

International Journal of Development and Sustainability
ISSN: 2186-8662 – www.isdsnet.com/ijds
Volume 14 Number 11 (2025): Pages 1032-1058
https://doi.org/10.63212/IJDS25042201

Empowering women through permaculture: Lessons from the *Mapfihwa* project in Kutama, Zimbabwe

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Abstract

This article explores a women-led permaculture intervention known as *Mapfihwa*' as reinforcement towards peri-urban resilience in Kutama, Zimbabwe. The intervention falls at the intersection between permaculture and women's empowerment. The aim was to determine the effectiveness of the permaculture approach. The objectives were to explore the micro-level dynamics and resilience parameters of the *Mapfihwa* Project in Kutama, Zimbabwe. Using both qualitative and quantitative methods, the project review targeted women participants in the *Mapfihwa* Project, underpinned by a descriptive comparative design. Qualitative data captured micro-level dynamics of permaculture, while quantitative data provided descriptive data on resilience parameters such as yield per area, income from the produce, asset base change, and household social mobility. Resilience was further measured through livelihood enhancement amidst socio-ecological challenges faced in the community. The findings suggest that women-led permaculture interventions improve community resilience by reducing food insecurity, revitalising ecosystems, empowering women, and enhancing sustainable livelihoods in peri-urban Zimbabwe. The article concludes that undertaking women-led permaculture interventions in peri-urban settings contributes to improved resilience. The study provides a flexible and adaptable community-based permaculture model tailored to the needs of vulnerable women in Zimbabwe.

Keywords: Permaculture; Women; *Mapfihwa*; Resilience; Peri-Urban; Food Security; Agro-Ecology

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1. Introduction

Permaculture, a holistic design approach, offers a promising solution to build resilient peri-urban communities in Zimbabwe (Holmgren, 2002). By promoting agroecological practices, permaculture provides a new way of enhancing biodiversity, improving soil fertility and increasing crop yields, consequently contributing to food security, sustainable livelihoods and community resilience (Ndhlovu, 2018; Rubio, 2023). Moreover, permaculture empowers women farmers to take control of their natural resources, improving their social and economic status (Forte-Taylor et al., 2025). In Zimbabwe, permaculture has been recognised as a valuable approach to building resilient peri-urban communities (Dadirali and Gambiza, 2019). However, despite the potential of permaculture, women farmers in Zimbabwe face significant challenges in accessing and utilising permaculture-based solutions (Didarali and Gambiza, 2019). Limited access to education, training, and resources hinders women's ability to adopt and benefit from permaculture practices (Dibakoane et al., 2022).

Women, who are the primary custodians of crop production and agro-ecosystems in Zimbabwe, bear the brunt of biodiversity and conditions that threaten food security (Gwimbi, 2009). In the face of such threats, Balasha et al (2022) indicate that socio-economic, environmental, and institutional constraints limit women's control of and access to agroecological resources such as land, credit, agricultural technologies, and information. However, women are also key to building resilient peri-urban communities, as they possess valuable indigenous knowledge and skills in natural resource management and sustainable agriculture (Dibakoane et al., 2022). As a result of their inherent skills in knowing their land, ecosystems, and traditional practices, women are the key identifiers of risks and are more able to manage the challenges (Rocheleau et al., 1996). This article addresses these challenges by producing a flexible and adaptable community-based permaculture model appropriate for meeting the needs of vulnerable women in Zimbabwe.

2. Methodology

This section outlines the research methodology for the study, including the research site, sampling procedure,

2.1. Research site

This study was conducted in Kutama, a drought-prone area in Zvimba District of Mashonaland West Province in Zimbabwe, a low-income area found on the Western boundary of Harare. Its inhabitants survive through informal trading activities at the centre of Harare town. They also thrive on market gardening, a rampant source of household primary food. Agricultural practices in the area are chemical input-based agriculture and rainfed with limited irrigation. Farmers in this area practice mixed farming, where both animal and crop husbandry are done in the same household. Their plots have residential space, farming space, and pasture space. The approximate size of their residential space is 0.5 hectares, 6 hectares of farming land, and 15 hectares of communal grazing land. The population size is estimated at 23011 with 6138 households. The level of unemployment, poverty, and food insecurity is very high. This is where the *Mapfihwa* training hub, a community laboratory point, is located, where permaculture training, experiments, and observations are made.

2.2. Sampling procedure

Participants for the study are exclusively women living within the boundaries of 7 km from the Mapfihwa community laboratory centre. A community stakeholder consultation was done as a mobilisation process to introduce the project to the community as a whole. A call was made to volunteers wanting to participate in the intervention. To minimise selection bias, a clear inclusion/exclusion criterion was used to minimise selection bias. A sensitivity analysis was done prior to the selection to assess the potential impact of different risks to health, safety and costs that are exacerbated by gender-based vulnerability posed by travelling long distances on foot. To curb this, only women who live within a boundary of less than or equal to 7km (walkable and safe distance) from the *Mapfihwa* community laboratory center were purposively selected only from these volunteers. A random selection of 15 volunteers was made from these. The participants are women willing to work on the project for 3 years.

Only women subsistence farmers were selected for the permaculture practice. The selection was informed by observations made from current interventions in the developing countries' communities, where occasionally food handouts are provided to migration-stricken households, where women are the spouses left behind. Often, the handouts comprise limited dietary requirements. These handouts are also not consistent; hence, dry food spells are experienced during some periods of the year. Such challenges might be addressed through permaculture.

2.3. Procedure

The findings of this article are basically project activities in the form of practices and methods that were implemented during the project. A total of 15 participants were given two equal beds with measurements of 8m in length and 1-meter-wide in width within the *Mapfihwa* community laboratory centre. Plot A was designated for permaculture methods and was the control bed where non-permaculture agricultural activities and chemical input-based agriculture sources of plant nutrients and pesticides were used. According to this article, permaculture practices involve the use of liquid poultry fertiliser which is a nutrient-rich organic fertiliser made from poultry manure through an anaerobic digestion process which breaks down the manure into liquid form. It can be used as foliar spray and soil amendment to improve soil fertility and structure. The permaculture practice also uses Azolla water as a source of nitrogen, vermicompost as a source of nutrients, and carbon and dolomitic lime to correct soil pH levels. Mulching and limited tillage were used as soil and water conservation methods. Organic pest management for the permaculture beds was inclusive of rabbit urine and pepper juice as pesticides, crop rotation, and companion cropping as disease control strategies.

2.4. Data collection methods and analysis procedure

Data was collected using semi-structured questionnaires designed to gather a wide range of information. These questionnaires included sections on demographic details, socio-economic characteristics before the permaculture intervention, details of the permaculture practices adopted during the intervention, and an assessment of the impacts resulting from these practices. Quantitative data was analysed using descriptive statistics to summarise and interpret numerical findings. Meanwhile, qualitative data derived from responses to open-ended questions in the semi-structured questionnaires underwent content analysis. This involved cleaning and organising the qualitative responses to identify recurring themes or patterns. This software

facilitated rigorous statistical analysis, allowing for a comprehensive examination of the data and providing insights into the effectiveness and outcomes of the permaculture intervention.

3. Literature review

This section presents the literature related to permaculture and its positive impacts and challenges.

3.1. The use of permaculture by women in agriculture at global level

With the adoption of permaculture in the 1970s by its proponents Bill Mollison and David Holmgren in the 1970s, permaculture has since been recognised as a holistic design model that incorporates sustainable agricultural practices to address social, economic and environmental aspects of sustainability (Didarali and Gambiza, 2019). Lawrence et al. (2025) refers to permaculture as a set of design principles centred around simulating or directly utilising the patterns and features observed in natural ecosystems. Consequently, Chimhanda et al. (2025) reveal that Australian permaculture practitioners have worked towards a more sustainable, equitable and resilient agricultural system by incorporating gender equity and empowerment within permaculture and agroecological practices. These gendered agriculturalists developed systems integrating native plants, water conservation techniques, and soil regeneration practices (Mollison and Holmgren, 1991). Besides its ability to foster social cohesion, Hemenway (2009) states that gender sensitive permaculture principles in Portland and Los Angeles have been used for food production and community engagement.

Permaculture Association UK (2021) indicates that European countries have embraced permaculture through educational initiatives that increased awareness of ecological issues among communities, whilst encompassing gender equity as a key element for agroecological transitions (Vizuete, et al. 2024). In Australia and the United States, Henfrey (2017) demonstrates the use of permaculture education as ecology of the mind and as a philosophy and practice of celebrating and making practical use of diversity, and as a transition to social equity by gender mainstreaming the agroecological systems (Magrini et al., 2019). Fukuoka (1992) postulates that in Asia, permaculture has been integrated into traditional farming practices as the concept of "natural" farming, which emphasises minimal intervention and working with nature rather than against it. This approach enhances soil fertility and crop resilience (Altieri et al., 2025) and also gave women the opportunity to gain access to resources and technical skills (Serpossian et al., 2022). In Latin America, Gonzalez et al. (2016) observed a rise in permaculture projects to restore ecosystems while providing livelihoods for local women. Initiatives such as agroforestry systems combine trees with crops to create more sensitive resilient agricultural landscapes (ICRAF, 2020), in the process it provides social support for women who previously felt excluded in such masculine spaces (Annes and Wright, 2017). Research by Jackson (2002) shows that these systems significantly increase biodiversity while providing economic benefits to women farmers.

In Africa, permaculture practices have been instrumental in addressing food insecurity and promoting sustainable land management. For instance, in Sub-Saharan Africa, the World Food Program (2020) has implemented food security and livelihood programs, inclusive of permaculture practices, to empower vulnerable communities and women to improve their access to food. In addition, permaculture practices such

as the keyline design for water management have been practised in Africa to improve agricultural productivity while conserving water and empowering women in the process (Lawton, 2010) and (Chimhanda et al., 2025).

3.2. Permaculture practices in Sub-Saharan Africa

ICRAF (2020) observed agroforestry permaculture practices in Kenya, Tanzania, and Malawi as practices that involved integrating trees into agricultural landscapes, while Sibanda (2025) observed that such practices, if gendered, can promote sustainable and equitable food systems. In the form of conservation agriculture, permaculture in Zambia and South Africa involves minimising soil disturbances, maintaining soil cover, and promoting crop rotation to improve soil health and reduce erosion (FAO, 2019). In Ghana, Nigeria, and Ethiopia, permaculture is viewed by CGIAR (2020) as a sustainable intensification that involves improving crop yields and reducing environmental impacts using improved crop varieties, integrated pest management, and precision agriculture to close the gender gap in productivity, as promoted by Adu et al. (2024). Ecological restoration efforts have been adopted as permaculture practices in Kenya, Tanzania, and Mozambique, which include restoring degraded lands, promoting biodiversity, and improving ecosystem services from a gendered approach (IUCN, 2019; Ndhlovu, 2025). In Uganda and Rwanda, permaculture is termed Climate-smart agriculture, and it improves agricultural productivity and resilience in the face of climate change by transitioning towards a just, gender inclusive and sustainable food system (Bryan et al., 2024).

In this article, permaculture is based on three core ethics: care for the earth, care for gender equity, and empowerment (Elmhirst, 2015; Holmgren, 2002). In Zimbabwe, these principles are manifested through various practices such as water conservation techniques and organic farming (Ndhlovu, 2024). Research indicates that permaculture can enhance soil fertility and biodiversity while reducing dependency on chemical fertilisers (Altieri, 1999). For instance, integrating bees into agricultural systems improves plant reproduction and provides additional income sources through honey production (Etxegarai-Legarreta and Sanchez-Famoso, 2022). In Zimbabwe, organisations like Chikukwa Ecological Land Use Community Trust (CELUCT) support community-based permaculture projects, contributing significantly to practitioners' income and promoting women to produce their own food to compliment other food sources at household level.

3.3. Women and permaculture in Zimbabwe

Due to economic instability and climate change, food security remains a critical issue in Zimbabwe. According to Etxegarai-Legarreta and Sanchez-Famoso (2022), permaculture households reported increased crop yields compared to chemical input-based farming methods. In Zimbabwe, Quisumbing et al. (2023) observe that women have been empowered to control agricultural activities by their involvement in permaculture practices. By adopting permaculture practices such as companion planting and mulching help conserve moisture and suppress weeds, which are vital in arid regions of Zimbabwe (Moyo et al., 2025; Ndhlovu, 2017; Ndhlovu and Dube, 2024), women have been able to increase their crop yields, improve their food security, and generate income from the sales of their products. Mutopo (2011) postulates that women in areas of Zimbabwe, such as the Mwenezi district, have formed networks and cooperatives to share knowledge on permaculture practices.

Despite the wide adoption of permaculture at global and local levels, Didarali and Gambiza (2019) state that women in Zimbabwe continue to face challenges in implementing permaculture. This is because they have limited capacity to access land, credit, and markets for their permaculture products. However, the government

of Zimbabwe has made initiatives to promote women's access to land, agricultural resources and opportunities to participate in permaculture to improve their livelihoods (World Bank, 2019). Also, the Permaculture Research Institute of Zimbabwe has provided workshops that empower local women in targeted communities with knowledge about ecological farming methods (Altieri, 2002). These educational initiatives enhance agricultural productivity and foster community women resilience against climate variability.

The women-led permaculture project, 'Mapfihwa', supports women in adopting permaculture practices, enhancing their capacity to manage natural resources sustainably, and improving food security. By fostering women's leadership and collective action, this study aims to build resilient rural communities capable of adapting to climate change, poverty, and other challenges. This initiative contributes to the achievement of the Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger), SDG 5 (Gender Equality), and SDG 13 (Climate Action). The study's outcomes offer valuable insights into the potential of permaculture and women's empowerment to drive transformative change in rural Zimbabwe.

4. Findings

This section presents findings on how permaculture contributes to a convenient supply of healthy food, increased resilience to environmental shocks, reduced costs of inputs and the social status of *Mapfihwa* project members.

4.1. Demographic data

Figure 1 shows the age distribution of the *Mapfihwa* project participants. The participants' ages range from 20 to 60 years, with the majority (50%) concentrated in the 41 – 50 age group, highlighting a predominance of middle-aged members in the project.

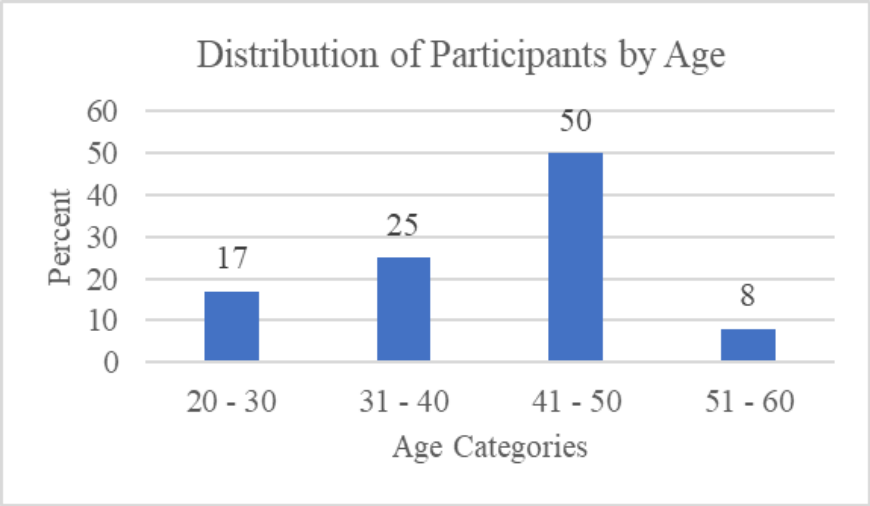


Figure 1. Age Distribution

Figure 2 illustrates the marital status distribution within the group. Most participants (75%) are married, 17% are widowed, and 8% are single.

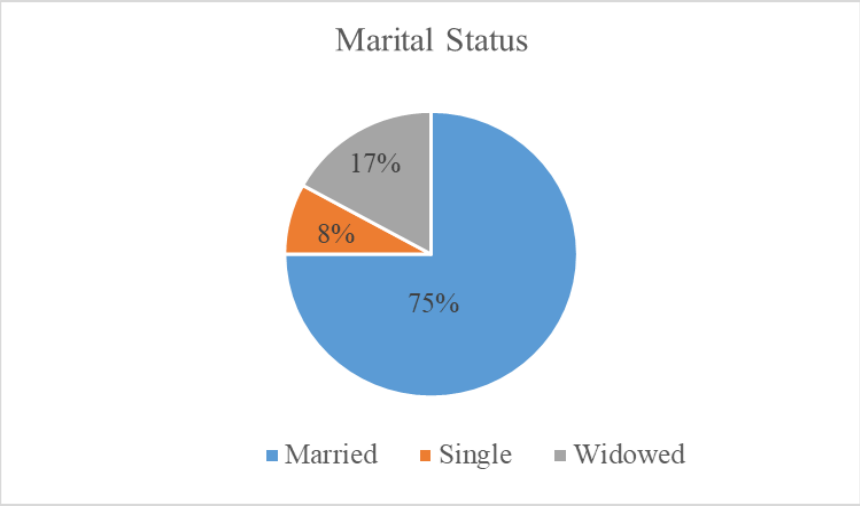


Figure 2. Marital Status

Figure 3 shows that 8% of participants received some primary education, 17% completed primary education, 33% received some secondary education, and the majority (42%) completed secondary education.

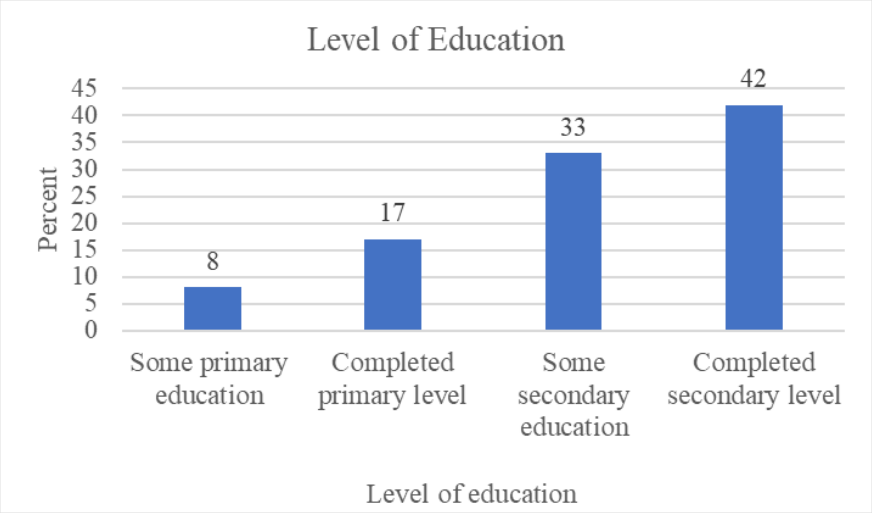


Figure 3. Level of Education

The average household size among the *Mapfihwa* project participants is 5, with household sizes ranging from 3 to 9 members.

4.2. Sources of income for project members

Figure 4 shows the primary and alternative sources of income for *Mapfihwa* project members. The Figure illustrates that 25% of the participants have no primary source of income. In comparison, 25% rely on casual labour (both agricultural and non-agricultural), 8% engage in the sewing business, 17% depend on remittances, 17% are involved in vending (selling vegetables, other relishes, bread and second-hand clothes), and 8% practice broiler farming.

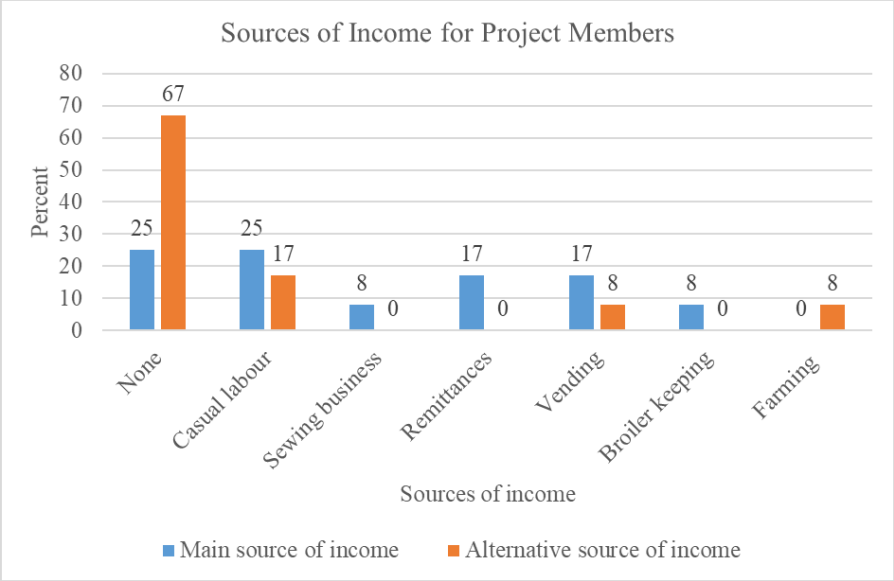


Figure 4. Sources of Income for Project Members

On the other hand, 67% of the participants reported having no alternative sources of income. Among those with alternative sources, 8% depend on vending, specialising in second-hand clothes, 17% engage in casual labour, and 8% rely on farming. These findings highlight the limited income diversification among participants.

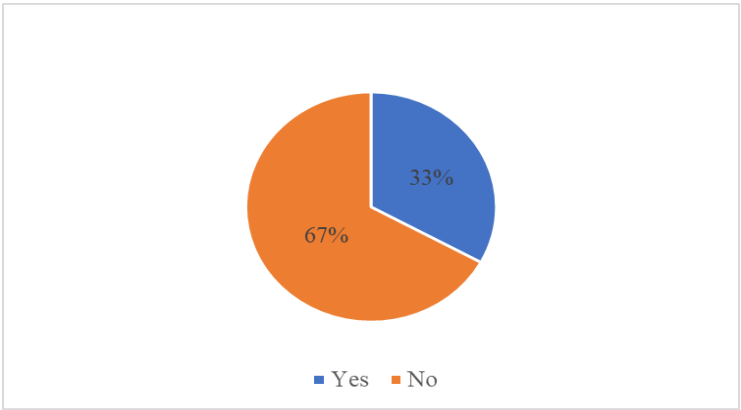


Figure 5. Income from Selling of Produce from the Crops

Figure 5 shows that 33% of the participants sold produce from their fields. Among those who sold their crops, 75% sold them on-site, 25% sold by the roadside and 25% sold at St Bernard College. The income generated from selling crop produce ranged from USD30 to USD120, with an average income of USD77. This income was used to pay school fees, buy household food, clothes, kitchen utensils, farm inputs, pay hospital bills and pay for grinding mealie meals.

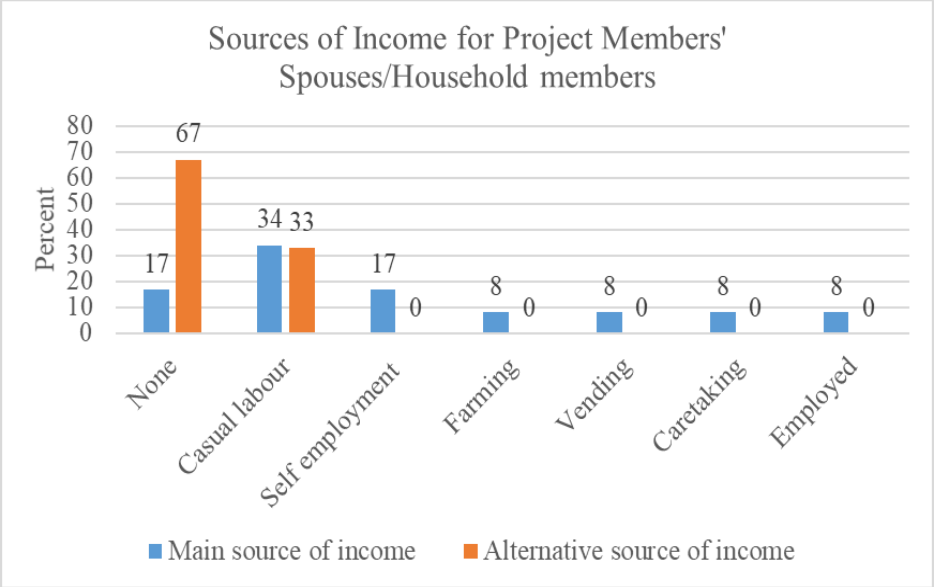


Figure 6. Sources of Income for Project Members' Spouses/Household Members

Figure 6 presents the primary sources of income for project members' spouses/household members. The Figure shows that 17% have no primary source of income, 34% depend on casual labour, 17% are self-employed (engaged in activities such as painting and plumbing), 8% depend on farming, 8% on vending, 8% caretaking (managing other people's broiler projects), and 8% are formally employed. Those who are self-employed are engaged in activities such as painting and plumbing. On the other hand, participants reported that 67% of their spouses or household members do not have alternative sources of income. In comparison, 33% depend on both agricultural and non-agricultural casual labour as alternative sources of income.

4.3. Socio-economic attributes before permaculture intervention

Table 1 shows that among the 67% who have been engaged in gardening in the past 5 years, the majority (88%) cultivated *covo*, followed by 75% who were growing tomatoes, and 38% growing rape. Peas were the least cultivated crop, grown by only 13% of participants who were engaged in gardening in the past 5 years. Participants explained that crops such as *covo*, shallots, and king onions were preferred because they are drought-resistant and last long in the field. Rape and *tsunga* were *favoured* for their fast growth and ability to quickly provide relish. Some were just experimenting with crops such as peas.

Table 1. Types of Crops Grown

History of Gardening	Type of crop	Proportion of those who grew the crop
67%	Covo	88
	Rape	38
	Shallots	25
	Tsunga	25
	Tomatoes	75
	King onion	25
	Peas	13

Table 2. Sources of Nutrients

Source of nutrients	Proportion	Source of source of nutrients	Proportion
Cattle manure	63	Own kraal	80
		Neighbours/fellow villagers	60
Goat manure	25	Own kraal	100
Fertiliser	25	Presidential input scheme	50
		Bought	50
Chicken manure	13	Own fowl run	100

Table 2 shows that among those practising gardening in the past 5 years, 63% used cattle manure to provide nutrients to their crops, 25% used goat manure, 25% used fertiliser, and 13% used chicken manure. About 80% of participants used cattle manure sourced from their kraals, while 60% obtained it from their neighbours or fellow villagers. All those using goat and chicken manure sourced it from their own kraals or fowl runs. About 50% purchased it, and the other 50% received it for free through the Presidential Input Scheme. Those who purchased fertiliser for gardening spent a total of USD 20.

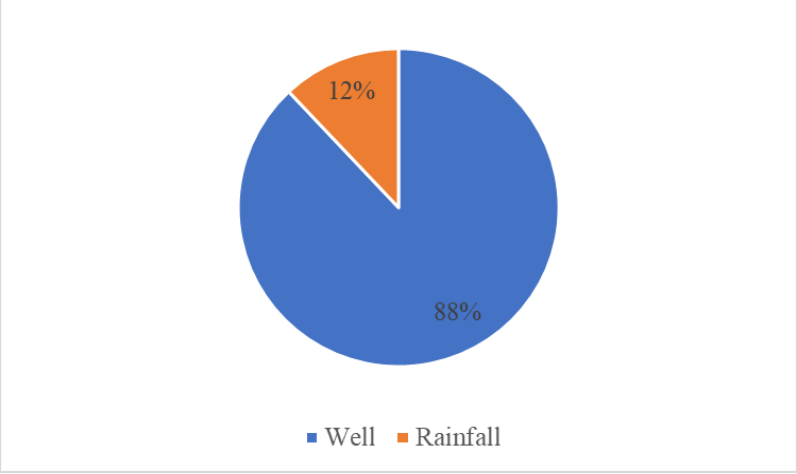


Figure 7. Source of Water for Gardening

Figure 7 shows that 88% of the participants practising gardening in the past 5 years were using water from wells, and only 12% were practising rain-fed gardening. All participants (100%) indicated that gardening water was unavailable throughout the year. They reported that water is usually available between January and July, with rare instances of availability extending to September.

4.4. Source of water for the crops

All the participants (100%) indicated that the water source for their crops is rainfall, which comes at no cost. However, participants highlighted the challenges posed by climate change and rainfall variability. They noted that rainfall is often highly unpredictable and insufficient, with most rainfall received between November and March. Although it is rare, rainfall starts as early as October and extends into April.

4.5. Average water uses per week

On average, participants watering their gardens used about 17 twenty-litre buckets of water, translating to 340 litres of water per week. None of the participants incurred any cost for water used in their gardening activities.

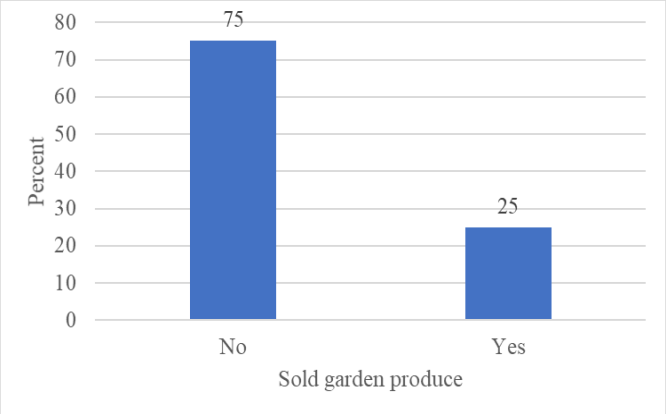


Figure 8. Income from Gardening

Figure 8 shows that 25% of those who were practicing gardening in the past 5 years managed to sell produce from their gardens. They sold their produce on-site and generated an average of USD25. The income generated from gardening was used to pay school fees, buy kitchen utensils, clothes, farm inputs, pay hospital bills and cover milling costs for maize meals.

4.6. Other types of farming

Table 3 illustrates that all participants (100%) were practising crop production. Among those practising crop production, 100% were growing maise. Other crops grown included groundnuts grown by 67%, groundnuts

by 50%, and sweet potatoes by 33%. Cowpeas, pumpkins, sweet reeds, and beans were less frequently grown crops.

Table 3. Crop Production

Type of farming	Proportion	Types of crops grown	Proportion
Crop production	100	Maise	100
		Groundnuts	67
		Roundnuts	50
		Cowpeas	17
		Sweet reeds	8
		Pumpkins	17
		Sweet potatoes	33
		Beans	8

Participants reported that they favoured the above-highlighted crops for several reasons, including that they are relatively easy to grow, require minimal labour, and ensure a steady food supply with the potential to sell surplus. In addition, the crops were suitable for the participants' soil types and the agroecological conditions. Some participants grew these crops without options, while others had access to seeds. The ease of managing legumes, mainly due to their low fertiliser requirements, was also noted as a significant factor in the participants' crop choices.

Table 4. Source of Nutrients for the Crops

Source of nutrients	Proportion	Source of source of nutrients	Proportion	Average cost
Fertiliser	100	Presidential input scheme	67	-
		Bought	67	USD81
Cattle manure	33	Own cattle	67	-
		Neighbours	17	-
		Parents	16	-
Goat manure	17	Own goats	100	-
Chicken manure	8	Own fowl run	100	-
Compost	8	Own compost	100	-

Table 4 highlights that all participants (100%) were using synthetic fertiliser, with 67% having obtained it for free through the presidential input scheme and 50% purchasing it. About 33% of the participants used cattle manure, with 67% getting it from their kraals, 17% from neighbours and 16% from their parents' kraals.

About 17% of the participants used goat manure, all of which came from their kraals, while 8% used chicken manure from their fowl runs. Approximately 8% of participants used compost, which they produced at home. The cost of fertiliser purchased by participants ranged from USD 10 to USD 189, with an average expenditure of USD 81.

Table 5. Poultry Production

Type of farming	Proportion	Type	Proportion
Poultry production	75	Road runners	100

Table 5 shows that 75% of participants practised production at home, with all the participants practised production near roadrunner chickens. Only one participant sold their chickens, generating USD20, which was used to buy household food.

Table 6. Livestock Production

Type of farming	Proportion	Type of livestock	Proportion
Livestock production	50	Cattle	50
		Goats	50

Table 6 highlights that 50% of the participants were involved in livestock production. Among those involved in livestock production, 50% kept cattle and 50% kept goats. About 50% sold their livestock and generated income ranging from USD 30 to USD 350, with an average income of USD 162. The proceeds from selling livestock were used to pay school fees and buy household food and clothes.

4.7. Household food supply in the past 5 years

Figure 9 presents household food supply status in the past 5 years. About 75% of the participants reported experiencing food shortages, while 25% indicated having moderately sufficient food. No participants reported having a sufficient food supply in the past 5 years.

Table 7 shows that 33% of the participants felt empowered in the past 5 years. The results show that 33% of participants reported not having permission to make important household decisions in the past 5 years. While 67% of the participants are now participating in decision-making, participants highlighted that these changes are recent, as it was once tricky for many participants to be involved in decision-making. Among those allowed to participate in decision-making, 67% make food management, asset purchasing, and farming

decisions. About 58% are allowed to make decisions regarding family events and functions, while 8% reported being allowed to decide which casual work to engage in for income generation.

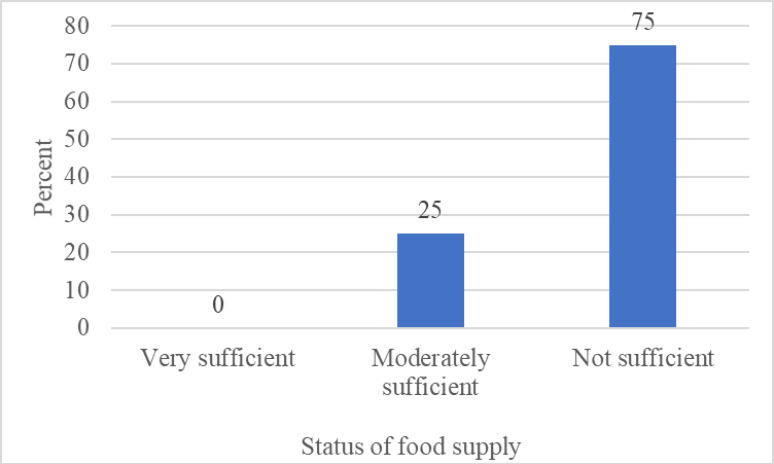


Figure 5. Household Food Supply in the Past 5 Years

Table 7. Empowerment Status of Women in the Past 5 Years

The proportion who Felt Empowered in the Past 5 Years	The proportion of those participating in Decision-making in the Past 5 Years	Type of Decision	Proportion
33%	67%	Food management	67
		Asset purchasing	67
		Farming	67
		Family events	58
		Going for casual labour	8

4.8. Permaculture intervention practices

4.8.1. Understanding of permaculture by women

Though participants demonstrated a general understanding of permaculture, their understanding of permaculture varied and reflected personal sentiments about the project.

Technical understanding: Participants described permaculture as the practice of growing crops in the same bed and using restorative methods such as the use of organic fertiliser and biological pest control techniques. In addition, permaculture was viewed as small-scale farming that minimises costs, emphasising organic practices and incorporating other crops and foodstuffs to prevent pests.

Personal sentiments: Permaculture was viewed as a farming practice for sustenance and income generation. Some participants said that permaculture is a project aimed at empowering women, reducing domestic violence and decreasing the reliance of project members on their spouses for sustenance.

Table 8. Crop Varieties Planted for the Summer Crop at Mapfihwa Training Hub

Crop variety for summer	Mentioned	Mentioned for the winter season
Green pepper	9	1
Tomatoes	10	2
King onions	8	2
Covo	9	2
Sugarloaf	5	3
Rape	10	2
Parsley	2	-
Sweet cabbage	2	-
Marigold	1	-
Basil	1	-
Peas		2
Potatoes		1

Table 8 presents the crops grown by participants during the summer and those lined up for the winter season. Summer crops mentioned by the participants included green pepper (9), tomatoes (10), king onion (8), *covo* (9), sugar loaf (5), and rape (10). The least mentioned summer crops were parsley (2), sweet cabbage (2), marigold (1), and basil (1). For *Mapfihwa* winter crops, participants mentioned green pepper (1), tomatoes (2), king onion (2), *covo* (2), sugar loaf (3), rape (2), peas (2) and potatoes (1). The low number of winter crops was largely attributed to participants either forgetting, yet planning or intending to consult their notebooks, or relying on advice to determine suitable crops for the winter season.

Table 9. Bed sizes and number per Person

Bed	Bed size	Number of Beds
Permaculture	8m x 1m	1
Chemical input-based agriculture	8m x 1m	1

Due to challenges in accurately estimating bed size, participants reported that the lengths of their permaculture beds ranged from 8 metres to 15 metres and widths of 1 metre (see Table 9). For chemical input-based agriculture beds, participants reported sizes ranging from 10 metres x 1 metre to 25 metres x 1 metre. Upon verification, it was established that permaculture and chemical input-based agriculture bed sizes are 8 metres x 1 metre. Each person had two beds.

Table 10. Differences in the Practices Applied to Beds

Mentioned Practices	**Bed A – Permaculture**	**Bed B –** chemical input-based agriculture	**Comment**
Mulching	✓	**X**	
Improved manure used	✓	**X**	
Direct poultry manure	**X**	✓	
Pesticides	**X**	✓	
Herbicides	**X**	✓	
Synthetic fertiliser	**X**	✓	
Companion crops	✓	**X**	Group 1: tomatoes, green pepper, king onions; Group 2: shallots, rape covo, sugar loaf,
Intercropping	✓	✓	Group 1: Tomatoes, green pepper, king onions, marigold Group 2: Shallots, rape covo sugar loaf, parsley, basel,
Household foodstuff	✓	**X**	

Table 10 highlights the differences in Bed A (permaculture) and Bed B (chemical input-based agriculture) practices. The table shows that practices such as mulching, using liquid or improved manure, using herbs and household foodstuffs to repel pests, intercropping, and companion cropping are applied in the permaculture beds. On the other hand, practices such as synthetic fertiliser, direct use of manure, use of pesticides, herbicides and intercropping are applied in the chemical input-based agriculture beds.

For companion cropping, participants are using two groups of crops: Group 1, consisting of tomatoes, green pepper, and king onions, and Group 2, which includes shallots, rape, *covo*, and sugar loaf. For intercropping, participants are also using two groups of crops: Group 1 included tomatoes, green pepper, king onions and marigold, while Group 2 included shallots, rape, *covo*, sugar loaf, parsley, and basil.

Table 11. Standard Spacing for Main Crops

Crops	Standard spacing – Bed A	Bed B
Leafy vegetables	10cm	7cm
Tomatoes	30cm	20cm

The participants highlighted varied standard spacing for main crops (see Table 11). However, the standard space for permaculture beds was 10cm for leafy vegetables and 30cm for tomato crops, with companion crops in between the spaces. For chemical input-based agriculture beds, spacing was not standardised, and it ranged from 3cm to 30cm for leaf vegetables and 5cm to 30cm for tomatoes, with an average spacing of 7cm for leafy vegetables and 20cm for tomatoes.

4.8.2. Average water consumption for the crops per week

Figure 10 shows that the permaculture beds consumed an average of 568 litres of water in Week 1, with fluctuations observed throughout the six weeks, culminating in an average consumption of 502 litres in Week 6. In comparison, the chemical input-based agriculture beds started with 450 litres in Week 1, also fluctuating, and ended with 385 litres in Week 6. Overall, the permaculture beds consistently recorded higher water consumption than the chemical input-based agriculture beds, largely due to the larger cultivated area in the permaculture beds.

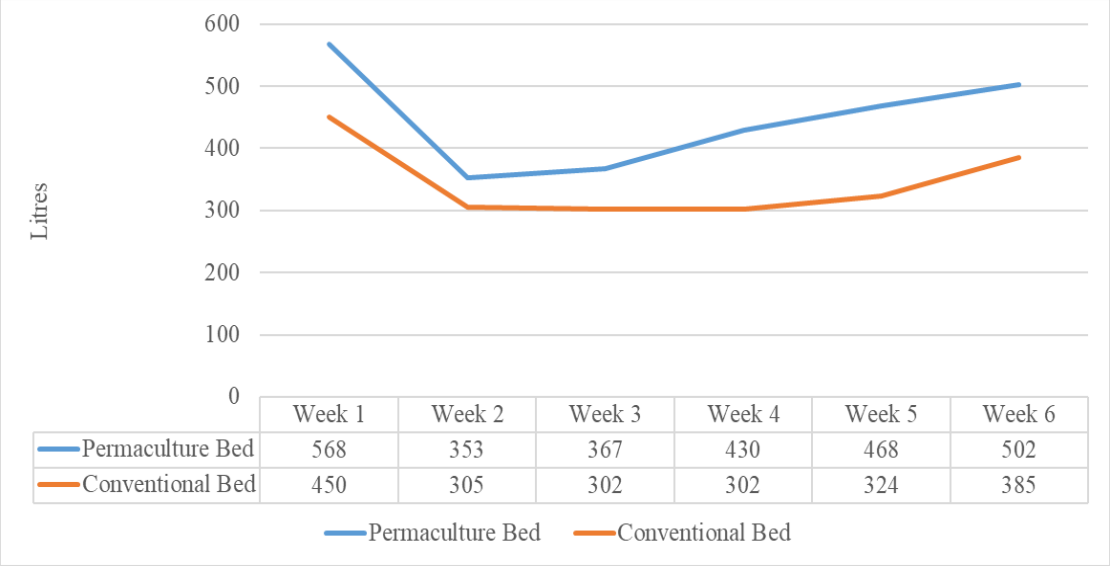


Figure 10. Average Water Consumption for the Crops per Week

Participants noted that water consumption typically starts high under normal circumstances and gradually decreases as plants establish. However, water usage increased significantly during hotter periods, contrary to expectations that higher water consumption should mainly occur when plants are still small and vulnerable.

4.8.3. Source of water for Mapfihwa gardening

All participants indicated that the water used for *Mapfihwa* gardening is obtained from a borehole, which is consistent with the researchers' observations.

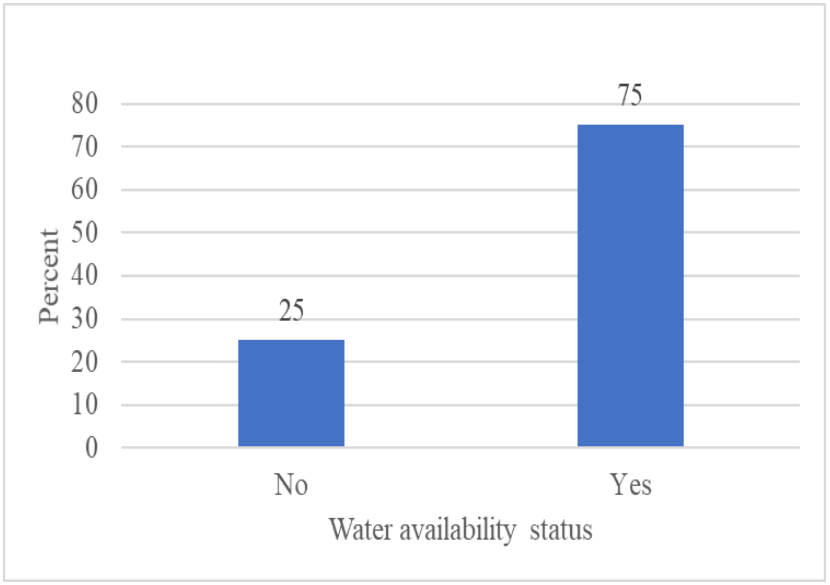


Figure 11. Water Availability

Figure 11 shows that only 25% of the participants reported that borehole water for the *Mapfihwa* gardening project is not always available.

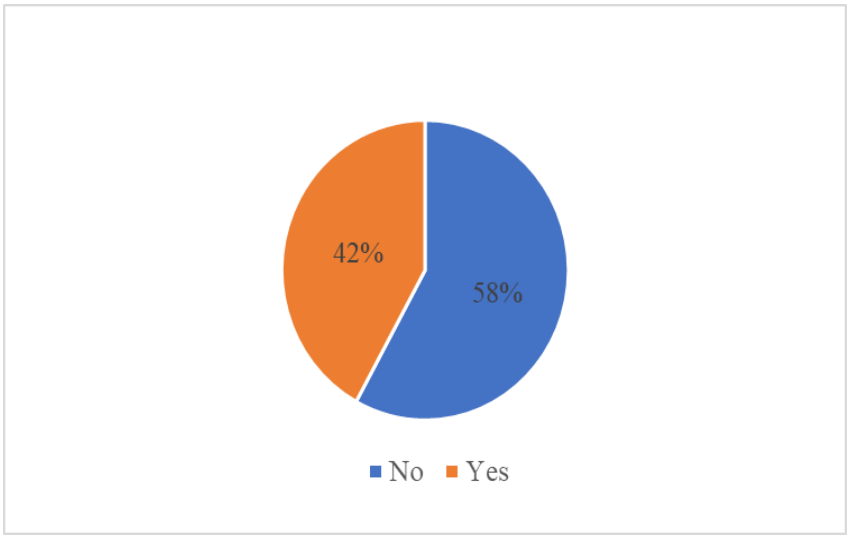


Figure 12. Water Use Challenges

Figure 12 indicates that about 42% of the participants reported facing challenges in using Mapfihwa water for gardening. About 25% of the participants highlighted that they are facing delayed water filling and water shortages when it is overcast, affecting the efficiency of solar panels. About 17% of the participants reported having to take turns to water their gardens since they only have two horse pipes and taps.

4.9. Poultry management at Mapfihwa training hub

All participants (100%) mentioned practising poultry management at the Mapfihwa training hub.

Table 12. Poultry Varieties Kept at Mapfihwa Training Hub

Type of poultry	**Number of times mentioned**	**Usefulness**
Layers	11	Manure, eggs
Roadrunner chickens	8	Manure, meat
Ducks	11	Manure, meat

Table 12 shows the types of poultry kept at the Mapfihwa training hub. The types of poultry mentioned are layers, road runner chickens, and ducks. Participants reported that the poultry is useful for the project because it provides the much-needed manure, meat, and eggs. Participants also said that eggshells are an important ingredient for insect repellent. However, it was mentioned once that participants have yet to see poultry's usefulness in the Mapfihwa gardening project.

Table 13. Other Useful Activities at Mapfihwa Training Hub

Activities	Number of times mentioned	Number of times usefulness mentioned
Livestock production	0	
Bee keeping	10	Honey (5), money (5), pollination (3),

All participants (100%) reported that they were not keeping any livestock at the Mapfihwa training hub (see Table 13). Nonetheless, though beekeeping was mentioned 10 times by the participants after they were prompted, they could not remember the direct usefulness of beekeeping to the crops. After prompting the participants, they mentioned that beekeeping brings honey and money. Thus, many were not sure of the benefits to crops and were hoping to learn soon

4.10. Impacts of the Mapfihwa intervention

Figure 13 shows that 92% of respondents observed differences in crop growth rates between their household gardens and the *Mapfihwa* garden. Participants noted that crops grown under permaculture practices in the *Mapfihwa* garden took longer to grow but lasted longer once established.

Approximately 67% of participants attributed the better and faster crop growth at the *Mapfihwa* training hub to consistent and reliable access to water. This resource was often limited in their home gardens. Additionally, participants highlighted that permaculture vegetables remained fresh for longer, exhibited high quality, and had the potential for regeneration.

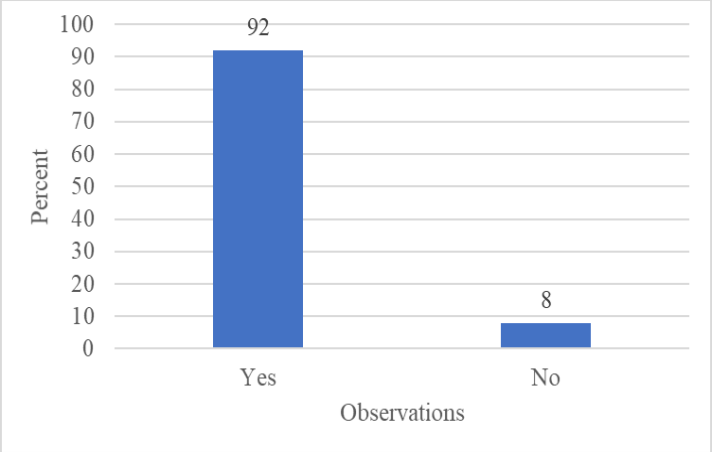


Figure 13. Difference in Crop Growth Rate Between Household and Mapfihwa Gardens

Table 14. Differences in Crop Management Practices Between Household Garden and the Mapfihwa Garden

Practices	**Mapfihwa/ Garden**	**Household garden**
Improve organic manure	✓	**X**
Pesticides	**X**	✓
Herbicides	**X**	✓
Companion cropping	✓	**X**
Intercropping	✓	**X**
Biological pest control	✓	**X**
Pruning and trimming	✓	**X**
Raised beds	✓	**X**
Consistent watering	✓	**X**

All participants noted significant differences in crop management practices between their household gardens and the *Mapfihwa* garden (see Table 14). Participants exclusively used organic manure in their permaculture beds, including liquid manure, avoiding synthetic fertilisers entirely. They also refrained from spraying pesticides and herbicides, instead relying on companion planting and simple foodstuffs to repel insects naturally. Participants reported regularly pruning and trimming vegetables in their permaculture beds to enhance growth and productivity. Raised beds were also implemented to prevent flooding during the rainy season. Furthermore, crops in the permaculture beds were better safeguarded against domestic animals through the installation of a security fence.

4.11. Prospects for Mapfihwa and permaculture

About 92% of the participants were optimistic that the Mapfihwa garden will most likely yield more produce than their household gardens, mainly because of water availability for watering (see Table 15). However, they lamented that land under cultivation is still small.

Table 15. Projections on Vegetable Use

Vegetable benefits	Proportion
Household nutritional addition	25
Household food security	83
Income	83
Sharing with friends	50
Value addition	33

Participants expressed optimism about the benefits of vegetables from the *Mapfihwa* garden. Approximately 25% anticipated that the vegetables would improve household nutrition, while 83% believed they would enhance household food security and support income generation. Additionally, 50% of participants planned to share the vegetables with friends and relatives, and 33% intended to add value by drying the vegetables for future use.

4.12. Income expectations

Participants are hoping to earn considerable income from the *Mapfihwa* garden. Income projects from participants ranged from USD20 to USD500, with an average of USD188 per person.

Table 16. Projected Income Expenditure

Projected Expenditure	Proportion
Re-investment	42
School fees	33
Buying stationery	17
VSLA	8
Household food	25
Kitchen utensils	8

Table 16 indicates that 42% of participants plan to reinvest the income generated from Mapfihwa into projects such as tuckshops, broiler production, and goat farming, aiming to upscale and diversify their income sources. Additionally, 33% of participants intend to use the funds to pay school fees, 17% to purchase stationery, 8% to circulate the money through Village Savings and Loan Associations, 25% to buy household food, and 8% to acquire kitchen utensils.

4.13. Position of women *Mapfihwa* project

All participants (100%) reported that their roles and positions within their households have improved due to the *Mapfihwa* project. Participants shared that their spouses and other household members now respect them, as they are perceived as hardworking and organised due to their ability to access and provide vegetables. They also noted that this newfound respect stems from their contributions to household food supply, as they are now bringing food to the table, staying occupied, and avoiding gossip and other social issues. Additionally, the project has alleviated financial pressure on household income, as money previously allocated for purchasing vegetables can now be redirected to other household needs. As a result, women expressed a sense of value and empowerment, feeling appreciated for their contributions brought about by the project.

All participants (100%) reported positive changes in their social standing within the community as a result of the *Mapfihwa* project. Previously, they were often perceived as beggars or individuals unable to be self-reliant. However, this perception has changed significantly. Members of the *Mapfihwa* project are now held in high regard by the community, being seen as knowledgeable in gardening and as individuals who have achieved improved livelihoods.

Some participants highlighted that the community now believes they are generating income from their gardening activities. This perception has contributed to upward social mobility, with participants feeling more esteemed and valued. They also reported improved social interactions and noted that they are now more approachable and respected within their communities.

5. Discussion

The findings of the *Mapfihwa* project align with existing literature on the transformative potential of permaculture, particularly its role in enhancing food security, improving soil health, and empowering women. The project demonstrates how adopting permaculture principles fosters resilience among peri-urban communities in Zimbabwe. This discussion juxtaposes the results of the *Mapfihwa* intervention with findings from similar studies globally and highlights key areas of convergence and divergence.

Globally, permaculture has been recognised for its adaptability and scalability across diverse contexts. The *Mapfihwa* project's success mirrors initiatives in Latin America, where agroforestry systems integrate trees and crops to create resilient landscapes (ICRAF, 2020). Similarly, the use of indigenous knowledge by *Mapfihwa* participants aligns with Fukuoka's (1992) concept of "natural farming" in Asia, emphasising minimal intervention. In Africa, agroforestry and conservation agriculture have shown comparable benefits, particularly in addressing food insecurity and land degradation (FAO, 2019). However, unlike some large-scale initiatives, *Mapfihwa's* focus on women-led, community-based approaches underscore the importance of local agency in driving sustainable change.

5.1. Food security

Before the permaculture intervention, Mapfihwa participants reported severe food insecurity, with 75% experiencing shortages and 25% having only moderate sufficiency. These findings echo Chikozho et al. (2021), who highlighted the critical role permaculture plays in increasing food production at the household level. The Mapfihwa intervention improved food availability through companion planting and mulching, which conserve moisture and enhance soil fertility. The observed longer shelf-life and higher quality of vegetables grown under

permaculture practices further confirm Moyo and Nyoni's (2020) assertion that agroecological methods are crucial for resilience in arid regions.

5.2. Social and economic empowerment

The Mapfihwa intervention enables participants to generate income through gardening, with projections going up to USD 500 per person. These earnings have the potential to diversify household incomes, reducing reliance on precarious sources such as casual labour. This supports findings by the World Food Program (2020), which emphasised the economic benefits of permaculture in Sub-Saharan Africa. Additionally, the income generated allows participants to reinvest in small-scale enterprises in new environments, illustrating the flexibility and adaptability of such initiatives, as suggested by the Permaculture Association UK (2021).

Women's empowerment through the *Mapfihwa* project aligns with the literature on gender and permaculture. Participants reported improved household decision-making roles, with 67% now involved in managing food, assets, and farming activities. Mutopo (2011) similarly documented the role of women in the Mwenezi District, forming cooperatives to share permaculture knowledge, thereby enhancing their agency. These changes challenge traditional power dynamics and support the hypothesis that permaculture interventions can drive gender equity, as proposed by Dibakoane et al. (2022).

The *Mapfihwa* intervention transformed participants' social standing and economic contributions. Previously marginalised, these women are now viewed as knowledgeable and capable contributors to household and community wellbeing. This shift mirrors findings from Dadirali and Gambiza (2019), who noted that women's involvement in permaculture elevates their status and fosters social cohesion.

5.3. Agricultural practices and contribution to resilience

Prior to the intervention, most participants relied on chemical input-based farming methods using synthetic fertilisers and pesticides. These practices are resource-intensive and environmentally degrading. In contrast, the permaculture beds utilised organic inputs like liquid poultry manure, Azolla water, and vermicompost, demonstrating improved crop yields and soil health. These findings support Didarali and Gambiza's (2019) observation that permaculture reduces dependency on chemical inputs while enhancing biodiversity.

Participants highlighted water scarcity as a significant challenge before the intervention. Under *Mapfihwa*, mulching and raised beds improved water retention, reducing weekly water consumption. This resonates with findings from Lawton (2010) on the effectiveness of permaculture's keyline design in conserving water in Africa. However, water use efficiency at *Mapfihwa* may require innovative solutions to ensure sustainability.

The contribution of permaculture to resilience is therefore evident in agroecological, economic and social resilience**.** Using organic fertilisers and pest control methods reduced soil toxicity and improved water retention, fostering a more sustainable agricultural ecosystem. This aligns with Altieri et al. (2025) assertion that permaculture enhances ecosystem services. The income generated from permaculture gardening can lead to diversified livelihoods, providing a buffer against economic shocks. Participants' plans to reinvest earnings demonstrate the potential for long-term economic stability. The empowerment of women through decision-making roles and increased respect within their households and communities fosters social cohesion, a critical component of resilience.

6. Conclusion and recommendations

The *Mapfihwa* project highlights the transformative potential of women-led permaculture initiatives in enhancing resilience within peri-urban communities. By addressing critical challenges such as food insecurity, gender empowerment, and ecological sustainability, the project provides a comprehensive model for sustainable development in Kutama and similar contexts. Through integrating organic farming practices, efficient water management, and social empowerment, *Mapfihwa* has demonstrated how resource-efficient solutions can create a lasting impact. The flexibility and adaptability of the *Mapfihwa* model in new environments are supported by the low-cost and resource-efficient nature of permaculture practices, combined with a strong focus on capacity building through training. Establishing community hubs based on the *Mapfihwa* approach, which leverages local resources and knowledge, could enable replication in other peri-urban areas.

Several recommendations are proposed to build on the *Mapfihwa* project's success and amplify its impact. This article recommends multiple duplication of the same project in different sites in order to build on the replicability and scalability of the *Mapfihwa* model. Enhancing water resources is also crucial to ensure efficient usage. The introduction of drip irrigation systems can optimise water use efficiency, reducing wastage and ensuring more consistent crop growth. To meet the growing demand for fresh produce, increasing production space is necessary. The expansion of cultivated land within the *Mapfihwa* project will accommodate more participants and boost vegetable output, thus enhancing the project's capacity.

Diversifying income streams is another important strategy to ensure economic resilience. Participants should be encouraged to explore complementary projects, such as broiler production, which can provide alternative revenue sources. Microloans or grants could be offered to support the start-up costs of these initiatives, making them more accessible. In addition, addressing resource limitations is vital for sustained productivity. Efforts should focus on improving resource allocation by addressing seedling shortages and enhancing seedling distribution. If drip irrigation is difficult to establish, increasing the number of water taps and hoses would make irrigation more efficient, saving time and effort for participants. An integrated approach to domestic and agricultural water use can enhance resource efficiency. Exploring dual-use water systems and ensuring that borehole systems are equipped to handle increased demand will help prevent resource depletion and sustain long-term productivity.

Scaling and replication should be prioritised to maximise the reach and impact of the *Mapfihwa* model. Establishing additional community training hubs modelled after *Mapfihwa* will expand outreach, while partnerships with local governments and NGOs can secure funding and technical support for scaling up. Developing a replicable framework tailored to different communities will ensure the broader applicability of the *Mapfihwa* approach. Finally, active involvement and feedback are critical for the continued success of the permaculture projects. Regular engagement with participants to identify areas for improvement and incorporate their suggestions into project planning ensures responsiveness to their needs.

References

Adu. B.E., Boateng, D.J. and Berko, D. (2024), "Understanding the Gender Gap in Productivity in Agricultural Production Among Small Holder Cereal Growers in Rural Ghana", *Cogent Economics and Finance*, Vol. 12 No. 1, pp. 2318979. https://doi.org/10.1080/23322039.2024.2318979

Altieri, M.A. (1999), "The Ecological Role of Biodiversity in Agrosystems." *Agriculture, Ecosystem and Environment*, Vol. 74 No. 3, pp. 19-31. https://doi.org/10.1016/S0167-8809(99)00028-6

Altieri, M.A. (2002), *Agro-ecology: The science of sustainable agriculture*, Westview Press.

Altieri, M.A., Nicholls, C.I., Montalba, R., Vieli, L., and Vazquez, L.L. (2025). Agroecology and the limits to resilience: extending the adaptation capacity of agroecosystems to drought. Frontiers in Agronomy, Vol 7 No 1534370. https://doi.org/10.3389/fagro.2025.1534370.

Annes, A. and Wright, W. (2015), "Creating a Room of One's Own; French Farm Women, Farm Tourism and the Pursuit of Empowerment", *Women Stud. Int. Forum* 53, 1-11. https://doi.org/10.1016/j.wsif.2015.08.002

Balasha, A.M., Kitsali, J.K., Murhula, B., Tshoma, K.J. and Nkulu, M.FJ. (2022), "Challenges Faced by Congoloese Women Farmers to Access Agricultural Productive Resources: A Review", *Open Journal of Social Sciences*, Vol. 10 No, 7, pp. 73-91. https://doi.org/10.4236/jss.2022.107007

Bryan, E., Alvi, M., Huyer, S. and Ringler, C. (2024), "Addressing Gender Inequalities and Strengthening Women's Agency to Create More Climate Resilient and Sustainable Food Systems", *Global Food Security*, Vol. 40, p. 100731. https://doi.org/10.1016/j.gfs.2023.100731

CGIAR (2020), *Sustainable Intensification in Africa*. CGIAR.

Chimhanda, K., Chimonyo, V., Zingwena, T. and Matangi, D. (2025), Advancing Gender and Socila Inclusion in Agroecology: Insights from the CGIAR Agroecology Initiative in Zimbabwe, CIMMYT.

Dadirali, Z. and Gambiza, J. (2019), "Permaculture: Challenges and Benefits in Improving Rural Livelihoods in South Africa and Zimbabwe", *Sustainability*, Vol. 11 No. 8, pp. 2201- 2219. https://doi.org/10.3390/su11082219.

Dibakoane, S., Siyongwana, P. & Shabalala, A.N. (2022). Vulnerability, impact and adaptation strategies of female farmers to climate variability. *Jàmbá: Journal of Disaster Risk Studies*, Vol 14 No 1, pp. a1302. https://doi.org/10.4102/jamba.v14i1.1302.

Elmhirst, R. (2015), Introducing New Feminist Political Ecologies, *Geoforum,* Vol. 42 No. 2, pp. 129-132. https://doi.org/10.1016/j.geoforum.2011.01.006

Etxegarai-Legarreta, O. and Sanchez-Famoso, V. (2022), "The Role of Beekeeping in the Generation of Goods and Services: The Interrelation Between Environmental, Socioeconomic and Sociocultural Utilities", *Agriculture*, Vol. 12 No. 4, pp. 551-569. https://doi.org/10.3390/agriculture12040551

FAO (2019), *Conservation Agriculture in Africa*. FAO.

Forte-Taylor, R.C., Clark, O.G. and Malard-Adam, J.J. (2025). Assessment of permaculture integration into gray and mainstream scientific literature in four languages. A review. *Agronomy for Sustainable Development,* Vol 45 No 36. https://doi.org/10.1007/s13593-025-01017-2.

Fukuoka, M. (1992), *The Natural Way of Farming: The Theory and Practice of Green Philosophy*. Japan: Japan Publications.

Gwimbi, P. (2009), "Cotton farmers' vulnerability to climate change in Gokwe District (Zimbabwe): impact and influencing factors", *JÀMBÁ: Journal of Disaster Risk Studies*, Vol. 2, No.2, pp. 81-92. https://doi.org/10.4102/jamba.v2i2.17

Hemenway, T. (2009), *The* Permaculture *City: Regenerative Design for Urban, Suburban and Town Resilience*. Chelsea: Green Publishing.

Henfrey, T. (2017), *Permaculture and Climate Change Adaptation: Inspiring, Ecological, Social and Economic Transformation*. Permanent Publications.

Holmgren, D. (2002), *Permaculture: Principles and pathways beyond sustainability*. Holmgren Design Services.

ICRAF (2020), *Agroforestry in Africa: A Pathway to Sustainable Development*. World Agroforestry (ICRAF).

IUCN (2019), *Ecological Restoration in Africa*. IUCN.

Jackson, W. (2002), "Natural Systems Agriculture: A Radical Alternative to Industrial Agriculture", *Journal of* Sustainable *Agriculture*, Vol. 19 No. 2, pp. 1-13. https://doi.org/10.1016/S0167-8809(01)00247-X

Lawrence, J.L., Altamirano-Jiménez, I., Daggett, C. *et al.* (2025). Feminist approaches to environmental politics. *Contemporary Political Theory,* 24, 81–97. https://doi.org/10.1057/s41296-024-00707-y.

Lawton, J.H. (2010), Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network, Report to Defra.

Magrini, M.B., Martin, G., Magne, M. A., Duru, M., Couix, N. and Hazard, L. (2019), "Agroecological Transition from Farms to Territorialised Agri-food Systems; Issues and Drivers in Agroecological Transitions, From Theory to Practice", In: J. E Bergrz, E Audoumin and O. Therond (eds), *Local Participatory Design*, Cham, Switzerland: Springer, pp. 69-98. https://doi.org/10.1007/978-3-030-01953-2_5

Mollison, B. and Holmgren, D. (1978), *Permaculture one: a perennial agricultural system for human settlements*, Tagari, Tyalgum

Moyo, F., Dube, Z. L., Nkala, P., Ncube, V., Mathe, T. T., Murai, T., Ndlovu, T., Mamba, F. S., Ncube, M., Ndlovu, S., Ndlovu, N., & Ndlovu, A. (2025). Climate-Change Resilience and Women's Participation in Food-Security Initiatives. A Review of Amalima-Loko Programmes in Nkayi, Zimbabwe. *Journal of Asian and African Studies*, *0*(0). https://doi.org/10.1177/00219096251313536

Mutopo, P. (2011). Women's struggles to access and control land and livelihoods after fast-track land reform in Mwenezi District, Zimbabwe. *The Journal of Peasant Studies*, Vol *38 No* 5, pp. 1021–1046. https://doi.org/10.1080/03066150.2011.635787.

Ndhlovu, E. (2017), An analysis of household livelihoods under the fast-track land reform programme in *Chiredzi*, Zimbabwe (MA dissertation), University of South Africa.

Ndhlovu, E. (2018), "Relevance of Sustainable Livelihood Approach in Zimbabwe's Land Reform Programme", *Africa Insight,* Vol. 47 No. 4, pp. 72-87.

Ndhlovu, E. (2024), "Building farming resilience to climate change through social assistance in South-Eastern Zimbabwe", *International Journal of Research in Business and Social Science*, Vol. 13 No. 10, pp. 105-117. https://doi.org/10.20525/ijrbs.v13i10.3800

Ndhlovu, E. (2025), "Women, Agricultural Development, and Prospects for Industrialisation in Africa" (pp. 283-300). In: *Agriculture, Autonomous Development, and Prospects for Industrialisation in Africa*. Springer, Cham. https://doi.org/10.1007/978-3-031-84992-3_16

Ndhlovu, E. and Dube, K. (2024), "Contract Farming and Climate Change Adaptation in Rural Zimbabwe", *Mankind Quarterly*, Vol. 64 No. 3, pp. 579-594. https://doi.org/10.46469/mq.2024.64.3.13

Permaculture Association UK. (2021), *Permaculture Design: A Practical Guide*, Permaculture Association, UK.

Quisumbing, A., Cole, S., Elias, M., et al. (2023). Measuring Women's Empowerment in Agriculture: Innovations and evidence. Global Food Security, Vol 38 No 100707. https://doi.org/10.1016/j.gfs.2023.100707.

Rocheleau, D., Thomas-Slayter, B. and Wangari, E. (1996), *Feminist Political Ecology: Global Issues and Local Experiences*, Routledge.

Rubio, M. (2023*), Breaking Ground: A Systematic Literature Review of the intersection between Women's Empowerment and Urban Farming in Latin America*. Jonkoping University: School of Education and Communication.

Serpossian, E., Coquili, X. and Annes, A. (2022), "Involvement of Women Farmers in the Agroecological Transition of their Work: Chronicle of the Agricultural Organisation Groupe Femmes", *Frontiers in Sustainable Food Syst*ems, Vol. 44 No. 6, pp. 869533. https://doi.org/10.3389/fsufs.2022.869533

Sibanda, M. (2025), "Feminist Agroecology: Towards Gender Equal and Sustainable Food Systems in Sub-Saharan Africa", *Agriculture and Rural Studies*, Vol. 3 No. 1, pp. 1-16. https://doi.org/10.59978/ar03010001

Vizuete, B., Garcia-Liorente, M., Perez-Ramirez, I. and Oteros-Rozas, E. (2024), "Gender Equity as a Key Element for Agroecological Transitions: Neo-rural Women as Managers of Agroecological Initiatives", *People and Nature*, Vol. 7 No. 2, pp. 449-462. https://doi.org/10.1002/pan3.10761

World Bank (2019), *Cash Transfers and Human Capital*. World Bank.

World Food Programme. (2020), *Food Security and Livelihoods*. WFP.