

Aquaculture the New Way of Creating Sustainable Livelihoods Among Rural Populations in Africa. A Case of Seke Rural District Zimbabwe

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ABSTRACT: *Aquaculture is one of the fastest growing agricultural activities in Zimbabwe in Zimbabwe today, a rare visit on social media you will be greeted by ads on aqua farming service providers. Thore aqua farming is broad in Asian communities where it is mainly practiced due to their strong fish diet especially in Easten Asia, prawns, fish and calamari to name a few are reared in Asia. In Africa the Nile tilapia is the most commonly reared fish in aqua culture. Food sustainability has been a key problem in Africa where most of the population live in rural setups where the rely on outdated farming methods and poor equipment which presents a challenge in production output. The main focus of this paper is to look on how aqua farming commonly known as fish farming has helped with sustainable livelihoods among rural populations with main focus being Seke in Zimbabwe. The research will look at the shortfalls that are faced by the farmers due to natural and man induced during the execution of the project. The recurring draughts in Zimbabwe in recent years has seen the need for an alternative sustainable livelihood to mainly horticulture-based economies like Seke District, aqua farming also helping in supplementing diet of the community as fish is highly nutritious and can be substituted for red meat which can easily be attacked by diseases. The research will show the role that has been played by aqua farming service providers in equipping the farmers with the know how to run the projects adequately, they have also been key to provide the materials that are necessary to carry out the projects. Job creation is also one area that the author will dwell on as aquaculture has made our rural areas better especially for the youth as they are the ones that are mainly responsible for the digging and construction of the ponds. This research will show the benefits and the shortfalls of aqua farming. The question will utilise interviews, data collection techniques and participant observation to support findings.*

KEYWORDS: aquaculture, construction, farming, horticulture, sustainable livelihood, rural populations

INTRODUCTION

The issue of food sustainability has been a major problem in sub-Saharan Africa where most of the population lives where below the poverty datum line. Agriculture has seen more cash inducement by monetary institutions and the World Food Programme in order to increase food production in Africa so alleviate poverty. Aquaculture has become the fastest growing field in agriculture in Africa and this has helped in increased fish production that had begun to suffer from oil mining and other dangerous human activities in the oceans. The aqua fish farmers have utilised fish ponds in most places to practice small scale aqua farming and unlike in Asia and Europe where aqua farming involves the farming of animals (including crustaceans, finfish and molluscs) and plants (including seaweeds and freshwater macrophytes) most farmers in Africa specialise in fish farming. Zimbabwe was one the bread basket of Africa as commercial farming boomed in the periods before the Fast Track Land Reform Program but has seen a downward spiral in agricultural production, but its economy remains agriculturally based though many farmers especially in the communal lands have suffered from bad weather conditions in recent years. Aqua farming has come as a relief to many farmers that are seeking sustainable livelihoods as this type of farming is easy to manage and does not rely on the rains. Aqua farming is being practiced both in urban and rural setups in Zimbabwe and ponds do not care about space as one can construct any side of pond. Fish farming has helped to supplement people's diet as fish has high protein. The project is not time consuming as the feeding does not take long and unlike projects like chicken farming that involve cleaning the fowl run, heating the place during winter and giving water to during the routines of fish farming are less. The communal farmers in Zimbabwe usually practice farming only for three months a year due to their heavy reliance on rain water so their fields lie idle throughout the year so the invent of fish farming has brought a chance to utilise the land throughout the year as aqua farming is not seasonal but a continuous process. The aqua farming initiatives has been spearheaded mainly by graduates of agricultural institutes throughout Zimbabwe and this can be credited to the government support of agricultural institutions. The government as will show in this paper has a role and has facilitated the implementation and practice of aqua farming in communal lands in Zimbabwe especially in preserving wetlands from harmful human activities that destroy the ecosystem. Seke Rural District is located 40km from the Zimbabwean capital Harare and its mainly horticulture-based economy as the farmers supply Mbare market and Chikwanha market with fresh vegetables. Due to its proximity to Harare the land has become attractive to home seekers who are running away from exorbitant prices of land in urban areas and this has led to conflict with farmers that are losing grazing lands and wetlands to land barons that are working with traditional leaders to sell land though communal lands can only be sold at the discretion of the president under the Communal Lands Act of 1981. Aqua farming can help protect the lands as they are utilising all season compared to traditional crop farming where the land is ideal almost half of the year hence the malicious acts of selling the land arises. My research focuses on Mhindurwa Village, Munatsi Village, Murape Village and Muzorori Village where fish farming has become the new gold and has providing the youth with jobs. In most rural areas in Zimbabwe hunting, rod runner chicken farming, goat farming and cattle farming provided much of the protein that was consumed by the population but due to increased

human activities like mining, urbanisation and other natural factors these have decreased hence the advantage of aqua farming to help cover the nutritious gap left by the others.

Sustainable Livelihood through Aquafarming

Poverty has become a character of most rural communities and it is a common site among the rural people who especially in the years of draught and poor harvests rely heavily on food donations from nongovernmental organisation. In Seke efforts to create sustainable livelihood has been an evolving exercise and now aqua farming has come to supplement the goal. Zimbabwe has one of the highest unemployment levels among the youth and the rise in the number of Aqua farming projects that have started to be implemented has help create employment from the training of the farmers an initiative that is been undertaken by individual service providers with the goal of educating farmers. Fish has a high level of nutrition as 100g of cooked fish provides about 18-20g of protein (Arino A 2013) therefore it is health to consume. Besides the nutritional gain that has come due to fish farming in the Seke Rural District the farmers themselves are now making a living out of the projects as they are selling the fish after harvest and consume some. Although almost 90% of the fish consumed by humans are wild species that are acquired through hunting (Ackefors H 1979), the recent years have seen a rise in aqua farming due to the low levels of fish in the sea due to oil mining activities and fishing by multinational companies who do not have regards to the environmental implications. With the events of 2023 where Lake Kariba the largest dam in Zimbabwe faced low water levels (Kawanza S 2023) most people within the Zambezi basin that rely on fishing for a livelihood would suffer so the practice of aqua farming through fish ponds as practiced in Seke Rural District is important as it supplements the traditional suppliers of fish in times of crisis. Seke rural is not a new ground for sustainable livelihoods projects in 2013 when I was working there under Seke Rural Home-Based Care they were sponsored sustainable livelihood programs by Oxfam international and US Aid. The Oxfam project supported horticulture farmers with training, seeds and necessary funds to start and sustain the projects, the NGO's site was used as the practical training ground and it produced many results as Seke is still a horticulture economy owing to the success of the program. Under the US Aid program, the NGO donated towards chicken projects in 9 schools within the district these were meant to create self-sufficient for the children who were beneficiaries of the US Aid school fees scheme in case the organisation would fail to pay the fees in the future. The introduction and the spread of aquafarming in the Seke Rural District can be seen as a new wave of projects that will help alleviate the economy of the peri-urban rural area, the proximity of Seke to Chitungwiza and Harare is advantageous to the fish farmers as they can easily access a big market. The drought that has hit Zimbabwe in 2024 can be averted if farmers in Seke are encouraged and equipped to do aqua farming especially the economically disadvantaged, their involvement in the growing industry will lessen the burden of donor reliance at household levels. Fish farming can help solve the issue of prostitution and theft in Seke as it is cheap to manage and has a low mortality rate compared to chicken farming where much detail has to be paid in order to maximise profits. Aqua farming does not require the use of strength making it ideal for both men and women. The 6-month cycle of fish farming especially fish that breed is sustainable as it can be run for years as the fish produce fingerlings on a regular three months' bases.

Land utilisation

Zimbabwe has a lot of unutilised land and hence its potential has been limited for a long time a factor that can be contributed to colonial times. The land with rural areas commonly referred as communal homes has for generations exchanged hands through patriarchal ancestry roots. Unlike commercial land this land is cheap to operate as it does not pay rates and taxes, the land has been utilised mostly for crop farming and animal rearing. The maize crop is one of the major crops that is farmed in rural Zimbabwe though crops like sunflower, groundnuts, sweet potatoes, beans are also farmed. The rural agriculture has always been seasonal and the farmer gets to work for six months a year as he does land preparation, sowing of seeds, removing of weeds and harvesting. The land in rural areas spend most of the time idle and in cases of years of draught the farmer suffers most as in most cases farming is their only form of livelihood. Cattle ranching, goat ranching and chicken farming on a small scale has been long a character of Zimbabwe rural setups. The cattle consume the largest use of land utilisation in rural areas as large tracks of land are preserved as grazing lands especially wetlands. The failure by most rural farmers has come at a large cost to households as most of them wallow in poverty whilst having land due to underutilisation. Aqua farming also referred to as fish farming among the locals has become an ideal economic viable alternative to utilise land and have a yield that is all year round, the most practiced aqua farming in Zimbabwe rural uses fish ponds that are dug near homesteads for security purposes. The fish ponds are hand dug by mainly the unemployed youths in the villages using cheap tools like pick and shovels. Fish farming does not utilise too much land thereby it is not a threat to cattle feeding grounds. The Zimbabwe constitution Section 97 which gives substance to the Environment Management (EMA) Act which prohibits the draining of wetlands can easily be managed if aqua farming is practiced in these lands as seen in Seke village of Muzorori where Dr Chipfakacha a retired diplomat is doing fish farming near a wetland which is his ancestral garden, the availability for water due to springs has added in providing water for the fish ponds. The farmer has 2 ponds and plans to construct three 20metres by 10 metres ponds that will cater for an estimated 10000 fish seedlings, utilising former ideal land that used to be used during the rain season. The area where the ponds were built had been hard for the farmer to utilise as the area would flood with water during the rain season but now since their water ponds which uses polythene plastic to contain the water, the land is utilised unlike before when he would fear the plants would die because of too much water. Aqua farming can help habilitate the land as it conserves the ecological chain of the environment where its practiced, frogs are fish best friends and fish ponds have given them a place where there can free habitat, the presence of oxygen through plantain in the water has provided animals that leave in water to find a home. Seke has been battling land barons who has been illegally selling stands with the help of traditional leaders, the Munatsi, Mhindurwa, Murape and Muzorori villages are the few ones where wetlands have not been sold, aqua farming helps the preservation of the wetlands as the land barons cannot sell land that is being used. Aqua farming has come as an answer at a time the government wants to fend of land barons that are parcelling out rural land in what are called sabhuku deals, fish farming will help land occupiers to utilise the land rather than sell it to get economic reward, fish farming has an advantage that it utilises a small portion of land yet giving much yield per hectare compared to other agricultural activities. The coming of fish arming as helped utilise some of the pits that had been created by brick moulders within the Seke Rural District land degradation can be

become a thing of the past as the pits can be converted in to ponds thereby rehabilitating the soil.



Picture 1: Pond built in a wetland



Picture 2: Own Source – Pond in Mhindurwa Village



Picture 3: Own Source- Small fish pond built in Murape Village

Aquafarming Service Providers

The role of knowledge in project management is as important as the project itself, as I always say in my arguments its “it’s easy to start something, but it is hard to reach your goal without proper management”, aqua farming as cheap as it easy and as easily manageable it seems require knowledge in order to carry out. The role of service providers and suppliers cannot be underestimated for one to reap what they sowed; they are many service providers of aquafarming in Harare but one that stands out for me is Agrimarine run by Ian Kadzongi he in the years to come can be refered to as a godfather of aqua farming from training workshops around the country and an expansion drive that has seen aqua service provision coming to other cities besides Harare. Agrimarine offers fish farming trainings to its potential clients and these are done on quarterly basis, the trainings out by expert agricultural graduates. Agrimarine has caught my attention because of its organisation having a fixed aboard address at number 182 Samora Machel compared to other bogus service providers who many farmers have encountered who do not have a permanent address. They also use agencies that are equipped with knowledge on aqua farming in my villages of study in Seke rural district the organisation has an agent named Pearson Tawonekwa an Agricultural Economics graduate from the Midlands State University, he has spearheaded many projects in the Murape, Mhindurwa, Munatsi and Muzorori villages. The expertise of Mr Tawonekwa has become hand in solving problems that have been experienced by farmers in the villages as far as aqua farming is concerned. Mr Tawonekwa has overseen the construction of over 15 fish ponds since January 2024 to date not counting the previous year’s siting the importance of service providers in attaining results in aqua farming, his main role has been fixing and supplying then when the projects is under way, he carries consultation services and all this because of his link to Aquamarine solutions. Aquamarine solutions has not been left behind to promote gender equality as it has female agencies also one to note is Rapture Mwenda a graduate from the Midlands State University. In an interview with Mr Tawonekwa, he highlighted to me that he had been linked by Aquamarine solutions to a local Non-Governmental Organisation that intended for him to help them build fish ponds in Binga this shows the importance of cooperation between the private sector and public sector to create food sustainability.



Picture 4: Own Source- Mr Tawonekwa and a group of youths digging a fish pond in Muzorori village.



Picture 5: Own Source- Mr Tawonekwa makes plantain through chicken manure in the sack
Table1

Agrimarine Solutions Harare Fish farming Training

Topic	Details
Introduction to fish farming	This is an introduction to the basics of fish farming so that one understands what they want to venture in and also to know the types of fish farming
Type of fish	<ul style="list-style-type: none"> • This encompasses knowledge on the types of fish one can farm. • The most common farmed fish in Zimbabwe being the Nile Tilapia /Kariba bream. • The topic also explains the advantages and weaknesses of certain fish types.
Land preparation and site selection	<ul style="list-style-type: none"> • Like any other agricultural activate land is prepared in a way that is favourable for production so in aqua farming the farmers learn about how to prepare the land. • Site is important as fish farming is not carried out in bushes but the land has to be cleared and takes into cognisance the prevailing direction of the wind as fish thrive in certain environments.
Pond Construction	<ul style="list-style-type: none"> • One does not dig for pond construction the way he does for pit latrine details are given as the polythene tent require well dug ground to install it. • The pond is to be constructed in a way that harvesting becomes easy. • Fish of different size swim at different depths so the pond has to be constructed with a depth and a shallow. • Digging of a pond starts from the ages so as to control the shape of the pond.
Water quality	<ul style="list-style-type: none"> • The ph. level of the water is important for the growth and survival of the fish.

	<ul style="list-style-type: none"> • Plantain is needed to provide nutrition and a proper habitation for the fish. • Clear water is not ideal for the fish.
Stocking density	<ul style="list-style-type: none"> • This is where you calculate the number of fingerlings a square metre. • An example of 5 fish per 1 square metre is required in the pond st modest. • This topic helps the farmer with the knowhow of the fish he can stock according to his area and is vital during construction.
Feeding and disease management	<ul style="list-style-type: none"> • Feeding is crucial in aquafarming as fish is sensitive to feeding time, they do not take well to random feeding they require a specific feeding time that is consistent daily. • The portion of the feed is vital as to much nutrients will lead to less oxygen which the fish need for survival. • Do not feed fish when they are gaping. • The type of feed also depends on the size of the fish as young fingerlings cannot be fed with pellets. • The topic on disease also equips the farmer with knowledge of the type of disease that affects fish and ways to treat the diseases.
Harvesting	<ul style="list-style-type: none"> • The stage where every farmer` investment is seen to be worthwhile is crucial, farmers are taught how to harvest and the hours of day when fish must be harvested. • The kind of nets that are needed per type of fish is leant during this topic • Preferably harvest fish early morning when its cooler. • Freshen the water 6 days before the harvesting.

Market and value edition	<ul style="list-style-type: none"> • Farmers are equipped on how to charge the fish especially according to weight. • The type of market is important for a farmer to be successful in the topic you are given hints on the best fish markets in your surroundings.
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Below is a feeding table by PROfeeds Aquafeeds Manual

Feed	Type	Duration	KG required	Feeds per Day	Fish Size
Starter 1 and Starter 2	Small and medium crumble	20 days	5KG	8	1-5g
Starter 3	Large crumble	20 days	10KG	6	5-15g
Juvenile 1	Small pellet	30 days	50KG	4	15-50g
Juvenile 2	Medium pellet	30 days	75KG	3	50-100g
Grower	Large pellet	100 days	450KG	3	100-300g

Challenges faced by Aquafarming farmers

Many farmers in Zimbabwe since the fast-track land reform program have haphazardly jumped from different farming products as the flooding of products on the market has affected consistence and some farmers have now lost hope and left the farming profession. During the Unilateral Declaration of Independence by Ian Smith the agricultural sector received heavy funding from government and results followed making Rhodesia a bread basket a title that was inherited by Zimbabwe post-independence. Farmers were the pride of the nation; the government recently has tried to fund the agricultural sector but with little or no success in most cases only the elite politicians have produced though some when they leave office seem to leave their farming boots in their former titles. Agriculture is a field where passion and patience play a vital role. Aqua farming like any other agricultural project that has been undertaken in Zimbabwe can become a flight by night project though it has many economic and health benefits. Water availability is one factor that can affect aquafarming as the ponds the fish ponds require water and the water is changed per circle so places like Chilonga in Chiredzi and other hot dry places may not reap the benefits of such an initiative. Fish farming also faces challenges as people face the risk of being sold to wrong fish seeds that are not favourable for farming in their areas, Zimbabwe as the economy hardens has become a haven for conmen who lure the populace by selling cheap imitations of products. At Mbare musika in Harare during the height of potato farming hype many farmers fail victims of buying seeds that would only produce flowers but a few potatoes. Those that want to venture in to fish farming must be protected from crooks who want to steal from them this can be done by community leaders and other stakeholders creating relationships with accredited suppliers of products of aquafarming. They are also challenges in building of fish ponds as some farmers just randomly

build without proper knowledge as the author discovered with one of the fish ponds in Muzorori village that was built in a bush, this is not good as many poisonous things may find itself in the pond thereby endangering the fish. They are incidents where the fish pond is built without consideration of how the wind blows in the area. One farmer Mr Blessing Nyamatumbu built a pond which was 2 metres deep which makes it hard for harvesting plus the fingerlings mainly swim in shallow waters, so there is need to educate farmers on the proper way of digging fish ponds. In Munatsi village the author discovered that the fish were not growing and this may be attributed to the lack of plantain in the water which had the colour of borehole water whilst green water is ideal for fish farming. The lack of growth in the fish may be due to lack of knowledge on how to feed the fish as Mr Munatsi in an interview I had with him had not no prior training in aqua farming and had acquired seed from a friend in Murape village who also is experiencing the same challenge of fish not fully developing even when they reach harvesting stage. The issue of funding remains challenging when it comes to fish farming as the first farmer to do aquafarming in Mhindurwa village Mr Muzambia has since hang the boots on the activity this he attributed to lack of funding as the Zimbabwe economy has left many leaving on hand to mouth bases so farmers after harvest and selling may not farm another season as the finances are diverted to other households needs. Also, at Muzorori village at the Chipfakacha ponds one of the ponds experienced mortalities of 3 weeks fingerlings and from my research it was due to the workers giving to much feed to the fish which made the water poisonous as it had to many nutrients thereby suffocating the fish of oxygen, a site of the fish gasping for oxygen in the morning led the author to this conclusion along with a confession from one of the workers. They are also issue of negligence of the farmers in checking the ph. level of the water as it has much bearing on the fish, most farmers in Seke are blindly fish farming with only profits in their sites whilst the whole six months towards harvest is important to ensure maximum results. In a questionnaire I carried out at Chikumbamarara growth point which links the 4 villages I studied of the 20 people I interviewed 10 being 40 and above and distributed among gender they thought that aqua farming was an important step in creating food sustainability especially in the years of drought, they suggested that the government thought he ministry of agriculture promote aqua culture by funding and providing trainings to greater lengths also they saw it as a solution to stop youth delinquency. Then of the 10 youths also divided among male and female that I conducted the questionnaire on 70% saw it as a hustle for the old as they pointed out that the land was mainly distributed among the old, they also complained about the time frame it takes before harvest. The 70% also cited that they were no readily available market as they would require to hire transport to go and sale there produce. Among the 30% they were excited and pointed out how the construction of ponds had helped earn money they also suggested the need for government support rural livelihood sustainable problem which they suggested would help make a reality President Mnangagwa`s vision 2030 agenda.



Picture 6: Own Source Wrong site for a fish pond in a bush

Advantages of aqua farming

- The only busy time is the construction of fish ponds, wants the projects begin it is less demanding on the farmer.
- Feeding does not take long it only jas to be carried out at a strict time routine.
- The project unlike pig farming and chicken farming where one is required to clean regularly they is no cleaning only changing of water that can be done during harvest or after harvest.
- It does nor require to much labour unlike growing potatoes that require labour regurlaly.
- It can be easily managed as most of the work entails feeding.
- It helps supplement diet with protein especially as an alternative to beef in Zimbabwe where for two years cattle have been dieng from diseases.
- Aqua farming does not utilise too much land that may affect our traditional communal farming.
- It is an answer to building rural economies and can help stop the pleg of land selling due to poverty in communal areas.
- It helps create a sustainable enviroment by utilising wetlands.

CONCLUSSION AND RECOMMENDATION

Aqua farming as a sustainable livelihood program has many benefits which include economical and nutritious benefits. Fish is highly nytritious a as it has high level of protein, in the day and age where they is a high rate of diseases that are killing cattle which make up most the diet for protein for most Zimbabweans fish farming can be a viable alternative to supplement beef. For most rural areas if the Seke success can be replicated aqua farming will help in the fight against poverty and create a sustainable economic benefit for farmers throughout the continent. Africa

has become a basket case when it comes to the issue of food production and aqua farming can supplement other agricultural practices in order to alleviate poverty and hunger within the continent. Land utilisation has been on the forefront in Zimbabwe as the yield per hectare has not been fully utilised, fish farming is one way of utilising land especially wet lands that are prohibited by the Zimbabwe constitution to build property on. The use of the various service providers to educate the population on how to successfully farm fish can help farmers to maximise profits and face little risk of loss in aqua farming. Fish ponds take a small area of land yet they produce huge profits compared to many farming products and aqua is cheap to manage as plantain can be made from chicken and pig manure. Less labour is required during the duration of fish cycle before harvest compared to tilling land that is time consuming.

- I recommend that the government put its full weight through the ministry of agriculture of Zimbabwe to help fund aqua farming in rural areas.
- The government should utilise on graduates from its agricultural colleges and those with agricultural degrees to help educate the rural population and service providers like Aquamarine solutions be subcontracted to drive the initiative.
- I recommend schools to start undertaking aqua farming as a taught practical subject so the young can know the benefits.
- The governments should subsidize aqua farmers in order to encourage them to practice it especially the youth as they are the muscles of the economy.
- Land should be redistributed to the youth especially those that have gone to agricultural colleges like what has happened in Burkina Faso since Ibrahim Traore took office.
- They should be a budget for rural farmers, the same way small scale entrepreneurs are considered this will help grow the rural economy independently.
- The young Africans should take initiative in participating in economic activities no matter the duration they take rather than always imagining rich quick schemes.

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