



Concept Document

FEW Nexus and Seaweed

Proposed Project for the Establishment of a Baseline Assessment of Seaweed Use in Coastal Communities in South Africa

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1. Food, Energy, and Water Nexus

South Africa has been experiencing a serious drought since 2015, with associated crop losses, water restrictions, and impacts on food and water security ([DEA, 2016](#)). In 2017, 6.8 million South Africans experienced hunger, with almost 20% of South African households having inadequate or severe inadequate access to food ([StatsSA, 2017](#)). In addition to this, extensive research shows that climate change is predicted to further increase the intensity of droughts in South Africa, as well as the severity of associated impacts such as acute reduction in access to food and water ([DEA, 2016](#)). As the National Department of Environmental Affairs noted, the socio-economic and ecological impacts of drought events are becoming more onerous as they converge with increasing urban water demand and issues of social vulnerability ([DEA, 2016](#)). The poor and vulnerable are most affected, with higher levels of food and water insecurity in rural areas and disadvantaged communities ([Selepe et al, 2015](#)).

Food, energy and water securities are interconnected and interlinked, and tackling these development challenges from a systemic view allows for an analysis of the relationships and interdependencies which affect the achievement of sustainable resource management. Additionally, utilising a systems analysis perspective allows for the development of portfolios of solutions as opposed to linear, single-point solutions. The Water Research Commission have identified the FEW nexus as a focus “lighthouse” area of research moving forward ([WRC, 2018](#)), and identifying solutions that can positively impact the security and sustainability of each sector has the potential to accelerate the achievement of multiple SDGs.

2. Seaweed in South Africa

According to the World Health Organization (WHO) seaweed are among the healthiest foods on the planet as they contain vitamins, over 90 minerals, and many antioxidants ([Amosu et al, 2013](#)). Seaweed aquaculture has grown faster than any other marine production sector over the last 20 years, and there is a growing body of literature that suggests that seaweed will become a major component of global marine aquaculture, contributing towards the

production of aquafeeds, functional foods, nutraceuticals and possibly human food ([Bolton et al., 2016](#)). The known seaweed diversity in South Africa includes approximately 900 species, making the country one of the richest marine floras in the world, with a high level of endemism ([Amosu et al, 2013](#)).

Seaweed has multiple purposes, and markets currently exist for the use of seaweed in the production of biogas, pharmaceuticals, fertilizers, binding agents (for example agar), beauty products, as a food source for human consumption, and many more ([FAO, 2018](#)). Seaweed offers multiple ecosystem services, providing environments for other aquatic species, crucially juvenile fish and molluscs which combats decreasing fish stocks, as well as providing high levels of carbon sequestration and water purification ([Buschmann et al, 2017](#)).

3. Seaweed Uses to Decrease Food Insecurity and Poverty

The farming of seaweed for direct human consumption does not take place on a significant scale in South Africa in comparison to other countries in the area (for example see Tanzania's [Seaweed Community Cluster Initiative](#)). As FAO noted in 2018, "improving an understanding and awareness of the use of seaweed in human nutrition within the country cannot be over-emphasised" in order to promote socioeconomic benefits such as food security and poverty reduction ([FAO, 2018](#)).

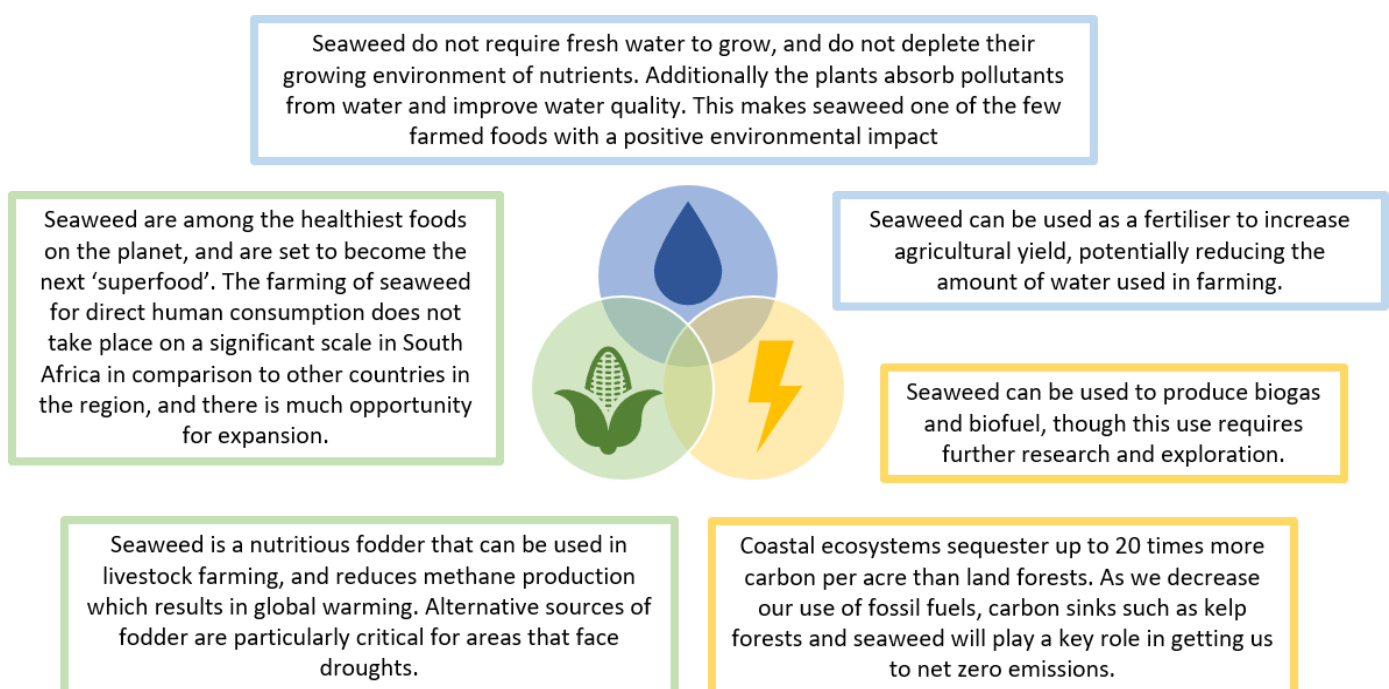
The aquaculture industry in South Africa is currently focused almost entirely on the farming of fish and molluscs ([DAFF, 2016](#)). However, seaweed is used as a feed for the fish and molluscs and there is much evidence of improved yields and health of stock with the introduction of seaweed, particularly in the production of high-value abalone ([Robertson-Anderson et al, 2008](#)). Seaweed additionally decreases ocean acidification (caused by run-off from aquaculture farms as well as climate change) and absorbs pollutants from water leading to improved water quality ([Global Aquaculture Alliance, 2017](#)), making it one of the few farmed foods with a positive environmental impact ([Harvard University, 2019](#)). In addition to

the above benefits, seaweed requires no food or water to grow, is fast growing, and can easily be harvested and farmed sustainably ([Global Aquaculture Alliance, 2017](#)).

Seaweed is used in fertilizers to enhance soil conditions and increase agricultural yield in farming. There are established companies producing these fertilisers at a commercial scale (for example see <https://kelpak.com/home.html>) and the markets to these companies exist in South Africa. Additionally fertilisers can be produced easily at the local level as seaweed can be dried, milled, and added directly to soil ([FAO, n.d.](#)) increasing the yield of subsistence farmers.

Global demand for seaweed is on the increase as it is one of the most versatile and naturally occurring sources of vitamins and minerals for both humans and livestock ([Dairy Global, 2019](#)). Considering seaweed's source of amino acids, antioxidants and essential fatty acids, there is growing evidence of the use of seaweed for livestock fodder, particularly in areas stricken by drought where livestock are dying due to a lack of food (for example, the Western Cape government needed to provide R50 million to farmers in the Karoo for emergency fodder). There is additionally growing research that adding seaweed to livestock diets can significantly reduce methane production which is a contributing factor to global warming and climate change ([Science Alert, 2016](#)).

Figure one: Seaweed in a Nexus Approach



4. Supportive Policy Environment in South Africa

The Department of Agriculture, Forestry and Fisheries aims to create an enabling environment to facilitate the development and growth of the South African aquaculture sector through the establishment of Aquaculture Development Zones (ADZ's) which are areas or sites either on land or sea set aside exclusively for aquaculture use or development ([DAFF, 2016](#)). In 2015, the total additional investment of approximately R264 million was achieved from both the marine (including crocodiles) and the freshwater aquaculture sectors, representing an increase of 35% from R162 million in 2014 ([DAFF, 2016](#)). 23 aquaculture concession sites have been established along the Northern, Western, and Eastern Cape ([DAFF, 2013](#)) and licenses for individuals can be acquired at local post offices making seaweed foraging, harvesting and farming accessible at the local level.

Strategic Environmental Assessments have already been conducted under Operation Phakisa in multiple areas on the South African Coast, identifying suitable areas where sustainable aquaculture can be prioritised and incentivised ([DAFF, 2017](#)). An Aquaculture Development Fund model and mechanism was established in 2017, creating an integrated pool of funds to support the development of this sector, and Operation Phakisa has issued calls for aquaculture projects to be registered with them in order to become part of "Unlocking the Economic Potential of South Africa's Oceans" ([DAFF, 2017](#)).

As Minister of the Department of Agriculture, Forestry, and Fisheries Mr Zokwana noted in 2016, "the department will continue to work towards the realisation of the aquaculture aspirations to build a thriving sector that contributes to food security, job creation, transformation, and contribution towards the country's GDP" ([DAFF, 2016](#)).

5. Proposed Project

Youth and gender are core focus areas of UNDP, and seaweed-based projects have much potential to be implemented with the involvement of, and benefit for, young woman in South Africa. In 2013 it was noted that employment in the seaweed sector in South Africa was made

up by a majority of women ([Amosu et al, 2013](#)). We have also seen examples of successful women-led projects in other countries on the continent (for example [Tanzania](#) and [Namibia](#)).

There is large potential for job creation – for example in Indonesia, after 30 years of sector development, seaweed farming is now a fundamental part of the livelihood of close to 200,000 smallholder farmers and is still rapidly increasing ([The Blue Economy Challenge, 2016](#)). Seaweed harvesting and farming can offer the most vulnerable sectors in society alternative livelihood options, increased health and food security, and adaptation strategies to the changing climate. With the length of coastline and number of endemic species, South Africa has an uncaptialised comparative advantage in this sector.

After engagements with key stakeholders in the sector, it has been established that there is no research available on the current use of seaweed at the local level in coastal communities in South Africa. This proposed project seeks to establish a baseline of seaweed use, as well as surface any cultural or social barriers to the use of seaweed, and identify any existing grassroots innovations using seaweed. The project will achieve this by collecting data using mixed methods from a selected sample of coastal communities. This will inform further phases of the project, surface potential areas for collaboration, and potentially uncover innovations that can be scaled for development impact.