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Management for community development: Musoromuchena community engagement for lifelong learning and action for sustainable development fruit tree growing initiative

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Abstract
Lifelong learning (LLL) is important for rural development to impart knowledge, skills and technology that are constantly renewed for the betterment of society. This action research raises awareness on nutrition and health, environmental conservation and organising the community for fruit tree growing in Musoromuchena, Makonde District. Twenty volunteer families were used for the development of a three-year lifelong learning project that aims to equip the community with knowledge, skills and incubation of a fruit tree growing enterprise premised on nutrition, health, water, energy and environmental conservation issues for rural development. This baseline survey assessed knowledge levels and attitudes of participants whose results are informing the development of modules and frameworks for the project. Findings and observations show that the area has no safe water sources, fruit trees and has poor environmental conservation practices hence the project is confident that the fruit tree growing modules will go a long way to raise awareness of people on nutrition and health, fruit tree nursery, growing and harvesting for income generation.

Keywords: management, nutrition, community engagement, lifelong learning and sustainable development

Introduction: Background of the study

The Musoromuchena area is located in Mashonaland West province in the hilly parts on the western side of Manyamba Clinic and plots in the Kuduvale farm have a dam that supplies water for villagers throughout the year. In the winter season most villagers go fishing in the dam to get the protein rich different kinds of fish to provide relish for their families. The mostly grown crops in the plots are maize, groundnuts and sugar beans, which are seasonal. Most families grow vegetables but have not taken the initiative to grow different indigenous fruit trees in their homes making it difficult to provide their families with adequate vitamin sources in their diet. The available indigenous fruit trees are very few making insignificant dietary contributions worth mentioning. The majority of the population is composed of youths and young children who greatly require vitamins and mineral elements for their healthy being. Source of income is mainly the sale of crops that they grow during the rainy season due to lack of irrigation systems in the area.

The first Saturday of December each year is National Tree Planting Day in Zimbabwe and runs till April when the rain season comes to an end. The day was set aside in 1980 to launch the tree planting season. The purpose of this day is to motivate the nation to plant and conserve trees; enlighten the nation on the importance of forest and woodland resources; and to enhance household food security, as alluded to by the Environmental Management Agency Report of 11 December 2014. In Zimbabwe deforestation remains the largest threat to the country's forests and fruit trees have not been spared. This deforestation has also been conversion of forestland to farms, ranches, or urban use. In the Musoromuchena area, Kuduvale farm has been demarcated into six-hectare plots accommodating nearly hundred families. The farm has a dam with lots of fish. Regardless of this all year-round source of water; the locals have not been keen to join the national tree planting programme

Elsewhere, the International Small Group Tree Planting Programme (TIST) has grown to include 65,000 farmers in Kenya, Tanzania, Uganda and India, from a starting point of 75 participants in Tanzania. The programme was inspired by people who were living in a non-cash economy following a famine and the desire to help- achieve SDGs 1-no poverty, 2-zero hunger, 3-good health and well-being and 11-sustainable cities and communities. One of the things people there, especially women, wanted to do was to plant trees so that they could cut the time they spent gathering firewood and water in the dry season. The project included setting up small community groups that were responsible for organising themselves into fruit tree planting teams, and for spreading knowledge and word to their neighbours who can also get involved in the project. The organisers were inspired by how people wanted to do environmentally sensitive things on their own farms.

Mejos, Cervo, Calayo *et al*. (2015) [5] observed in the Philippines that indigenous fruit trees are underutilised in some regions native to the area, and that the indigenous trees are less popular than their imported counterparts due to the lack of familiarity and promotion to the general public. Although several campaigns and food-based initiatives have been made by industries in promoting common fruits and vegetables as a healthful diet to the Filipino people, the lack of promotion of the nutritional and health value of less-known indigenous plants through print media fails to encourage availability, access, and consumption of such. This is also observable in Zimbabwe's rural and urban settings were mostly exotic fruits are sold and are in high demand as compared to the indigenous fruits. An extensive literature research and compilation of updated information of indigenous, less-known

high value fruits and vegetables is necessary to help mainstream and promote the latter. Most recent data on the nutritional composition, functionality and active biological components, recipes and recommended method of preparation to maximize nutrients for consumption need to be done.

Problem Statement

Musoromuchena area of Makonde District has a few remaining indigenous plants and trees that contribute to the supply of food providing vital nutrients to the rural populace and their relatives from the urban areas. There is a wide variety of wild indigenous fruits and vegetables that enrich the diet of the local people. These plants and trees are looked down upon by many people especially among the youths, yet they are of considerable horticultural and nutritional significance. Their fruits are available at certain periods of the year when the more common sources are very scarce or completely unavailable, especially in the winter and early summer seasons (June to October). These crops could do very well with little care and without the use of costly agricultural inputs such as fertilisers, herbicides and pesticides and could be complimented with exotic fruit trees. The fruits are edible in their fresh state making them rich sources of nutrients including ascorbic acid, vitamin A, C and minerals with health-promoting benefits. Regrettably, many of these indigenous fruit trees have been cut down to pave way for the growing of crops such as maize by the resettled farmers who benefited from the land reform programme of 2000. Besides nutritional benefits, the trees are also of considerable environmental significance but are threatened by deforestation arising from uncontrolled wood felling activities. Moreover, because of poor postharvest handling practices, the few highly perishable fruits being harvested from the remaining few trees suffer considerable postharvest losses, reducing their contribution to food security. There is therefore the need for the planting of many indigenous and exotic fruit trees to boost nutrition and at the same generate income among the resettled families in the Musoromuchena area. The families also require training in value-added processing of these fruits into shelf-stable products to reduce postharvest losses and promote their utilisation and cultivation that's promoting rural entrepreneurship. There is need to empower rural communities with easily manageable affordable projects for sustainability and development of their communities for the attainment of the sustainable development goals (SDGs 2030) 1, 2, 3 and 5.

Research Questions

- What are the knowledge levels of the Musoromuchena area residents on the available indigenous fruit trees in the local community and their uses?
- What is the community doing to preserve/conserve the trees and to ensure everyone benefits from these trees?
- Are the trees adequate to cater for the population's needs?
- What is the community doing to augment the indigenous fruit trees' supplies in order to meet local community's nutritional requirements?

Justification

People leaving in rural areas mostly depend on farming as a source of income and usually get money once a year after selling their produce except for a very few who have irrigation schemes. Musoromuchena families have no irrigation schemes hence, fall in the one-off salary per year group. This project therefore becomes a life line if it succeeds, as it will grow into a cash spinning venture where families grow both indigenous and exotic fruit trees for their consumption and for income generation. The project will help eradicate extreme poverty (SDG 1) and hunger (SDG2), good health and well-being (SDG 3) and promote gender equality and empower women (SDG 5) as SDG 11. Women form the bulk of the population in the area since men are working in the urban areas or seeking employment. So the project will empower women to get income for self-sustenance at the same time not discriminating the men in the area. It will also ensure environmental sustainability (SDG 11 sustainable cities and communities); by planting more trees we will prevent soil erosion, whether degradation, provide shade and greening the environment. This is in adherence to the Report of the United Nations Conference on Environment and Development of 1992 that called for countries to intensify their collective efforts for the management, conservation and sustainable development of all types of forests. The project in the long term will also equip the community with postharvest skills, create employment and networking with other communities and most importantly improve livelihoods of the families in this community.

Literature Review

According to Okigbo (1977) and Aworh (nd) the African continent has hundreds of indigenous plants crops that contribute to food security and play vital roles in the nutrition of the people, particularly the rural populace. However, there is very little knowledge, especially written work about these valuable fruits and vegetables. Among these is a wide variety of wild indigenous fruits and vegetables that enrich the diet of the rural populace. According to the Environmental Management Authority 2014 Report, trees provide a wide range of ecological goods and services including the removal of carbon in the form of carbon dioxide from the atmosphere during the process of photosynthesis but release some carbon dioxide back into the atmosphere during normal respiration; promotes transpiration, provide food, cooking fuel and some have highly valuable medicinal qualities. Forests provide food such as mushrooms and edible insects and are habitat for activities such as beekeeping and are important medicine for people and livestock. These fruits and vegetables are available at certain critical periods of the year when the more common sources are very scarce or completely unavailable (Okigbo, 1977). The fruit trees thrive with little care and without the use of costly agricultural inputs such as fertilisers, herbicides and pesticides (Okafor, 1981) as compared to the exotic fruit trees. Cangao (2011) [1] says Africa is a treasure trove for medicinal plants found nowhere else in the world. Traditional African medicine is effective and still remains as the main source of remedies for the continent, servicing the needs of up to 80% of the population. Cangao further asserts that though little research and development has been done, these plants remain a viable source for the development of new drugs and health supplements. Though Western media usually depicts Africa as a dry and arid land, it has a wide range of ecosystems including mangrove swamps, savannahs, and rainforests. While rainforests and swamps are abundant with medicinal plants, dry places like savannahs and deserts contain fruit-bearing trees that are packed with nutrients and therapeutic value. Zimbabwe's Makonde District, Musoromuchena area is one such area that contains a

variety of such fruit trees. Fruits from these trees can be classified as "super fruits" a term used to describes fruits with both high levels of nutrients and anti-oxidants that help fight certain diseases and ailments. Some known examples include blackcurrants, blackberries, cranberries, and pomegranates. While African fruits contain the same properties, they are not that well-researched due to the dismissive nature of some scientists, magnified by colonial suppression, religion inhibitions, lack of political will, (Mejos *et al*., 2015; Cangao, 2011) [5, 1]. Nonetheless, these fruit trees have the potential to be the source of revolutionary remedies that could save locals who cannot afford the now very expensive modern health institutions in Zimbabwe. Besides affordability, health services are also deteriorating with drugs hardly available especially for the poor.

These fruits that are consumed in the fresh state are rich sources of nutrients including ascorbic acid, vitamin A, folate, minerals and nutraceuticals with health-promoting benefits. Mason and Levesque (1996) alluded that inadequacy of folate results in abnormal DNA methylation and synthesis, chromosome breaks, and disruption of DNA repair. Most fruits are naturally low in fat, sodium, and calories. They are sources of many essential nutrients that are under consumed, including potassium, dietary fiber, vitamin C, and folate (folic acid). Diets rich in potassium may help to maintain healthy blood pressure. Fruits and vegetables are rich sources of carotenoids, vitamins C and E, folate, and dietary fibre, as well as plentiful other phytochemicals that may restrain carcinogenesis that are known to cause cancer (Zhang, Hunter, Rosner, Giovannucci, Graham, Frank, and Walter, 2000).

Regrettably, many of these indigenous fruit trees that are also of considerable environmental significance are threatened by deforestation arising from uncontrolled wood felling activities and veld fires as observed in the Musoromuchena area. During the months of August to November most parts of Zimbabwe are known to be lack due to rampant veld fires. The Zimbabwe Parks & Wildlife Authority define veld fires as blazes that get out of control and become wild, and in the process destroy extensive tracts of forests, grasslands, animals, people and their properties. Fire, as part of natural process has a positive role in the vegetation structure and composition, and helps recycle nutrients contained in old and dead trees. There is, however, concern in Zimbabwe that the frequency, extent and pattern of burning are increasing due to human activities. Statutory Instrument 7 of 2007 as read with Environmental Management Act (CAP 20:27), no person is allowed to light a fire outside residential and commercial premises during the period July 31 to October 31 of each year.

Growing and preserving the fruit trees is in line with the UN set 2030 SDGs 1, 2, 3 and 11 that focus on eradication of poverty and hunger, addressing issues of gender equality and empowerment of women as well as ensuring environmental sustainability. According to the Millennium Development Goals Report of 2015, the report confirms that goal-setting can lift millions of people out of poverty, empower women and girls, improve health and well-being, and provide vast new opportunities for better lives. Thus, this research aims to assist in the achievement of previously MDG 1, 3 and 7 (now referred to as 2030 SDGs 1, 2, 3, and 11) in the Musoromuchena area.

According to Ife Fitz James, Bas Kuipers (2003: 6) [3] most of our food consists of agricultural products, which are usually seasonal and they spoil quickly. So to make food available throughout the year, humans have developed methods to preserve or prolong the storage life of these products. This can be done by adding preservatives, optimizing storage conditions, or applying modern techniques. RADA Diaries (2015) alluded that post-harvest management is important to maintain the good quality of the harvested produce for the market, to reduce the level of losses in weight and quality after harvest and as a result the shelf/storage life of the produce is extended. Goredema (2013) [2] observed that because of poor postharvest handling practices, these highly perishable fruits suffer considerable postharvest losses, reducing their contribution to food security. There is therefore the need for value-added processing of these fruits into shelf-stable products to reduce postharvest losses and promote their utilisation and cultivation.

Some of the fruit trees below are found in the Musoromuchena, while others are what the project would try to grow. The following pictures and narrations were taken from http://thesovereignstate.org/indigenous-fruits-of-zimbabwe article entitled Indigenous Fruits of Zimbabwe, Posted by Baynham Goredema and from Indigenous Knowledge, Sustainability; from http://newsvyb.com/zimbabwean-fruits-zimbo-must-try-once/#.WEGnOrmClQA 11 Zimbabwean fruits every Zimbo must try at least once.

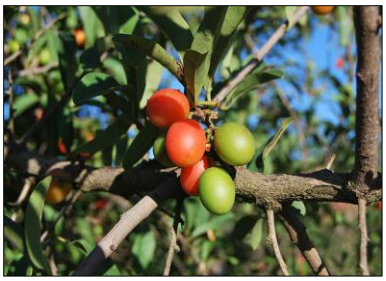

Fig 1: *Nhengeni – Ximenia caffra, sour plum in the family Olacaceae. There is another species of Ximenia commonly found, which is Ximenia americana.*

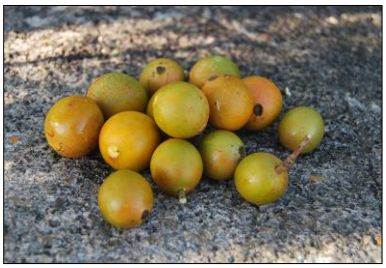

Fig 2: *Matunduru or Mutunduru – (Garcinia buchananii, granite mangosteen, in the Clusiaceae)*

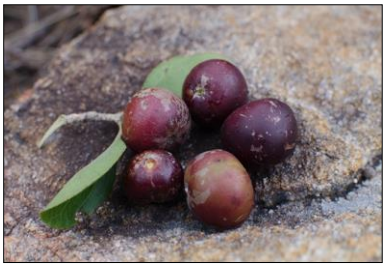

Fig 3: *Nhunguru – Flacourtia indica, governor's plum, in the Flacourtiaceae*

Fig 4: *Hubva/Tsubvu – Vitez mombassae, in the Lamiaceae. Known as smelly-berry fingerleaf, according to the Zim flora website,* www.zimbabweflora.co.zw. They are green and turn black when ripe.

Fig 5: *Masawu – Ziziphus, probably Ziziphus abyssinica, or jujube, in the Rhamnaceae*

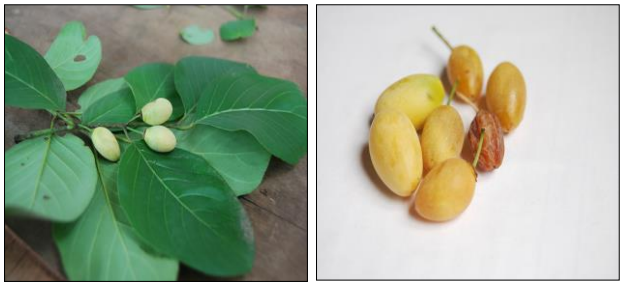

Fig 6: *Nyii – Berchemia discolor, birdplum, also known as 'African sweets', in the Rhamnaceae*

Fig 7: Dried Nyii

Fig 8: *Masekesa – Piliostigma thonningii, monkey-bread, in the Caesalpinioideae section of the Fabaceae family (legumes)*

Fig 9: Ripe *Hacha or Muhacha – Parinari curatellifolia, mobola plum, in the Chrysobalanaceae, green when not ripe.*

Fig 10: *Nzambara – Carissa edulis, simple-spined num-num, in the Apocynaceae*

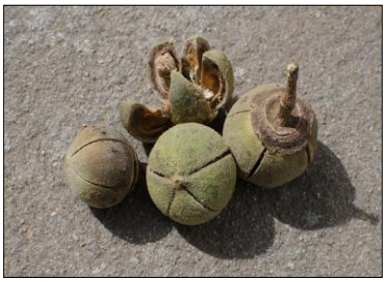

Fig 11: *Matohwe – Azanza garckeana, snot-apple, in the Malvaceae*

Fig 12: *Madhorofiya/Madhorosiya – Opuntia, prickly-pear. Cactaceae. Introduced to Africa long ago. Sometimes categorised as invasive. There are no native cacti species in Africa.*

Fig 13: *Matamba – Strychnos. Most edible ones are known as monkey-orange in English. Family Strychnaceae. (Left) they are green and unripe on the, (Right)they are yellowish brown and ripe.*

Fig 14: *Tsambatsi – Lannea edulis in the Anacardiaceae. The Zim flora website calls it 'wild grape' but I haven't heard that name, and it's not in the grape family.*

Fig 14: *Mususu – Looks like Lantana camara to me. A seriously invasive plant introduced to South Africa over a hundred years ago and spreading rampantly throughout the southern hemisphere. Family Verbenaceae*

Fig 15: *Hute or Mukute – Syzygium cordatum, waterberry, in the Myrtaceae.*

Fig 16: Mazhanje/Amazhanje *Uapaca kirkiana*, commonly known as Mazhanje, Mahobohobo or Wild Loquat. The tree is called *Casimiroa edulis*,

Fig 17: Mahuyu/Baobab

This fruit has a whitish powdery appearance around the seed. It can be sucked or gently pounded to separate the white powder and the seed (without breaking the seed!) into a powder**.** The powder can be mixed with porridge or used to prepare a beverage. The baobab fruit is rich in vitamin C, thiamine, vitamin B6, fibre and calcium.

Methodology

The base line survey was meant to establish the current state of affairs and engaged the local people to develop a community-based fruit tree growing project at family level as well as community level. The population is Dzikamunhenga village in Musoromuchena area. A sample of twenty families was selected on voluntary basis to ensure participants are intrinsically motivated for the uptake of the second phase of the research which will be an action research. Questionnaires were distributed to forty members of the ten volunteer families. However, due to the low literacy among the adults 55% of participants aged 21 (especially females) and above, where interviewed while 45% in these families were able to fill in the questionnaires. The survey forms the basis for the initiation of a fruit tree growing project to assist the local people meet their families' nutritional needs as well as generate income to meet other household expenses. The research is meant to improve the quality of life for the villagers resulting in sustainable rural development such as small post-harvest factories.

Research Findings and Discussions

Table 1: Demographic data of Research Participants N=40

Gender	Age Distribution (years)					Highest Educational Level			Position in family	
	15-20	21-29	30-39	40+	Total	Gr. 5	Gr. 7	High School	Parent	Child
Males	5 (12.5%)	4 (10%)	5 (12.5%)	10 (25%)	24 (60%)	8 (20%)	10 (25%)	6 (15%)	8 (20%)	16 (40%)
Females	7 (17.5%)	2 (5%)	3(7.5%)	4(10%)	16(40%)	7 (17.5%)	6 (15%)	3 (7.5%)	12 (30%)	4 (10%)
Totals	15 (37.5%)	6 (15%)	8 (20%)	14 (35%)	40 (100)	15 (37.5%)	16 (40%)	9 (22.5%)	20(50%)	20 (50%)

Table 1 shows that there were 24 (60%) male participants in this research with 10 (41% of the male population) of these males in the 40+ age range and ten males with a highest educational qualification of grade 7. Eight of these men were parents while 16 were male children. Eighteen of the males hold primary school qualifications and only 6 males attended high school. The table further shows that there were 16 female participants with 7 of them in the 15-20 age range (17.5%) of the total participants. Four women in the study were above 40 years with 3 women in the 30-39 age range. These show that most women in the village are still young and may also indicate prevalence of early girl child marriages, and the more need for the provision of education in fruit tree growing to meet high nutritional requirements for their families. The age discrepancies in the female parent might also show polygamous marriages as children in the family had too close age range with mothers in the sample. Most females (13) have a primary education level with 7 having gone up to grade 5. Only 3 attended high school and these being children in the ten families selected for the research. The community seems to be more supportive of sending the male child to school than the girl child.

Table 2: List of indigenous fruit trees available in Musoromuchena area, Dzikamunhenga village and their uses from the perspective of participants

Indigenous Name	Scientific Name	Uses as perceived by participants
Muchakata/Muhacha	*Parinari curatellifolia, mobola plum, in the Chrysobalanaceae*	Traditional ceremonies venue, fruits, beverage, toothbrush
Munhunguru	*Flacourtia indica, governor's plum, in the Flacourtiaceae*	Fruits, firewood
Mutamba	*Strychnos, but not sure which one. Most edible ones are known as monkey-orange in English. Family Strychnaceae.*	Fruits, firewood, hosho (jiggles), porridge, beverage
Musekesa	*Piliostigma thonningii, monkey-bread, in the Caesalpinioideae section of the Fabaceae family (legumes)*	Fruits, animal feed, beverage, firewood,
Mutsubvu	*Vitez mombassae, in the Lamiaceae. Known as smelly-berry fingerleaf,*	Fruit, firewood
Munzvirumombe	Vangueriain fausta, known in English as Velvet wild medlar or African medlar, in Shona as munjiro, munzviru or munzvirwa and in Ndebele as umviyo.	Fruit, Firewood. Contains significant amounts of vitamin C, sodium, calcium and magnesium, as well as carbohydrates and protein. It has a number of medicinal uses too. An infusion of the roots and leaves is reputed to treat malaria, chest pains, pneumonia and ring worm. It is also believed to be a good treatment for snake bites.
Mubhubhunu		Fruits, firewood, snake repellent
Munhengeni	*Ximenia caffra, sour plum in the family Olacaceae*	Fruits,
Nzambara/Mbambara	*Carissa edulis, simple-spined num-num, in the Apocynaceae*	Fruits
Mutohwe	*Azanza garckeana, snot-apple, in the Malvaceae*	Fruits, firewood
Mukute	*Syzygium cordatum, waterberry, in the Myrtaceae*	Fruits, firewood

The medicinal value of the fruit trees mostly came from the older men and women while the nutritional value of the indigenous fruit trees in the area came from the younger children in the 15-20 year age range showing the role played by the school system especially the Content subject at primary school level. The adults only referred to the satisfying aspect of fruits when one is hungry with one interviewee saying in Shona vernacular, " Kana tichifamba musango tiri parwendo kana kuti tichifudza mombe, hatichemi nzara nekuti tinodya michero iri mumasango edu, zvikuru sei nguva yekunaya kwemvura" Translated into the English language, the interviewee said, "Our forests are blessed with many different fruit trees especially during the rainy season such that we never go hungry while herding cattle or even when travelling on foot through the forests" When pressed further to explain the nutrients in these fruits most of them said, "Izvo zvekuti munowanikwa chii nechii mumuchero zvotoda imi vakaenda kuchikoro, isu tinongodyira kupedza nzara uye kurapa zvirwere sezvinoita zvibhubhunu". ("We do not know the nutritional content of the fruit trees but we only eat these to overcome hunger. What we know for sure is that some of the fruit trees also have medicinal properties for example the ones we use as medicine for malaria, pneumonia, cough treatment, stomach aches, snake repellents and for rain making ceremonies").

On the other hand, the younger participants are not very much aware of the medicinal and herbal value of the trees in their area an indicator that indigenous knowledge is not being adequately passed on to the younger generation. Raising awareness among the children would be important so that this great value of the different tress does not die with the older generation. With the rise in healthcare services in Zimbabwe, it is important that the indigenous knowledge on the nutritive, herbal and medicinal value of trees is recorded and if possible taught in the school curriculum. This would help boost nutrition and save lives in situations where it is not easy to access clinics and hospitals. The findings have shown low knowledge levels on the nutritive value of fruits in the Musoromuchena area among the adults, while little knowledge on the medicinal value of the trees exist among the 20 and below age ranges but a lot needs to be done to boost the knowledge levels about both nutritive and medicinal value among villagers in order to help preserve these indigenous fruit trees. Over and above that, there is need to conscientise villagers on the economical value of these indigenous trees. People can only appreciate the existence of these trees if they know the value of the trees to their day to day living.

Conservation of the indigenous fruit trees

The chief has declared that no fruit tree should be cut down however the implementation and monitoring mechanics have loopholes. Researchers observed that fruit trees are being cut down when farmers clear land for farming and gardening. Trees such as Michakata (*Parinari curatellifolia, mobola plum)*, mitohwe (*snot-apple)*, misekesa (*monkey-bread) and mitsubvu (smelly-berry fingerleaf)* were notably cut down. No conscious effort is put by villagers to conserve, grow and nurture indigenous trees.

Looking at the growing population in the village, the trees are no adequate to meet the demands for fruits in the village. The predominant fruit trees are the Munzvirumombe (Velvet wild medlar), Musekesa, Muchakata, and mubhubhunu. The Sclerocarya birrea, commonly known as marula, (Mapfura) known to be rich in Vitamin C does not grow in this area. As much as 200mg vitamin C per 100g has been recorded in the marula pulp which is approximately four times that of oranges and comparable to the amount present in guavas and black currents. Even the guava trees that are common in rural areas of Zimbabwe are not available in the Musoromuchena area. Maroro,

Hute, Masawa, Mazhanje/Mshuku and Tsambatsi are not available in this area.

The worrying trend is that villagers, especially the adults, are not doing anything to rectify the situation. They are not growing or conserving the indigenous trees and at the same time they are not growing the exotic trees such as mangoes, peaches, paw paws, apples, bananas and the guavas to augment their diet or for economic sustainability. This project is a move to help conscientise villagers on the importance and value of growing and conserving indigenous fruit trees and introducing other fruit trees for good health. Poverty elimination starts with our efforts to achieve SDG 2 zero hunger.

Recommendations

Because of varying awareness levels on the value of fruit trees in the Musoromuchena area, this research recommends an extensive and serious awareness drive among the Nzikamunhenga villagers in Musoromuchena area. This research should then expand to neighbouring villages. The starting point will be a meeting with the Chief to agree on the modalities, followed by meeting the headman and then meet the villagers to get buy in. Mobilisation of resources will rope in the Forestry Commission, local councillors and business community. A pilot project to grow fruit trees will begin with nursery planting and preparation for transplanting. All families will be persuaded to take part in the project which has a long-term plan of being an intensive fruit tree growing for commercial purposes. There is need for villagers to be educated on the importance of fruits in the diet for them to be motivated into growing fruit trees leading to the success of the project.

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