

# Sea Water Fish Cage Farm Tanzania – Outlines of Economics

## Executive Summary

### Introductory remarks

The International Christian Embassy Jerusalem (ICEJ) has contacted us, based on personal trust, to assist Africans in Agriculture.

The mission assigned to us by the ICEJ was: To assist Tanzanian communities in agriculture by:

- Mapping the Challenges
- Finding the Mitigations
- Taking the required actions

To that end, a few necessary steps were taken.

Internal step - We have set up to work through a company owned by one of the partners, named GREENERIX Ltd. GREENERIX has vast experience in building agricultural projects around the world and in Israel.

Step one – mapping the problems – The challenges were mapped but will not be focused on within the framework of this paper.

Step two – suggesting solutions – Suggested solutions were brought up. These are:

- A) Creating cooperatives
- B) Having the Church as the cooperative financial trustee
- C) Establishing regional Agricultural Service and Training Centers (ASTC)
- D) Sending locals to study in Israel and come back to support the agricultural activity mainly through the ASTC.

Step three – visiting the country and the communities – The above was offered to different communities and congregations in Tanzania and accepted warmly.

Step four – implementation – in this stage we work according to the stages introduced to the communities during the visit in step three.

The status is that we started in Tanzania. We have made 2 trips and fulfilled the first 3 steps, and the outcome is that of vast acceptance by the local communities, tremendous will to do and succeed

with our guidance and help. We have now started stage 4 by conducting a survey for open sea fish farms. We found out the locations selected by the Tanzanian partners are amongst the best in the world for that! We are at the stage of raising capital for the same, while having all experts, building companies and such in place.

**A very important note: This is no charity!**

This is a business proposition. A very solid and good one as well. By which the investor may gain money either over interest on top of return of investment or become a partner and enjoy dividends (with some favor in receiving funds up until the investment is returned). Namely, in case the investor becomes a partner, the Tanzanian partners will agree that until such time as the investor has fully recouped his investment, dividends will be distributed not prorata but with a significant bias in favor of the investor.

In a fish farm we are looking at about 7 years' time for return of investment.

Specific terms and conditions will be discussed with the investor openly aiming for an honest result for both the investor and the Tanzanians.

The projects are to be owned by the Tanzanian or be a partnership between the Tanzanian and the investor. We are not part of the owners. We are the contractors to design and build the said projects for the Tanzanians or the partnership as we enjoy the confidence of the Tanzanians regarding ensuring them to receive the best professional advice, the exact project they asked for based on the said advice, activate all required subcontractors, and make sure they do an adequate job.

Before coming to the projects, the stage they are in and the economical parameters of each one, it is essential to understand what the messages that were conveyed to the Tanzanians during the visits.

### **Business Description**

This is based on a survey conducted early March 2023. The survey was conducted in few sites along the southeast coast of Tanzania in Kilwa and Lindi. The report including the feasibility study is available for the potential investor.

Our initial aim, through stages, is to prove first that the growing is working well, and the marketing is at least as expected. We have made a two-stage program that from year 4 will yield 5,000 MT of fish per annum, i.e., 2,000 MT of processed fish.

The 5,000 MT project will be considered as one "module" which can be duplicated later, while increasing the annual production accordingly (for example: 10 modules will produce 50,000MT).

The selected location of the prospective fish farm was determined in the region which was considered and provided to us by the client (Southern coast of Tanzania).

The project will be developed over 2 years and ramped up in production over 1 more year. There will be no products sold during the first two years. In the third year the project will produce 2,000

MT of whole fish, while from year 4 and onwards the annual production level will be 5,000 MT of whole fish. Forty percent of the net weight from this will be sold as processed fish, i.e., the total sold quantities are 800 MT in year 3 and 2,000 MT in years 4-12 respectively. As explained, we are looking at 10 years lifetime of the projects from end of building it (end of year 2).

Fish will be harvested from the marine farm and will be delivered to the processing plant on shore for the final processing and packaging according to the marketing plan.

The average conservative sale price of the processed fish (fillet or equivalent value) is 31 USD/kg FOB Tanzania.

For this project we have a business plan. It is not fully adjusted to the site as the specific location (out of 4 possible) has not been chosen yet. However, the outlines of the business plan give extremely good indications.

It is important to note that all production is aimed at export. There are a few reasons for that. First, we do not wish to compete with local fisherman and have them loss their source of livelihood. Doing so, will very likely cause resistance both from local fisherman, local population, and government officials. Second, we do not expect locals to be able to purchase fish at the relevant price. Third, our goal, apart from doing a good business, is to benefit the Tanzanian people and nation. Therefore, selling fish for foreign currency without affecting the local market seems like the proper way. This will likely gain government support due to its interest in foreign currency income. It will not cause resistance from local fisherman (those will only benefit from food not entering the cages that will support endemic fish on the wild), will not affect fish prices in the local market, hence, will not harm the population, especially the poor one.





*Land base fish tanks and facilities (for illustration only)  
(Selected technology and production units will be concluded in the engineering plans)*



*Marine cages*

*(For illustration only/ Selected technology and production units will be concluded in the engineering plans)*

**Basic assumptions:**

The basic assumptions are:

**Data sources**

The professional and economic data which provide the basis for this Economic Evaluation were obtained in Tanzania and Israel and these data were processed and analyzed during the preparation of this report.

## Project Scope

The project will be based on two parts. Land base center which will include the breeding and hatchery units, packing and processing facilities and logistic and administrative. Marine Cages submerged as growing places of the fish, with vessels for feeding, harvesting, and cooling the harvested fish, including a team of scuba divers to examine the cages and make required maintenance and repairs. The annual production level will be 2,000 MT of whole fish in year 3 and 5,000 MT of whole fish from year 4 onward to year 12.

## Project Lifetime

The economic evaluation has been carried out assuming a project lifetime of ten years commencing on the first year of full yield, i.e., year 4. Including the building year and first growing fish year this is a project for 12 years.

Also, the presence of Israeli supervising and managing team has been taken at a cost of \$2,000,000/year throughout the life span of the project. This is essential to make sure technology, knowledge and knowhow are fully transferred. The contract will be for 5 years and additional 5 years at the sole discretion of the Tanzanian client. In such a case, the operating costs will be reduced from \$28,000,000 to \$26,000,000 and the changes in economic parameters will be adjusted accordingly. For now, we took the conservative approach with the aim in mind to increase to maximum the chances of success, not to minimize costs.

Table 1 - MAIN INDICATORS

Item	
Production of whole fish - MT	5,000
Sold production of processed fish - MT	2,000
Annual Revenue USD (years 4-12)	62,000,000
Operating costs USD (years 4-12)	28,000,000
Operating income, EBIDTA USD (years 4-12)	34,000,000
CAPEX USD	38,500,000
Working capital USD	12,500,000
Maximum exposure - at the end of 2nd year USD	51,000,000
PBP- Pay Back Period (years)	5
No. of employees	>100

Table 2 - SUMMARY OF BASIC PROJECT INVESTMENT (USD)

Item	Year 1 (USD)	Year 2 (USD)	Year 3 (USD)
Infrastructure to the fish farm land base	1,000,000	-	1,000,000
Infrastructure in land base	3,000,000	5,500,000	8,500,000
Marine hatchery including Quarantine (10 M capacity)	10,000,000	100,000	10,100,000
Grow out - sea operation including vessels	4,500,000	7,500,000	12,000,000
Equipment & vehicles	2,000,000	1,000,000	3,000,000
Preoperative & miscellaneous	500,000	-	500,000
Detailed engineering planning inc BOQ	300,000	-	300,000
Freight (sea & land)	300,000	-	300,000
Construction, installation and management	600,000	300,000	900,000
<b>Total</b>	<b>22,200,000</b>	<b>14,400,000</b>	<b>36,600,000</b>
Unexpected 5%	1,110,000	720,000	1,830,000
<b>Total</b>	<b>23,310,000</b>	<b>15,120,000</b>	<b>38,530,000</b>

Table 3 - REVENUE CALCULATION (USD) FROM PROCESSED FISH

	Year	1	2	3	4	5-12
	Sale price USD/kg = 31					
Processed fish – ton/year		0	0	800	2,000	16,000
Revenue USD		0	0	24,800,000	62,000,000	496,000,000

Table 4 - PROJECT - CASH FLOW INDICATORS

Payback Period (PBP) Years	Net Present Value (NPV) USD	Internal Rate of Return (IRR) %
5	130,000,000	>40%

In such case we are looking at the following financials:

**TOTAL INVESTMENT: \$38,530,000**  
**TOTAL WORKING CAPITAL: \$12,500,000**  
**TOTAL FUNDS REQUIRED: \$51,000,000**

**Annual EBTIDA (year 3 onwards): \$34,000,000**

**Pay Back Period (PBP) = 5 years** (counting starts from the day the projects start to be built)

All PBP, above and in sensitivity analysis and tables below are calculated from the very start of the project, i.e., from start of building year.

A sensitivity analysis has been made. The first case considered was that of 30% reduction in revenue on way of reducing selling price for process fish sold by 30%. The second case considered was that operational costs increased by 30%. Below are the financial implications of these two scenarios.

a) Reducing processed fish selling price by 30%

- a. NPV = \$31,000,000
- b. IRR = 18%
- c. PBP = 7 years

b) Increasing operational cost by 30%

- a. NPV > \$84,000,000
- b. IRR = 31%
- c. PBP = 5 years

Risks: The above analysis can also serve to understand the risks involved. 30% decrease in sales price (while holding all expenses unchanged) covers, with large margins, any health, predators, and other problems that can dramatically decrease the fish yield. On top of that insurance is calculated in the study to cover real losses, but not loss of profits.

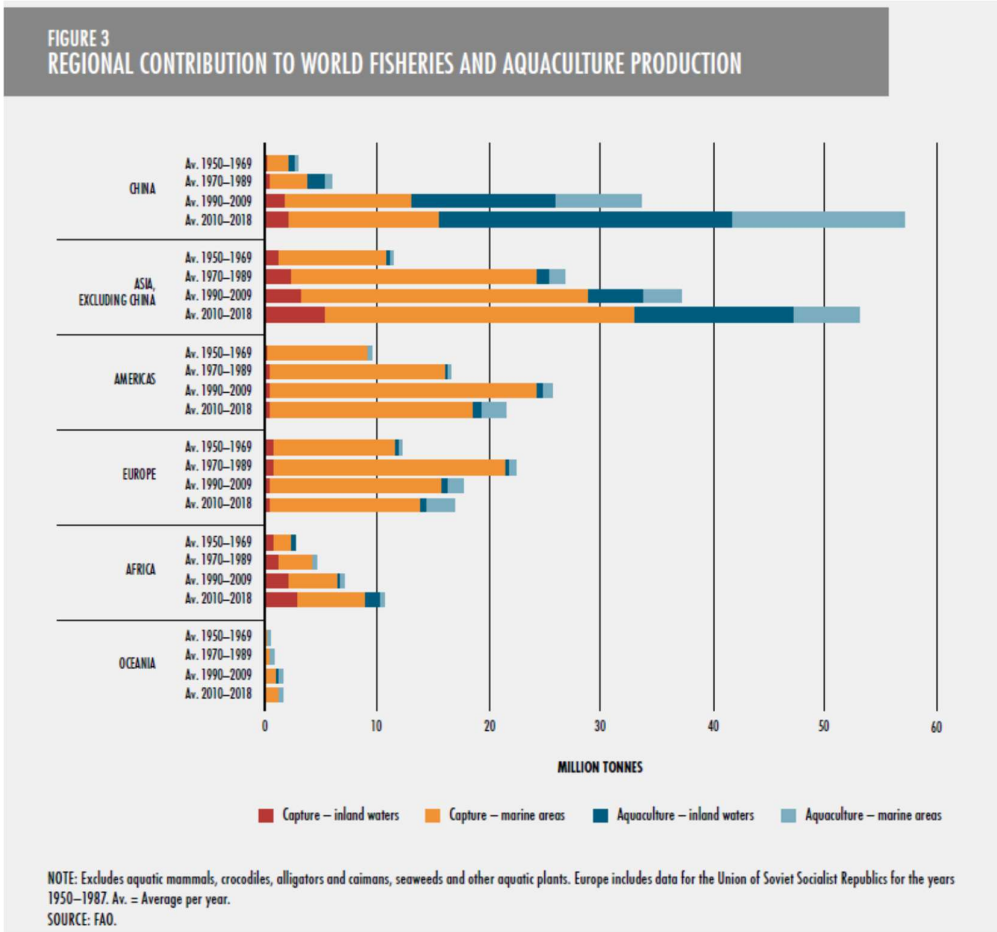
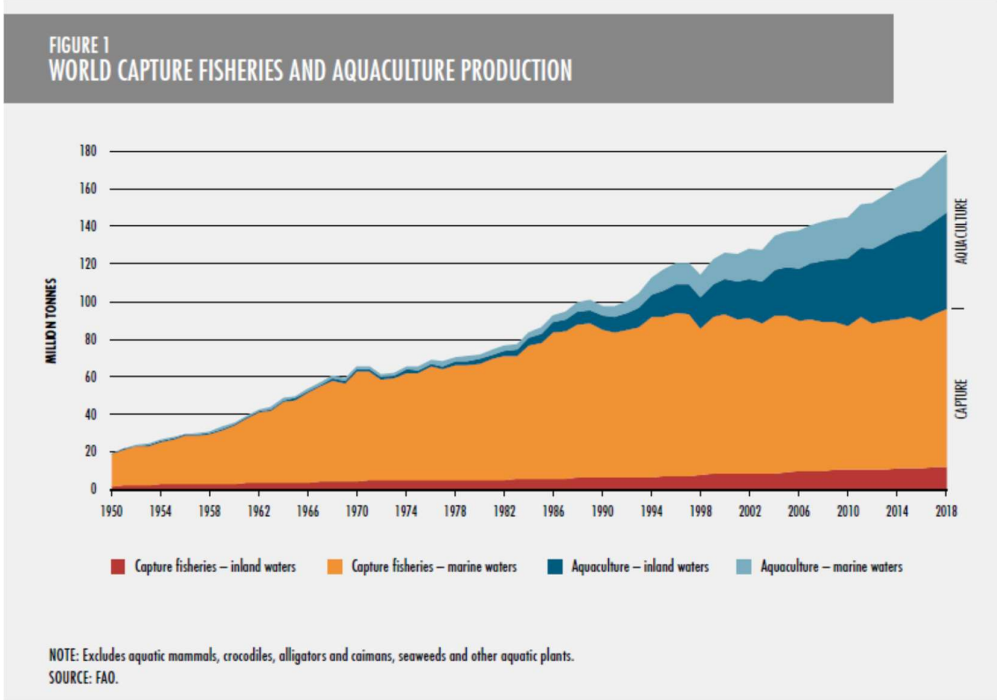
The most important factors are the selling price of processed fish and feeding price of the fish. To analyze the combined sensitivity the below tables were formed. These tables are an estimate to within +/- 10% of values of the figures presented therein. To be more accurate we need the full business plan that can only be made once the Tanzanian have decided on a specified location and some other parameters.

On the other hand, it is worth mentioning that the world is in a state of shortage of fish. This is going to be the situation for quite a long time in the future, definitely the upcoming decade or two. Hence, we expect fish prices to get higher rather than lower, which will make the economic results even better.

However, we choose here to take the conservative approach and go with the current prices. From those prices (of both fish and fish food) we have made our calculations and sensitivity analysis. Note, if the demand for fish grows, this might well increase the price of such food. For fish farms smaller than about 25,000 to 30,000 MT it is not worthwhile for the farm to produce its own food. The important thing shown is that the project is not very sensitive to a change in food costs. It is much more sensitive to a change in fish price. As sensitive as it is for fish prices going down by 30%, it will be for fish prices going up 30%.

To demonstrate the growth in demand for fish and the fact it must originate from aquaculture and that Africa is a preferable place for such aquaculture, we have added the two graphs shown in the next page. They are taken from research by The Food and Agriculture Organization of The UN in 2020.

The first graph shows that capture fisheries in marine water has reached saturation, while both in land and marine water aquaculture is growing dramatically. The second graph shows that the main world reserve for such aquaculture is in Oceania and Africa. We are targeting the second.



**SENSITIVITY OF INTERNAL RATE OF RETURN (IRR) TO FISH  
AND FEED PRICES**

**Fish sale price – USD/kg**

	<b>32.0</b>	<b>31.0</b>	<b>30.0</b>	<b>26.0</b>	<b>25.0</b>	<b>24.0</b>	<b>23.0</b>
<b>1,300</b>	45%	42%	39%	30%	27%	25%	22%
<b>1,400</b>	43%	41%	38%	29%	26%	24%	21%
<b>1,500</b>	42%	<b>40%</b>	38%	28%	25%	23%	20%
<b>1,550</b>	41%	39%	37%	27%	25%	22%	19%
<b>1,600</b>	41%	39%	37%	27%	24%	21%	17%
<b>1,650</b>	41%	38%	36%	26%	24%	21%	15%
<b>1,700</b>	40%	38%	29%	26%	23%	20%	14%

**SENSITIVITY OF PAY BACK PERIOD (PBP) TO FISH AND FEED  
PRICES – YEARS**

**Fish sale price – USD/kg**

	<b>32.0</b>	<b>31.0</b>	<b>30.0</b>	<b>26.0</b>	<b>25.0</b>	<b>24.0</b>	<b>22.0</b>
<b>1,300</b>	5	5	5	5	6	6	7
<b>1,400</b>	5	5	5	5	6	6	7
<b>1,500</b>	5	<b>5</b>	5	5	6	6	7
<b>1,550</b>	5	5	5	5	6	6	7
<b>1,600</b>	5	5	5	6	6	6	7
<b>1,650</b>	5	5	5	6	6	6	7
<b>1,700</b>	5	5	5	6	6	6	8

**Conclusions from the above sensitivity analysis:**

- The project is more sensitive to a decrease in fish price than to an increase in operational costs.
- In either case the project shows excellent financial results within 5 years at most (including the building year!)

Current population growth and the status of fisheries around the world promises an ever-growing demand for fish and hence, at the very least, no price reduction. The real option is price increase.

Few key notes:

- 1) Most of the locations surveyed have proven to be very good for seawater fish farms in all aspects. Water temperature, salinity, ph, currents, protection from weather harm and distance from shore facilities. We base this and the economics shown above on a full report and feasibility study made after surveying and diving in the locations with world leading experts. Such a study can be shared with any interested investor.
- 2) The choice to market processed fish is due to the wish to pursue foreign markets only, as explained above. These markets would like the processed fish frozen to Sushi grade.
- 3) A full business plan will be made as soon as the specific location is decided upon. That, in turn, is dependent upon local authorities and factors, such as a fishing harbor now being built in Kilwa by the Chinese.
- 4) We are currently working with the local Tanzanians to verify what type of collaterals, if any, on top of the project and future contracts, can be given to the investor.



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