Understanding Community Awareness of the Importance of Uluguru Mountains Forest Conservation for Livelihoods, Morogoro Tanzania.

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Introduction

Forests are among the most critical natural resources supporting ecological stability and human well-being across the globe. They provide essential ecosystem services, including carbon sequestration, water regulation, biodiversity conservation, and soil protection (FAO, 2020). For rural populations, especially in developing countries, forests are essential for daily subsistence, offering fuel, water, medicinal plants, food, and income-generating opportunities (Charnley et al. 2010). The Uluguru Forest in Tanzania is a prominent example, offering both ecological value and livelihood support to surrounding communities.

Being part of the Eastern Arc Mountains, the Uluguru Forest is mainly knowns for its outstanding beauty and as one of the most biologically diverse areas in East Africa, hosting numerous endemic species of flora and fauna (Burgess et al. 2002, Burgess et al. 2007, EAMCEF 2021). Additionally, the forest functions as a vital water catchment area, for both rural and urban areas including Morogoro and Dar es Salaam (through Ruvu river) (Mkami 2011, Nuru et al. 2020). Apart from ecological services, the forest is integral to the socio-economic activities of local communities, who rely on it for agriculture, forest products, traditional medicine, and cultural practices (Kideghesho et al. 2015). Specifically, Uluguru Mountains forest play a key role in agriculture, which is the backbone of the country's economy (URT, 2002).

However, apart from its importance at local and national level, the forest is under increasing pressure from human activities, such as unsustainable farming practices, logging. charcoal production, and settlement expansion (URT 2014). These actions are largely contributed by poverty and behaviour and contribute to environmental degradation, threatening biodiversity and reducing the forest's ability to provide essential services. These unsustainable practices in the forest are expected to increase given the increased human population and the associated demands (Ganiver 2020). Consequently, conservation initiatives and practices are critical to preserving this ecosystem, but their success centres on the active participation and support of local communities (Pretty & Smith 2004, URT 1998). A key factor in this process is community awareness and how well people understand the importance of forest conservation and the benefits it provides to their livelihoods.

Community awareness is a foundational pillar in effective environmental management (Eshetu 2015). When individuals and groups recognize the link between forest ecosystems and their

own welfare, they are more likely to adopt conservation-friendly practices and support long-term protection efforts (Mehta & Heinen 2001). In the context of the Uluguru forest, enhancing community understanding can empower residents to become custodians of natural resources, encouraging sustainable practices that benefit both the environment and their livelihoods. Without such awareness, conservation strategies may face resistance or indifference, undermining their effectiveness and sustainability (Kideghesho 2009).

Ultimately, understanding community awareness is essential for aligning conservation objectives with local development needs. As global environmental challenges intensify, there is a growing consensus that sustainable natural resource management must be participatory, culturally relevant, and grounded in the realities of those most directly impacted (Ostrom 2009). The case of the Uluguru Forest underscores the importance of bridging ecological science and local knowledge to achieve lasting conservation outcomes.

This study investigates the level of awareness among communities surrounding the Uluguru forest regarding its conservation and the potential human factors responsible for the forest degradation. Additionally, the study examines how does local community participate in conservation, and the role of conservation stakeholders in promoting forest stewardship. By focusing on these dynamics, the research contributes to the development of locally informed conservation strategies that are socially inclusive and ecologically sustainable.

Materials and Methods

Description of study area

The Uluguru Mountains are found within three districts of Morogoro region, namely Morogoro Rural, Mvomero, and Morogoro Urban. The UMNFR, covering an area of 97.6 km2 (24,115 ha), it forms the central part of the Eastern Arc Mountains (EAMEF, 2022), and lies at Longitude: 37.70946° or 37° 42' 34" east, Latitude: -6.82601° or 6° 49' 34" south (Hansen et al. 1995). The primary Uluguru mountain range is a ridge oriented roughly north-south, reaching its highest elevation of 2,630 meters (https://easternarc.or.tz/mountain/uluguru/). The reserve is surrounded by villages which majority of them are located adjacent to the reserve's boundary and some are even located within the reserve confines. The vegetation of Uluguru varied considerably partly due to elevation differences. It ranges from dry in the lowland area (coastal habitats) to interim rain forests, to sub-montane, montane and upper montane forest

types. In addition, it also includes an area of Afromontane grasslands at the highest peak of the mountain.

Uluguru mountains is among the Tanzania's biodiversity hotspots and it is a well- known for their exceptional biological diversity, species richness, and degree of endemism (Burgess et al. 2007). The UMNFR has high endemism and contains at least 16 endemic vertebrate and 135 endemic plant taxa. This high degree of endemism is exceptional even for tropical Africa. The area inhabited by Luguru people who are mostly peasants producing crops for food and sale. Main crops cultivated in the area are bananas, cassava, rice, cocoyam, oranges, maize and beans (references).

Data were collected in two districts in Morogoro region. These two regions are Movemero and Morogoro urban and were selected due to their closeness to the Uluguru Forest Reserve. A total of four wards were purposively selected across these two districts namely; Bunduki, Nyandira, (in Mvomero), Bigwa and Kilakala (in Morogoro Urban) (Figure 1). Two villages from each ward were selected making a total of eight villages. The villages were Vinile, Maguruwe, Nyandira and Kibagala in Mvomero and Vituli, Bohomela, Chalumbi and Nughutu in Morogoro Urban district. These two districts were selected because they represent villages in rural areas and urban dwellers who are both beneficiary of Uluguru Forest Reserve at different levels.

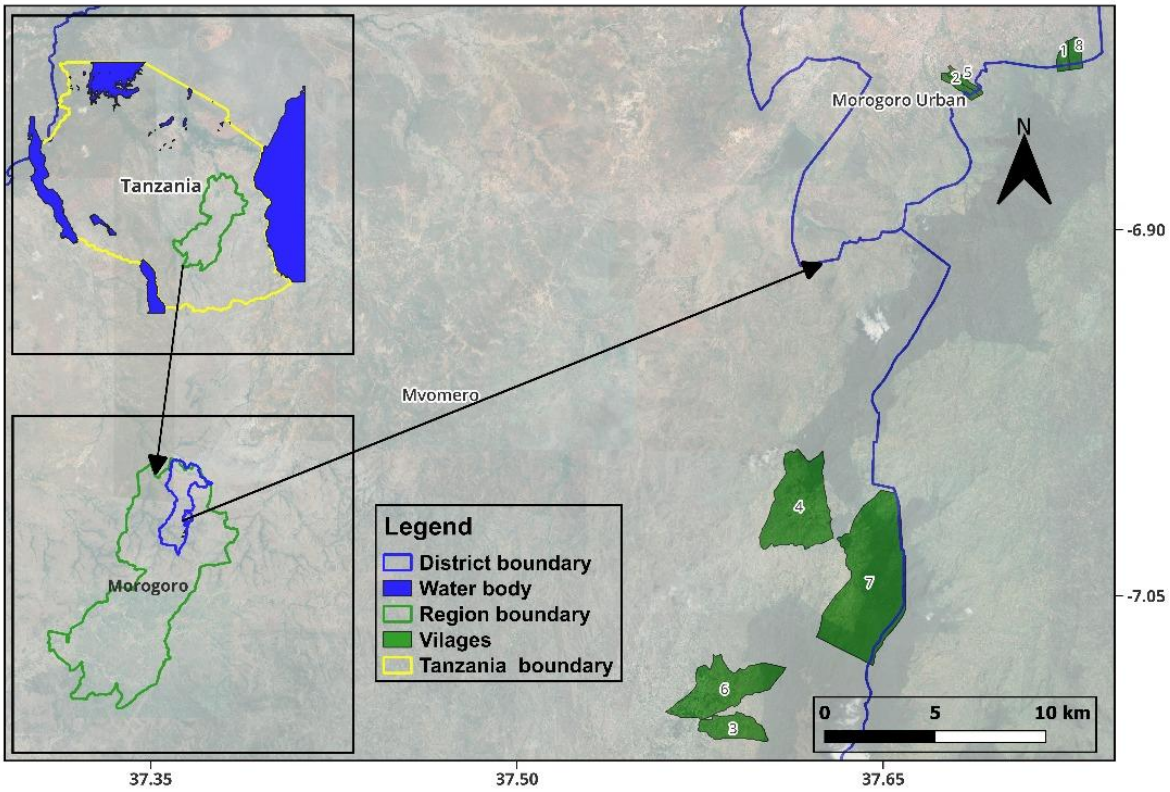

Figure 1: Study villages (labelled in numbers 1-8) in Morogoro region (2025).

Both secondary and primary data were collected. Secondary data came from various published and unpublished sources, while primary data was gathered through household interviews and field observations conducted in March 2025 (Fig 2). A total of 268 respondents were interviewed representing 10% of the total households from each villages surveyed (Kothari 2004). The household interview questionnaire included demographic information (age, sex, and education level) and respondents' occupations. The survey assessed respondents' awareness of small mammals (rodents) found in their compounds and their benefits to the environment. It also examined their attitudes toward the importance of the Uluguru Forest Reserve for their livelihoods and the negative impacts of human activities on its biodiversity.

Figure 2: Household interview in progress at Vituli street in Bigwa ward, Morogoro (2025)

Social survey data were record in the KoboCollect (v2024.2.4) and later were transferred to Microsoft excel for cleaning and visualizing. Analysis was done using Statistical Package for Social Sciences (SPSS) in which descriptive statistics such as frequencies and percentages were obtained.

In order to supplement the information from respondents on the trends of forest condition and the potential human factors responsible for forest loss, the trend of the forest land use types and cover was established using remote sensing where image classification and analysis was used. This technique involved spectral pattern recognition in which features with homogenous group

of pixels in an image were be classified together to generate features of land cover classes of interest (Natural resources Canada 2015). Satellite images of the study area during a particular year were downloaded from a 10 years-time series pairs of Landsat images from current predetermined time just prior to sampling to obtain four images (that is, 2000 to the present). Images were downloaded following the period of the dry season in the study area since it was possible to identify agroforestry and the remaining bare lands were termed as seasonal agricultural lands (Mmbaga et al. 2017). Image classification in this case focused on agriculture, settlements, forest, and shrubland.

Images were imported into the ArcGIS Pro-3.4 then processed and analysed through cleaning, compositing, masking, clipping and mosaicking. Finally, image classification used the maximum likelihood function under supervised classification (Campbell and Whyne 2011). Land use land cover types were classified into shrubland, forest, agriculture, and settlements similar to Noe (2003), Msoffe et al. (2008), Mmbaga et al. (2017), and Sanare et al. (2022).

Results

Demographic information of the respondents

A total of 268 respondents were involved in the household survey. Generally, majority of respondents were between the age of 30 and 49 (56.3%, n = 151) and comprised of more females compared to males indicating probably males are more vigilant in searching for economic opportunities outside their houses as compared to females (Table 1). Over 70% (n = 202) of respondents had primary education with more of them engaging in the farming activities (Table 2). In addition, majority (85.4%) of respondents have lived in the study area for more than 10 years indicating that they are aware of their surroundings.

Table 1: Age and se of the respondents from villages surrounding the Uluguru Forest Reserve (2025).

Age class	Frequency	Percent
18-29	34	12.7
30-49	151	56.3
50 and above	83	31

Total	268	100
Sex		
Female	160	59.7
Male	108	40.3
Total	268	100

Table 2: Education level and the occupation of the respondent in the villages around Uluguru Mountains Forest Reserve (2025)

Activity	**Frequency**	**Percent**
Both a farming and a livestock keeping	15	5.9
Business owner	50	18.7
Farmer	170	63.4
Other	20	7.5
Unemployed	12	4.5
Total	**268**	**100**
Education level		
No formal education	38	14.2
Primary school	202	75.4
Secondary school	27	10.1
Tertiary education	1	0.4
Total	268	100

The nature of crop fields in the study area are hilly with some of the respondents cultivating up to 1800 a.s.l (per. observation) Figure 3). The nature of the area needs a sustainable farming including mixed farming and terracing in swahili known as *Makinga maji* which was not practiced in the study area especially in the villages around Bigwa and Kilakala ward as compared to villages around Bunduki and Nyandira wards.

Figure 3: Crops fields in hilly areas in Maguruwe village in Bunduki Ward, Morogoro region (2025).

Community's awareness on the importance of conservation of Uluguru Forest

Awareness on the occurrence and the importance of small rodents

All respondents (100%, n = 268) were aware of the presence of some small mammals (mainly rodents) in their surroundings, both inside their houses and in the crop fields. They identified the small mammal species found in their area using the Luguru language, except for one species the Giant pouched rat (*Cricetomys* spp.) which they referred to by its Swahili name, '*Panyabuku*.' This species was mentioned as one of the preferred rodent species for food. Other species mentioned by the local community included *Dendromus* spp., *Lophuromys* spp., *Rattus* spp., and *Praomys* spp.

According to the respondents, all the mentioned species are potentially consumed, except for those usually found inside the house, such as *Rattus* spp. However, when asked about the current status of the preferred food species, 69.4% (n = 186) felt that their availability in recent years has been moderate, suggesting that their numbers are neither too high nor too low (Table 3).

Table 3: Availability of some of the small mammals especially the preferred species

Status	Frequency	Percent
Good	32	11.9
Moderate	186	69.4
Poor	38	14.2
Very good	10	3.7
Very poor	2	0.7

Total	268	100

Since majority of respondents mentioned giant poached rat as common specie for food in their area, they were asked to rate the availability of this species for the past 5-10 years. Majority (46%) of the respondents feels that this were decreasing while 22% of respondents thought that species were still stable (Fig 4). The fact that 15.7% of respondents declared that they were not sure of the status indicates that they were not able to estimate if the abundance was increasing or decreasing.

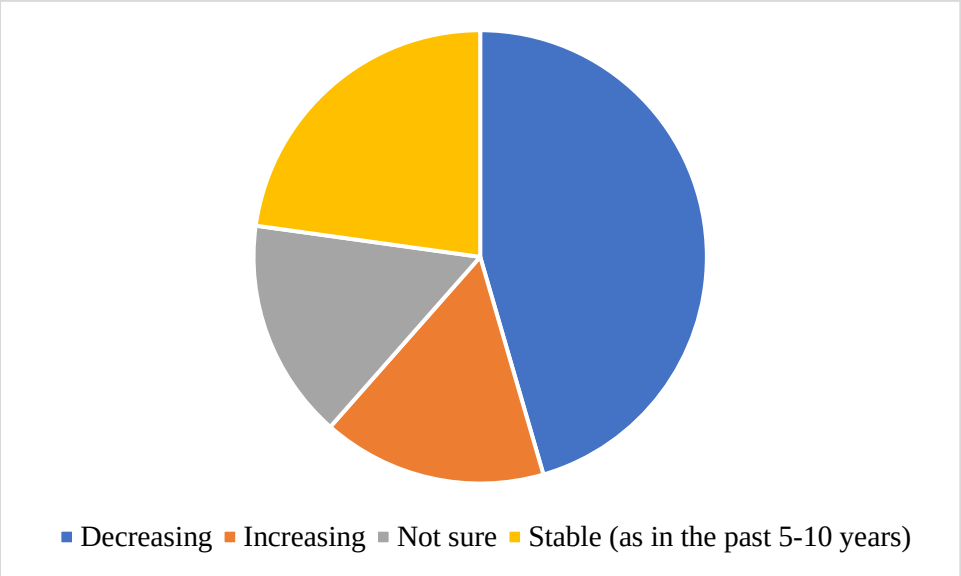

Figure 4: Abundance of Giant poached rat for the past 5-10 years in the villages around Uluguru forest reserve (2025)

Awareness of the community on the ecological importance of rodents in their surroundings

Although all respondents were aware of the occurrence of small mammal in their vicinity, majority were unable to mention any of their ecological roles. Over 90% (n = 267) of the respondents revealed that small mammals have no any ecological roles in their environment (Table 4). Instead, the respondents were very negative about rodents as they mentioned these animals are mainly damaging crops, vandalizing crops, clothes and other properties. In addition, although majority felt that rodent causes more economic loss, very few individuals (7.5%, n = 20) were able to mention the possibility that rodents may transfer diseases to human (Table 4).

Table 4: Percentage and frequency of the response of community on ecological roles and negative effect of rodents found in the villages around Uluguru Reserve

Ecological roles of small mammals	Frequency	Percent
No any ecological roles	267	99.8
Source of food to other animals	1	0.4
Total	**268**	**100**
Negative effect of rodents		
Crop damage	203	75.7
Disease transmission	20	7.5
Crop damage and food vandalism	33	12.3
I don't know/Others	12	4.5
Total	**268**	**100.0**

When they were asked to rate how important the Uluguru forest to their lives, over 80% of respondents said the Uluguru forest is very important. Improved water quality and availability was the most (>50%) mentioned importance of the forest to their livelihoods (Table 5). Although climate regulation was the second in the mention, it received less percentage (17.9%, n = 17.9%) indicating that the ecosystem services that are not seen or tangible are hard to quantify and realize. However, respondents from Mvomero district further mentioned fire wood collection as the day-to-day benefits from the forest as compared to Morogoro Urban districts respondents.

Table 5: Percentage of the respondents regarding the importance of Uluguru forest to their livelihoods

Importance of the Forest	Frequency	Percentage
Water quality and availability	160	59.7
Climate regulation and improved water quality	48	17.9
Water availability and improved soil	13	4.9
Water availability and pollination	10	3.7
Others	20	7.5
Not sure	17	6.3
Total	268	

Apart from the importance of the forest to the local community's livelihood, yet they felt that the forest condition has changed for the past 10 years. Majority of the respondents (53%) said that the forest condition has changed (Fig 5) in terms of increased in planted trees (for rehabilitation), scarcity of fire wood and the reduced canopy cover in some areas adjacent the forest boundaries. When they were asked to mention the drivers to these changes, the respondents restrict themselves from disclosing activities that could victimize them. However, majority of them claimed that logging and poverty are the main drivers. In addition, Kilakala ward had more respondents who discloses that the forest was changing mainly due to human activities (Table 6).

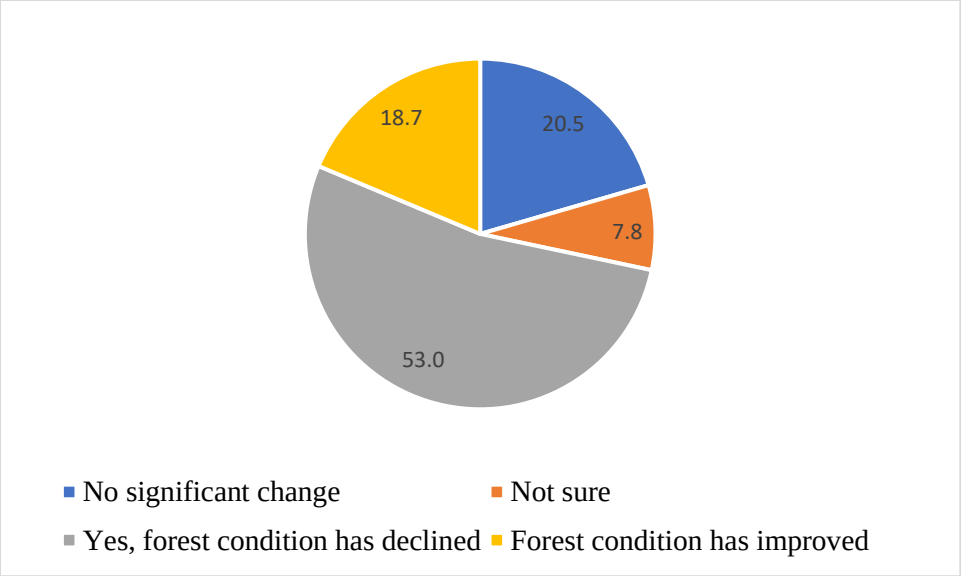

Figure 5: Community's perception of the condition of the Uluguru forest reserve for the past 10 years

Tabel 6: Community' responses across wards on the human activities responsible decline of Uluguru forest condition

Human activities	Bunduki	Nyandira	Bigwa	Kilakala	Total (%)
Agriculture	0	0	10	15	25(9.33)
Settlement	3	2	5	8	18(6.72)
Climate change	5	6	12	9	32(11.94)
Poverty	1	0	13	36	50(18.65)
Logging/deforestation	6	10	26	47	89(33.21)
Lack of knowledge	1	3	9	11	24(8.955)

I don't know/Others	6	8	4	12	30(11.19)
					268(100)

In addition, results from the satellite maps between 2000-2020 showed that there is apparent change in the land use cover. Dense forest for example covered >80% of the total Uluguru forest reserve in 2000 but it changed to only 74% in 2020. Agriculture/settlements has increased from 8% of the total land area to 13% indicating loss of natural habitats in the forest. Shrubland on the other hand, although changing in small rate, it has changed by 4% between 2000 and 2020 (Fig 6, Table 7).

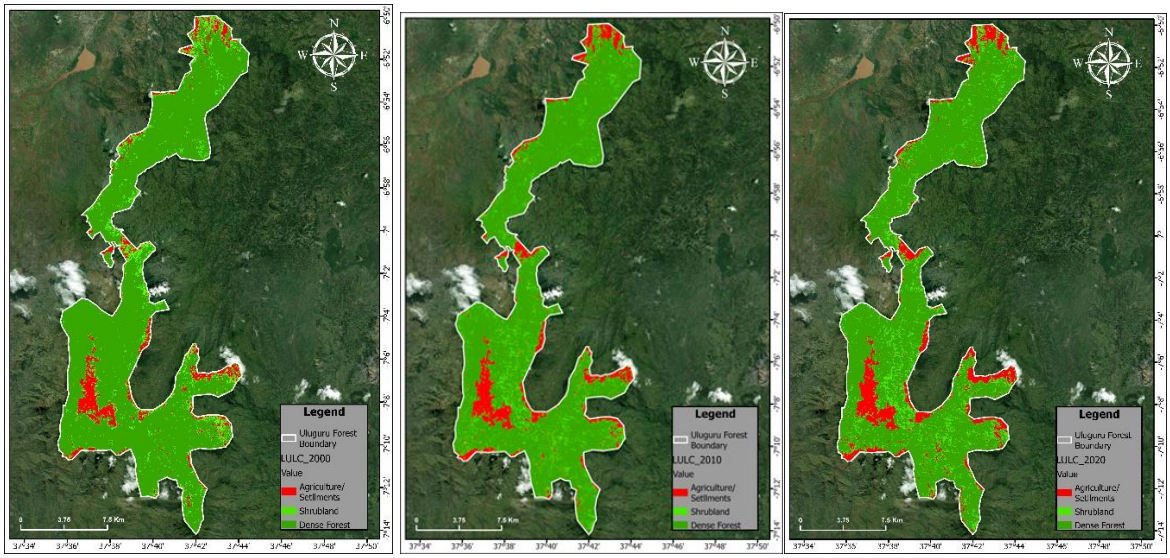

Figure 6: Satellite maps of 2000-2020 showing land cover change in Uluguru Forest

Table 7: Area of land cover and percentage of changes of each land cover between 2000-2020 in the Uluguru Forest reserve.

YEAR 2000		
Land cover	**Area (sqkm)**	**Percentage**
Agriculture/Settlements	20.7905	8.498280764
Shrubland	22.1336	9.047283477
Dense Forest	201.7195	82.45443576
Total	**244.6436**	**100**
YEAR 2010		
Agriculture/Settlements	27.9007	11.40463106
Shrubland	30.0767	12.29408822
Dense Forest	186.6662	76.30128072
Total	**244.6436**	**100**
YEAR 2020		
Agriculture/Settlements	32.2691	13.19121956

Shrubland	31.0795	12.7049254
Dense Forest	181.277	74.10385503
Total	244.6256	100

Since majority of respondents were farmers, they were asked to explain if they think agriculture have any effect on environment if not practiced sustainably. However, majority of respondent said that agriculture has no significant effect on the environment (66%, n = 177) while only 34% were able to connect if agriculture is not well practiced it will lead to loss of biodiversity (Table 7). Sustainable farming practice such as terrace farming to control erosion and water runoff was only observed to be practiced in the villages in Bunduki and Nyandira Ward in Mvomero district as compared to the areas in Morogoro urban district (Pers. Observation, Fig 7).

Figure 7: One of the crop fields cultivated without soil erosion control mechanism in Bohomela village in Bigwa Ward (2025)

Table 7: Frequency and percentage of respondent on the effect of agriculture on biodiversity

Effect of agriculture on environment	Frequency	Percent
Increases soil erosion and land degradation	65	24.3
Leads to deforestation	21	7.8
No significant effect	177	66
Reduces habitat for wildlife	5	1.9
Total	268	100

Given the importance of Uluguru forest to the livelihoods, respondents were asked to mention how they participate in conservation to ensure its sustainability. Over 50% (n = 159) of respondents said that they do not participate while 30.2%, (n = 81) of respondents claimed to do by tree planting activities (Table 8). Although not mentioned, in this questions, majority of respondents from Bigwa ward had energy efficient stoves indicating that they were also participating in the conservation indirectly (Fig.8). In addition, the use soil control mechanisms in farming are among the way of conservation although the respondents did not mention.

Table 8: Different ways in which community participates in the conservation of biodiversity in Uluguru Forest reserve.

Activities involved	Frequency	Percentage
Tree planting	81	30.2
Information giving	15	5.6
Fire fighting	4	1.5
Tree planting and fire fighting	9	3.4
I do not participate	159	59.3
Total	**268**	**100.0**

Fig 8. Fuel efficient stove as it was observed in Bohomela village (left-field data 2025), as compared to traditional three stones stove (right-google photo 2025).

Discussion

Socio demographic characteristics of respondents

Most respondents (69%) were between 18 and 49 years old, with a higher proportion of female participants. The dominance of female respondents may be due to the fact that males are more vigilant in searching for income opportunities while leaving women with other household chores (International Organization for Migration 2005). A significant proportion (>80%) of respondents have resided near the Uluguru Mountains forest for over a decade, indicating a deeply rooted community with prolonged exposure to forest ecosystems and conservation issues. Notably, 75.4% (n = 202) of these individuals possess only primary education, while a mere 10% (n = 27) have attained secondary education. This limited educational attainment constrains livelihood options, often compelling residents to depend heavily on forest resources for sustenance. For example, Chambwera and Folmer (2007) and Nyembe (2011) found that households with higher levels of education were more likely to opt for cleaner energy sources instead of relying on firewood and charcoal. The Food and Agriculture Organization (FAO 2014) emphasizes that education is vital for enhancing productivity and employability in rural areas since it facilitates community to participate in market economies including value added activities for better livelihood and reduce dependency on the forest (Muro and Burchi 2007).

Importance of forest conservation to their livelihood

The findings from this study show that all community members interviewed (80%) were aware of the importance of the forest to their livelihoods, highlighting a strong appreciation of the role of forest in sustaining local community's livelihoods. Forests are commonly known to support rural livelihoods by providing firewood, medicinal plants, construction materials, and favourable microclimates for agriculture (FAO 2018). Thus, this high level of awareness reflects the community's long-standing interaction with forest resources and aligns with previous studies indicating that communities living near forests often develop a deep, functional understanding of their value (Tadesse and Tekeyai 2017).

In addition, many community members reported being aware of the presence of rodents in both crop fields and inside their homes. Also, they were aware of the species that are eaten and (those in the crop fields) and those which are not eaten (rodent species that are found inside the house). This suggests a level of experiential knowledge, particularly because most residents are farmers who encounter these animals frequently during crop cultivation and storage. This finding supports previous research indicating that farmers in rural areas are often the first to

observe pest presence due to their direct interaction with the environment (Makundi et al. 2005).

However, despite this high awareness of rodents, most respondents (99.8%) could not identify any ecological importance of rodents, instead classifying them entirely as pest species. This perception is understandable given the economic damage rodents cause to stored crops and growing fields. Nonetheless, it reflects a limited ecological understanding, as rodents also play significant roles in natural ecosystems, such as seed dispersal, soil aeration, and serving as prey for higher predators (Brehm et al. 2019, Qiaoling et al. 2022, Rodgers 2019). The lack of recognition of these roles highlights a knowledge gap that may limit community participation in balanced conservation efforts.

More concerning, the fact that respondents were generally unaware that rodents can transmit diseases indicates a serious gap in health education, especially since rodents are known carriers of zoonotic diseases such as leptospirosis, hantavirus, and plague (Meerburg et al. 2009, Ziwa et al. 2013, Astorga et al. 2025). Given that the community is composed primarily of farmers who have regular contact with environments inhabited by rodents, this unawareness represents a significant public health risk. According to the WHO (2021), awareness and hygiene practices are crucial components of zoonotic disease prevention, particularly in areas with close human-wildlife interactions.

Although over 80% of respondents recognized the Uluguru forest as very important to their lives, they mentioned improved water quality and availability as the main benefit (60%, n = 160). This aligns with findings that communities near forests develop strong awareness of tangible ecosystem services (Eyassu 2021). However, only 17.9% mentioned climate regulation, highlighting that intangible services are less understood or valued (MEA, 2005, Krause et al. 2017). Respondents from Mvomero district (rural area) emphasized firewood collection as among the forest benefits more than respondents from Morogoro Urban districts, reflecting rural communities' higher daily dependence on forest products (Shackleton and Shackleton 2006, Paumgarten & Shackleton, 2009). These patterns underscore the need for awareness programs that address both visible and invisible forest benefits.

While the local community recognizes the importance of forest to their lives, majority perceived that forest condition has changed over the past decade. Observed changes include an increase in planted trees (rehabilitation efforts), scarcity of firewood, and reduced canopy cover

near forest boundaries. Similar community-based observations have been documented in other studies, where local knowledge effectively complements scientific forest monitoring (Danielsen et al. 2011). Despite the awareness of these changes, respondents were cautious in identifying specific drivers, possibly due to fear of self-incrimination an issue commonly observed in communities living close to protected areas (Peng et al. 2020). In addition, historical relocations of people who lives close to the natural resources might also make them fear not to implicate themselves. For example, in Bohomela and Vituli streets in Morogoro municipal, communities were very cautious of the environmental practices as in some years back there was an attempt to re gazette the area and possible to relocate some of its dwellers far from the forest (Pers. Communication 2025). The fear of relocation due to historical practices in the areas close to conservation has also been observed world-wide where community are always defensive not to lose their land (USAID 2013). However, many acknowledged that poverty and illegal logging are key drivers of forest degradation. This corresponds with findings that rural poverty often compels communities to extract forest resources unsustainably (Kyere-Boateng and Marek 2021). According to Kaur and Mittal 2020, worldwide, forests are vital for community's livelihoods and the demanding might increase as crop cultivation is compromised by the increased climate change. Notably, over 350million people living very close to forest almost whole dependent on forests for subsistence and income (World bank 2001) indicating that for some communities especially in the rural area, the forest close to them is the only option for life which is calling for more strategies for livelihood diversification. Heavy reliance on forest and forest products was narrated by one of the Key Informants from the Noghutu street in Kilakala Ward "*Forest cover is decreasing at an alarming rate. This is partly due to poverty, as most villagers were born here and depend heavily on the forest for both subsistence and income. To reduce pressure on the forest, we must provide them with alternative livelihood options, such as employment opportunities"*

Another respondent disclosed that not only people around Uluguru forest who vandalize the resources, also people from outside. "*The Uluguru Forest belongs to us. If we don't use it, outsiders will destroy it. Currently, illegal mining is taking place in the forest, leaving behind large, uncovered holes. We can not fight these people because they are powerful and armed, so we at least use the forest to support our livelihoods before we are left with nothing but barren land"*.

Although, the respondents restrict themselves from mentioning agricultural activities as among the sources of forest degradation, cultivated field were observed to extend to the border of the forest (pers observation). Similar finding has been reported in Uluguru mountain forest by Hymas (2000) and Nkombe, (2008) who indicated that Uluguru Mountains are facing intense degradation pressure mainly from agricultural expansion and fire. Po'cs and Nkombe (1980) found that farms extend up to the border of the reserve, with very little public forest found outside the reserve suggesting that as human population increases, encroachment will peak up. The importance of the Uluguru Forest cannot be overstated, as it is the future not only of the *Luguru* people but also of the surrounding communities and the nation as a whole, due to its vital role in water catchment, biodiversity conservation, and climate regulation. Being among the important biodiversity host-spots in Tanzania it holds a great value both in ecology, economic and social so the need to addresses these challenges.

When they were asked how they participate in conservation, majority of respondents claimed that they do not participate (they do nothing). For those who agreed to engage in conservation activities, they mainly do it through tree planting. This finding is unsurprising as it has been observed that in Uluguru forest and adjacent areas majority of the community engage mostly in tree planting mostly as part of conservation activities (Fragallah et al. 2021, Sanga 2010). This is because tree serves multiple purposes such as economic gain (shading, fruits, poles, ornamental, medicines) and conservation such as soil erosion control and water catchment. This tree planting activity was mainly supported and emphasised by Village Environmental Committee (VEC) especially in the villages in Mvomero districts and Bohomela and Vituli villages ni Bigwa ward. Although these villages (Bohomela and Vituli) were relatively in the remote areas compared to other villages in Kilakala ward, the respondents were aware of the presence of VEC and their role in the conservation of the environment. This suggest that people who are in town might not attend village meetings and thus less informed on the important matters related to environmental conservation.

Surprisingly, although majority of the respondents have resided in the study area for more than a decade, they failed to mention some practices such as terracing and agro-forestry as among the methods they do to conserve. This indicate that the community are not entirely understand the meaning of biodiversity conservation that calls for more education. Terracing practice is among the soil conservation mechanism in the hilly area's agriculture. Although all study villages were located in the hilly areas, only villages from Mvomero district were observed to

practice terraces (Per. observation 2025). For more details we asked one of the village chairpersons in Kilakala and Bigwa ward, why their people do not adhere to the sustainable agriculture? Here is his response; *These people have been here since they were born. They have been practicing agriculture without terracing (makinga maji) because they are used to it (due to customs). They know the consequences of not using terraces in the hilly areas but they do not want to change their behaviour.*

Another lady from Bohomela village disclosed that terracing is not a good practice as it causes more damage when there is heavy rain (Per. Communication, 2025). According to her, when using terracing, accumulation of some stalks and grasses on the terrace causes it to became heavy and once there is a rain it will wash the soil and the entire materials down the hill. This suggest that, it is not always that the education on the sustainable practices is missing but people are rigid to change towards a new practice "failure to adopt new technology syndrome". More research is needed at least to get to understand why are they not following the practices despite been fully informed.

Conclusion and Recommendations

The findings reveal a strong awareness among the local community about the importance of forest conservation, particularly regarding the direct benefits such as improved water availability. However, there remains limited understanding of the broader ecological functions of forests, such as climate regulation and the roles of various species like rodents. This gap in knowledge highlights the need for targeted environmental education that connects biodiversity conservation to everyday livelihoods and health.

Despite the recognition of forest value, forest degradation continues due to human pressures such as unsustainable agriculture and poverty-driven practices. While many respondents are engaged in tree planting, which they view as beneficial both economically and ecologically, sustainable land management practices like terracing are not widely adopted. This is partly due to resistance to change, lack of awareness, and misconceptions about the techniques.

To enhance conservation outcomes, it is recommended that community education programs be strengthened to address the ecological roles of species and the less visible benefits of forests. Extension services should be improved to promote and support sustainable farming practices, including terracing, with a focus on demonstrating practical benefits and addressing local

concerns. Additionally, efforts to alleviate poverty must be integrated with conservation strategies, ensuring that livelihood needs are met without compromising the integrity of the forest ecosystem.

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