% have hired consultancy services and 53% hired additional employees. A relatively high share of firms (41%) has taken all three measures related to skills, which could imply that companies faced a significant reorganisation of their staff to implement green measures. Employees that were retrained or upskilled were mainly unskilled or seasonal workers, followed by managers and senior officials. This indicates that there is a need for various types of skills and training across the company’s workforce to accompany the green transition.

The workshop and in-depth interviews with case study companies highlight that in order to implement more green measures in their businesses there is a shortage of artisans, technicians, electricians and plumbers for the day-to-day maintenance (see Figure 3.5). Companies participating in the survey highlighted more technical skills (54%) and more managerial and leadership skills (50%) as foremost.

*Source: OECD LEED Company Survey*
At the management level, there was felt to be an adequate supply of workers but more specialised skills were needed so a re-focusing or provision of new training approaches and modules is required. Also, whilst there is no shortage of scientific staff and researchers there is a shortage of highly technically skilled staff. With a lack of formalised training, inevitably some companies such as Molapong have established study visits abroad for their employees (see Box 3.2).
Box 3.2. Good Practice at Molapong - partnering with Danish aquaculture sector

Molapong Aquaculture produces rainbow trout on six farms spread across the wine producing region of South Africa. The company is owned by Viking Aquaculture Group, with operations in southern Africa, with diverse fresh and seawater aquaculture farms. It is a medium-sized company producing 400 tonnes of product and 10 million trout ova annually (revenues are not publically available).

Trout farming is not a very labour intensive practice. At Fizantakraal, the staff members are split into two general categories: Managerial positions (which require in-depth, technical expertise in the area of trout farming) and the more general “farm hand” positions (which also require technical know-how, but mostly of skills which are acquired on site).

A large majority of the training is carried out on site, however, staff members are sent for formal training in areas such as human resources, management, teamwork and leadership. Since no formalised training is available locally for the practical aspects of trout farming, senior staff members have been sent to Denmark on several occasions to learn new techniques and improve on current trout farming practices.

To combat attrition and churn, the company employs new staff on short-term performance-related contracts that lead to permanent employment. New employees are given contracts of 3 months, then 6 months, then a year before becoming part of the permanent staff.

There is a clear need for basic skills (literacy, numeracy) within lower-skilled employees and several companies such as Abagold and HIK (see Box 3.3) are assisting their workers with Adult Basic Education and Training (ABET) as well as Life skills training (which relates to ethics, health and behaviour at work).
Box 3.3. Good Practice Examples in Training - Abagold and HIK

**Abagold**

Located in Hermanus, on the southern coast of the Western Cape, Abagold maintains a staff of 388, of which 290 are contract staff and most operate at the artisanal, semi-skilled and unskilled levels.

The dominant approach to skills acquisition is upskilling. Most contract workers come to Abagold without having received a Matriculation or trade certificate and rely on on-the-job training and various short courses to build up their aquaculture competencies at the artisanal levels. Abagold was the first abalone farm in the country to invest in Adult Basic Education and Training (ABET) as the primary means of improving employees’ communication and numeracy skills. This education and training is the foundation for further development of employees. A total of 278 AET certificates have been awarded to date.

For matric graduates entering the employ of Abagold, the company provides aquaculture training through ‘learnerships’ which allow semi-skilled employees to progress into aquaculture and infrastructure supervisory and technician roles. As part of the training, accredited learning materials are presented to the selected Abagold employees as skills courses over a period of three years. The learners accumulate a total of 120 credits which qualify as a full learnership in animal production. These skills have occasionally been complemented with experienced recruitment at managerial levels.

While Abagold is able to marshal substantial resources for investment, it faces its most significant challenge in acquiring qualified manpower at the supervisory and technician level in the infrastructure trades sections to support its auxiliary operations, viz., electrical and water pump systems.

**HIK**

HIK also relies on upskilling to build up in-house competencies. On their Hermanus farm, HIK has established an ABET centre where employees can further their education in basic subjects such as communication, numeracy and life orientation. HIK allows each employee 2 hours per week (at HIK’s cost) to pursue ABET. HIK employs ABET facilitators specifically for the ABET programme. Also, HIK is involved in implementing learnerships for learners at local schools in conjunction with the Agriculture Sector Education Training Authority (Agri-SETA). Further, candidates from all employment levels are continually identified for training potential. The training HIK offers ranges from bricklaying to directorship, occupational health & safety to biosecurity, workplace skills to aquaculture and general management, secretarial to financial accounting, and from first-aid to driving to mention a few. All training is conducted at the company’s cost and amounts to approximately 11% of the company’s annual turnover.

HIK values good employment quality, and therefore pays a basic wage which is approximately 40% above the minimum wage for agricultural workers. HIK also provides a provident and funeral fund where HIK contributes 50% and 100% of the premiums respectively. Further, the firm also provides access to a medical aid
programme and ensures that its employees operate in a safe environment through adherence to the provisions in the Occupational Health & Safety Act (OHAS).

Despite providing seemingly competitive remuneration packages, HIK faces considerable challenges retaining low- to mid-level staff in the aquaculture and infrastructure trades. In some cases, staff at the lowest level in the business resign in order to access their provident fund contributions. Similarly, employees with a matric-level education at the low to mid-level positions are often poached by other aquaculture farms or resign to pursue better paying opportunities in the metropolitan cities. In order to arrest skills drain and build sufficient competencies for its new operations, HIK plans to expand its in-house aquaculture training facilities to cater to the broader industry’s requirements.

Responsiveness of the education and training systems

According to the company survey, the main providers of training activities are the institutes of technology (54% of respondents refer to having used the services of such training providers), private training providers (50%) and trade and industry associations (42%). When employers offer training to their staff 80% is delivered by accredited trainers and in 65% of cases it provides formal (nationally recognised) qualifications.

Among employers, the difficulties related to training provision vary according the occupational profile of their employees. In particular, the cost of training and the timing of training seem to be an obstacle for both senior managers and technicians. For artisans and seasonal workers, the lack of information on available training represents the most important barrier to training. In one third of the cases, specific training doesn’t exist for seasonal workers. The system appears relatively reactive in the provision of green courses with around 70% of training being available in less than 6 months (see Figure 3.6).

Figure 3.6. Training providers

Source: OECD LEED company survey
Knowledge-sharing activities and public sector support

Knowledge-sharing activities can assist firms in greening their business and exchanging best practices. Typically around or just over one third of aquaculture companies are connected to knowledge-sharing institutions with the largest response being for links with universities and institutes of technology (38% of companies already participate in such links). There is also existing collaboration with training providers (35%), business clusters (27%) and with industry/trade association and the chamber of commerce (31%). Interestingly, a large share of the companies that are not currently involved within business clusters or other industry/trade associations would find this useful to green their business (see Figure 3.7).

Figure 3.7. Knowledge-sharing activities

Source: OECD LEED company survey

Companies can also benefit from public sector support to meet their rising green skills needs. The survey found that employers felt that public support would be particularly beneficial for investing in new machinery (88%), employing new staff (85%) and funding training activities (81%) (see Figure 3.8).
Conclusions on greening company practices

Private companies clearly have an important role in contributing to greening the economy. In the case of the aquaculture sector, companies often do perceive themselves as environmentally minded and able to provide an alternative to unsustainable fishing practices. Companies are also highly dependent on environmental factors such as water quality. It is therefore not surprising that around two thirds of aquaculture companies have already taken measures to green their businesses, in particular related to energy efficiency and water quality. However, only a few firms have completely reshaped their business.

Company’s values such as corporate social responsibility, as well as CEO vision and saving operational costs are the main drivers for greening companies but obstacles exist especially in relation the high costs and lack of financing.

The green transition is having an impact on skills and occupational profiles and firms signalled that there is a particularly increasing need of technical skills as well as managerial and leadership skills. In order to have the skills necessary to green businesses 80% of companies had already up-skilled or retrained current employees, 70% had hired consultancy services and 53% had hired additional staff.

A shortage of artisans and technicians (plumbers, electricians) has been identified. Aquaculture companies are also confronted with high skills deficits in basic skills such as literacy and numeracy for their lower skilled operators. In depth-interviews during a study tour in March 2015 highlight that some aquaculture companies are also facing difficulties in retaining lower skilled workers.

Difficulties in training provision relate to; the cost of training; timing of training; lack of information and the non-existence of specific training for seasonal workers. However differences exist according to the occupational profile and skills levels of the employees.

Knowledge-sharing activities could be a useful tool to assist firms in greening their business. The Western Cape aquaculture firms are rather well connected to universities and research institutions. They are also actively collaborating with other businesses. Around one third

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**Figure 3.8. Public sector support**

*Source: OECD LEED company survey*
of companies interviewed indicate being involved in this knowledge sharing activities. A large share of companies not currently involved indicated that these types of knowledge-sharing activities would be useful to green their business.
Promoting Skills and Investment for Green Growth

This chapter analyses the regional policy framework in place to promote skills development and both public and private investment in the emerging aquaculture sector in the Western Cape, South Africa. It outlines existing policy initiatives while also presenting examples of inter-departmental co-operation between tiers of governance.

The aquaculture sector in South Africa, and specifically in the Western Cape, is set for rapid expansion through public and private investment. This expansion is facilitated through intensive intergovernmental co-operation (Operation Phakisa) as well as close co-operation with priority private sector projects. While this has drawn representatives from subnational government into a national process, there are particular responses and points of leverage that fall specifically within the mandate and jurisdiction of provincial and municipal governments in the Western Cape Province.

Considerable innovation is required if the sector is to compete favourably with its Asian counterparts in terms of price, scale of operations, and export volumes. With the Western Cape aquaculture sector still in its nascent phase there is an opportunity to ensure that the subsequent value created benefits local communities. Environmentally responsible growth and the mainstreaming of resource efficiency into operations is a critical objective.

There is already a province-wide focus on innovation included in the Provincial Strategic Plan 2014-2019. Efforts to drive growth and employment over the last two decades have not yielded the required level of job creation and poverty alleviation and this has led to political recognition of a need to do things differently. The plan aims seeks innovation that is better aligned to resource efficiency, particularly energy and water-use.

The Western Cape Government’s approach to business development in the green economy has been one of enabling private sector led growth. The focus has been on the required infrastructure, knowledge and skills, public investment or facilitation of private investment, and rules and regulations that enable and constrain private enterprises. Through the company survey administered as part of this research, companies identified particular areas where they see value in government support.

The previous chapter identified that one of the biggest sectoral challenges was hiring qualified technicians and artisans to oversee and undertake industrial electrical, pump operation and plumbing tasks on aquaculture farms and facilities. There was a perception that individuals with these skills were attracted away from smaller operations to better paid work in larger operations and to seek jobs in metropolitan areas. In terms of ‘greening’ these skillsets, the survey found that knowledge of sustainability could be acquired once a solid technical skills base was in place. In order to begin to unpack the skills role for provincial government, an overview of this environment is provided.
Broad institutional support for the sector

Various support services to the aquaculture sector are already provided at the provincial level (Republic of South Africa, 2014b) and comprises:

- Business support
- Aquaculture research
- Extension officers
- Provincial state vets
- Representatives from provincial Departments

Internal human resources to deliver these services are limited and the level of support currently being extended to the aquaculture sector needs to be scaled up if growth is to be supported. Companies surveyed indicated a range of potential government interventions (Figure 9) with the strongest demand from interviewed companies being linked to investment in machinery. Aquaculture farms often require significant upfront capital investments that take several years to show profit.

Although it is small the aquaculture sector does have established industry organisations. There is a multiplicity of associations and working groups which interface with government institutions (e.g. DAFF). The forums include the Marine Aquaculture Working Group (MAWG), the Aquaculture Intergovernmental Forum (AIF), and the Marine Aquaculture Industry Liaison (MAIL). Others are the Aquaculture Sector Workgroup (ASWG) and Northern Aquaculture Workgroup (NAWG) (FAO, 2014). These organisations provide good touch-points for government in order to deepen the understanding of what industry needs, as well as delivering services to as many producers and processors as possible. They have already been used by Western Cape Government to engage on issues of energy efficiency and water use.

Streamlining environmental governance

A common company perception is that the legal framework is hampering development of the sector. Over-regulation, uncoordinated institutional frameworks and a non-integrated authorisations process are some of the problems identified by industry stakeholders (Department of Environmental Affairs, 2015). These result in multiple requirements being placed on the sector, making it difficult for both new and existing operators to grow. Better aligning the permitting process to the sector would be helpful.

There are several possible solutions that can be implemented with varying degrees of complexity. One possibility is to develop an aquaculture act to harmonise the overlaps resulting from overlapping governance and industry support structures (Republic of South Africa, 2014b). This act could (among other things) regulate freshwater and marine water, redefine aquaculture as part of agriculture and not fisheries, adopt a development focus, zone areas specifically for Aquaculture activities and reduce fragmented authorisations to enable a “one stop shop” (Republic of South Africa, 2014b).

Another possible intervention would be to use a dedicated statutory body to support and regulate the industry. South Africa uses public entities and independent ‘special purpose vehicles’ to facilitate progress in key or growing sectors. A central aquaculture institution with representation from the public organisations could be established to help to streamline decision-making and increase co-operation. This intra-governmental institution, building on the co-ordination of resources under Operation Phakisa, could support both freshwater and marine aquaculture.
Central support services should encompass assistance in navigating the complex permitting process. An example of government attempting to demystify the permitting process is the “user friendly” Department of Agriculture, Forestry and Fisheries’ Legal Guide for the Aquaculture Industry (2013). This is a 100 page document, lists 33 pieces of provincial legislation and has a permissions checklist containing 14 national and 32 provincial (not all applicable in each province) permits, authorisations and consents potentially required for the development phase of an aquaculture project. During the production phase, 11 national and 38 provincial requirements for permits, authorisations and consents apply (again, not all applicable to each project). As argued earlier, there is significant potential to streamline this process.

The validity periods for some authorisations are insufficient to create commercial certainty and allow enough time for some proposed aquaculture projects to secure funding (Western Cape Government, 2014). There is a need for the licensing departments to align the permit validity periods with each aquaculture development enterprise and allow for sufficiently longer periods of operation. Furthermore, aquaculture is not included as a primary or consent use in most current zoning schemes except in the standard zoning scheme under the Western Cape Province Land Use Planning Ordinance, 15 of 1974 (Western Cape Government, 2014). In this regard, it would be useful to engage with municipalities regarding consistent inclusion of aquaculture under agricultural zoning.

Managing trade-offs and challenges in resource planning for development

Environmental management and development facilitation are often seen as being at odds with one another. However, this relationship can also be mutually supportive. Environmental management is critical for the sector to thrive and more generally to support economic activity within finite resource limits. Environmental Impact Assessments (EIAs) are often complex and expensive. EIA thresholds often impact most on small aquaculture enterprises (Department of Environmental Affairs, 2014) and reviewing the existing wording of listed activities and thresholds to determine whether they are effective would be a useful future step.

Rather than listing aquaculture activities for EIAs, finalising and expanding applicable norms and standards could be used for some species under well-tested methods of production. The abalone and trout norms and standards co-developed by the Western Cape and National Governments are a positive example of proactive governance for the sector. An additional support measure is the proactive pre-selection of sites for specific aquaculture operations. The zoning of land for priority aquaculture development zones would cut down some of the regulatory red tape requirements for individual operators.

Job creation is at the heart of South Africa’s development agenda. With limited natural resources available, development must be concentrated on sectors with the highest potential for growth. Though the aquaculture sector possesses strong potential for growth, it is from a very limited base. Aquaculture operations are also energy and water intensive. Prioritisation must therefore be integrated into wider local economic development plans to ensure that limited resources are allocated optimally for the best possible outcomes for the region as a whole. Development initiatives often compete for the same natural resources and for this reason, vehicles for co-operation across organisational and governmental levels need to be established, especially within identified development regions.

The Intergovernmental Task Team (IGTT) for the Greater Saldanha Bay area is an example of where this kind of co-operation is already in place. Saldanha Bay is one of the main development nodes in the Western Cape and several initiatives are currently are planned. The Saldanha Bay Special Economic Zone and aquaculture investments facilitated through Operation
Phakisa are just two examples of economic activity that require energy and water security to be viable into the future. Planning is required not only for direct demand for resources within businesses but also to cater for possible inward-migration of employees and job seekers. The Western Cape Department of Environmental Affairs and Development Planning convened the IGTT in order to facilitate a coherent response from all spheres of government and public entities to the planned development in the area. The IGTT serves as a forum to enable co-operative governance for a co-ordinated inter-governmental approach to addressing the environmental quality concerns in Langebaan Lagoon, Saldanha Bay and its environs.

**Collaboration between the aquaculture sector and the tertiary education sector**

Universities also plan an active role in the expansion and diversification of the aquaculture sector in South Africa. They engage in training, direct engagement with farmers and industry associations, and also often partner with government. The national Department of Agriculture, Forestry and Fisheries (DAFF) have recently established a new Directorate for Aquaculture Research which actively drives collaboration between sectors (DAFF, 2016a). The focus of this collaboration is largely on species diversification, enhancing commercial production, animal health and improving aquaculture interaction with the environment. South African universities supporting this research work include the University of Cape Town, University of Limpopo, University of Stellenbosch, University of Pretoria, University of Free State, and University of KwaZulu Natal. The work is also supported by the government funded Centre for Scientific and Industrial Research (CSIR), as well as industry and international partners (see Box 4.1).

Several universities are also independently proactive in this area. Rhodes University offers specialised Masters and PhD level qualifications in aquaculture. The University’s Department of Ichthyology and Fisheries Science (DIFS) has joined a partnership with Lilongwe University of Agriculture and Natural Resources (LUANAR) (Malawi), the University of Eldoret (Kenya), and Makerere University (Uganda) to “develop and refine the curricula of PhD courses in aquaculture and fisheries science to enhance the capacity of our continent to improve food security and the livelihoods of the people who depend on these industries” (Rhodes University, 2014). This project is part of the Edulink II Program, funded by the African, Caribbean and Pacific Group of States (ACP) and the European Union (EU) Co-operation Programme in Higher Education.

DIFS has been actively involved in research and development programmes focused on the African aquaculture industry, having worked, for example, to commercialise the culture technologies for abalone in South Africa. The department is also actively involved in the aquaculture sector through an affiliated independent consultancy, Enviro-Fish Africa (EFA). The consultancy maintains a focus on the social and ecological impacts of fish farming. As early as 2012, DIFS also partnered with the North West Provincial Department of Agriculture and Rural Development to create an aquaculture support programme to stimulate job creation and food security (Rhodes University, 2012). Work in the sector has also extended to the Western Cape, with affiliated consultants working on the Triple Green Aquaculture Project, which aimed to build an investment case for new polyculture technology that combines Salmon, Seaweed and Abalone to create a more resource-efficient farming system.
**Box 4.1. Stellenbosch University aquaculture division**

Based in the Western Cape, the Stellenbosch University Aquaculture Division was established in 1989 and offers extensive training options covering:

- informal training;
- distance education programs;
- graduate programs;
- diploma programs; and
- post-graduate programs (Stellenbosch University,(n.d.)[10]).

The Aquaculture Division works with the World Wildlife Fund’s Sustainable Fisheries Programme and views aquaculture as a strategic response to threatened wild fisheries. It is integrated into the province’s aquaculture sector and maintains networks with fish farms and feed facilities. It also has three of its own experimental farms in Jonkershoek, Marienhdal and Welgevallen (Stellenbosch University,(n.d.)a).

Stellenbosch University operates the Jonkershoek Hatchery, previously run by provincial authorities, which produces a significant proportion of South Africa’s trout stock. The Aquaculture Division’s research focus encompasses experimental farming of indigenous marine species, as well as the development of artificial food sources from the by-products of agricultural and industrial processes (Stellenbosch University,(n.d.)b).

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### Supporting skills development in the aquaculture sector

Key stakeholders strongly articulated a need for generic artisanal skills for growing the green economy both generally and specifically in the aquaculture sector. Whilst some highly specialised training was required this was not the main concern as opportunities for local and international skills development do exist and are accessible to the sector. Study tours and knowledge exchanges with aquaculture industries and operations have been undertaken by South African government officials and farm operators.

Addressing the challenges to aquaculture also requires a response to the skills deficit that plagues the sector. Challenges relating to skills and capacity building are evident at both project and sector support levels. These challenges include:

- Lack of certified vocational training for basic aquaculture farming skills;
- Lack of formal mechanisms for recognition and validation of skills and prior learning for farm workers;
- Lack of dedicated and specialised extension officers;
- Lack of veterinarians specialising in aquaculture at provincial level.

Through Operation Phakisa, proposals have been made to address the challenges of skills and capacity. Some solutions that have been proposed include up-skilling support services such as state vets, training and employing additional aquaculture research and extension officers to assist with provincial growth in the sector, and additional staff for DAFF. It has also been proposed that local and international funding should be sourced for skills development and
sending state vets overseas for training (where required) until specialist programmes are addressed locally through Operation Phakisa.

**Relevant skills development frameworks**

Central to skills development in South Africa, the institutional framework (see Figure 4.1) revolves around three quality education councils:

1. **The Council for Higher Education (CHE)**

An independent statutory body whose functions are to provide advice to the Department of Higher Education and Training (DHET); conduct quality assurance audits; accredit programmes at National Qualifications Framework (NQF) Levels 5-10; promote quality assurance; develop and manage the higher education qualifications framework; set standards; maintain a learner database; publish information on the changing state of higher education; and monitor higher education. The CHE has the responsibility of overseeing the Higher Education Qualification Sub Framework and looking at qualifications through the National Qualification Framework Act of 2008.

2. **The Quality Council for Trades and Occupations (QCTO)**

Responsible for designing, developing, establishing, maintaining and quality assuring occupational standards and qualifications within the NQF, Levels 2-9. The QCTO reports to the DHET, and was established to ensure that occupational qualifications, involving workplace training, were registered, quality-assured and offered by reputable service providers. Each of the Councils has a different and defined focus area. The QCTO is there to ensure that every qualification offered was of relevance in the market place and would ensure employment for those who took those qualifications. There are three components to the curriculum; theoretical knowledge; simulation; and work experience.

3. **Umalusi.**

The educational council sets and monitors standards for general and further education and training. The Council reports to the Ministers of Basic Education and Higher Education and Training and is responsible for development and management of a sub-framework of qualifications for general and further education and training, NQF levels 1 to 4, and for the associated quality assurance.
Our study suggests the aquaculture industry has sufficient professional skills at NQF levels 5 to 10. The key skills gap at the HEQF is the acute shortage of individuals with both a blend of aquaculture and entrepreneurial skills and sensitivity to environmental management. The low survival rate of firms in the sector and limited number of aquaculture organisations that have achieved scale in South Africa can be partially attributed to a lack of skills. The sector has its most significant skills gap in artisans and technicians at NQF levels 4 through to 8. This includes electricians, plumbers and pump-operators.

The Western Cape Government, together with Aqua-SA, are currently engaging the Agriculture Sector Education and Training Authority (Agri-SETA) and the QCTO on the development of an aquaculture specific training programmes. The province through two Further Education and Training (FET) Colleges is also participating in a bilateral programme between the DHET in collaboration with the Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation) (GIZ) namely, “Skills Development for Green Jobs”, with the intention to support green skills development in training institutions. Within this programme is the “Greening of Colleges” initiative is based on international best practices in the greening of colleges.

**Strengthening extension services**

The extension and advisory services provided by the Department of Agriculture are to assist commercial aquaculture producers in accessing services and facilities that are essential for the enhancement of farm productivity, securing finance and accessing markets. Extension services also assist producers in identifying and overcoming day-to-day operational challenges.
The role of the extension officer is intensive and demanding. Extension officers work with aquaculture producers in technology development, and provide information to research institutions on producer’s production constraints to inform further support for the sector.

Extension services are instrumental in the dissemination of shared knowledge that would capacitate participants in becoming self-reliant. While extension work is recognised as being very valuable, it is not well resourced and there is limited capacity within the Western Cape Government to provide these services. Bolstering extension and advisory service to the industry by government is particularly important for small-scale and commercial aquaculture given.

The Western Cape Government Department of Agriculture has partnered with GreenCape to set up a support desk for agriculture producers and processors in the province. The green agri-desk provides online and in-person support for the industry on all matters related to resource efficiency. While this support is also technically extended to aquaculture, it is not specialised in this direction. The agri-desk, however, will provide a potential model if the province would like to ramp up support for resource efficiency as aquaculture operations expand.

Enabling finance and investment

Figures from 2012 indicate a tremendous (34.6%) growth in capital investment in the sector amounting to ZAR 241 million (DAFF, 2014[11]). The abalone sub-sector invested approximately ZAR 162 million during the same period (DAFF, 2014[11]). These investments were primarily for expansions to meet increasing demand. The marine finfish sub-sector has experienced rapid growth in recent years, with more than ZAR 60 million invested during 2012 (DAFF, 2014[11]). Similarly, investment by the trout sub-sector increased substantially by 72% (ZAR 7.8 million) in 2012, illustrating the potential of the commercial trout market in South Africa (DAFF, 2014[11]).

There are a number of dedicated Development Funding Institutions (DFI) that provide financial support within the sector. These institutions play an integral role in the development of the sector. Key among these is the Industrial Development Corporation (IDC). In addition, national government, through Operation Phakisa, DAFF and the Department of Trade and Industry’s Aquaculture Development and Enhancement Programme (ADEP) has sought to promote and encourage investment into the sector by providing financial and bureaucratic support for would-be impactful aquaculture projects. In the Western Cape the efforts of national government are further supported through the Provincial Department of Agriculture’s Comprehensive Agricultural Support Programme (CASP). Despite these interventions, a number aquaculture firms are still unable to access funds as there are organisational capacity constraints, including the lack of preparedness to generate and manage bankable business plans.

Facilitating market access and increasing demand

Internationally there is a growing awareness on the environmental impacts associated with consuming fish and fish products. Consumer interest groups and NGOs such as WWF have been lobbying retailers and fisheries/aquaculture farmers to ensure that fish and fish products that are produced ecologically sustainable methods are clearly distinguished from those that are not. This movement for eco-certification has some presence in the South African market, but not all producers and consumers can afford to pay the premium associated with ‘green’ products, or the certification process itself. Aquaculture producers in the province have also benefited from the South African Sustainable Seafood Initiative (SASSI) Retailer/Supplier Participation Scheme. The SASSI takes a bottom-up approach in supporting sustainable and responsible fishing practices by creating awareness and providing up-to-date information to all participants in the
seafood trade (Turpie and et al, 2014[7]). While food certification is still its infancy in South Africa at present, establishing a reputable certification for its aquaculture produce could provide the country a competitive edge, especially in international fish markets. The broader strategic positioning of certain species tied to a Western Cape origin (as used in wine marketing, for example), could be worth exploring as the aquaculture sector matures in line with strong environmental standards and product standards. This would be a role that local economic development agencies could fulfil.

**Conclusions on promoting skills and green investments**

Although the aquaculture sector in the Western Cape is small, it is formally supported through a number of public and private mechanisms. The need to scale up this support is evident and in terms of specifically ‘green’ interventions, some specialised support may be needed. There are two main points in terms of sector support that are evident from this research. Firstly there is a significant opportunity to streamline the permitting processes and institutional support for aquaculture, building on the successes of Operation Phakisa and some of the other strategic initiatives being undertaken at national and provincial levels of government. Secondly there is a skills deficit, which mainly compromises generic artisanal skills, coupled with some business acumen and environmental management and resource efficiency awareness. This is not unique to the aquaculture sector, but is certainly a prominent barrier to development.
Policy Recommendations

OECD LEED research has highlighted a number of opportunities for promoting green growth in fisheries and aquaculture in the Western Cape Province of South Africa. This chapter takes these findings and builds them into a series of recommendations to further the transition to a local green economy, including specific measures that can be taken to boost skills in the aquaculture sector. The recommendations build on the findings of the company survey, workshops, interviews with stakeholders and analysis of policy frameworks set out earlier in this report.

Delivering green growth entails enhancing collaboration between various layers of government and growing partnerships at the local level and the aquaculture sector is not an exception to this. There is significant potential for the aquaculture sector to contribute to more sustainability in food chains but this is only possible by managing the environmental impacts whilst promoting the growth of the sector.

Recommendation 1: Reduce administrative burdens nationally and locally

Aquaculture would benefit from the introduction of an Aquaculture Act or Bill that would harmonise the various pieces of legislation pertaining to the growth of the sector and one has been recently drafted. A possible intervention would be to use a dedicated statutory body to support and regulate the industry. South Africa uses public entities and independent ‘special purpose vehicles’ to facilitate progress in key or growing sectors. A central aquaculture institution with representation from the public organisations could be established to help to streamline decision-making and increase co-operation. This intra-governmental institution, building on the co-ordination of resources under Operation Phakisa, could support both freshwater and marine aquaculture. It would be useful for central government to engage with municipalities regarding consistent inclusion of aquaculture under agricultural zoning.

Streamlining the permitting process could improve participation in the aquaculture sector as the South African and Western Cape Province regulatory frameworks are complex and involve a large variety of national and local public agency departments. There is a need for the licensing departments to align the permit validity periods with each aquaculture development enterprise and allow for sufficiently longer periods of operation. The zoning of land for priority aquaculture development zones would cut down some of the regulatory red tape requirements for individual operators.

Rather than listing aquaculture activities for Environmental Impact Assessments, finalising and expanding applicable norms and standards could be used for some species under well-tested methods of production. The abalone and trout ‘norms and standards’ co-developed by the Western Cape and National Governments are a good practice example of proactive governance for the sector.
Recommendation 2: Address skills bottlenecks

The green transition is having an impact on skills and occupational profiles in the aquaculture sector. Aquaculture companies have been confronted with high skills deficits in basic skills such as literacy and numeracy for their lower skilled operators. Companies need to learn from the Abagold and HIK Good Practice concerning the training of lower skilled, semi-skilled and higher skilled workers. Policymakers could help ensure similar systems receive support from the state as they are addressing real industry skills needs. Local government could engage with Agri-SETA, QCTO, and SAQA to improve curricula assessment and qualifications registration. Collaboration with national government could create an aquaculture branch of the “Working-for-Aquaculture Extended Public Works Programme” (EPWP) which could help aquaculture companies to train lower skilled workers while attracting them to the aquaculture sector.

Greening existing skills programmes feeding into sectors such as aquaculture should be a priority as most employees are not employed specifically in green skills jobs, but are required to green existing technical and engineering activities with new techniques and approaches.

Our survey revealed the cost of training and the timing of training seem to be an obstacle for both senior managers and technicians and there is a resultant shortage in particular of artisans and technicians (e.g. plumbers, electricians). These skills are often associated with vocational apprenticeship-type qualifications and there is scope to explore how similar skills are acquired in other countries in partnership with national and regional education systems. Subsidy for larger employers to train more apprenticeships than they require would enable smaller and newer companies entering the sector to hire suitably trained staff not kept on by the larger company leading the training. This ‘over-training’ is the norm for many European countries.

Recommendation 3: Grow extension and support services to assist local operators with green standards, particularly SMEs and new start-ups

Supporting local operators is key and the Western Cape Government could continue play a role through its extension services such as its agri-desk. Such services could further assist businesses, especially SMEs, unlock existing local and international funding mechanisms. This is especially the case since the majority of aquaculture companies are SMEs. Larger companies with access to capital are better able to respond to the challenges from Greening. Good examples of assisting SMEs can be found in OECD countries - the average licensing time for aquaculture farms in Norway has been reduced from 12 months to 6 months since the introduction of a single contact point. By comparison, in some EU countries, it is not unusual for such procedures to take between 2 to 3 years.

Recommendation 4: Deliver innovation by boosting research and development

National and local governments can play an important role in boosting research and development for greening the aquaculture sector. Links with research institutions such as universities are already quite well developed and South African universities supporting this research work include the University of Cape Town, University of Limpopo, University of Stellenbosch, University of Pretoria, University of Free State, and University of KwaZulu Natal. Focusing research funding on tackling green issues in the sector (energy, waste water etc.) will ultimately benefit companies and the environment.
**Recommendation 5: Support and grow communities of practice**

The results of our survey indicated a large share of the companies that are not currently involved within business clusters or other industry/trade associations would find this useful to green their business. This genuine desire for a variety of knowledge-sharing activities and innovation could be supported by helping establish an aquaculture community of practice to share local and international knowledge about greening, amongst other industry issues. This could be linked to new and ongoing research programmes as advised in Recommendation 4.

**Recommendation 6: Understand economic potential and returns to targeted investment**

With job creation at the heart of South Africa’s development agenda and limited natural resources available, development will be concentrated on sectors with the highest potential for growth. Aquaculture operations are energy and water intensive so prioritisation must be integrated into wider local economic development plans to ensure that limited resources are allocated optimally for the best possible outcomes for the region.

There is considerable potential within the aquaculture sector but it covers a number of sub-sectors and activities. To impact significantly on the greening of the industry policymakers will need to identify where economic advantage and genuine greening potential lie and then seek to grow these areas/sub-sectors. For example, as water availability and quality are increasingly stressed in the Western Cape, the development of the sector will need to pay particular attention to the management of water coming into and flowing out of production systems. Examples of good practice are the larger, energy-intensive mariculture firms in the Western Cape which have been successful in supplementing energy consumption with renewable energy technologies.

**Recommendation 7: Strengthening extension and support services**

Support services should encompass assistance in navigating the complex permitting process building on good practice such as the user friendly Department of Agriculture, Forestry and Fisheries’ Legal Guide for the Aquaculture Industry (2013).

The extension and advisory services provided by the Department of Agriculture are to assist commercial aquaculture producers in accessing essential services and facilities and to assist producers in identifying and overcoming day-to-day operational challenges. The role of the extension officer is intensive and demanding. While extension work is recognised as being very valuable, it is not well resourced and there is limited capacity within the Western Cape Government to provide these services. Bolstering extension and advisory service to the industry by government is particularly important for small-scale and commercial aquaculture.

The Western Cape Government Department of Agriculture has partnered with GreenCape to set up a support desk for agriculture producers and processors. The green agri-desk provides online and in-person support for the industry on all matters related to resource efficiency. While this support is also technically extended to aquaculture, it is not specialised in this direction. The agri-desk could be a good practice model to help the province ramp up support for resource efficiency as aquaculture operations expand.
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