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Place-value Attachment on Provisional and Cultural Services for Sustainable Management of Ngezi Forest

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Abstract

This paper uncovers the importance of people's place-values on sustainable forest management, and how such values can be incorporated into forest management actions and decision-making. Specifically, it focuses on mapping economic and cultural values on forest ecosystem services; assesses how non-materials and materials benefit from forest ecosystem cause landscape fragmentation; and how this information could assist in better forest planning and management. The data were collected from ten villages surrounding the Ngezi forest reserve in Pemba, Tanzania. Data were collected through participatory mapping, field observation, and focus group discussions. A map of place-values for each respondent was transferred from paper to digital format, digitized and coded using the GIS, and analysed using kernel density. Non-spatial data were processed and integrated into GIS-based spatial analysis. The results indicate that only 12 areas were identified as very high-valued and these require careful consideration for sustainable forest planning and management. About 4 out of 6 very high-valued areas for material services are found inside the reserve. The areas outside the reserve are undervalued and not utilized effectively for material services. Contrary to cultural services, only 1 out of 6 very high-valued places is located inside the reserve. Furthermore, economic situations, together with social driving forces, have been important determinants of forest values in the areas. Therefore, place-values issues, particularly economic development outcomes, preservation of the aesthetics and improvement of recreational amenities should be considered when examining sustainable forest resource management.

Keywords: *place-values, kernel density, forest management*

1. Introduction

Different researchers associate peoples' values on landscapes with different community attachments. For example, Brown et al. (2015) relate it with place-dependence; Mishra et al. (2009) associate it with religious, genealogical, and economic attachment; Araujo et al. (2013) link it with quality of life, and Fagerholm and Käyhkö (2009) associate it with social and cultural attachment. The place-value concept is practiced worldwide and has gained popularity in natural resource planning (Brown, 2015; Plieninger et al., 2019; Crilley et al., 2012). Land-use planners and decision-makers are aware that any decision

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implemented on forest planning and fails to effectively consider people's values is unlikely to succeed (Raymond et al., 2014; Seymour et al., 2010). Place-based approaches to natural resource planning are attracting increased attention in many parts of the world (Sinare, et al., 2016; Plieninger et al., 2019; Brown, 2005). There is a need and demand that people's needs must be taken into account for sustainable forest ecosystem management.

Sinare et al. (2016) contend that the problem of natural resource degradation is not caused by population, technology development, distance, or economic factors; but it is primarily influenced by poor management that originates from centralized systems that pay no attention to the importance and values of local communities. He suggested the solution to this is to improve management systems to consider the values of local communities and involve them in resource planning, decision-making, and sharing of benefits. If people feel that a resource they are attached to is threatened, and that a landscape could change into a place in which they no longer feel an emotional bond, they can act negatively towards the people or organizations responsible for that change.

In Pemba, the issue of place-values in sustainable forest management is very important. The Ngezi forest reserve was established in Northwest Pemba in the 1950s and served as one of the last remaining stands of indigenous forest. However, it has been degraded fast and is currently facing much pressure from surrounding communities (Saleh, 2012; Yussuf, 2004). Although there are mechanisms in place for community forest management in Pemba—e.g., the Community Forest Management Agreements (CoFMAs)—they have failed to sustainably preserve the forest (Balsem, 2011). A large amount of the original evergreen forests and endemic species like *milicia, erythrophloem, phoenix leaves, wild pigs, chesi, and Pemba flying fox* have completely disappeared and/or are near extinction (Davidson et al., 2017; Nahonyo et al., 2005).

The government of Zanzibar has taken considerable measures to sustainably conserve indigenous forests. The measures include the improvement of tourist facilities, provision, and promotion of forest conservation education, as well as fostering local communities' participation in forest-related issues through seminars, workshops, and study visits (DCCFF, 2010). Nevertheless, these efforts have not yielded the expected fruits of resolving the problem due to inadequate understanding of its causes. This limited understanding is largely influenced by poor linkage of indigenous knowledge with spatial scientific knowledge. Without adequate knowledge of the people's place-values on the forest, it will be difficult to attain sustainable forest management.

Initially, there was a debate among forest stakeholders and scholars on how to integrate multi-functionality of the ecosystem to achieve sustainable forest management. However, it was later agreed that there is a need to engage on Participatory Geographical Information System (PGIS) if human communities need to enjoy the ecological, social, and economic benefits of forests (Zolkafli and Brown, 2017). Irina and Paulo (2014) showed the capability and importance of PGIS in creating maps of land-use and demonstrating the impact of human activities on ecological functions. Many scientific studies suggest that the application of PGIS, coupled with the involvement of local communities can add value to local knowledge and support development (Plieninger et al., 2019). In contrast with conventional GIS applications, PGIS aims at placing communities in control of, and have access to, their resources (Smith et al., 2012). PGIS can be used to capture local knowledge, and combine it with more traditional spatial information in exposing problems associated with forest resources management (McCall & Dunn, 2012; McLain, 2013).

Several studies have been conducted in Zanzibar on landscape and PGIS. However, most of the studies have focused on social landscape values (Fagerholm & Käyhkö, 2009), government interventions, community and stakeholders' knowledge in landscape assessments, and the ethical dilemma of participatory GIS (Fagerholm et al., 2012; Käyhkö et al., 2014). However, despite the increased use of GIS and PGIS on landscape studies in Zanzibar, the government's environmental and spatial planning policies have failed to protect the environment successfully because of poorly integrated landscape planning with people's place-values in the landscape. Little is known on the impacts of provisional and cultural values on sustainable resource planning. This study intends to fill this gap by examining how non-materials and materials benefits from forest ecosystem cause landscape' fragmentation; and how this information can assist in better forest planning and management in Zanzibar.

2. Context and Methods

2.1 Study Area

The study was conducted in the Ngezi forest reserve, which lies between 39° 40' and 39°44' E and 4°58' and 4°54' S. It is found in Micheweni District, in the North region of Pemba Island. It covers an area of approximately 20km^2, and it is bordered by the sea in the north and southwest. It is surrounded by ten villages with a total population of around 12,000 inhabitants (URT, 2012). These villages are: Mkia wa Ng'ombe, Kiuyu Kipangani, and Bandari Kuu in the south; Kibatini, Kiuyu kwa Manda, and Gombani villages in the east; and Tondooni, Makangale, Jiwe Moja, and Kijiji villages in the west. It is the largest remaining forest in Pemba with high biological diversity.

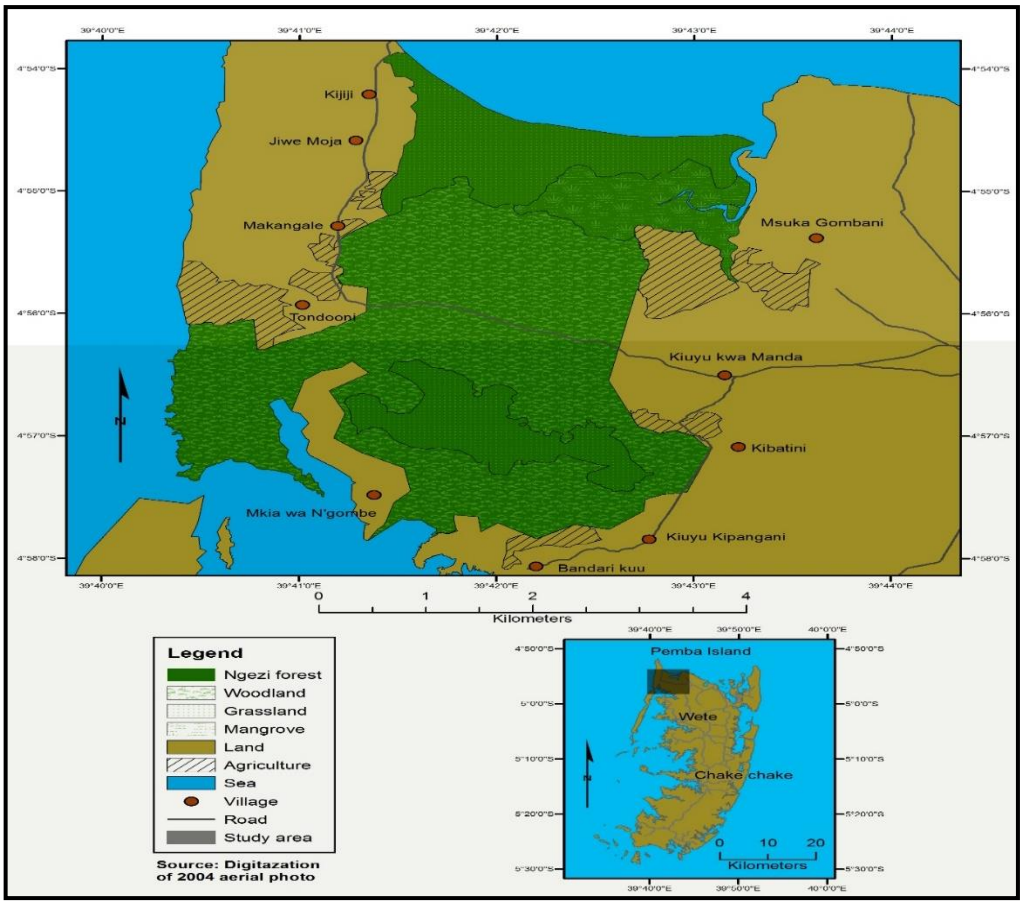

Figure 1: Location of the Study Area (DoSup, 602)

2.2 Sample Frame and Sample Size

The Micheweni district has 13 wards and 23 villages, while 4 wards and 10 villages surround the Ngezi forest reserve. Purposeful sampling was used to draw all four wards and ten villages surrounding the Ngezi forest area in the study. The choice of the wards and villages was influenced by their proximity and attachment to the forest. Physical proximity in this dimension was vital because people who live near the forest often have unique and useful knowledge due to their accumulated experiences over time. A total of 219 households (18.4%) out of 1,187 households from 10 villages in the Ngezi forest reserve areas were selected for the study. Apart from the local community, others stakeholder involved in study included village leaders, NGOs, and representative from the local and central governments (see Table 1).

Table 1: Population and Community Sample Size of the Study Area

Wards	Village	Pop	HH	Sample	Women	Men	Total %
Makangale	Kijijini	2,600	100	19	9	10	8.7
	Jiwe moja	1,000	200	37	19	18	16.9
	Makangale	2,000	136	25	12	13	11.5
	Tondooni	1,500	300	55	28	27	25.1
	M/Ng'ombe	1,000	50	9	4	5	4.2
Kifundi	Bandari Kuu	350	70	13	7	6	5.9
	K/Kipangani	250	115	21	10	11	9.6
	Kibatini	50	16	3	2	1	1.4
Konde	K/Manda	1,200	100	18	9	9	8.2
Msuka	Gombani	2,000	100	19	9	10	8.7
Total		**11,950**	**1,187**	**219**	**109**	**110**	**100**

Source: URT (2012)8

2.3 Data Collection

2.3.1 Participatory Mapping

Data collection was done through single-informant interview, combined with participatory mapping with semi-structured interview questions (Fagerholm et al. 2012; Käyhkö et al. 2011). The most recent 2011/ 2012 digital rapid eye satellite image and geo-referenced aerial photographs (2004/5, 0.5m pixel size), which covered the Ngezi forest reserve and all the surrounding villages, were printed at a scale of 1:7500 on laminated paper sheets for data collection. This was applied to 219 forest community respondents who were interviewed. Most of the interviews were conducted at the respondents' homes.

Before the interviews, respondents were oriented on how to use the information on the map in relation to ground facts and realities. This exercise aimed at enabling local people to understand the image map clearly to respond to the questions correctly. Using pebbles, each respondent was asked to locate his or her places-value on provisional and cultural services (see Table 2).

Table 2: Cultural and Provisional Landscape Values and Interviewed Questions Used

Provisioning services: Firewood Building materials Wild fruits Traditional medicine Handicraft materials	**Place Meanings:** Valued places to reduce vulnerability to ecological shocks and stress; to earn income and gain livelihoods.	Where do you collect wood material for cooking? Where do you often collect fruits? Where do you often collect medicinal plants? Where do you often collect building materials? Where do you often collect handicraft materials?

Cultural services: Favourite Existence value Recreation Spirituals and religious	Opportunity to express aesthetic and recreational values; to express cultural and spiritual values; study and learn about ecosystem	Do you visit forest for recreation? Where do you go commonly**?** Do you have the areas that you value just because they exist? If yes what are those areas and where are they? Do you have a definite place for burial and sacred activities in the environment? If yes, where are they? Do you visit forest for studying? Where do you go commonly**?**

Source: Field Survey, 2017

2.3.2 Field Observation

Under this method, information was sought through direct observation in the field without specifically addressing questions to the respondents. The researcher was guided by a set of definite items, which were: the current state of the forest, places for cultural services, places for materials services and dominant species, villagers' land use activities, and the socio-economic status of the villagers. This technique was employed throughout the fieldwork exercise to get information beyond what respondents said. The observation took place immediately after the conclusion of mapping and interviews in each village. The researcher took some important points by using GPS and digital camera.

2.3.4 Focus Group Discussions

Two focused group discussions were held based on guided topics. There were five discussants in each group discussion. Two group discussions were conducted at *shehia* level: one at Makangale in the west, and the other in the east at Kiuyu kwa Mmanda (Konde *shehia*). These discussions involved key stakeholders from three different sectors: 2 local communities; 2 local governments; and 1 from the central government. Discussions covered the following items: the status of the Ngezi forest reserve, current methods used as strategies of forest management in the area, and people's needs from the forest reserve. The overall goal was to sketch stakeholders' priority areas and needs that guided environmental management decisions at the local level.

3. Data Analysis

The Kernel density spatial analyst tool was used to analyse data about peoples' perceptions on provisional and cultural values. This method helps understand how and what people perceive as value places (Alessa et al., 2008; Moore & Polley, 2007). Practically, two digitized shape file points for provisional and cultural services were added on a worksheet for spatial analysis. Thereafter, the study used the kernel density analysis technique to calculate distribution of the points in a given case in the analysis; the output cell size being 100. This was selected because it is a standard for good map resolution and obtains detail

features because a smaller or larger cell size can distort information. The population field was 'None'. This was selected to avoid assigning the weight to some points more heavily than others. The radius was 200 (double of cell size). This radius was used to limit the number of points that were used when making predictions through the specifications of the search neighbourhood. The result was a raster kernel density map with pixels and data, and pixels with zero values. Then all empty cells were removed. This was successful done by applying spatial analysis tools, conditional and set null; whereby in 'input conditional raster' was material products kernel; and in the expression was placed 'VALUE' = 0. Because the intention of this study was to know the area where there was very high density and very low density, the data was classified using a standard classification method known as 'natural breaks (Figure 2).

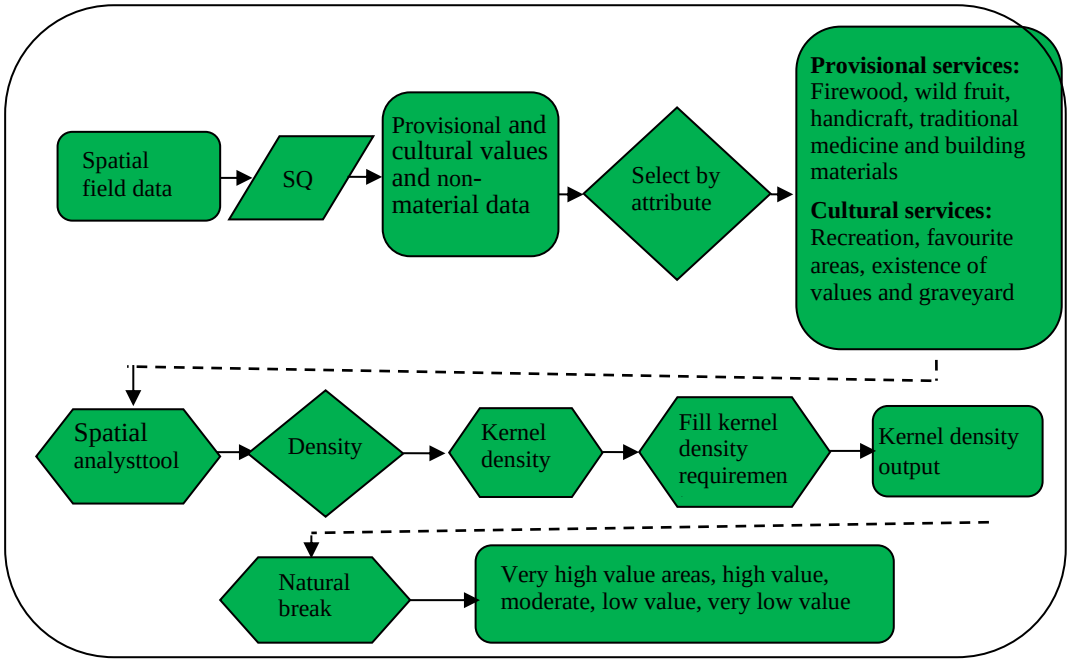

Figure 2: ***Spatial Data Analysis***
Source: Field Survey 2017

4. Results

4.1 Place Value for Provisional Services

A total of 1,418 points were placed on a map for provisional services to indicate places where the local people valued for firewood, building materials, traditional medicines, wild fruits, and handicraft materials. About 267 points were placed on the map for firewood. Out of these, about 178 points (66.7%) fell inside the Ngezi forest reserve, and 89 points (33.3%) were marked outside.

For building materials, a total of 229 were marked on the map. Out of these, 73.4% of the points fell inside the Ngezi forest reserve, while a quarter of the points (26.6%) were placed outside the forest. About 296 points were placed on the map by 195 respondents to indicate areas where people place value for traditional medicine. Of these, 120 points (40.1%) were located inside the Ngezi forest reserve, while 176 points (59.9%) were located outside the forest (Figure 3C). For wild fruits a total of 468 points were marked on the map, with over half of them (238 dots/50.8%) being located inside the forest reserve. About 158 points were placed on the map to reflect the most preferred areas for handiwork materials. A total of 80 points (50.6%) were inside the Ngezi forest reserve, while 78 points (49.4%) were outside the forest (Figure 3).

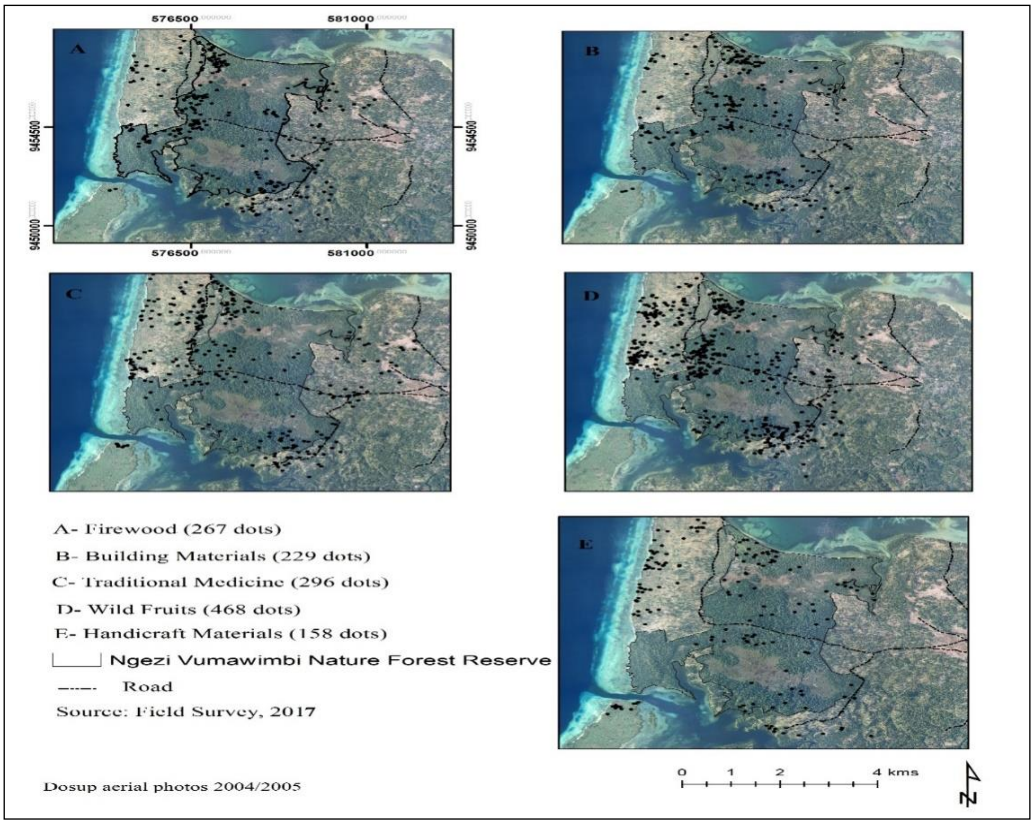

Figure 3: Points Data for Provisional Service

Source: Field Survey 2017

In general, provisional services were frequently mapped by respondents in the areas inside the forest reserve, particularly in the western part, northwest, and southern parts of the Ngezi forest reserve; while in the eastern side households

placed more values on community forests. This means, the Ngezi forest reserve has not yet become a major contributor of provision services in the eastern zone mainly because community forests still provide adequate supplies of the services. In contrast, the whole of the western area is bordered by the Ngezi forest reserve, where Jiwe Moja, Kijiji, Makangale and Tondooni villages are located. The respondents marked these areas as valuable for provision services; indicating that these areas need strong considerations in landscape planning process. Other areas that also need strong considerations are Mkia wa Ng'ombe, Bandari Kuu, and Kiuyu Kipangani.

4.2 Provisional Values Clustering Based on Kernel Density Estimation

The results in Table 3 show that the average area mapped to indicate people's preferences on forest products covered 3520ha, of which 27ha is classed as very high density, 184ha as high density, and 1924ha is considered as very low density. Out of the 27ha of very high-density area, 22ha (81.5%) is located inside the reserve, and only 5ha (18.5%) is outside the reserve. Even though most of these areas were located inside the forest reserve, especially in the western side, no area was mapped in the east and south-east of the forest. Compared with cultural services, forest products have larger catchment areas, though with low value density (Table 3).

Table 3: Forest Products Density in the Study Area

Density	Area (ha)	No. of polygons and area inside forest reserve	No. of polygons ad Area outside the forest reserve
Very high density	27	4 (22 ha)	2 (5 ha)
High density	184	12 (123 ha)	8 (61 ha)
Medium density	423	42 (200 ha)	45 (223 ha)
Low density	962	57 (500 ha)	97 (462 ha)
Very low density	1924	9 (1527 ha)	46 (397 ha)
Total	**3520**	**124 (2372 ha)**	**198 (1148)**

Source: Field survey 2017

Kernel density values for various locations revealed most of the places valued are inside the reserve as pointed out by a majority of the respondents. The findings show that the western side had the most forest values, whereas the eastern side had the least values. The general spatial distribution of landscape values of forest products tended to have a broader, forest-wide distribution of values, with high points per hectare inside the forest reserve (Figure 4). The larger landscape units in the forest reserve were located on the western side, and this area has much higher value densities on average than the landscape units of the entire study area; whereas the eastern side landscape units had less value density.

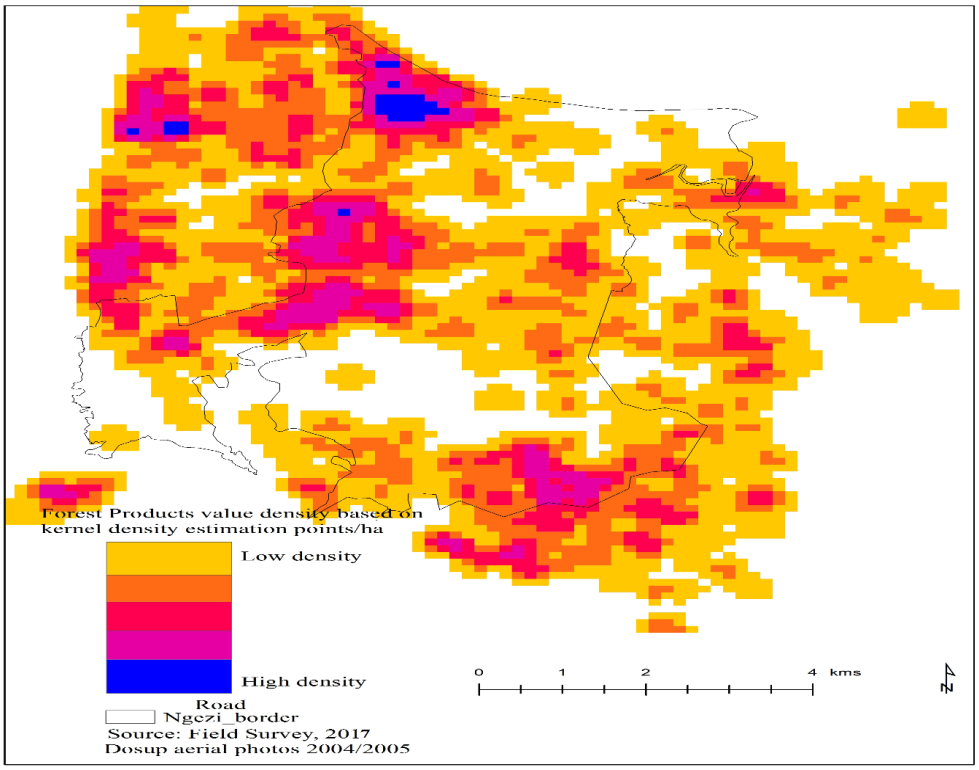

Figure 4: Variability of Provisional Values Across the Forest Areas
Source: Field Survey 2017

4.3 Cultural Services Place Value

4.3.1 Favourite Areas

Respondents showed 62 place-values (22.2%) near their homes as the common favourite areas they often frequented for exchanging ideas. The areas pointed are under big trees that offered shades. One respondent said that trees provide historic, cultural, and symbolic values that connect people to the past, their childhood experiences, and their cultural heritage; and provide meaning and value to their lives. The northern part of Tondooni village and eastern part of Kiuyu kwa Mmanda were also frequently identified as football playing fields; while 48 places (17.2%) were marked in Tondooni village as being dominated by young men. Within the village areas of Tondooni, Makangale and Bandari Kuu, respondents identified 37 places (13.2%) as their favourite areas for learning Islamic knowledge. These areas were mainly dominated by women. Of these, only 11 points (4%) were placed inside the Ngezi forest reserve, implying that they can be preserved for ecological and education purposes (Figure 5).

4.3.2 Existence Value

About 305 places were marked on the map for existence value. Of these, 173 points (56.7%) lie inside the Ngezi forest reserve, while 132 points (43.3%) are outside the forest. The respondents indicated that 88 points (28.8%) are at the centre and south of Ngezi forest reserve. A total of 59 points (19.3%) were placed in the north of the forest, a common area in Pemba where the Vumawimbi beach is located. The respondents explained that they prefer Vumawimbi beach due to the beautiful nature of the area (Figure 5).

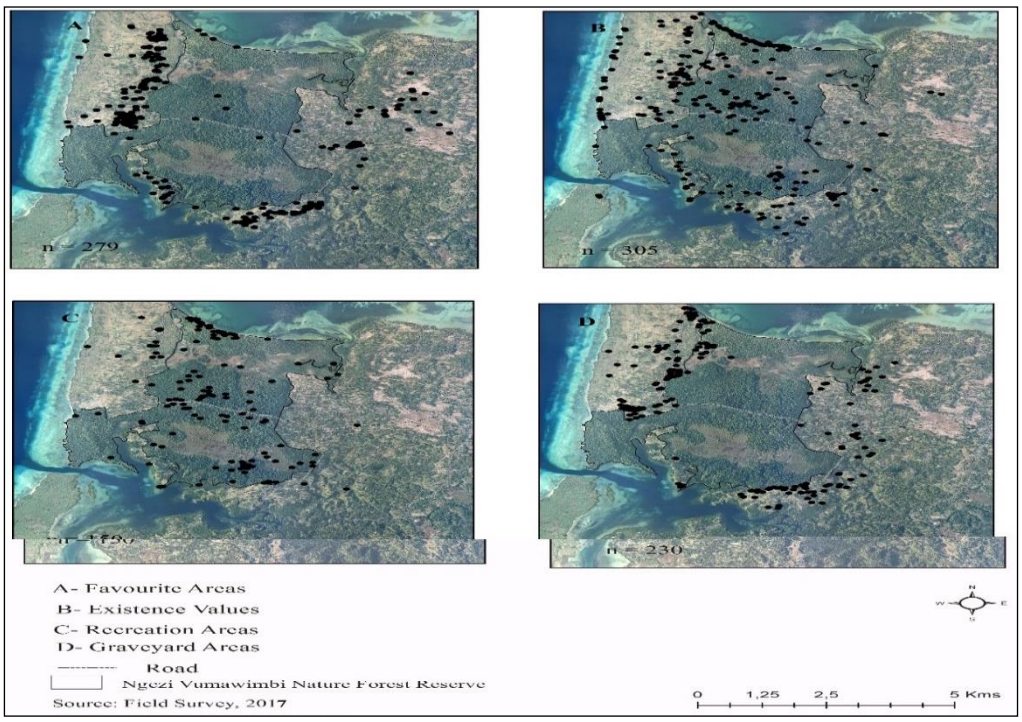

Figure 5: Cultural Non-materials Services
Source: Field survey 2017

One respondent—who also participated in a personal interview—mentioned that limited livelihoods options, unaffordable health services, low quality education, and insufficient income increases the demand for forest materials. These are also considered as the main reasons why people posted many dots inside the Ngezi forest reserve as their valued existence areas. The community does not value the natural environment for its ecological heritage, but for its economic value. They further attributed this to the poverty trap that does not allow people to reduce their dependence on forests. If the people had better income and alternative income sources, this would have ensured both the safety of the forests and the well-being of the people surrounding it.

4.3.4 Recreation Areas

Concerning recreation areas, a total of 126 (57.5%) respondents indicated the areas being valued for recreation outdoor. A relatively high percentage of respondents (42.5%) rated recreation activities as a lower priority than economic adversity. Few points (150) were marked on the map. Of these, 132 places (88%) lie inside the forest while 18 places (12%) lie outside the forest. Many respondents prefer recreation in the north of the forest because of its natural beauty. Recreationists primarily fall into two main groups: those involved in hunting, fishing, and collecting forest products (villagers surrounding Ngezi forest reserve); and those who prefer quiet enjoyment of the forests (the majority from outside Ngezi areas). In other words, the findings appear to provide a real picture of the importance of this forest to the surrounding villagers.

4.3.5 Religious and Spiritual Areas

Concerning religious and spiritual issues, 95% of the respondents picked the graveyard areas but not for sacred activities; 5% did not mark at all. A total of 230 places were marked on the map to show the burial areas. Burial activities were also done in both reserve area and community forest. In Gombani and Kiuyu kwa Mmanda villages, the respondents mostly use community forest for graveyard. Findings from group discussion show that cultural value of forest resources was recognized in the past since forest products were mostly used during cultural ceremonies. As economic hardship continues to affect the local communities in Ngezi forest reserve areas, they no longer perceive these cultural values, therefore the destruction of Ngezi Forest reserve continues apace.

4.3.6 Cultural Values Clustering Based on Kernel Density Estimation

On average, the kernel density area for cultural value was 2906ha, while areas indicated as very high density covered 22ha; high density areas were 64ha; and very low density was 2099ha. Out of the 22ha of very high density in cultural values, only 3ha (13.6%) is sited inside the reserve, and about 19ha (86.4%) is located outside the reserve (Table 4).

Table 4: Density Cultural Values

Density	Area (ha)	No. of Polygons and Area Inside the Forest Reserve	No. of Polygons and Area Outside the Forest Reserve
Very high density	22	1 (3 ha)	5 (19 ha)
High density	64	4 (23 ha)	18 (41 ha)
Medium density	111	12 (45 ha)	38 (66 ha)
Low density	610	54 (243 ha)	55 (367 ha)
Very low density	2099	11 (1028 ha)	31 (1071 ha)
Total	**2906**	**82 (1339 ha)**	**147 (1564)**

Source: Field Survey 2017

Most areas with very high kernel density areas are in the north, west and south-east (Figure 6). More than a quarter of the very high kernel density areas stand for burial sites, which are in the west near Tondooni village, and at Mikunguni peninsular. The remaining area is for recreation, and it is found in the north along the Vumawimbi beach. Many respondents prefer recreation in the north of the forest because of its natural beauty.

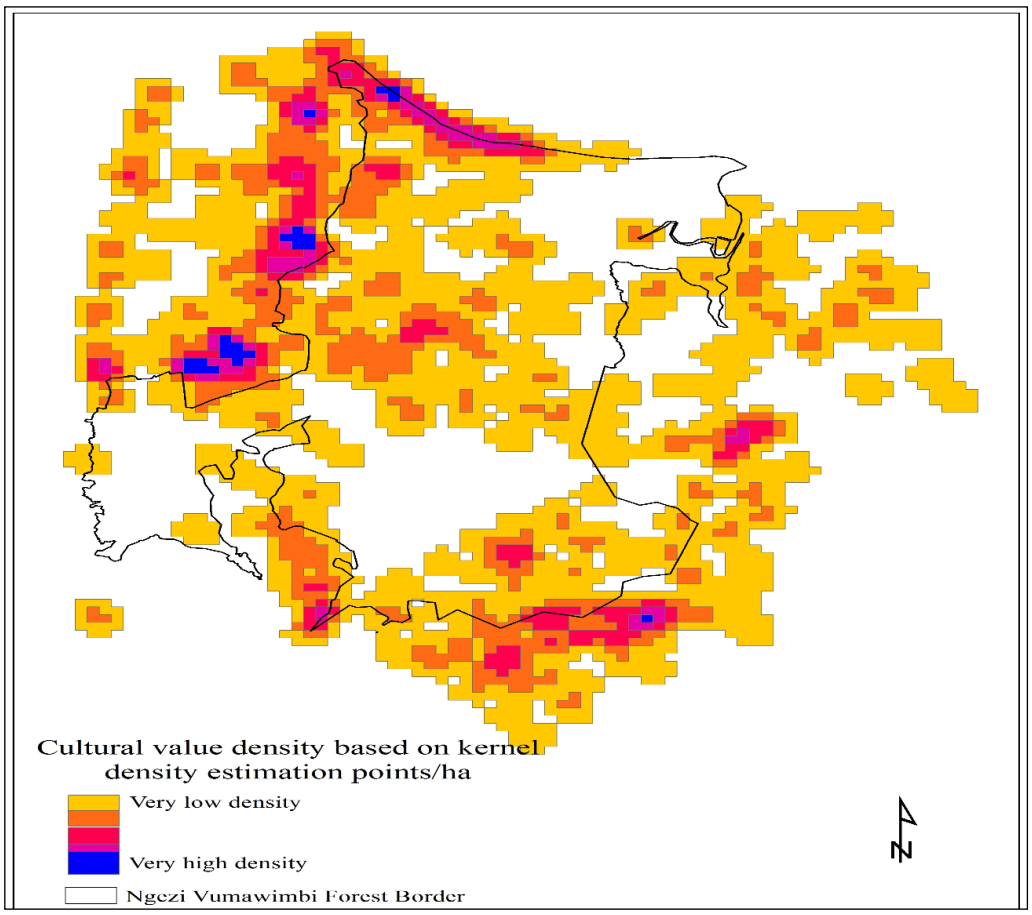

Figure 6: Cultural Values Based on Kernel Density Estimation

Source: Field survey 2017

Compared cultural and provisional values, out of the 6 very high-density-values areas of provisional service, 4 high-density-values are inside the reserve. Regarding cultural values, 6 have high-density-values; and of these only 1 is in the eastern area of the reserve (Table 5).

Table 5: Provisional and Cultural Values

Density	Area (ha)	No. of Polygons and Area Inside the Forest Reserve	No. of Polygons and Area Outside the Forest Reserve
Provisional Value			
Very high density	27	4 (22 ha)	2 (5 ha)
High density	184	12 (123 ha)	8 (61 ha)
Low density	962	57 (500 ha)	97 (462 ha)
Very low density	1924	9 (1527 ha)	46 (397 ha)
Cultural Value			
Very high density	22	1 (3 ha)	5 (19 ha)
High density	64	4 (23 ha)	18 (41 ha)
Low density	610	54 (243 ha)	55 (367 ha)
Very low density	2099	11 (1028 ha)	31 (1071 ha)

Source: Field survey 2017

5. Discussion

5.1 Integrating Materials and Cultural Values for Sustainable Ngezi Forest Management

Even though respondents did not state it in words, but their concerns were signposted on the map by indicating their most important landscape values of forest products in the entire study areas. The results indicate a very high density of forest materials to be most closely associated with social and economic needs that are determined by the nature of forest materials needed, and the distance from homes. Since people walk on foot to collect forest products, an increase in distance directly translates into an additional cost to get forest resources. This explains why the people's values on the landscape increased with closeness to the forest. This implies that the impact of human disturbance is magnified near settlements, as supported by Mahamane & Mahamane (2005), and Williams (2002). Similarly, this is corroborated by Speck (2012) and Montgomery (2013) who assert that the everyday engagement with the places in which we live, work and play will influence—for good or ill—the lives we lead, the opportunities available to us, and our personal and communal happiness, identity, and sense of belonging. However, the study findings contradict those of Adams and Tiesdell (2013) and Barton (2017), who contend that the worthiness of a place is influenced by its resource conditions, markets, and the experiences of the place.

This finding of the study will enable forest managements understand arguments and complex issues related to the landscape, and help them make decisions that prioritize issues based on people's needs and values. Construction materials, firewood, wild fruits, handicraft materials and traditional medicinal plants are all considered to be essential resources provided by the forest. Since the village communities heavily depend on the Ngezi forest reserve for these resources, their

economic values are always increasing; and due to the socio-economic conditions of the people in Ngezi area, there will always be a tendency for overuse. Given this reality, prohibiting the use of the Ngezi forest resources will always be like trying to keep fish out of water.

For people who use the forest for physical benefits, field observation found that as economic hardships tighten, it is not easy for them to appreciate its ecological purpose. The study found a high level of abuse of natural resources solely for short-term economic gains. Although respondents admitted getting social and environmental services such as water and fresh air, but forest products are the most desirable items to them.

For cultural values, the findings indicate recreation value as the most common landscape value mapped in the 'coastal' zone. Those who marked the Ngezi forest reserve for recreation said that enjoying forest nature and landscapes at an aesthetic level is a part of their life, and this makes them better and happy. The beauty of Ngezi forest enriches the lives of those who appreciate it. Wealthier people appreciate the forest when passing through it: taking photographs, and watching wildlife. They spend time almost every weekend in these pursuits: proof enough of the forest's beauty value.

Favourite and existence values are mostly common in residential areas in the western and south-east areas. Here, respondents of different age groups gather at their homes during the evening to chat and exchange ideas related to social, economic, and political issues. One of the respondents said that they prefer to talk in the green areas because large trees provide a sense of peace, and security. These findings are similar to what was observed by Zhang and Dong (2007), who found that residents had an overall positive attitude toward residential trees; especially large trees that provide visual, aesthetic, and symbolic values.

Burial areas are mostly found in the community forest areas in the south-east part. Traditionally, people in the Ngezi areas had long-preserved sections of the natural environment as sacred forests for traditional religious functions. Sacred forests have been associated with the cultural and religious beliefs of the indigenous peoples. As such, these sacred forests have served as an important reservoir of biodiversity, preserving unique species of plants and animals. Normally people revere burial and sacred areas, and as such take it as a sacrilege to enter such areas for other purposes than burials or religious activities. In the old days if one wanted to enter such areas they had to be cleansed and surrender their sharp implements before being permitted to do so. However, today these traditional rules and customs are no longer in place to help conserve the sacred areas of the Ngezi forest reserve (Tonkiss, 2013; Inam, 2014).

Although it is not shown on the map, findings from field observation indicate that the life-sustaining and economic values are most common in the 'forest protection' zone. In general, the cultural landscapes values are located inside and outside the Ngezi forest reserve area, while the material values are mostly located inside the forest reserve. Fewer material values are found outside the reserve. This means the conservation of natural environment that consider economic development outcomes should be given priority for sustainable management of the Ngezi forest reserve. This can then be followed by preserving the aesthetic values and improving recreational amenities in the reserve forests.

6. Conclusion

It is acknowledged that there are many problems associated with relying on people's perceptions in conservation planning because their views of landscape values are influenced by past events, and economic and cultural issues. However, the findings of this study have demonstrated that local communities know what is of value in their surrounding environment. Therefore, their knowledge should be seen as a relevant source of information for future sustainable forest management practices. The findings further emphasize that forest managers and planners should consider both economic and social values of forest ecosystems along with direct product-based services to achieve socio-economic sustainability of both forests and dependent communities.

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