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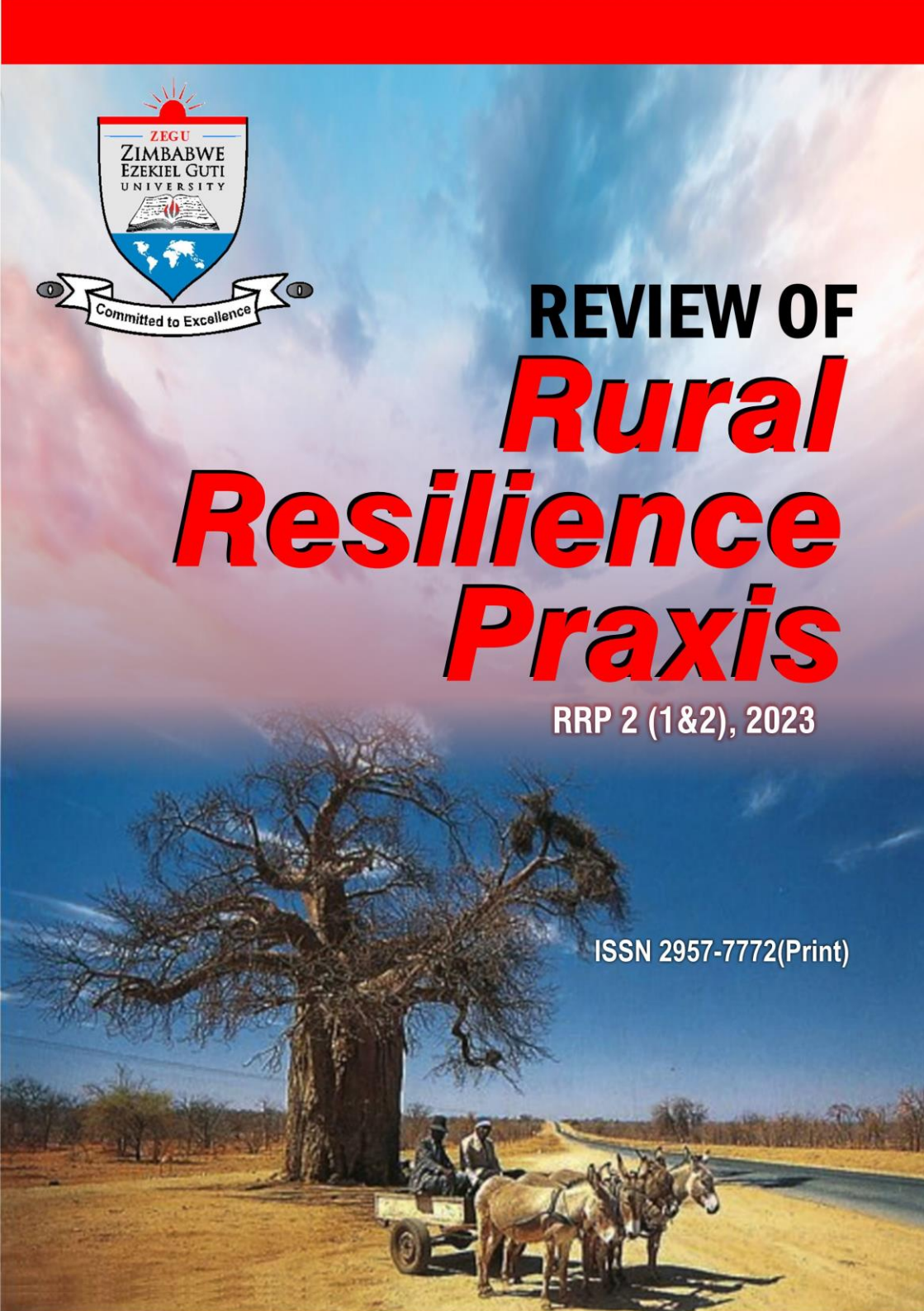
REVIEW OF Rural Resilience Praxis

RRP 2 (1&2), 2023



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About the Journal

JOURNAL PURPOSE

The purpose of the *Review of Rural Resilience Praxis is* to provide a forum for disaster risk mitigation, adaptation, and preparedness.

CONTRIBUTION AND READERSHIP

Sociologists, demographers, psychologists, development experts, planners, social workers, social engineers, economists, among others whose focus is that of rural resilience.

JOURNAL SPECIFICATIONS

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SCOPE AND FOCUS

As much as the urban territory is increasing by each day, the rural economy, especially in many developing countries, still retains a great proportion of the extractive and accommodation industry. Retaining some space as rural remains critical given the sectors role in providing ecosystem services to both wildlife and humanity. In this light, rural resilience as practice beckons for critical studies especially in the face of the ever-threatening extreme weather events and climate change that then impact on the livelihoods and lifestyles of the rural communities. Review of Rural Resilience Praxis (RRRP) comes in as a platform for critical engagement by scholars, practitioners, and leaders as they seek to debate and proffer solutions of the rural sector as well as trying to champion the philosophy of the right to be rural. The issue of conviviality between the different constituencies of the sectors, compiled with the competing challenges of improving rural spaces while also making the conservation, and preservation debates matter is the hallmark of this platform of criticality. The journal is produced bi-annually.

Guidelines for Authors for the Review of Rural Resilience Praxis

Articles must be original contributions, not previously published and should not be under consideration for publishing elsewhere.

Manuscript Submission: Articles submitted to the *Review of Rural Resilience Praxis*are reviewed using the double-blind peer review system. The author's name(s) must not be included in the main text or running heads and footers.

A total number of words: 5000-7000 words and set in 12-point font size width with 1.5 line spacing.
Language: British/UK English
Title: must capture the gist and scope of the article
Names of authors: beginning with the first name and ending with the surname
Affiliation of authors: must be footnoted, showing the department and institution or organisation.
Abstract: must be 200 words
Keywords: must be five or six containing words that are not in the title
Body: Where the authors are more than three, use *et al.,*
Italicise *et al.*, *ibid.,* words that are not English, not names of people or organisations, etc. When you use several authors confirming the same point, state the point and bracket them in one bracket and in ascending order of dates and alphabetically separated by semi-colon e.g. (Falkenmark, 1989, 1990; Reddy, 2002; Dagdeviren and Robertson, 2011; Jacobsen *et al.*, 2012).

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Perceptions of Villagers on Traditional Food Crops Production in Response to Climate Change in Bocha Village, Manicaland Province, Zimbabwe

TINASHE MWAROZVA[1]

Abstract

Based on the qualitative approach, this research highlights an assessment of the perceptions of villagers on traditional food crop production in response to climate change. The study was inspired by the need to unearth views on traditional food crop production, how they are produced in the wake of climate change and the mitigation measures they employ to ensure food security and poverty reduction. The study was undertaken in Bocha Village in the Manicaland Province of Zimbabwe. The Indigenous Knowledge (IK) theoretical framework used hypothesised ways of knowing, seeing and thinking, passed down orally from generation to generation and that reflect thousands of years of experimentation and innovation in all aspects of life. A sample of 10 was drawn using purposive sampling. Data was gathered using semi-structured interviews and focus group discussions with participants. Findings were thematically presented. The study revealed that villagers view traditional food crops as food security commodities with drought-tolerant and climate mitigation potential produced using indigenous knowledge systems. They also reduce poverty through commercial and nutritional benefits derived from their processing.

Keywords: *adaptation; mitigation; drought, food security, indigenous knowledge systems, poverty*

INTRODUCTION

The consumption of traditional food crops among African societies has been highly revolutionised since pre-colonial days due to exotic cultural interactions, shifting from being considered poor man's food crops to

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nutritious strategic food crops (Sanchez, 2004). This has resulted in the low uptake of indigenous food crops that are highly nutritious and adaptive to the local climatic environment. Most farmers no longer grow these crops at all including those located in arid and semi-arid regions of the country. Maize has become the preferred crop grown by smallholder farmers in the region, although it is characterised by very low yields. Semi-arid regions of Zimbabwe are adversely characterised by adverse climate changes that include erratic rainfall, excessive temperatures, mid-season droughts during the growing season and low soil fertility that sustain agricultural production under continuous cultivation (Mapfumo and Giller, 2001).

Increasing food productivity is a priority concern of the Hunger Task Force of the United Nations through strategies to sustain the Millennium Development Goal 1 (FAO, 2011), through Sustainable Development Goals (SDGs), thus the ability of farmers to produce more nutritious food per unit area of land. Traditional food crop production systems are critically used as adaptation methods to address climate change problems that minimise crop failure by using drought-tolerant traditional crop varieties (Achamwie, 2015), hence reaching poverty reductions and food security objectives of a nation (SEAVEG, 2012).

Over the last decade, production of traditional food crops by smallholders has declined due to numerous factors that include financial, social and environmental factors. Thus, farmers are now focusing mainly on cash crops, such as tomatoes, tobacco, flowers and soya-beas production, although these production systems fail in marginal areas due to adverse climate change. Traditional food crops play a crucial role in addressing food security and malnutrition and boosting the HIV/AIDS immunity of positively infected patients (ZIMSTAT, 2012).

Cultural interactions, urbanisation and negative perceptions have contributed to the neglect of traditional food crop production and consumption. Traditional agriculture is one of the high-priority sectors in the rural village setup where the impacts of climate change exceed tolerance limits. Climate change projections for rural villagers are inherently severe, bringing difficulties to people living in marginal areas for whom achieving food

security is already problematic and is the most pressing challenge as the nation seeks to nourish its people to sustain the MDGs through SDGs. These points necessitated an assessment of the perceptions of traditional food crops as a key source of information on adaptive capacity among villagers to build resilience to deal with climate change stresses.

THEORETICAL FRAMEWORK

Indigenous knowledge hypothesises the ways of knowing, seeing and and thinking, passed down orally from generation to generation and reflect thousands of years of experimentation and innovation in all aspects of life in a particular context (Kang and Banga, 2013). IK theory is grounded in an indigenous worldview that operates on seven principles (Simpson, 2000). The seven principles of indigenous worldviews are: the knowledge is holistic, cyclic and dependent upon relationships and connections to both animate and inanimate beings; there are many truths and these truths are based on individuals' experience; everything has life; all things are equal; the land is sacred; the relationship between humans and the spiritual world is relevant and humans are least significant in the world. According to Demi (2014), these principles differentiate IK based on social constructionism from other forms of knowledge.

It is observed that "Indigenous knowledge" specifically refers to the epistemic salience of cultural traditions, values, belief systems and worldviews that, in any indigenous society, are imparted to the younger generation by community elders (Dei, 2004). Advocates for IK theory have highlighted the potential it holds in addressing contemporary glitches such as poverty, hunger and underdevelopment (Moock and Rhodes 1992; Esiobu, 2019).

LITERATURE REVIEW

Southern Africa, Zimbabwe included, is vulnerable to climate change, causing social, economic, ecological and environmental stresses (Lichtfouse, 2012). The stresses compound communities' susceptibility to vulnerability. Elevated temperatures, unpredictable precipitation and increased frequency of droughts and floods are combining to cause biodiversity loss, depressing crop yields and increased production risks (Achamwie, 2015). Due to climate change, impacts on food dimensions which include food availability, food accessibility, food utilisation and stability have been eroded (Ganpat, 2015). Traditional food crops such as Cleome gynandra, Amaranthus, loquats, sorghum, millet, cowpea and Bambara nuts, originally from Eastern and

Southern Africa, have a long history of cultivation, domestication and use in African communities (Grubben and Denton, 2004; Shackleton *et al.*, 2009; Nyakupfika, 2013). However, the production of traditional crops has been constrained by the negative impacts of climate change and inadequacy of scientific knowledge. The change in African diets to western dishes has further eroded the cultivation and use of these traditional food crops. This has led to underutilisation of traditional food crops, resulting in increased food insecurity and malnutrition (Shackleton *et al.*, 2009, Ng'tich *et al.*, 2012;). Traditional food crops have been used as livelihood strategies of escaping hunger during times of femine (Legwaila *et al.*, 2011). The importance of traditional food crops as a supplement for medicines and hunger survival strategy, is being overlooked (*ibid.*). Understanding farmers' perceptions towards traditional food crops is crucial in incorporating indigenous food plants into existing food systems at the advent of climate change (*ibid.*).

RESEARCH METHODOLOGY

The study used the interpretivism and a case study approach, focusing on Bocha. A sample of 10 respondents was drawn based on the quality of information gleaned from views given to the research. Data was collected through key informant interviews, semi-structured interviews and focus group discussions. This systematic analysis involved the researcher devising a coding system to classify information or themes.

RESULTS

Perceptions accounted for in this article are purposively from villagers who are producing traditional food crops in Bocha Village, Manicaland Province as identified by traditional leaders of the village.

TYPES OF TRADITIONAL CROPS AND REASONS FOR THEIR PRODUCTION

From the interviews, respondents indicate that they grow a wide variety of traditional food crops representing broad categories of cereals, legumes, root and tuber crops and leafy vegetables.

Millet *(Panicum species)* and sorghum *(Sorghum bicolour)* known by villagers as *zviyo* and *mhunga* are common traditional cereal crops grown in Bocha Village. One of the farmers interviewed for this research revealed that:

> "Millet and sorghum are the cereal crops we grow since the time of our ancestors for *sadza* in Bocha Village that is prone to high temperatures and erratic rainfall."

These crops represent cereal crops and have been indigenised due to many years of cultivation and natural and farmer selection. Cultivation of millet and sorghum is practised mainly at a subsistence level by smallholder farmers in arid and semi-arid conditions where water and excessive heat are limiting factors for crop growth. These findings are congruent with the finding by Bichard *et al.* (2004) who concluded that the production of millet and sorghum is intensified in villages where maize (cereal) normally fails due to droughts.

Millet and sorghum are crops grown in Bocha Village for their nutritional values which respondents believe are vitamins and carbohydrates. In the focus group discussion, it was reiterated that: "We grow these cereal crops because they have high nutrient value."

The fact that these cereals contain balanced nutrients makes them suitable crops for combating nutritional challenges to Bocha households. Millet and sorghum are often referred to as "high-energy" cereals as they contain high oil content, protein and vitamin A (NRC, 1996). Compared with other cereal grains such as maize, oats and wheat, sorghum and millet are less susceptible to pests and diseases (*ibid.*). Hence the IK theory has shown its ability to transfer the worldview of traditional knowledge to later generations through years of trial and error in the context of cereal production for sustainability under drought conditions.

Bambara groundnut (*Vigna subterranea*) or (*nyimo*) and Cowpea (*Vigna unguiculata*) or *nyemba* are the oldest legume crops grown in Bocha Village with their level of domestication in the area being closely related to millet and sorghum through IK preservation. Traditionally, these legumes are cultivated in Bocha village where rainfall is erratic, limited access to irrigation and fertilisers, with little guidance on improved agronomic practices. From the interviews, it emerged that:

> "We grow Bambara groundnuts and cowpea because they are crops that we have grown since childhood, rainfall in the area is erratic, our water sources cannot keep water for long and we cannot afford fertilisers."

They have been produced mainly for the sustenance of families as a complement to cereals. To the villagers, they serve as important sources of

protein in their diets. Cowpea leaves are consumed as vegetables, while cowpea and Bambara groundnut seeds are eaten in the same manner as dry beans. From the focus groups, it was highlighted that: "We eat the legumes together as a family; cowpea leaves are vegetables whilst the seeds are boiled for relish as we cannot afford meat."

When utilised both as leafy vegetables and grain legumes, these crops have the potential to close the hunger gap that often plagues farmers during periods before the next harvest. When used in this way, they have significant potential to contribute towards food and nutrition security by providing vitamins, minerals and protein (Bressani, 1985).

The legumes' drought tolerance and low levels of water use potential make them ideal crops for cultivation in semi-arid areas of Bocha, which continues to face an increased frequency and intensity of droughts and impoverished soils due to climate change. Through integration with other communities, these legume crops have become to be known to replenish nitrogen in the soil through nitrogen fixation. "Mutsubvu" (pseudonym) said, "Most of the time, this area experiences high temperatures and low rainfall and the soil is evident of nutrient deficiency but we always have a harvest to store each year."

From these sentiments, in can be seen that these legumes are drought tolerant and have soil-replenishing potential that is important to villagers who are unable to afford inorganic nitrogen fertilisers. Thus, they are important crops to incorporate in rotations with cereal crops. Cowpea and Bambara groundnuts are drought tolerant and thrive in arid and semi-arid conditions. They can be produced in areas with average optimum rainfall of 400 mm/year (DAFF, 2011). These legumes are widely reported to be drought tolerant (Mabhaudhi *et al.*, 2013) and are traditional food crops that have received significant attention concerning their drought tolerance.

These legumes are perceived as a traditional food crop based on social and economic restrictions imposed on IK. One of the villagers said:

> "We never enrolled for formal lessons to produce bambara groundnuts and cowpea. We usually observed our grandparents growing them and we and our parents also adopted them. Most of the time, we grow them and we have a harvest under all circumstances."

As such, cowpea and bambara groundnut germplasm improvement and agronomic management practices have relied mainly on local experience and resources, that is, IK (Mukurumbira, 1985).

Cat's whiskers *(Cleome gynandra)*, amaranth (*Amaranthus* spp) and wild cucumbers (*Enchinocytis Lobata)* leaves also known as *nyevhe*, *mowa* and *musesera*, respectively, by Bocha villagers, are major traditional leaf vegetables grown due to their nutritional benefits and drought-tolerant capabilities. The vegetables are perceived as highly nutritious and adaptive to the local environment as they can grow naturally as weeds. Their production attention has also shifted from being problematic weeds of arable lands to crops capable of alleviating food insecurity by addressing malnutrition concerns. As unveiled by one respondent;

> "In other areas, Cat's whiskers and Amaranth and Wild cucumber leaves are weeds, but as for us, we grow them for relish, nutrition and as medicine since time memorial. However, even in drought conditions, we are assured of a harvest."

The study unearthed that, these traditional leafy vegetables that form part of traditional diets and heritage of Bocha villagers, was adopted into the IK system through many years of cultivation. The multiple under-exploited benefits in terms of nutritional value, food security, income-generation and medicinal value that is suitable for low input systems and harsh climatic conditions, are explored by Bocha villagers. Some of the most important unearthed believed health and household benefits of these vegetables highlighted from focus group discussions are:

> "their ability to spur growth and development, protect the heart, boost the immune system, strengthen bones, increase blood circulation, optimise digestion and induce appetite. The grains of Cat's whiskers and amaranth crops can be made into flour as a substitute for modern flour sources whilst the fresh fruit of Wild cucumber is used as a bio-pesticide against aphids and ticks on domestic animals.".

The fact that in Zimbabwe, information on cultivation, drought tolerance and water use of local Amaranth, Cat's whiskers and wild cucumber is limited in extent and scale is a reality, but vast information is enclosed within the IK system. The principles of indigenous worldviews that knowledge is holistic and there are many truths and these truths are based on individuals' experience (Simpson, 2000), indicate that traditional vegetable crops serve as healthy food and medicines, at the advent of climate harshness for Bocha villagers.

Therefore, exhaustion of soils over many years and limited access to fertilisers, has not hindered the successful production of these vegetables under marginal climatic conditions (Shackleton *et al.,* 2009). A review by Alemayehu *et al.*, (2014) reported that owing to their drought tolerance and promotion of amaranth, cats' whiskers and wild cucumber production are alternative crops vital for combating food and nutrition security under climate change.

STRATEGIES EMPLOYED TO ENSURE TRADITIONAL FOOD CROPS' SUCCESS IN THE WAKE OF CLIMATE CHANGE

Bocha village farmers prefer the use of traditional grains such as millets and sorghums that are more drought-resistant than maize and, therefore, give a good yield even with very little rain. They also prefer specific crop varieties for drought seasons, such as an indigenous finger millet variety (*rukweza*), as it ripens fast and an early maturing cowpea (*Vigna unguiculata*) (*Nyemba*) variety. The villagers highlighted that;

> "Millet, sorghum and cowpea survive under drought stress conditions but maize cannot survive, traditional crops require even spatially distributed rains to secure a harvest. In the case of finger millet, it yields after two months from germination time."

The growing of drought-tolerant crops is a strategy of great significance as they point the way for resource-poor farmers living in Bocha Village, which is in a marginal environment, providing the basis for adaptive natural resource management strategies that privilege the diversification of cropping systems that lead to greater stability and ecological resilience under climatic extremes (Achamwie, 2015). This is coherent with the Indigenous Knowledge Theory principle that Dei (2004) posits that land is sacred in that it suits certain crops to survive even if external forces do not permit it.

Bocha villagers tend to combine polyculture systems as part of a typical household resource management scheme aimed at reaching acceptable productivity levels amid environmentally stressful conditions. One of the farmers highlighted that:

> "We plant different crop types and varieties in the same field, examples are sorghum, millet and groundnuts. This ensures maximum land use and multiple yields of different crop types or at least one of the crops in the case of adverse climatic conditions."

The practice of multiple cropping systems enables smallholder farmers to achieve several production and conservation objectives simultaneously. Polycultures exhibit greater yield stability and less productivity declines during a drought than in the case of monocultures. By practising this production strategy, it then holds that the Indigenous Knowledge Theory has the potential of addressing contemporary glitches such as poverty, hunger, climate change and underdevelopment (Moock and Rhodes, 1992).

Natarajan and Willey (1986) noted that intercrops over-yield consistently at five levels of different moisture availability, over the cropping season. They further note that the rate of over-yielding increased with water stress, such that the relative differences in productivity between monocultures and polycultures became more accentuated as stress increased (*ibid.*). These types of ecological studies suggest that more diverse plant communities are more resistant to disturbance and more resilient to environmental perturbations (Vandermeer, 2002).

In addition to adopting a strategy of interspecific diversity, many Bocha villagers exploit intraspecific diversity by growing, at the same time and in the same field, different cultivars of the same crop. The type of diversity that prevails in different areas depends on both climatic and socioeconomic conditions and farmers' responses. For example, one of the farmers unearthed that:

> "Locally adapted landrace varieties of cowpea (*Vigna unguiculata*) that have been grown for centuries and are genetically heterogeneous, uniquely combine optimal nutritional profiles, high tolerance to environmental stresses, high biomass productivity and nutrient and moisture contributions to the soil if cross mixed with hybrid."

The existence of genetic diversity has special significance for the maintenance and enhancement of productivity of small farming systems, as diversity also provides security to farmers against diseases, especially pathogens, that may be enhanced by climate change. By mixing crop varieties, farmers can delay the onset of diseases by reducing the spread of disease-carrying spores and by modifying environmental conditions so that they are less favourable for the spread of certain pathogens. The outcomes of this study are congruent with findings by Jarvis *et al.* (2007) that considerable crop genetic diversity

continues to be maintained on a farm in the form of traditional crop varieties, especially of major staple crops. Villagers maintain diversity as insurance against future environmental change or to meet social and economic needs. These crossbreeds that exhibit high genetic variability have a huge success potential to be grown in marginal environments of Bocha, as it is threatened by climate change.

Adaptation of traditional food crops to marginal lands, by villagers of Bocha, makes them constitute an important part of the local diets by providing valuable nutritional components, which are often lacking in staple crops. Based on one of the villagers' views, for example of Cat whiskers' medicinal benefits:

> "Sap from leaves cures scurvy, improves eyesight when mixed with milk, reduces dizziness and labour pains in pregnant women and helps quicken recovery after baby delivery. The vegetables' leaves have acaricidal properties and are used in controlling ticks on cattle, sheep and goats. In crop production, Cat's whiskers extracts have pest deterrent uses against crop pests such as aphids."

Traditional vegetables are characterised by a high nutritional value compared with global vegetables like tomatoes and cabbage (Keatinge *et al.*, 2011). As a source of essential vitamins, micronutrients, protein and other phytonutrients, traditional vegetables and legumes such as cowpea, have the potential to play a major role in strategies to attain nutritional security.

Villagers avoid some of the high economic cost challenges caused by high inputs of agrochemicals, fertilisers, mechanisation and water supply, hence they grow traditional food crops. By incorporating indigenous crops and increasing crop diversity, farmers are ensured of cost-effective diets and increased agricultural resilience to pests, diseases and weather changes. "We grow traditional crops that have a definite yield capability, meaning that we don't waste money to supplement food in times of famine and droughts"

The benefits of growing more diverse crops include seed saving and the processing of traditional foods. With dried and other preserved traditional foods, villagers have a more secure and reliable food source during the off-season and seed saving and exchange enable villagers to remain independent from commercial agricultural companies, helping to ensure future food

security at affordable prices. A villager explained that: "we venture into food processing of traditional vegetables through sun-drying and ensure food availability in off-season periods".

With the advent of healthy diet requirements of locals, traditional food crops are of considerable commercial value and thus can make a significant contribution to household income. Value addition by applying appropriate production and post-harvest techniques ensures that high-quality products reach the market and satisfies consumer expectations. In Zimbabwe, selected traditional cereals, legumes and vegetables are becoming an increasingly attractive food group for the wealthy segments of the population and are slowly moving out of the under-utilised category into the commercial mainstream (Weinberger, 2007).

Apart from their commercial, medicinal and cultural value, traditional food crops are also considered important for sustainable food production as they reduce the impact of production systems on the environment. From the focus group discussions held, it emerged that:

> "traditional food crops are important for sustainable food production as they reduce the impact of production systems on the environment. Traditional food crops have the potential to make a substantial contribution to food security, protection against internal and external market disruptions and climate uncertainties and lead to better ecosystem functions and services, thus enhancing sustainability".

It was further indicated by "Muzambani" (pseudonym) that:

> "a wider use of traditional food crops and species, in intercropping systems, provide multiple options to build temporal and spatial heterogeneity into uniform cropping systems, thus enhancing resilience to biotic and abiotic stress factors and ultimately leading to a more sustainable supply of diverse and nutritious food".

Many of these crops are hardy, adapted to specific marginal soil and climatic conditions and can be grown with minimal external inputs (Hughes and Ebert, 2013). Due to harsh climatic conditions only robust, drought-tolerant traditional vegetables, such as *Cowpea* and Amaranth, with short growth cycles, can survive and produce food (Maurya *et al.*, 2007).

CONCLUSION AND RECOMMENDATIONS

Views, perceptions and methods towards traditional food crops by traditional farmers in Bocha have adapted to ever-changing environments by developing diverse and resilient farming systems in response to different opportunities and constraints faced over time. Many of these agricultural systems serve as models of sustainability that offer examples of adaptation measures that can help millions of rural people to reduce their vulnerability to the impact of climate change and to maintain ecosystem goods and services.

Bocha villagers are the key actors and players with responsibility for improving the land and as land managers; their needs, priorities, resources and preferences are highly diverse. They have a wealth of knowledge about their crops, soil, farming environment and economic condition embedded in traditional knowledge systems. The local knowledge systems and agricultural practices and techniques adopted by local people remain the dominant form of coping mechanisms for climate change and food security.

Some of these adaptation strategies include the use of locally adapted varieties/species exhibiting more appropriate thermal time and vernalisation requirements with increased resistance to heat shock and drought, enhancing the water-holding capacity of soils through cover crops, thus increasing water holding capacity and use of crop diversification strategies.

- There is need to re-evaluate and consider indigenous knowledge and technology as a key source of information on adaptive capacity centred on the selective, experimental and resilient capabilities of farmers in dealing with climate change.
- The implications of climate change for food security are explored and understood, not only at global and national levels, but also at local levels. It is also imperative to have a better understanding of how to sustain and combine indigenous agricultural knowledge systems and scientific knowledge and how to translate this into decision-making processes that provide the necessary support to the local peoples.
- Emphasis must be placed on involving farmers directly in the extension of innovations through well-organised farmer-to-farmer networks. The focus should be on strengthening local research and

problem-solving capacities. Organising local people around projects to enhance agricultural resilience to climate change must make effective use of traditional skills and knowledge as this provides a launching pad for additional learning and organising, thus improving prospects for community empowerment and self-reliant development in the face of climatic variability.

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