FINAL EVALUATION REPORT

An Aquaculture Industry for Madagascar -

Increased and Diversified Sources of Revenue in Southwest Madagascar (2016 – 2019)

Final Evaluation Report submitted to Norges Vel by Joseph Mario Ray 23rd November 2019
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Executive Summary

This report presents the results of the evaluation of the project "An aquaculture industry for Madagascar – increased and diversified sources of revenue in Southwest Madagascar (2016-2019)." This is the last of three project phases (2010 – 2012, 2013 – 2015 and 2016 -2019) that has been conducted in partnership between Norges Vel and Blue Ventures and marks the end of that partnership. The main purpose and use of this evaluation is to document and provide recommendations for this project, in addition to documenting results and efficiency to be reported back to stakeholders. It is expected that recommendations from this evaluation will be useful to Blue Ventures in their continuing work in Madagascar, and to Norges Vel and Norad in future institutional capacity building.

The project has targeted isolated and economically marginalised traditional fishing communities in Southwest Madagascar who are dependent upon fishing for their subsistence and income. Madagascar is one of the world's poorest countries with 75% of the population living on less than US$ 1.90 per day.[1] This project now provides employment and income to over 600 farmers, of whom over 50% are women, as well as 30 private partner employees: these benefits of aquaculture are certainly relevant to these communities and this has led to a rapidly growing demand from villages to be included in the project.

The reconstruction of the sea cucumber (SC) pens and the more scientific approach being taken to SC farming is bearing fruit with increased and more stable production. Key ingredients to this success have been Blue Ventures' training and social organising which have led to the increasingly professional functioning of the Zanga ('sea cucumber') Management Committee and the engagement of farmers in the ongoing adaptation and management of the farming model.

Blue Ventures' training and social organising of seaweed (SW) farming and the development of the SW farming model are seen by Ocean Farmers as key to the steadily increasing SW production and the better handling of epiphytic filamentous algae disease. Velondriake is now the most productive of Ocean Farmers' sites.[2] Blue Ventures has also put much effort into organising leases for SC farmers and contracts for SW farmers which give security and predictability for the farmers and other stakeholders.

Project effectiveness appears low in comparison to many of the financial targets set by the project. However, this is considered more a reflection of over optimistic financial targets and several unforeseen factors, that include the redesign of activities in 2017 and the outbreak of disease, rather than lack of impact. Despite such difficulties, the project has made good progress because it has increased production from baseline figures. The production of SCs is on course to exceed the 2015 baseline figures by the end of 2019 and the production of SW is nearly three times the 2015 baseline after only 6 months of 2019. The project has also met and even excelled in most targets that are not financial, for example in training and institutional capacity building.

In terms of efficiency, the project will benefit from continued financial modelling to ascertain the net income of farmers after costs are deducted and to test the real effect on farmers of many variables highlighted in this report that affect net income.[3] This is particularly relevant at the moment as private partner Ocean Farmers are planning to introduce new incentives this quarter and Blue Ventures are considering the introduction of a collective sea cucumber pen instead of the individual pens being used in current farms.

[1] Overview. (2019). *World Bank*. Retrieved October 2, 2019, from https://www.worldbank.org/en/country/madagascar/overview
[2] 2019 Semi-Annual Report to Norges Vel. (2019). *Blue Ventures*.
[3] These include, for example, different pricing models, different sizes and outputs of farms, locations with particular costs, different prices received for products, return rates, various incentives or removal of subsidies.

Efficiency would also be improved through a closer and more trusting relationship with private partners. This is could be achieved by more regular communication between high-level decision makers, data sharing agreements that allow quick access to key information, and a formal agreement to align the long-term vision of all parties.

While baseline data on project indicators was available, the evaluation team identified indicators outside the scope of the project which they deemed relevant and which might have enabled a more thorough measurement of the impact of the project. Nevertheless, it is evident from project documents and interviews and focus groups conducted as part of this study, that the project is having a substantial positive impact on communities, with additional income from aquaculture enabling families to send their children to school. The project's success in gender mainstreaming should be celebrated.

Farmers are confident in their ability to manage the day to day running of the farms, and reports show that they are highly engaged in suggesting improvements and contributing to the ongoing adaptive management of the farming model.

Our main recommendations centre round three key issues. First, the financial modelling, and second, the relationship with the private partners, both mentioned above, and third, the continued handover, strengthening and capacity building of local associations and governance structures. This has been a focus of the project in the current phase and needs to continue and be adapted in various ways. These recommendations are detailed further in the report.

Contents

Abbreviations

Ar	Ariary
BUS	Bacterial Ulceration Syndrome
BV	Blue Ventures
CGA	Comité de Gestion des Algues
CSA	Center for Agricultural Services
CITE	Centre d'Information Technique et Économique
COPEFRITO	Compagnie de Pêche FRIgorifique de Toliara
EFA	Epiphytic filamentous algae
FRDA	Fond Régional pour le Développement Agricole
IHSM	Institut Halieutique et des Sciences Marines
IOT	Indian Ocean Trepang
LFA	Lomotse Farming Association
MEL	Monitoring, Evaluation and Learning
MFI	Microfinance Institution
MRHP	Ministère des Ressources Halieutique et de la Pêche
NORAD	The Norwegian Agency for Development Cooperation
NV	Norges Vel - The Royal Norwegian Society for Development
OF	Ocean Farmers
SC	Sea Cucumber (*Holothuria scabra)*
SILC	Savings and Internal Lending Communities
SkUD	Skin Ulceration Disease
SW	Seaweed (*Kappaphycus cottonii*)
PIC	Pôles Intégrés de Croissance
ZMC	Zanga Management Committee

Figures

1. Introduction

Joseph Mario Ray ("the consultant") and his team, Volaniaina Robsona and Michael Riddell were commissioned by Norges Vel to evaluate the project titled "*An aquaculture industry for Madagascar – increased and diversified sources of revenue in Southwest Madagascar (2016-2019).*"

This project phase, 2016 - 2019, builds on Norges Vel and BV's existing partnership that started in 2010 developing Sea Cucumber (SC) and Seaweed (SW) farming as alternative sustainable livelihoods. It targets isolated and economically marginalised traditional fishing communities in Southwest Madagascar who are dependent upon fishing for their subsistence and income.

This evaluation has included an inception report, followed by a review of documents and fieldwork carried out in August and September 2019. This report presents the findings and recommendations of the evaluation.

As described in the original ToR, the purpose and use of this evaluation is mainly to "document and provide learning on best practices in addition to documenting results and efficiency to be reported back to stakeholders." Recommendations will be useful to BV in their continuing work in Madagascar, and to Norges Vel and Norad in future institutional capacity building.

2. Project Objectives

This project has targeted traditional fishing communities in two regions in Southwest Madagascar with the goal of increasing and diversifying sustainable livelihoods for men and women. The project objectives are set out in the results frame attached in Appendix 1. The expected impact of the project is to increase and diversify sustainable livelihoods for men and women in southwest Madagascar. The project has the following intended outcomes:

1) Improved aquaculture business operations
2) Well-functioning producer steered businesses and organisations
3) Improved market integration of small aquaculture producers

The outputs and key activities expected to achieve these outcomes, and indicators at all levels, are detailed in the results frame.

3. Approach and Methodology

A review of the project documents provided by Norges Vel and BV has been undertaken. All documents reviewed are listed in section 7: References.

The evaluation adopted a partnership approach which is an inclusive process with the aim of including different stakeholders such as government, civil society, the private sector, international partners, targeted beneficiaries and their wider communities.[4] In total the evaluation team conducted 9 focus groups and 22 semi-structured interviews. These took place at various sites, including Antananarivo, Tulear and 10 field sites which are illustrated below in Figure 1 and Figure 2.

[4] DAC Guidelines and Reference Series, Quality Standards for Development Evaluation, 2010, p.7.

Figure 1: Velondriake Sites Visited

Figure 2: Belo Sur Mer Sites Visited

In accordance with the relevant professional and ethical guidelines and codes of conduct for individual evaluators, participants will remain anonymous. Reference will only be made to the stakeholder group of which they are a part, for example, 'targeted beneficiaries.' The only exception to this rule will be when referencing the two main parties involved in this evaluation, Norges Vel and BV, and even here only the organisation will be referred to.

4. Evaluation Questions

4.1 Relevance

The expected impact of the project is "to increase and diversify sustainable livelihoods for men and women in Southwest Madagascar."[5] The project used the establishment of aquaculture as the means to achieve this impact. This section assesses the extent to which aquaculture is suited to the target group and their wider communities, taking into consideration the current and expected population growth in Madagascar, high level of poverty, degradation of biodiversity, increased pressures on marine resources and limited possibilities for developing further from subsistence farming and fishing.

Madagascar is one of the world's poorest countries with 75% of the population living on less than US$ 1.90 per day.[6] This project now provides employment with contracts to over 600 farmers, of which over 50% are women, as well as 30 private partner employees. Focus group discussions revealed that employment and increased sources of income were real and relevant priorities for these communities. For most farmers who participated in the evaluation, SC or SW farming typically provides enough cash liquidity to ensure household food security and to provide school fees for children, income having been insufficient previously.[7] For the more successful farmers, their income may be sufficient to make improvements to their houses and buy clothes; some have even made enough to buy livestock or start their own businesses such as a grocery store.[8] On account of the multiplier effect (incomes being re-spent in the community providing income to others), the benefits of increased income to farmers are spread widely in the community, relieving poverty and increasing food security.[9]

In the past three decades Madagascar's population has more than doubled increasing from approximately 11 million in 1988 to more than 26 million in 2018.[10] The pressure on marine resources is increasing. If the project is to diversify incomes, it is important that fishing as a source of income is maintained at a level which is sustainable, while other diversified sources of income are developed. Therefore, the relevance of the project to ensuring sustainable fishing and marine resources was also evaluated.

The Vezo are a nomadic people,[11] highly mobile, and willing to move to more productive fishing grounds.[12] Although aquaculture is a sea-based activity there is less interest in adopting it exclusively and ceasing fishing in communities who want to continue their traditional way of life and maintain fishing as their alternative means of income. This particularly applies in locations where fishing is still productive. This is one reason cited in the 2019 report why SW farming was slow to take off in the Belo-sur-Mer area.[13] Aquaculture requires a more settled lifestyle and more careful long-term planning than fishing. Fishing provides an immediate return and can be done when income is required.

[5] Terms of Reference (ToR) for the evaluation of the Project. (2019). *Norges Vel*.
[6] Overview. (2019). *World Bank*. Retrieved October 2, 2019, from https://www.worldbank.org/en/country/madagascar/overview
[7] Focus Group with Targeted Beneficiaries. (2019). Velondriake.
[8] Focus Group with Targeted Beneficiaries. (2019). Velondriake.
[9] Focus Group with Targeted Beneficiaries. (2019). Belo Sur Mer.
[10] Population, total - Madagascar | Data. (2019). *Data.worldbank.org*.
[11] There is a wide degree of variation within the Vezo community; some people are completely nomadic, others itinerant, and others much more settled/sedentary. There is also variation between sites and the degree of movements. For example, it appears that Tampolove has a predominantly settled population but Antanimanimbo (Belo Sur Mer) is a temporary settlement.
[12] Cripps, & Gardner. (2016). Human migration and marine protected areas: Insights from Vezo fishers in Madagascar.
[13] Semi-Annual Narrative Report. (2019). *Blue Ventures*.

In the Velondriake LMMA, where fishing is less productive, aquaculture is viewed as a means of gaining a more steady additional income.[14] [15] Since spring tides are both the busiest time for SC and SW farmers, and also when most effort is expended gleaning the shallow subtidal areas, aquaculture could reduce time available for fishing, and hence fishing incomes. This would, however, have the benefit of helping fish stocks recover and help ensure fishing is maintained as a sustainable livelihood. The addition of SC and SW farming also helps reduce the opportunity cost of not fishing during closures; this also decreases the risk of people breaking these collective management measures and consequently may contribute to the recovery of fisheries.[16]

Figure 3: Nomadic Vezo Temporary Settlement

Figure 4: Nomadic Vezo Temporary Settlement

However, it is important to note that the target group, "who see no alternative to overfishing as their means of subsistence" are not the only people adopting aquaculture. While the majority of SC and SW farmers are also fishermen/ women, aquaculture is attracting an increasingly broad selection of people. Through informal conversations with community members we learnt of a nurse and a teacher that had taken up SW farming.[17] Similarly, there are inland agricultural farmers moving to the coast specifically to take up aquaculture, having been encouraged by family members involved in the project.[18] Thus the project is not relevant only to the targeted fishing communities, as other people are moving in to take up SC and SW farming opportunities. Additionally in such cases, the project does not reduce fishing pressure. In fact, it may even increase fishing pressure as newcomers may also take up fishing as an additional income. Looking at the broader trend of migration to coastal areas throughout Madagascar, this project does help to provide an alternative livelihood to migrants who would otherwise take up fishing.

The question remains was aquaculture the most promising route to "increase and diversify sustainable livelihoods." It appears that no study was conducted at the outset of the project to consider alternative sources of income. The region's severe aridity meant there were no viable alternatives to fishing through agriculture.[19] Aquaculture was deemed particularly appropriate because it is another sea-based activity, there is a long history of collecting SCs for production of trepang, and experimental results at several sites and market opportunities made it the clear front runner.[20] [21] [22]

[14] Focus Group with Targeted Beneficiaries. (2019). Velondriake.
[15] Focus Group with Targeted Beneficiaries. (2019). Velondriake.
[16] Focus Groups with Targeted Beneficiaries. (2019). Belo Sur Mer.
[17] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[18] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[19] Project Report Document: An Aquaculture Industry for Madagascar. (2016).
[20] MacKnight, C. The voyage to Marege: Macassan trepangers in Northern Australia. (1976).
[21] Preston, G. Beche-de-mer. In Nearshore marine resources of the South Pacific. (1993).
[22] Semi-Structured Interviews with Blue Ventures. (2019).

However there might be other alternatives to diversifying sustainable livelihoods, and these could warrant future investigation. BV staff acknowledge that other alternatives (e.g. ecotourism) might work, but say they simply do not have the resources to investigate or promote these alternatives at the current time.[23] A study of the potential of the Velondriake LMMA area and an identification of economic opportunities could have helped the project in its strategic orientation in order to diversify the alternatives and alleviate the risks. In Belo Sur Mer, BV have recently appointed an alternative livelihood coordinator. While it may be a naturally more dynamic and productive region, with more scope for a variety of alternative sources of income, this is an important step forward.

The relevance of aquaculture is supported by the fact that in Velondriake in particular, "communities are aware of the success of SC and SW farming, and a growing number of villages are demanding the opening of new farms."[24] Such is the demand that neither BV nor OF have the capacity to satisfy these communities requests to be included in the aquaculture project.[25] While BV and OF might like to take advantage of this momentum, they are aware that testing of the farming model in new locations must be done properly, and best practices adhered to before scaling-up, otherwise this could lead to failures which would erode the confidence in aquaculture that has been steadily built up.

The self-selection method of farmers, which is based on family groups, appears to suit the Vezo culture.[26] BV's proximity and knowledge of the communities and farmers enables them to ensure involvement is fair.[27] The choice of locations for aquaculture is largely dependent upon suitable habitat. Part of BV's strategy to avoid social conflict is to ensure that there is a geographical spread of SC and SW farms. For example, with SC farms already in the North and South, the next SC farm has deliberately been chosen to be located in the one region in Velondriake, the Centre, which does not have a SC farm. With growing demand for aquaculture it is important that expectations of communities are managed and care is taken to ensure that promises are not made that cannot be fulfilled.

Finally, the project is relevant to Madagascar's national, regional and sectoral development plans. According to Initiative Emergence Madagascar (IEM), the Agriculture Sector Program Livestock and Fishing (PSAEP) and the South West Region Land Use Plan (SRAT), aquaculture was highlighted as a sector that could help to mitigate poverty, food security, biodiversity degradation and pressures on marine resources.[28] [29] [30] Madagascar's SW production accounted for approximately 0.25% of world production in 2016 and there is a national ambition to increase this to 25% by 2026.[31]

4.2 Effectiveness

The following is a summary of the achievements of the project between 2016-2019 with comparison made to the final agreed results frame selected by NV, which is included in Appendix 1. A comment on the usefulness of the results frame is included in Appendix 2.

The Effectiveness of the Project on its Impact

[23] Semi-Structured Interviews with Blue Ventures. (2019).
[24] Semi-Annual Narrative Report. (2019). *Blue Ventures*.
[25] Semi-Annual Narrative Report. (2019). *Blue Ventures*.
[26] Semi-Structured Interviews with Blue Ventures. (2019).
[27] Project Document: An Aquaculture Industry for Madagascar. (2016). *Blue Ventures and Norges Vel*.
[28] Schéma Régional d'Aménagement du Territoire de la Région Atsimo Andrefana. (2018).
[29] Initiative Emergence Madagascar, *Rattraper le Retard de Developpement de Madagascar*.
[30] Plan National de Developpement 2015 - 2019. (2019).
[31] Pôles Intégrés de Croissance Inventaire. (2016).

Referring to Table 1 in Appendix 3, targets for impact indicators related to income have not been met. According to the private partners, the consultation on the volume of demand in the market was not sufficiently thorough and the target improvement in income was too ambitious (355% of baseline income for SC and 1250% of baseline income for SW), which is too high an increase in income on a 4-year project.[32] It appears that the targets were set with only a limited understanding of some of the technical difficulties (quality of the sediment, physiological qualities of the sea, mastery of the techniques) and the impact of climatic hazards and diseases that can occur during implementation.

SW profitability has remained in a limited range, well below its targets ($US16.68/month in 2019 compared with a target of $45), while one of BV's specific aims for this phase of the project (2016-19) was to increase profitability for farmers.[33] The first half of 2019 level of achievement of mean monthly incomes compared to targets is at 81% for SC and 37% for SW.

Compared to 2015 baseline figures, there has been a significant improvement in incomes, to 290% of baseline income for SC and 463% of baseline income for SW. The price paid to farmers for SC has increased from 1,537 Ar in 2014 (figures for 2015 are not available), to 4000 Ar in June 2019, and the price paid to farmers for SW has increased from 500 Ar/kg in January 2016 to 700 Ar/kg in June 2019.[34] For SC farming, the income per farmer has also increased because the number of farmers per farm is now 2 instead of the initial 3-4 farmers in 2015. Part of the increase in incomes can be attributed to inflation, the Malagasy Ariary having depreciated against the US dollar from 3,208 Ar/$ on 1st January 2016 to 3,665 Ar/$ on 30 June 2019.[35] Since the aquaculture products are priced in US dollars, incomes in Ariary would be expected to increase but on account of inflation these increases may not give any greater purchasing power.

The percentage of female farmers has been maintained at greater than 50% except for the percentage of SW farmers in 2019 which has dropped to 46%. The impact on gender is discussed further in section 4.4.

Outcome 1: Improved Business Operations: Sea Cucumber Production

Referring to Table 2 in Appendix 3, the total number of sea cucumbers sold per year is well below the project target, the target in 2019 being to achieve production of 265% of the baseline figure. However, the shortfall is unsurprising since full scale production was delayed and production targets have not been subsequently adjusted. The targets were based on the expected number of farms to be developed, a consequent increase in the number of farmers and expected market demand, but these figures were not realized. 81 (50% of target) pens were built for 162 farmers (50% of target), while 60 are under construction for 2020 only.

In 2016 it was envisaged that the first harvest would take place in the 2017 4thquarter, but in fact it did not take place until November 2018, a year later for reasons given in the following paragraphs. Productivity as measured by the rate of return of adults for juveniles is at 90% of its target. It is too soon to draw many conclusions as full scale production only started in November 2018. This year harvests took place in Tampolove from February to June, the January harvest being cancelled due to a tropical storm. Harvests in Ambolimoke are due to start in September 2019 and tests are being undertaken for new farms at Andevitsy and possibly Antsatsamoroy.[36]

[32] Semi-Structured Interviews with Private Partners. (2019).
[33] Project Document: An Aquaculture Industry for Madagascar. (2016). *Blue Ventures and Norges Vel*.
[34] We understand that a new model might be introduced in Q4 2019 with a further increase in SW prices if certain conditions are met but have no details of that proposed model.
[35] USD MGA | US Dollar Malagasy Ariary - Investing.com. (2019). *Investing.com*. Retrieved October 5, 2019, from <https://www.investing.com/currencies/usd-mga>
[36] Semi-Annual Narrative Report. (2019). *Blue Ventures*.

To address the low baseline return rate and low baseline profitability of the existing sea cucumber farms, the 2016 "Assessment of Blue Ventures Community Based Sea Cucumber Farming Model" recommended the replacement of all farm enclosures and the complete reworking of the farming model.[37] The following were the principal measures undertaken in accordance with the recommendations of this report:

- The deconstruction of all existing pens and security structures
- Experimental trials to determine the carrying capacity of sediment and a stocking strategy to suit
- The construction of all new pens to a standard surface area and new construction method with higher longevity and that could be used in areas of shallow sediment
- Contractual agreements with all parties to ensure needed work was undertaken, best practice aquaculture guidelines were followed, and to facilitate the replacement of non-performing farmers
- The development of a community management system through existing farming associations

All this involved 40 experimental enclosures, 2050 sea cucumbers and over 25,000 data points. Of particular importance was determining the carrying capacity of the sediment which determined the size of the farming enclosures. It was observed that previously the enclosures had been highly overstocked, limiting growth rates and increasing the virulence of an outbreak of BUS.

Theft for side-selling of mature sea cucumbers was considered possibly the largest threat to the viability of the farming model. Following the successful prosecution of thieves in late 2016 and meetings between the local prosecuting branch of DINA, the Velondriake association and the ZFA, it was decided to "drastically increase security infrastructure and protocols" before resuming full scale production, both to protect the stock but also to deter financially vulnerable community members from attempting theft.[38]

Delays were extended by "difficulties with the importation of material from international suppliers," delaying construction of pens and waiting for the results of experimental growth trials in 2016 and 2017.[39] There was also an extreme shortage of juveniles from the IOT hatchery in late 2017 when farmers' pens were ready for stocking, there being no other juvenile supplier in the country.[40]

This all led to stocking of the new pens not being started until January 2018 and there were further delays in 2018 because of SKUD[41] disease and shortage of juveniles, but the first harvest was achieved in November 2018.

Despite all this, the project has made good progress because it has been able to increase both production and productivity from baseline figures. The production of SCs is on course to exceed the 2015 baseline figure by the end of 2019 and productivity of SCs per farm should exceed its baseline figure by the end of 2019.

The main reason for this success is a much improved return rate. For the 8 months from November 2018 to June 2019 a return rate of 53.8% was achieved compared to a baseline figure of 15% due to the innovations introduced in the new SC model.

[37] Assessment of Blue Ventures Community based Sea Cucumber Farming Model. (2016). *Blue Ventures*.
[38] 2016 Annual Report to Norges Vel. (2017). *Blue Ventures*.
[39] 2017 Annual Report to Norges Vel. (2018). *Blue Ventures*.
[40] 2017 Annual Report to Norges Vel. (2018). *Blue Ventures.*
[41] SKUD = Skin Ulceration Disease

IOT hope to improve the return rate even more by a new price strategy which they are proposing to introduce along with providing juveniles freely from the start of 2020. The price they pay to the farmers for SCs will increase with an increasing return rate.[42]

Outcome 1: Improved Business Operations: Seaweed Production

Referring again to Table 2 (Appendix 3), the tonnage of seaweed production has slowly but steadily increased, but it has increased at a much slower rate than targeted, such that the target is now approximately three times actual production. The target for 2019 was set at 1750% of the baseline production. Despite the fact that the number of active seaweed farms has exceeded it targets (128% of target in 2018), average production is well below its target because the average productivity per seaweed farm has been much lower than targeted (36% of target in 2018) and it has not improved since 2017.

EFA outbreaks have been the main cause of the shortfalls in production, productivity and profitability. EFA management strategies limited the number of lines in the water or stopped production altogether at different sites. The threat of EFA remains severe. Ocean Farmer's main production site at Sarondrano had to cease production completely due to an uncontrollable EFA outbreak in 2017.[43]

In addition, BV's 2018 report stated that "the target production figures in the project result frame were extremely optimistic, based on Ocean Farmers' outdated projections. These have since been revised down by Ocean Farmers due to the emergence of EFA and its impact on production."[44] However these revisions were not included in the results frame. Instead, the original figures were kept and explanations on why the reported figures did not meet expectations were provided.

BV's 2017 report stated "whereas in previous years it has been a project priority to ensure that as many new farmers and seaweed farming sites were developed as possible, in light of the increasing frequency and severity of EFA outbreaks in 2017, focus has instead been on consolidation of existing sites and the cessation of farming with communities and farmers that were increasing the risk of the spread of EFA."[45]

OF did not renew the contracts of farmers in communities where the risk of EFA was considered too high and of farmers who were not abiding by safe production practices and thus endangering the production of other farmers.[46] New farmers were brought on at a slower pace than with previous years and were allocated production materials only once they had proven their capacity to manage their farms effectively, following best practice protocols.[47] [48]

In 2018, EFA monitoring and management groups composed of farmers were created in each village, their role being to raise awareness, put internal rules in place and to identify farmers not following correct procedures when EFA is detected, removing all infected lines. This measure had good results in mitigating EFA.[49]

Seaweed production at Belo-sur-Mer which is being established also did not meet targets. A BV/OF team in March 2019 identified the reasons as:

[42] Semi-Structured Interviews with Blue Ventures. (2019).
[43] 2017 Annual Report to Norges Vel. (2018). *Blue Ventures.*
[44] 2018 Annual Report to Norges Vel. (2019). *Blue Ventures*.
[45] 2017 Annual Report to Norges Vel. (2018). *Blue Ventures*.
[46] 2017 Annual Report to Norges Vel. (2018). *Blue Ventures*.
[47] 2017 Annual Report to Norges Vel. (2018). *Blue Ventures*.
[48] 2018 Annual Report to Norges Vel. (2019). *Blue Ventures*.
[49] 2018 Annual Report to Norges Vel. (2019). *Blue Ventures.*

- Lack of the correct personnel and technical/strategic management on the ground
- Lack of integration of socio-organisation aspects
- Logistical (particularly transport) problems
- Lack of appeal of aquaculture in a culture that is still heavily reliant on fishing and with still sufficient fish stocks for local fishing.

New personnel with more suitable skills are now in place and attempting to put things right.

Despite all these difficulties, the project has made good progress because it has been able to increase both production and productivity from baseline figures. The production of seaweed in 2019 is already nearly three times the baseline after only 6 months of 2019 and productivity per SW farm is already at 180% of baseline after only 6 months of 2019.

The main reason for the improvement in SW farming has been the much more effective control of EFA outbreaks.

Rapid Increase in Production versus Slower but Lower Risk Production Growth

Overall, it is evident that there is a balance to be struck between attempting to increase production quickly, increasing incomes and meeting farmers aspirations versus doing so in a safe and sustainable way. BV and OF have had to scale down their expectations in terms of seaweed production in order to train new recruits to deal with EFA and follow best practices. In their 2017 report against volume of dried seaweed produced BV stated that "the target for 2017 (and 2018, 2019) was set very high. OF have reduced their production targets now with a greater emphasis on ensuring the sustainability of the seaweed industry through cautious expansion rather than a focus on quantities."[50]

At Belo-sur-Mer the community may simply need more time to become accustomed to aquaculture rather than fishing. To try and push production forward too quickly gives a greater risk of failure. Similarly with sea cucumber farming, trialling and training and the development of community management systems has taken a long time, but it is expected that with the current improved model, the industry will be able to grow more sustainably and by avoiding failure, ultimately more profitably.

Outcome 2: Well-functioning producer steered organisations

In terms of capacity building of the organisational structures, looking at the outcome 2 indicators we find the following:

Coverage of Operating/Administrative Costs from Sales/Production

As targeted, the SC project achieved full coverage of operational costs this year, from February 2019, when production began to stabilize. The system in place consists of the Velondriake Association deducting operational costs, insurance and community contributions from revenue received from IOT. The Velondriake Association then transfers the remaining profit to the ZMC, which distributes it to the farmers according to their production.[51] The operational costs cover common expenses (juveniles, juvenile transport, security employees and supervisors). BV have reported that "sea cucumber farmers are familiar with the financial model of the farm where information on the payment system has been clearly explained during numerous meetings."[52] Farmers understand and agree that a percentage of their money will go towards covering operational costs, an insurance scheme spreading risks to the whole farming body, with

[50] 2017 Annual Report to Norges Vel. (2018). *Blue Ventures.*
[51] 2018 Annual Report to Norges Vel. (2019). *Blue Ventures*.
[52] 2018 Annual Report to Norges Vel. (2019). *Blue Ventures*.

a contribution being made into a fund for community projects.[53] It is noted, however, that although this financial mechanism was reported as having been designed in 2018, operational costs were deducted from February 2019 onwards and contributions to the community project fund started in August 2019.

Some months sales are not made because the size of the SCs is not sufficient. Also stocking may not take place depending on maintaining a good density in the enclosure. For these reasons, the cash managed by Velondriake is always sufficient to cover these operating costs by accumulated funds.

Professional Annual Assemblies (with agendas, plans/results reporting, analysis and minutes produced)

Professional annual assemblies are happening successfully and professionally as targeted. The focus now turns to building the capacity of ZFA, LFA and Velondriake to lead the organisation and facilitation of these meetings.[54]

Democratic and Professional Internal Sharing of Plans, Results/Reports and Minutes by Boards with Feedback Given

Many more regular meetings are taking place at all levels and the flow of information has improved markedly over the course of the project. [55] [56] The ZFA, LFA and Velondriake all hold meetings to discuss successes, challenges and proposed solutions. Posters on information boards inform farmers of production figures, assessment grades, attendance records, and the schedule for the provision of materials.

Minimum 50% Women in Steering Committees of Aquaculture Associations

This is currently reported as 25% but as there are currently only four such people in total this statistic will be subject to large swings and should be viewed over a longer term. A figure of less than 50% should therefore only be of concern if it persists for a long period.

Organisational and Business Skills and Training

All SC and SW farmers are receiving monthly training. Supervisors and technicians are also being trained and gradually take on more responsibilities. All SW farmers receive ongoing technical extension support and training from OF through the ALDU project funded by KFW (Sustainable Algoculture). SC technicians have received invaluable hands-on practical and technical training by BV. However, they lack confidence in answering farmer's questions with scientific reasoning.

There is still progress to be made on the full appropriation and use of management tools, but the lease agreement is generally respected by farmers.[57] All SC farmers in Tampolove have signed and are respecting the lease agreement with IOT. The SC farmers in Ambolimoke are expected to sign the lease agreement shortly. All SW farmers have contracts with OF.

Comments and Recommendations

Establishing organisational structures and increasing these organisations' capacities are initiatives that are driven by BV under this project. The cost of BV undertaking this work is covered by the project budget. For this reason the community does not practise taking initiative themselves and have become dependent on BV. BV is already addressing this problem and BV and Velondriake have developed a plan to strengthen the capacity of the ZFA and LFA in order that they might be more autonomous. BV need to continue to empower local organisations by giving them more responsibility, promoting their leadership in any discussions with partners and in decision making. BV should also encourage them to be more autonomous financially, through the Savings and Internal Lending Communities (SILC) or a savings system, give them space to take more initiatives, and continue to handover management responsibilities to Velondriake.

[53] 2018 Annual Report to Norges Vel. (2019). *Blue Ventures*.
[54] 2019 Semi-Annual Narrative Report. (2019). *Blue Ventures*.
[55] 2018 Annual Report to Norges Vel. (2019). *Blue Ventures*.
[56] 2019 Semi-Annual Narrative Report. (2019). *Blue Ventures*.
[57] Semi-Structured Interviews with Blue Ventures. (2019).

Outcome 3: Improved Market Integration of Small Aquaculture Farmers

With the support of BV, Velondriake and Norges Vel, the value chain is more structured, better organized and the targets for the indicators are almost achieved. Reviewing these we find the following:

SC Operational Costs Covered by Farmers

As targeted, operational costs have been covered 100% by SC farmers in Tampolove since the first harvest in 2018.

% SC Capital Costs for 2nd Modules Covered by IOT

This indicator could be deleted as BV's 2018 report states "it is no longer planned that IOT will take on capital costs during the ongoing expansion of sea cucumber farming in Velondriake. These will continue to be funded with donor funding, with increasing contributions from village ZMCs as savings can be made from production. This will enable greater negotiation capacity for farmers through their ZMC, and will result in a more equitable share of power within the industry for producers, as opposed to a model where farming infrastructure was "owned" by the private partner."[58]

% SW Operational and Capital Costs Covered by OF

This objective has been 100% achieved in Velondriake with OF providing all production material. By contrast, in Belo sur Mer, BV covers all capital operating costs.[59] OF will consider operating in Belo Sur Mer, covering all operational and capital costs, when a production of at least 100 tonnes per year has been reached, allowing the profitability of such an investment in an area far from Tulear. Nevertheless, OF already takes care of the transport and has sent technicians on site intermittently throughout the 2016 – 2019 project phase; an OF technician has also been sent for a three month period in the second half of 2019.

BV should consider developing a framework agreement with OF for Belo sur Mer, because the significant investment carried out this year (for about 60 farmers who are expected to produce approximately 37 tonnes of SW in 2019) should have a written guarantee of OF's continued support once the 100 tonne per year target has been reached in addition to their verbal commitment to consider operating in Belo Sur Mer.

Associations have a Larger Role in Relation to the Private Partners

At the time of the evaluation field mission, September 2019, OF were still in discussions with IOT regarding taking over the technical side of SC farming, in addition to SW farming, as they already have a large field presence (OF has 17 technicians distributed in the Velondriake LMMA and Belo sur Mer) due to the number of SW farms they oversee. This leaves IOT to concentrate on juvenile production and the export of adult SCs. Managers of OF make a quarterly visit to Velondriake LMMA to discuss successes and challenges with communities and farmers say these are positive and helpful discussions. However, amongst all these periodic meetings and professional relationships it appears that BV plays an intermediary role in carefully cultivating and managing relationships between OF, IOT, Velondriake and the SC and SW farmers. The concern is that Velondriake cannot provide this function given the skills and abilities that would be required of the council members, and it is not gaining much experience, other than by observing BV, in order to be able to do so in the future.

BV therefore needs to continue to strengthen Velondriake's ability to negotiate, manage partner relationships, manage funds and manage farmers. This could be realised either by strengthening the team through the recruitment of new skills (executive secretary, accounting assistant, etc.) or by building the

[58] 2018 Annual Report to Norges Vel. (2019). *Blue Ventures*.
[59] Project Document: An Aquaculture Industry for Madagascar. (2016). *Blue Ventures and Norges Vel*.

capacity of volunteer members. From its experience, the BV team finds the recruitment of skilled staff more effective.

4.3 Efficiency

Economic Viability of the Sea Cucumber Model

The choice of SC aquaculture was initially based on market opportunities and experimental results at several Velondriake sites. Projections and targets made were quite ambitious given that this was a new experience with a high degree of technical expertise and socio-organising needed, as well as the possibility of natural hazards such as cyclones and the possibility of unforeseen costs. An initial economic viability assessment was carried out by BV in November 2017, but BV are now in a better position to be able to make such an assessment since they have more firm data on costs and farmers' incomes.

The main challenge with the SC farming model is the high level of operational costs. The operational costs included in the lease agreement, signed by SC farmers in Tampolove, are the sum of the salaries of the supervisors and guards, the cost of the supply of juveniles and their transportation.[60] In addition a contribution is made to a 'community pot' which funds community projects. Some of this money, for example, has been allocated to buying ovens so that the community can do some of the processing of SCs.[61] These costs are deducted before revenue is then distributed according to the number of SCs supplied.

The current annual operational costs of the 39 SC pens in Tampolove are given in Table 5 (Appendix 3). These are $1375 per month regardless of output. These figures then feed into the Cost and Profit calculation in Table 6 (Appendix 3). Operational costs are currently significant, sitting at approximately 37% of the revenue from sales. Construction and material costs (table 6, item 1) are fully subsidized by BV. Without this subsidy, if construction and material costs were added, construction costs being amortized over a ten year period, total costs would be as much as 52% of revenue. From table 6 it can be seen that under the current pricing structure, including subsidies, monthly profit is $55.5 and the profit per unit of SC (of minimum weight 400g) is $0.689. We think the difference between our calculated profit of $55.5 per month and BV's figure of $65.19 is probably due to BV calculating the harvest per month based on the 7 months there were harvests between November 2018 and June 2019. We have based it on the full eight months as the number of SCs were greater in the month or two following the missed harvest, so making up for the missed month. In any case, extreme weather events and missed harvests are bound to happen from time to time.

As long as SC operational costs are subsidized until revenues can fully cover operational costs and give farmers some income, and as long as return rates and production are reasonably stable or increasing, the risk of starting SC farming is low. Farms with low production will receive little income and they will have the effect of reducing other farmers' incomes when they contribute less than an equal share of operational costs. But the aim of the ZMC, by good training and quality assurance, is to try and assure reasonable levels of production and return rates in all farms. There is also an incentive for farmers to help their neighbours, as the higher the overall production, operational costs become a smaller percentage of total revenue and the profit per unit will be higher, so everyone is better off.

IOT are now proposing from the start of 2020 to provide juveniles free of charge to the farmers, but with a new pricing structure based on the return rate - the higher the return rate, the higher the price. This should reduce wastage of juveniles and encourage better farming practices. Since the price will vary from pen to pen, it could encourage healthy competition and mutual support, but it could also lead to envy and

[60] Lease Agreement between Velondriake and Blue Ventures. (No date) *Blue Ventures and Velondriake*.
[61] Semi-structured interviews with Blue Ventures. (2019).

stealing. Prices will range from 1000 Ar if the return rate is below 10%, to 3500 Ar if the return rate is above 60%. Figures are given on the right hand side of Table 6 showing what the effect of the proposed pricing model would be at the current return rate of 53.7% (achieved up to the end of June 2019). At 53.7% return rate, the price per unit would be 3000 Ar under the new pricing model, compared to 4000 Ar now, but juveniles would be provided free. The net effect is that there is virtually no change in profit with the monthly profit reducing marginally to $55.2 and the profit per unit to 2,467 Ar ($0.685).

However, farmers who achieve a better return rate than the current 53.7% would be somewhat better rewarded with a price per unit up to 3,500 Ar, while farmers who only achieve a lower return rate will be much worse off with prices per unit down to as little as 1,000 Ar.

One reason for not linking payments to return rate is that success or failure sometimes has little to do with the effort put in by the farmers. The 2019 semi-annual report says that for SC aquaculture while the average monthly net income per farm was $65.19 for January to June, the income from the most productive and least productive farms were $97.80 and $18.08 respectively. But it is thought that this has more to do with sediment type, and other environmental variables, than farmers' efforts.[62] The effect of these variables is currently being researched by the University of Edinburgh. To avoid the risk of corruption or favouritism, and ensure transparency, in the allocation of the best pens, farmers are randomly allocated their pens in the presence of all SC farmers and the ZMC.

Our calculated mean net monthly income of $55.5 per month per farm is a good income in the context of incomes in these communities. With only 2 farmers per farm and assuming each farmer works 25 hours per month, they each earn 55.5/(2*25) = $1.11 per hour or $8.88 per 8 hour day, considerably more than the approximately $1 per day normally paid for labour.[63]

Maintaining the 53.7% return rate, but testing the sensitivity of the calculation (current pricing model) to other variables, if annual production on a Tampolove farm increased by 25%, monthly profit would increase to $72 and the profit per unit would rise to $0.718. If instead the BV subsidy of construction and material costs (Appendix 3, table 6, item 1) of $US 155 per farm per year were removed, the monthly profit would reduce to $43 and the price per unit would fall to $0.529.

It is suggested that it would be very helpful if BV maintained a spreadsheet similar to that developed for SC farming in November 2017, but for both SC and SW, including up to date costs and revenues for typical farmers, in order to calculate actual net farmers' incomes.[64] It will then be able to be seen more clearly what farmers are actually receiving and better understand their perspective. This spreadsheet could then easily be used to test the effect of many variables including different pricing models, different sizes and outputs of farms, locations with particular costs, different prices received for products, return rates, various incentives or removal of subsidies.

For sites that are further away, like Ambolimoke, and the potential farm in the centre of the LMMA, it would be logistically easier for OF, as well as potentially more profitable for farmers, if some of the processing was done by local people. Discussions between OF and BV are ongoing about this for next year.

Economic Viability of the Seaweed Model

The main challenge with the SW model is the high intermediate costs of labour and transport. If SW farmers have less than 100 lines they can generally manage the labour themselves, but over 100 lines they need to employ labour to help with drying, seeding, harvesting and for transport from villages to the

[62] Semi-structured interviews with Blue Ventures. (2019).
[63] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[64] Tampolove SC Farming Financial Breakdown. (2017). *Blue Ventures.*

collection points. The need for more supplementary farmers in each group to help manage EFA disease has also had the effect of lowering incomes and production per farmer.

SW farmers in Velondriake can reach the collection points in less than one day either by pirogue or by charrette, and in Belo sur Mer collection is made by BV. But most farmers do not have their own transport and so the cost of hiring transport has a significant impact on their profitability.[65]

Performing a similar cost and profit calculation for SW as we have just done for SC, including subsidies provided by OF (see Table 7, Appendix 3), for a typical farm of 150 lines, if farmers undertake all their own labour, we calculate a monthly profit of $15.6 (slightly less than the $16.68 calculated by BV mostly because we have allowed $10/year for transport costs). We estimate the total labour requirement to be 143 days per year, or 12 days per month, so SW farmers are earning 15.6/12 = $1.3/day or 4,680 Ar/day by their own labour, slightly above a normal labourer's daily wage of 3000-4000 Ar. If farmers employ all the labour they require, their profit reduces to $4.1/month.

BV's 2018 report stated OF had introduced price based incentives, as well as prizes for high production, in the hope of increasing production. OF set SW farmers production targets (based on production from the previous quarter) which if they reach they will receive an extra 100 Ariary per kg of SW.[66] In addition, each farmer from the 3 most productive villages (based on the aggregated score from performance indicators) will receive rice. OF also provide 15 Ariary per kg of SW produced to LMMAs within which they work. These price incentives are believed to have had a significant effect on SW production, which increased by approximately 26% from 2017 to 2018.

Figure 5: Seaweed being transported by Pirogue

Figure 6: Seaweed being transported by cart

Partner Support, Contribution and Satisfaction

This project has not been implemented unilaterally, but various partners and sources of funds have had a part in achieving it.

OF is widely supported by Cargill in capacity building of farmers and in monitoring the ecological impacts of the project.[67] Cargill is in turn supported by Proforest, a "non-profit group that supports companies, governments and other organisations to implement their commitments to the responsible production and

[65] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[66] Semi-structured interviews with Private Partners. (2019).
[67] Cargill's Red Seaweed Promise designed to improve producers' prosperity and conserve the environment | Cargill. (2019). *Cargill.com*. Retrieved September 29, 2019, from <https://www.cargill.com/2019/cargills-red-seaweed-promise-designed-to-improve-producers

sourcing of agricultural commodities and forest products."[68] The SW project is also currently supported by the German Development Bank (KFW) in the Sustainable Seaweed Project to certify technicians.[69]

At the level of the government, the Ministry of Agriculture, Livestock and Fisheries (MAEP) temporarily grants materials to SW farmers' associations but that support is unpredictable and depends on the availability of funds from the ministry. Otherwise, OF invests in the grant of materials for the farmers and IOT has engaged to give free juveniles to the farmers from the start of 2020.

Looking at the collaboration of BV with the main project stakeholders we observed the following:

(i) Farmers[70] [71] [72]

The farmers, which includes a wide cross-section of people from the community, are happy with the collaboration with BV. Farmers stated that they did not feel they would have been able to develop a community-based aquaculture model to such a scale without the help of BV. Key barriers identified were low levels of literacy and little knowledge of aquaculture.[73] They see having sales contracts as essential and are aware that having the ability to comply with the terms of the lease agreement already demands a high level of professionalism. Awareness raising, mobilization, supervision and material support are very important for them, particularly at the start of production and in the facilitation of the relationships with private partners.

Farmers are also satisfied with the quality of the materials purchased which are mostly imported from the UK. Supplies sometimes experience delays due to the procurement system and import delays. Materials are still in short supply but in general farmers are very happy to have effective and more reliable farming systems, equipment and juveniles from the partner companies.

In summary, the farmers consider that the investment made by BV is very effective and indispensable to the start-up of aquaculture in Southwest Madagascar. Besides Blue Ventures, the World Bank supported the PIC Tulear programme by subsidising the purchase of juveniles and funding elements of the project through the private partners.[74]

(ii) Private partners[75]

The opinions of the private partners are much more mixed. On the positive side they credit BV with providing the financial and socio-organising spark to get projects going, and for working holistically. Without BV some aquaculture projects would not have happened and with BV they can reach sustainability quicker. SC farming in particular would not have happened without BV's subsidies. Other comments were that BV's leadership mobilises and motivates the involvement of all stakeholders, provides good expertise in socio-organization and takes a good integrated approach towards the development of communities.

The market structure is that IOT have a monopoly on the sale of juveniles and a monopsony (they are the only purchaser) on the purchase of SC adults. The SC contract stipulates that IOT will sell juveniles to the farmers through the ZMC under the condition that farmers are in adherence to the lease agreement, whilst farmers are contractually bound to sell outgrown animals only to IOT. OF has a monopsony (is the only registered buyer) of seaweed in the area. This potentially enables the private partners to keep the prices they offer for the farmers' products very low and close to the cost of production. It can also give the private

[68] Proforest - About us. (2019). *Proforest.net*. Retrieved October 5, 2019, from <https://www.proforest.net/en/about-us>
[69] Semi-Structured Interviews with Private Partners. (2019).
[70] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[71] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[72] Focus Groups with Targeted Beneficiaries. (2019). Belo Sur Mer.
[73] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[74] Semi-Structured Interviews with Blue Ventures. (2019).
[75] Semi-Structured Interviews with Private Partners. (2019).

partners a strong negotiating position in forming agreements. Without the threat of competition they could be tempted to offer less than their best level of service.

An example of this may have been SC stocking which has not been at its most efficient, with BV's 2019 half yearly report stating there were "a few cancellations: one due to bad weather, one to boat failure and one to delays in juvenile production at the IOT factory" to Tampolove and "a few deliveries were cancelled" to Ambolimoke.[76] BV's report continues "we are in discussions with IOT with the aim of securing a steady supply of juveniles and potentially compensation for missed deliveries."[77] Compensation for missed deliveries might encourage greater reliability and efficiency by IOT, but the fact that compensation is not already in place highlights the concern that the private partners appear to have considerably more negotiating power than the farmers and associations and that agreements between them are currently too heavily weighted in favour of the private partners.

If the private partners had competition, this would encourage them to offer the highest prices they could afford to farmers and the best service. However BV informed us that IOT and OF are the only companies legally registered to undertake such work in the area. This is in line with Madagascar's current policy for aquaculture to only have one buyer in any given area.

The important question is whether the private partners are abusing their position of strength and keeping farmers' profits unreasonably low while making excessive profits themselves?

From the private partners' perspective they teamed up with BV and have invested a lot of time and money in research and development and gained much technical knowledge and expertise. They feel their monopoly and monopsony situation is not a bad thing and they are using it responsibly and not making excessive or even any profit. One said they had debts but would break-even this year. But along with debts they had gained massive experience. Now BV want to replicate the projects elsewhere, but the private partners naturally do not want others to benefit from their hard-won investment and experience. They want to be part of new projects but feel they need to go a little more slowly and consolidate their operations in one area before they take the risk of setting up elsewhere. They feel BV are being driven by funding and are focussed on increasing the number of farmers, whereas they need to make sound sustainable investment decisions and allow time for farming institutions and administration to develop. Their views are possibly supported by BV's experience in setting up SW farming in Belo-sur-Mer where production did not meet targets and new personnel and a new work plan were required. Furthermore, the private partners argue that if their financial returns do not look good enough, there is always a danger that the government won't renew their licence to operate.

The private partners say they are dedicated to the communities they work with and their vision is to develop responsible, sustainable and diversified livelihoods. They currently support various projects in the community and would like a more significant percentage of their turnover to go towards social benefits such as health insurance and environmental projects such as mangrove planting.

Private partners also feel BV have a very strong funding team, but in their communications, especially to donors they rarely mention the private partners. They feel BV has more focus on the need to win funding and meet funders' demands than on working with partners to ensure the long-term sustainability of the value chain. The long-term vision of private partners is clear because as long as aquaculture continues in the region, the private sector will be needed to run it.

The private partners strongly advocate contracts for all farmers to protect both parties, to make sure farmers adhere to the Velondriake LMMA's mission and to guard against bad practices and even human

[76] 2019 Semi-Annual Narrative Report. (2019). *Blue Ventures*.
[77] 2019 Semi-Annual Narrative Report. (2019). *Blue Ventures*.

rights abuses such as child labour or discrimination. They say there can be too many negative effects without contracts. Farmers need constraints, they cannot be independent. They feel they are always advocating higher standards. Because of the lack of continuity of those responsible in government, they often find themselves filling the place of government in advocating higher standards. This also guards against bad practices of potential competitors - when one SW competitor came in, bad practice caused disease and everyone's stock was ruined.

Private partners enjoy very good working relationships with BV staff in the field, despite the high turnover of BV staff and the need to win the confidence of new BV staff. A key difficulty for them, however, is that they feel there is a disconnect between BV's field staff and BV's London office. They have often found that decisions taken by BV London office do not reflect the conversations that they have had with BV's field staff. This can lead to inefficiencies and a lack of trust. They are aware that there is more continuity of staff in BV's London office, and that is where the highest-level decision makers are based, but they feel that communication from/with BV London is insufficient and that they would like more. In summary, private partners feel that there is a lack of trust and suspicion towards them from civil society organisations involved in aquaculture. They would like more inclusive management of projects, solving problems through discussion and collective leadership.

In regard to SW, private partners believe they have established a good integrated value chain with Cargill who as their final buyer purchases all the product they can produce. Cargill is actively involved in the whole value chain, from promoting local sustainability of farmers to keeping track of international market demand and carrying out research and development on alternative use of aquaculture products. The private partners want to avoid fragmented value chains with lots of traders and intermediaries who add little or no value.

What recommendations can flow from all this? We think that greater and voiced appreciation of the benefits of working with the private partners, the investment and risk they have sustained, and their vision for responsible sustainable livelihoods would help sustain a healthy relationship. BV London needs to be in more frequent communication with private partner senior managers.

It is recommended that BV should have a master agreement with OF and IOT in order to have a long-term vision of cooperation in terms of the scaling of production, the distribution of responsibilities, monitoring systems and regular exchanges on the implementation and strategic approach of the project. Agreements could oblige the private partners to maintain high standards and that compensate the farmers when standards are not maintained. A legal review of the agreements would also provide a view on whether the agreements are weighted in favour of one party or another. By open accounting, the private partners should demonstrate to their partners that profits are being shared equitably. BV should also work to avoid dependence of themselves and farmers on particular private partner companies where this is possible and does not damage existing working relationships.

(iii) Public partners and NGOs[78] [79] [80]

Public partners judge BV's model as the best community-based aquaculture model in Madagascar because BV have a "very good socio-organization strategy and very good technical support."

They also identified the high level of involvement of private partners as another strong aspect of the model and the fact that the project has successfully "created jobs and is increasing and diversifying fisher's incomes." BV's emphasis on a science based-approach, and relationships with academic institutions such as IHSM and Tulear University, gives them a "very advanced community-based aquaculture model in

[78] Semi-Structured Interviews with Civil Society. (2019).
[79] Semi-Structured Interviews with Government. (2019).
[80] Semi-Structured Interviews with Public Partners. (2019).

comparison to other NGOs." They have "real expertise in aquaculture." Finally, they have shown respect for laws and regulations and commitment in the way that they persist in a sometimes difficult environment.

The national and regional government has little knowledge of, or involvement in, this project. The periodic meetings between the key stakeholders working for sustainable aquaculture (OF, IOT, WWF, WCS, IHSM, Velondriake, ZMC, CGA), provide an opportunity for BV to develop a closer partnership with the government, and to obtain government support for the aquaculture industry. BV can promote a government vision for aquaculture development by offering its project as a model to be replicated and adapted elsewhere. BV can continue to win government confidence and backing by respecting regulations and laws, ensuring security and facilitating dialogue between stakeholders. Joint monitoring is also required with all stakeholders to appreciate different partners' perspectives and to obtain their feedback. BV should consider allowing for greater institutional support in their future proposals and budgets in order to ensure the sustainability of the project.

Budget Management (Quality of Management, Corruption)

After consulting the audit and financial reports, as well as from discussion with members of the team, it is concluded that the management of the project funds did not encounter any major problems for the duration of the project. The team has planned budgets in line with the annual plan of activities and these budgets have been validated by Norges Vel. However, due to delays in implementation due to unforeseen events from the first year (delays in importing materials, delays in experimental SC model test results, juveniles being unavailable, SW EFA disease, training activities being updated etc.), the initial projected costs were adjusted in the budgets for the following years.

Budgets and financial reports could be reconciled and there appears to have been compliance with procedures in terms of procurement, compliance with policies on corruption and other regulations according to the results of audits.

Execution of the Budget (Level of Burn Rate and Expenditure Distribution %)

After a synthesis of the annual financial reports of the project, we observed the following to the end of June 2019.

Referring to Table 8 (Appendix 3), the project had reached a disbursement of 87% to the end of June 2019. With 6 months spending still to be recorded, this burn rate is satisfactory. There remains a disbursement of 13% to be made by the project, particularly on materials for SW farming in Belo sur Mer.

Referring to Table 9 (Appendix 3), expected expenditure distributions have been close to budgeted distributions. The project spent an average of 18% on project management and administration and 19% on capacity building, which is reasonable for a development project. Despite this, the community and the Velondriake LMMA Association do not feel fully empowered and would like more capacity building.[81] [82]

46% of the project budget was spent on SC farming with 162 farmers, and 18% was spent on SW farming with 424 farmers. Assuming the allocation of funds remains approximately the same until the end of the year, the efficiency of the SC investment is low because the project has invested 1279 pounds sterling per SC farmer but the only 191 pounds sterling per SW farmer. These figures would tend to even out slightly over a longer time period due to the higher proportion of up front construction costs for SC farming, for which investment has been made in long lasting (10 year) materials for the pens.

[81] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[82] Semi-Structured Interview with the Velondriake Association. (2019).

In summary, the project is efficient in terms of budget allocations but less in terms of investment allocation. Nevertheless, SC farming already generates higher incomes and is expected to do so in the long term.

The project did not consider in its formulation its efficiency in terms of the ratio of investment to the number of beneficiaries or to the revenue generated. It is recommended that future stages of this project or further projects should do so. The return on investment is important because if the value created is high but it is concentrated on a small number of beneficiaries, the impact of the project remains low.

Human Resources (Organizational Project Management System)

The human resources assigned to this project are generally sufficient to ensure the roles entrusted to it. The project has 12 key staff plus support staff (administration, monitoring-evaluation etc). The project is closely supported by BV's Association Support Team (AST) who operate throughout Madagascar with the aim of improving the structure and governance skills of local associations.

The SW farming model is supported by OF technicians (17 technicians throughout Velondriake and Belo sur Mer). According to the agreement with the partners, each SW technician is supposed to take care of at most 25 farmers to be effective.[83] IOT has only been sending technicians to help with the SC harvests. At the beginning of 2019 IOT and OF informed BV that SC farming extension support would be transferred from IOT to OF.[84] At the time of the evaluation discussions were ongoing and the transfer was yet to be implemented.

BV's aquaculture team works closely with the leaders of community and farmers' associations which facilitate the mobilization and understanding of farmers on the sites. However, BV's aquaculture team is very often undergoing staff changes that destabilize the implementation of activities. We recommend that BV review their staffing policies to see if there is any way they can reduce the rapid turnover of staff.

Also, after discussion with the aquaculture team, there are several hierarchies and responsibilities in the organization so that the tasks sometimes overlap, for example between the Aquaculture Lead, Site Manager, Aquaculture Coordinator and Private Partnership Manager. An internal evaluation of the structure of the BV team would be useful.

Finally, the field support teams from the community are dynamic and full of initiatives, but the BV team must continue to evaluate and strengthen their skills and capacity for autonomy to ensure the sustainability of their activities.[85]

Monitoring, Evaluation and Learning (MEL) System

While baseline data on project indicators was available, the evaluation team identified indicators outside the scope of the project which might have enabled a more thorough measurement of the impact of the project. These are discussed in the following section on 'Impact.' There is a plan to carry out a social impact evaluation specific to the SC model in January 2020, following one year of harvests.

Although BV Madagascar has a monitoring and evaluation manager who interacts directly with the London office, the field team have only had a MEL manager based in the Southwest since September 2019. For this reason, the use of monitoring tools and tracking systems were limited by staff capacity. As detailed in the following section, 'Impact,' there are many positive changes to the lives of the targeted beneficiaries of which BV and Norges Vel can be proud. A monitoring system, with the staff to operate it, would enable such results to be celebrated. Future funding should therefore include budgets for baseline studies, interim

[83] Semi-Structured Interviews with Private Partners. (2019).
[84] 2019 Semi-Annual Report to Norges Vel. (2019). *Blue Ventures*.
[85] Project Document: An Aquaculture Industry for Madagascar. (2016). *Blue Ventures and Norges Vel*.

evaluations, and staff salaries for a local MEL manager who could provide more local support for the project.

4.4 Impact

Impact on the Economy

The project has had a considerable impact on job creation (see Table 10, Appendix 3) because in total it has generated at least 630 direct jobs in the community (farmers, technicians, security). In addition there are periodic requirements for additional labour, particularly in SW production and harvesting and for transport whether manually or by boat, pirogue or zebu cart.

Given the revenue brought in by SC and SW farming, the local economy is more dynamic. These employees earn approximately $190,000 per year from SC and SW farming. But the benefit to the society will be much larger on account of the multiplier effect - incomes being re-spent locally several times over. For an injection of income, the multiplier is typically between 1.5 and 5, so society benefits by 1.5 to 5 times the initial injection.[86] But in poor communities the marginal propensity to consume will be high, meaning the multiplier will tend to be higher than in wealthier communities. [87]

Figure 7: Seaweed Farming Related Activities

Figure 8: Woman Sorting through Dried Seaweed

Private Partners Development (Viability of the Model for the Exporter)

Ocean Farmers stated “we have exported 1000 tonnes of seaweed in 2017, 850 tonnes in 2018 and expect about 1100 tonnes for 2019. We pay taxes at commune and regional levels depending on volumes. We also pay a contribution to local associations (such as Velondriake)”.[88] OF has Cargill, an American Company as buyer. They will purchase all the volume of red seaweed that they are offered.

IOT collaborate with a wholesaler from Hong Kong with very specific requirements. They have 7 categories of SC whose price varies between US$30 and US$100, compared to the less than US$1 received by the farmers.[89] Nevertheless, IOT confirmed that the SC business was still not profitable and had encountered

[86] Aquaculture for Food Security, Poverty Alleviation and Nutrition. (2015). *Seventh Framework Programme.*
[87] The multiplier effect (2019). *Economics Online*.
[88] Semi-Structured Interviews with Private Partners. (2019).
[89] Semi-Structured Interviews with Private Partners. (2019).

financial and exporting difficulties which had caused them to reduce the number of their employees involved in SC production.

Socio-Economic Impact on Beneficiaries

In assessing the socio-economic impact on beneficiaries, it is helpful to gain an understanding of how the beneficiaries spend their time and money before the introduction of aquaculture and then to observe the effects of its introduction.

While an integrated social survey (ISS) was carried out in 2016,[90] BV have informed us that much broader socio-economic monitoring is being developed. For this reason, changes in the social and economic level of the communities are difficult to assess.

Nevertheless, in addition to the 2016 ISS, there is some qualitative information available including a study that was conducted of the 'Perceived Access and Benefits from Community-Based Aquaculture using Participatory Photography' in 2018 by the University of Edinburgh,[91] and with the findings of the focus groups and interviews that were part of this evaluation, there are various observations of interest.

Nevertheless, there is some qualitative information available, including a Social Research Survey of SC farmers in Tampolove in 2016[92] and a study of the 'Perceived Access and Benefits from Community-Based Aquaculture using Participatory Photography' in 2018 by the University of Edinburgh,[93] as well as the findings of the focus groups and interviews that were part of this evaluation, there are various observations of interest.

- First, the increased income gained from aquaculture is reported by targeted beneficiaries and the wider community to be relieving poverty, increasing food security and enabling more children the right to education.[94] As in the studies mentioned above, the evaluation team found that the most common items that farmers were spending additional income on were household items, clothes, education for their children, upgrading their house, food, drink and livestock.[95] [96] [97]

- Second, on account of the multiplier effect (incomes being re-spent in the community providing income to others), the benefits of increased income to farmers are spread widely in the community and this impact has been duly noted by beneficiaries.[98]

- Third, since some SW farmers build up debts from outsourcing labour and transport, upon being paid, the majority of their income is used to service these debts. Due to the amount of labour that is required within a short time and also because not all SW farmers have boats, SW farmers enter into a cycle of debt repayments. SC farmers do not have the risk of going into debt as all operational costs are deducted before they receive their income.

- Fourth, the period within which farmers spend their income tends to be very short.[99] As a culture, the Vezo are accustomed to living day by day, and tend to live by the premise that as long as they

[90] Social Research Survey Results: Tampolove Zanga Farming Teams, July 2016
[91] Funk, Lara (2018). Perceived Access and Benefits from Community-Based Aquaculture using Participatory Photography.
[92] Social Research Survey Results: Tampolove Zanga Farming Teams, July 2016
[93] Funk, Lara (2018). Perceived Access and Benefits from Community-Based Aquaculture using Participatory Photography.
[94] Focus Group with Wider Community. (2019). Belo Sur Mer.
[95] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[96] Focus Groups with Targeted Beneficiaries. (2019). Belo Sur Mer.
[97] Focus Groups with Targeted Beneficiaries. (2019). Velondriake
[98] Focus Group with Wider Community. (2019). Belo Sur Mer.
[99] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.

have access to the sea, they will be able to make ends meet.[100] It is reported that one impact of increased incomes is alcohol abuse which BV tend to study further in the next phase of this project. While some farmers are part of savings groups, more regular training on financial management and budgeting was a specific request made by some farmers.

Impact on Human Rights

Aquaculture continues to enable families to pay school fees thereby directly supporting their children's right to education. The 2016 Social Research Survey for SC farming in Tampolove found that children would work on average 1.2 hours per month.[101] It is therefore unlikely that SC farming would have a disrupting effect on a child's education. Furthermore, according to farmers' contracts, children are not allowed to work on SC or SW during school hours. In regard to SW farming, however, the intensive labour effort that is required at certain times makes families more likely to include their children in various tasks.

It would be pertinent to find out exactly what roles children undertake and how much time they work in aquaculture, in particular in SW farming, and this should be included in the integrated social survey. The project needs a better understanding of whether aquaculture is providing the funds for children to go to school but at the same time disrupting their education.

Figure 9: Children Pulling Boats of Seaweed into Shore

Impact on Gender

Blue Ventures have "worked hard to ensure aquaculture activities are open to all interested parties in the villages we serve."[102] Gender mainstreaming is a key part of this project to ensure that men and women are equally able to become farmers or leaders.

Sea cucumber and seaweed farming are reported as popular activities for women and overall the project has enjoyed success in meeting its targets of a minimum of 50% female seaweed and sea cucumber farmers in 2016, 2017 and 2018. In 2019, the percentage of female sea cucumber and seaweed farmers was 59% and 46% respectively. In Belo Sur Mer, where fishing is the most popular livelihood for men, the majority of SW farmers are women who have taken aquaculture up as an additional livelihood.[103] Only the percentage of women in steering committees of aquaculture associations is low at 25%, but as there are currently only four such people in total this statistic will be subject to large swings and should be viewed over a longer term. The project's success in gender mainstreaming should be celebrated.

The annual project reports state that women actively participate in meetings, an observation also noted by the evaluation team across the course of 4 focus groups with SW and SC farmers and also from

[100] Semi-Structured Interviews with Blue Ventures. (2019).
[101] Social Research Survey Results: Tampolove Zanga Farming Teams. (2016). *Blue Ventures*.
[102] 2018 Annual Report to Norges Vel. (2019). *Blue Ventures*.
[103] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.

interviews.[104] Furthermore, women have also been leading meetings, for example the Tampolove ZMC is led by a female supervisor.

While women are equally represented, and actively participate in meetings, their views are less likely to be followed through with action.[105] According to Vezo culture, male family leaders carry the greatest influence; their views guide the community and are rarely challenged.[106] With at least 10 male clan leaders in the Tampolove ZMC, for example, their voices are the most influential. Other influencers include those who have greater wealth and also those connected to such people.[107] For example, the wife of a clan leader will also carry influence, though less than the clan leader himself. Following up the ideas of women who have no such connections remains an exception rather than the norm.[108]

Impact on the Environment

BV have worked to designate aquaculture areas as no-take-zones within the Velondriake LMMA. Anecdotal evidence suggests that fish are returning.[109] This might be due to the no-take zones being in place, the presence of complex 3D structures that provide protection to juvenile fish, or the fact that some fish are herbivorous and will eat SW. The culture of seaweed de-acidifies ocean waters, reducing carbon and also provides a healthy environment for shellfish.[110]

When developing aquaculture, it is critical to enforce sound policies to protect coastal areas from environmental degradation. One area of focus for BV has been the elimination of mangrove or other unsustainable sourced wood from project construction. Yet the gap between the demand and supply for SW farming materials is sometimes met by farmers making their own materials. While farmers are aware that cutting down mangroves is not good, they will occasionally do so in order to create stakes needed to anchor SW lines.[111]

Plastic bottles are used as floaters for SW farming with approximately 85,000 currently in use. There is an effective return scheme in place that incentivizes SW farmers to value old bottles, as well as a good system for collecting damaged lines. Nevertheless, the risk of these bottles being lost into the marine environment, especially during cyclones, is high. The lack of a local waste disposal scheme might see these bottles enter the marine environment, regardless, but to a much lesser extent.[112] OF are currently exploring more environmentally friendly and economically viable solutions.

Figure 10: Plastic Bottle Floaters used for Seaweed Farming

[104] Semi-Structured Interviews with Blue Ventures. (2019).
[105] Semi-Structured Interviews with Blue Ventures. (2019).
[106] Semi-Structured Interviews with Blue Ventures. (2019).
[107] Semi-Structured Interviews with Blue Ventures. (2019).
[108] Semi-Structured Interviews with Blue Ventures. (2019).
[109] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[110] Seaweed Farming - both people and fish love seaweed farming. (2019). *Wwf.panda.org*. Retrieved October 7, 2019, from <http://wwf.panda.org/wwf_news/?308490/seaweed-farming>
[111] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[112] Observations and informal conversations revealed that people tend to either burn, bury, or throw waste away into the environment (terrestrial and marine).

As previously discussed, the degree to which time spent working on aquaculture means less time fishing is not necessarily clear. Certainly, it reduces time spent fishing and in particular gleaning, as the key period for gleaning and aquaculture falls on spring tides.[113] In addition, by introducing another livelihood it helps to reduce the opportunity cost of not fishing during closures; this also decreases the risk of people breaking these collective management measures and consequently may help to recover fisheries.[114]During other times, however, fishing appears to continue as normal as fishermen work to sell what they catch to collectors first, before retaining some for their own subsistence. While it is possible that incomes from aquaculture could enable farmers to buy boats and equipment to increase their fishing effort focus group discussions revealed no anecdotal evidence of this happening.[115]

Increasingly, it appears that aquaculture is attracting communities inland to move to the coast.[116] There is concern that those who are new to the area, and unfamiliar with the management measures in place, as well as best practice fishing techniques, may take up fishing in addition to aquaculture, and are more likely to use bad or illegal fishing practices that damage the environment.

Impact on Population and Migration

Vezo are a nomadic people often moving to where fishing grounds are best.[117] Aquaculture, however, is having a stabilising effect on coastal populations and creating more permanent settlements.[118] This may in the long-run have a positive impact on communities' sense of ownership and awareness of the need for collective management of marine resources.

Settlements are also growing due to migration from inland areas to the coast.[119] Those involved in aquaculture have been actively encouraging family and friends who live further inland to join them in taking up aquaculture.[120] The transition is made easier by the fact that aquaculture suits land-based farmers who are more accustomed to long-term planning.[121] All this could, however, undermine fishers' livelihoods with increasing pressure on coastal resources, and competition for aquaculture.

Impact on Security

Those working in aquaculture can have significantly higher incomes than those in the wider community. This has increased the risk of theft, particularly as cashless payment systems are not available in the producing areas and the farmers are paid in cash. To reduce the security risk to beneficiaries, BV have paid for two armed 'gendarmes' to be stationed in Tampolove. In doing so, however, BV put themselves at risk if the gendarmes do not act responsibly.

Risks from security personnel are particularly challenging for the project to manage as law enforcement activities are not direct project activities, but are the responsibility of the local/ national authorities. Nevertheless, risk issues perpetrated by armed security personnel on other people in conservation projects might include unlawful acts including physical confrontation, torturing, threatening, abuse of power and sexual harassment of women. These are risks that are in breach of international human rights and could undermine the support for the project. While the link between these risk issues and the project is not due to direct activities of the project, these are often induced through activities including the

[113] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[114] Focus Groups with Targeted Beneficiaries. (2019). Belo Sur Mer.
[115] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[116] Semi-Structured Interviews with Blue Ventures. (2019).
[117] Grenier, C. (2013). Vezo lifestyle, «traditional » fishing and globalisation on the South-West coast of Madagascar.
[118] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[119] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[120] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[121] Semi-Structured Interviews with Blue Ventures. (2019).

provision of payment. We therefore recommend that BV transfer the responsibility for payment of the gendarmes to Velondriake, or another local association.

Impact on Corruption

On account of the monopsony market structure where the private partners are the only buyers of SC and SW, an illegal market in aquaculture products has developed. BV have made efforts to ensure that governance of sea cucumber farming is transparent by involving the local authorities and the wider community more. However, while open and transparent application of the Dina is encouraged by BV, it is difficult to measure the impact on corruption as infractions, even if witnessed, are often not reported, as witnesses tend to prioritise maintaining amicable community relations over the law.[122]

While it is difficult to know how much SC side-selling is taking place, the proposed new pricing structure, based on the return rate will encourage farmers not to side sell. BV are also making SC contributions through the Velondriake Association's established financial systems, which has a robust financial procedures manual in place. At the same time, BV are actively trying to build the community's sense of ownership such that a SC or SW related theft or infraction is not seen as something against BV, but rather as something against the community. From our experience of conservation projects, achieving a real sense of ownership is a watershed moment in the handover over of a project to a community.

4.5 Sustainability

Global Demand

Rapid economic development in China and increases in wealth have led to an increasing demand for luxury seafood products over the last few decades.[123] [124] SC have long been high value commodities in Chinese markets and prices for SC have steadily increased since 2011.[125] [126]

Madagascar exported 173 tonnes of aquatic invertebrates in 2018 at a value of US$679,000.[127] Growth in exported value increased 73% from 2014 to 2018. With exports to only four countries (Hong Kong/China, Vietnam, Malaysia and Mauritius) in 2018, there is opportunity to diversify export markets.[128]

Carrageenans produced from the seaweed are widely used in the food and pharmaceutical and cosmetic industries and the carrageenan market has grown by approximately 5% every 4 years from 1986-2016.[129] The value of Madagascar's exports of seaweed in 2018 was US$710,000, but this only accounted for approximately 0.25% of world production in 2016 and there is a national ambition to increase this to 25% by 2026.[130] Therefore again there is potential to tap into growth markets. The research and development by Cargill will help maintain the value chain in the long-term by looking for new ways to process and use Carageenans.[131]

[122] Semi-Structured Interviews with Blue Ventures. (2019).
[123] M. Fabinyi, M. Pido, B. Harani, J. Caceres, A. Uyami-Bitara, A. De las Alas, J. Buenconsejo, E.M. Ponce de Leon Luxury seafood consumption in China and the intensification of coastal livelihoods in Southeast Asia. (2012), pp. 118-132
[124] M. Fabinyi Historical, cultural and social perspectives on luxury seafood consumption in China Environ. Conserv., 39 (1) (2012).
[125] A.W.L. To, S.K.H. Shea. Patterns and dynamics of beche-de-mer trade in Hong Kong and mainland China Traffic Bull., 24 (2) (2012).
[126] Purcell, S.W., Williamson, D.H. & Ngaluafe, P., 2018. Chinese market prices of beche-de-mer: Implications for fisheries and aquaculture.
[127] Trade Map - Trade statistics for international business development. (2019). *Trademap.org*. Retrieved October 3, 2019.
[128] Trade Map - Trade statistics for international business development. (2019). *Trademap.org*. Retrieved October 3, 2019.
[129] Pôles Intégrés de Croissance Inventaire et Étude de Faisabilite de Sites Propices a l'Algoculture, l'Holothuriculture, la Gestion de l'Exploitation de Poulpes et Crabes dans la Région Atsimo Andrefana. (2016).
[130] Pôles Intégrés de Croissance Inventaire et Étude de Faisabilite de Sites Propices a l'Algoculture, l'Holothuriculture, la Gestion de l'Exploitation de Poulpes et Crabes dans la Région Atsimo Andrefana. (2016).
[131] Semi-Structured Interviews with Private Partners. (2019).

Cargill have issued their 'Red Seaweed Promise', a program designed to establish sustainability standards for sourcing red seaweed and to advance traceability and transparency in the global supply chain.[132] This is evaluated and assessed periodically by Proforest, a world leader in supporting the sustainable management and sourcing of natural resources and smallholder developments.

Domestically, the PIC report also tells us that there is plenty of room for expansion of the aquaculture sector in Madagascar which could bring economies of scale.[133] Only approximately 4% of exploitable sea cucumber sites and 14% of exploitable seaweed sites are currently being exploited.

There are, however, a number of things that could see global market prices for aquaculture products decline. These might include changes in fashions or tastes meaning reduced demand, austerity policies or import control or taxes in importing countries, alternative products stealing demand, competition from overseas, competition from other parts of Madagascar, impact of climate change and corruption.

Ownership of the Farming Model

SC farmers are confident in their ability to manage the day to day running of the farms, and reports show that they are highly engaged in suggesting improvements and contributing to the ongoing adaptive management of the farming model.[134] Knowledge sharing is also continuing between existing and new farming groups. These and other reports suggest a strong sense of ownership by the farmers which bodes well for their sustainability and ability to adapt to changing circumstances.[135] Areas of which farmers feel they have less ownership include the acquisition and supply of materials and price negotiations.[136] BV appear to be highly involved in negotiations with OF concerning handover of responsibilities from IOT. The 2019 semi-annual report says "once all farming responsibilities are clarified and agreed, Blue Ventures and Ocean Farmers will sign a new Memorandum of Understanding (MoU)."[137] We are unsure of how much farmers have been involved in this process, but we would encourage BV in its efforts to include representatives of local communities in all decision-making processes. Strengthening governance structures, through the Association Support Team, should be a priority to ensure that communities play a central role. According to Eriksson et al.,"communities that are empowered to maintain collective ownership of their coastal resources and have strong governance structures are less likely to lose access to larger interests associated with large-scale intensive aquaculture."[138] Great effort has been put towards achieving a real sense of ownership of the farming model amongst the community and it is important to acknowledge that this is an ongoing process that will take time to realise.

BV also has high involvement in legal work, organising and drafting agreements, contracts, internal rules and roles and responsibilities. As BV expand aquaculture operations they hope to do so with a lighter footprint. The need for such legal work, however, will remain and we recognised that BV will continue to be indispensable in this area for a considerable time, but we recommend that these responsibilities are handed over to Velondriake as soon as suitable staff can be recruited.

In the 2019 semi-annual report it is stated that "Velondriake has become the most productive area for seaweed of Ocean Farmers' sites of operation, and reports from the company's leaders are that the social organising support from BV is key to this success." The concerns from this are therefore how long BV can

[132] Cargill's Red Seaweed Promise designed to improve producers' prosperity and conserve the environment | Cargill. (2019). *Cargill.com*. Retrieved September 29, 2019, from <https://www.cargill.com/2019/cargills-red-seaweed-promise-designed-to-improve-producers>
[133] Pôles Intégrés de Croissance Inventaire et Étude de Faisabilite de Sites Propices a l'Algoculture, l'Holothuriculture, la Gestion de l'Exploitation de Poulpes et Crabes dans la Région Atsimo Andrefana. (2016).
[134] 2019 Semi-Annual Report to Norges Vel. (2019). *Blue Ventures.*
[135] Focus Group with Targeted Beneficiaries. (2019). Velondriake.
[136] Focus Group with Targeted Beneficiaries. (2019). Velondriake.
[137] 2019 Semi-Annual Report to Norges Vel. (2019). *Blue Ventures*.
[138] Eriksson, H., Robinson, G., Slater, M.J. et al. AMBIO (2012) 41: 109. https://doi.org/10.1007/s13280-011-0195-8

give support and what happens if they can no longer obtain their current level of funding and have to scale back their support. Since it can take many years for communities to learn to do their own social organising, a key area to address as BV look to handover, is the training of communities to do their own socio-organising.

BV is the driving force behind the possibility of experimenting with a collective pen at Antsatsamory. Communal pens may be more productive, cost less, and be more profitable. Whether communities are willing to adopt a new model remains to be seen. Certainly in Tampolove, local communities are more conservative and less willing to experiment as they are now familiar with the individual pen system and prefer to be paid for their individual production.[139] Communities need time, sometimes a lot of time to familiarise themselves with aquaculture, and with a particular pen arrangement, to observe its success and to adapt to any proposed changes.

Sustainability of the Farming Model

Aquaculture is bringing villages and communities within the Velondriake LMMA together. There have been learning exchanges and knowledge sharing between new farmers in Ambolimoke and the farm in Tampolove.[140] There is also a unity that comes from combating negative issues together, such as disease and theft.[141] This could lead to greater awareness about collective responsibility and the need for long-term management of marine resources.

Having an individual SC pen system poses a significant challenge for creating a fair price structure for the farmers. In theory, increased effort by farmers should lead to increased return rate. The individual SC pen system is a new experience and in practice it was found that more effort does not necessarily result in more product. Other factors such as sediment type and carrying capacity, which varies between pens, appear to be much more significant.[142] BV have developed a research project with the University of Edinburgh that examines the effect of factors such as sediment type. This will give greater understanding of such variables but may not help in determining a fair price structure. This is, in part, why BV are keen to trial a communal pen in which incomes may be more fairly distributed.

Other challenging aspects of the farming model include combating diseases which can spread through lack of professionalism, security with the project located in poor communities, effective dealing with theft or fraud, combatting traders who encourage side selling, fair choice of villages and beneficiaries within villages, removing unprofitable and unprofessional farmers in favour of those who will be more successful, keeping government bodies informed when there are changes in government personnel and obtaining the support that government can provide.

BV is working to improve the current low level of technical, managerial and legal expertise, but there is a risk to sustainability if BV do not conduct a smooth handover process. BV's plan, in their 2016 project document was to focus on training the best farmers, the training of trainers and supporting farmers associations.[143]

In regard to the training of trainers, BV aquaculture technicians have received invaluable hands-on practical and technical training. In turn, they also provide farmers with hands-on practical and technical advice, acting as coaches or mentors to SC farmers. However if there is high turnover of BV staff within the aquaculture team, this would see an enormous amount of knowledge lost. There is currently no formal

[139] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[140] 2019 Semi-Annual Report to Norges Vel. (2019). *Blue Ventures*.
[141] Focus Groups with Targeted Beneficiaries. (2019). Velondriake.
[142] Semi-Structured Interviews with Blue Ventures. (2019).
[143] Project Report Document: An Aquaculture Industry for Madagascar. (2016).

training system in place to ensure that the training of trainers can continue even with 100% staff turnover in the aquaculture team. We therefore recommend that BV create a formal training system so that it can easily be continued by new staff.

Other risks that threaten the sustainability of the farming model include climate change and its impact which includes more extreme weather events, warming seas, sea level rise and coastal erosion. We are aware of a potential PhD study into the vulnerability of coastal communities to climate change in Southwest Madagascar. We are also aware that a study into deeper water SC and SW farming systems to mitigate the effect of warming seas is being conducted.[144]

5. Recommendations

Recommendations for BV going forward and for Norges Vel and Norad for future institutional capacity building are as follows:

Financial Modelling

1. Throughout the project, BV maintain a spreadsheet to calculate actual net farmers' incomes after costs are deducted. This can then easily be used to test the effect of many variables including different pricing models, sizes and outputs of farms, locations with particular costs, different prices received for products, return rates and various incentives.

2. Monitor how farmers' incomes are being spent, including whether alcohol abuse is becoming a problem and whether any adjustment to the farming model could alleviate the problem.

3. A working results frame should be kept up to date, with regularly revised targets and actual results, and that results are tabulated or graphed over the whole project period or longer to observe trends.

4. In future projects or stages of this project, consider the ratio of investment to the number of beneficiaries and to the revenue generated for different investments and strategies.

5. In future proposals and budgets, BV try to include funds for greater institutional support, baseline studies and more extensive monitoring and evaluation.

Relationship with Private Partners

6. BV voice greater appreciation of the benefits of working with the private partners, their vision, investment and the risks they have taken. BV London to be in more communication with private partner senior managers. BV press for compensation for farmers when private partners do not fulfil commitments and for private partner transparency to demonstrate that profits are being shared equitably. BV continue studying with private partners whether farmers can undertake more processing work, adding value to their products.

7. BV develop a master agreement with OF and IOT in order to have a long-term vision of cooperation and strategic approach to the project. Obtain a written guarantee from OF of their continued support at Belo-sur-Mer when agree targets have been met.

[144] Semi-Structured Interview with Private Partners. (2019).

Continued Handover, Strengthening and Capacity Building of Local Associations and Governance Structures

9. BV continue empowering local organisations by giving them more responsibility, promoting their leadership in discussions and with partners and in decision making, encouraging autonomy, a sense of ownership and the taking of initiative. BV develops its exit strategy and work in that direction even though they fully intend to work at least several more years on this project.

10. BV continue strengthening Velondriake's ability to negotiate, manage funds and manage farmers. Recruiting skilled staff from outside is probably needed. BV strengthen skills and autonomy of field support teams.

11. BV gradually train local organisations to undertake their own socio-organising, legal work, organising and drafting of agreements, contracts, internal rules and roles and responsibilities.

12. BV provide more regular training on financial management and budgeting to the farmers as some of them requested during this evaluation.

13. BV transfer the responsibility for payment of the gendarmes to Velondriake, or another local association.

Other

14. Give greater clarity to objectives in any future project documents, particularly with any new funders or parties who may have different priorities.

15. Study the roles of children in families working in aquaculture and note if there are signs of work disrupting their education.

16. With growing demand for aquaculture, that care is taken not to make promises and raise expectations that cannot be fulfilled.

17. BV review the structure of their team to eliminate overlap of responsibilities and see if measures can be taken to reduce the high turnover of staff.

18. BV create a formal training system so that knowledge isn't lost when staff leave and training can more easily be continued by new staff.

19. Apply the results of research currently being undertaken by the University of Edinburgh on environmental variables for best production in SC farming.

6. Conclusions

This project phase, 2016 - 2019, has seen a great deal of change with the rapid development and successful realisation of two new community-based farming models which are intended to be sustainable and replicable elsewhere. Highlights from this project phase include the creation of 630 jobs for men and women, with increased incomes enabling more families to pay for education for their children. The prospect of a better future has led to rapidly growing demand from more villages to be included in the project.

The reconstruction of the SC pens and the more scientific approach being taken to SC farming is bearing fruit with increased and more stable production. Key ingredients to this success have been BV's training and social organising which have led to the increasingly professional functioning of the ZMC and the engagement of farmers in the ongoing adaptation and management of the farming model.

BV's training and social organising of SW farming and the development of the SW farming model are seen as key to the steadily increasing SW production and the better handling of EFA. Velondriake is now the most productive of OF's sites.[145] BV has also put much effort into organising leases for SC farmers and contracts for SW farmers which give security and predictability for the farmers and other stakeholders.

In the next phase of this project, in partnership with a different donor, BV might consider this report's main learning points and recommendations which centre round three key issues. First, financial modelling, second, the relationship with the private partners, and third, the continued handover, strengthening and capacity building of local associations and governance structures.

[145] 2019 Semi-Annual Report to Norges Vel. (2019). *Blue Ventures*.

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