



Article Policy Review and Regulatory Challenges and Strategies for the Sustainable Mangrove Management in Zanzibar

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Abstract: The aim of this study was to examine the challenges of the policies and regulatory framework and strategies for the sustainable mangrove management in Zanzibar, from 1890 to present. The study collected both primary and secondary data. The secondary data were collected through the a review of previous policies, legal documents, by laws, ministry/department reports, research reports, newspapers and articles. The primary data were mainly collected through focus group discussions (FGDs) and semi-structured interviews. The study found that, before Zanzibar became a British protectorate in 1890, the forests were communally managed with the guidance of forest guardians, chiefs and elders. The colonial government enacted a number of land administration laws, policies, and arrangements aimed at conserving the natural resources, including the mangrove forests. From 1930 to the end of the Second World War (WWII), mangrove forests were severely degraded because the colonial government paid little attention to their conservation and management. The policy arrangements put in place after independence, such as the National Forest Conservation and Management Act of 1996, laid the legal groundwork for the introduction of the participation of the local communities in the conservation of mangroves. However, they were not sufficient enough to promote the sustainable use of mangrove forests. This study proposes that there is a need for more inclusive and diverse regulations. Furthermore, for the effective conservation and management of mangroves, conflicting laws and responsibilities between government departments should be harmonized.

Keywords: mangrove management; conservation policies; regulatory framework; mangrove governance; community-based management; coastal communities; population growth

1. Introduction

Mangrove forests, which are among the most valuable ecosystems on the planet, were previously estimated to cover 18,100,000 ha of land worldwide [1], but this figure has since been revised downward twice, first to 13,776,000 ha [2], and then to 8,349,500 ha [3]. Along with other marine-related resources, mangroves are essential to the social and economic opportunities provided by initiatives, such as tourism, fishing and agriculture in Zanzibar [4–6]. Mangroves are crucial in protecting coastlines from storm surges [4–6]. Mangrove forests are also able to regulate the local climate [4–6]. Studies have shown that mangroves serve as a habitat for young coral reef fishes, among other marine life species, many of them endangered [4]. According to [7], predatory fish searching for invertebrate prey hiding within the root system, as well as prey trying to evade predators, benefit from the structural heterogeneity provided by especially Rhizophora mangroves. In addition to accumulating living biomass, mangroves also act as carbon sinks by accumulating litter and dead wood, as well as by trapping sediments brought in from the uplands [4,7]. Mangroves store more carbon per unit area than any other forest on Earth—it stores c. 3–5 times as much organic carbon as tropical upland forests [8]. A high productivity and the slow pace of soil decomposition makes mangroves able to acquire and retain organic carbon, especially in their soils [9]. Mangroves also act as a nutrient sink [4–6]. The water quality



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Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). from wastewater inputs can be improved by the nitrogen-fixation of specific bacteria and cyanobacteria connected to the mud from mangroves and the above-ground root structures [10], as well as the denitrification in the anaerobic setting [11].

In addition to the ongoing threats to mangroves' survival, and in light of climate change, there has been an increase, in recent years, in the knowledge and appreciation of mangroves' protective capabilities [5,6]. Communities, non-governmental organizations, and national governments are increasingly supporting conservation and management efforts [5,6]. Internationally, initiatives have been created to conserve and use mangroves sustainably. One example is the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) [12]. Although CITES is not directly involved in the protection of mangroves, or of species found in mangrove ecosystems—it only conditions their international trade to permit or prohibit their trading altogether. Therefore, the conservation and management of mangroves is dependent on county-specific policies. Furthermore, the Convention on Biological Diversity (CBD), which has three main goals—the conservation of the biological diversity; the sustainable use of its components; and the fair and equitable distribution of benefits arising from genetic resources [12]. Although it does not specifically mention mangrove forests, it is relevant to the mangrove protection-mangroves, which are a vital nursery habitat for a variety of species, are vulnerable, with half already cleared [3]. The United Nations Framework Convention on Climate Change (UNFCCC) aims to combat the 'dangerous human interference with the climate system', partially by stabilizing the greenhouse gas concentrations in the atmosphere [12]. Mangroves are regarded as high priorities in climate change adaptation and mitigation strategies—because of their high carbon stocks (per unit area); their land cover change/deforestation rates are the highest in the tropics; their emissions from land cover change exceed the emissions from the land conversion of upland forests; and they offer valuable ecosystem services that can sustain communities, livelihoods, and infrastructure [8]. The Ramsar Convention on Wetlands of International Importance entails the protection of wetlands and their resources [12]. The World Charter for Nature was updated in 1991 by the Charter for Mangroves, which was created by the International Society for Mangrove Ecosystems (ISME) [12]. It offers specific recommendations for mangrove conservation. The World Bank, ISME, and the Centre for Tropical Ecosystems Research published a draft code of conduct for the mangrove ecosystem management and sustainable use in 2003 [12]. The Code includes the recommendations for managing and conserving mangroves, and assisting interested parties in making sustainable use of them [12]. The World Network of Biosphere Reserves was established by the UNESCO Man and Biosphere Programme—at present, mangroves are present in 88 of the 669 biosphere reserves, or 13% of the total area of the World Network [12]. In a resolution passed on 17 December 2007, a non-binding UN paper that made suggestions for the sustainable management of all types of forests, including mangrove forests, was cited by the UN General Assembly [12]. The African Convention on the Conservation of Nature and Natural Resources (1968), which addressed the preservation and protection of forests [12], and the Nairobi Convention for the Protection, and Development of the Marine and Coastal Environment of the Eastern African Region, are two regional instruments that are pertinent to mangroves (1997, amended 2010) [12].

The effective governance, backed by a suitable legal and institutional framework, is essential for the preservation of mangroves. This necessitates the coordination of policies in a variety of fields that directly deal with the management and conservation of mangroves. Governance is defined as the interplay between institutions, procedures, and cultural norms that influence how authority is exercised, decisions are made, and how the public and other stakeholders can voice their opinions [13,14]. In response to mangrove loss, Zanzibar enacted a number of laws governing the mangrove conservation and management. Zanzibar's forestry sector has undergone significant legislative and policy reforms, changing the laws, regulations, and institutions. However, the effective policy implementation must be backed up by a number of action plans or strategies that are created in accordance with the strategic issues in the concept of sustainable development, in order to manage the

mangrove ecosystems and increase the welfare of the coastal communities. The support of local communities plays a key role in the conservation of mangroves.

This study sought to conduct an analysis of the policy and regulatory framework used in the conservation and management of Zanzibar's mangroves from the 1890s to date, as well as to identify the stumbling blocks thereof, and offer suggestions for the sustainable mangrove management.

2. Materials and Methods

2.1. Study Area

Unguja is the larger of the two main islands in Tanzania's semi-autonomous archipelago of Zanzibar (Figure 1). The island is situated in East Africa, 40 km to the east of the mainland of Tanzania, and a little south of the equator ($5^{\circ}70'$ to $6^{\circ}50'$ S and $39^{\circ}18'$ to 60' E). Unguja has a maximum length of 85 km and a maximum width of 39 km—its total area is 1660 km² [15]. Unguja's climate is characterized by a tropical monsoon system with two distinct rain seasons [16]. The annual rainfall ranges between 1000 and 2500 mm—mostly contributed by the long rainy season from March to June, known as "masika". Between October and December, the short rains, known as "vuli", bring around one-third of the annual rainfall. Less rain falls on the island's east side, and "vuli" is absent in some years [15,16]. The mean lowest temperature is 21.1 °C, while the mean maximum temperature is 29.3 °C. The hottest period is January through February, and the coolest period is May through September [15,16]. In terms of geology, the islands can be divided into two areas: the elevated and undulating topography with productive deep sandy soils and a maximum elevation of 120 m, on the western side, and the generally flat land, coralline limestonedominated region with a terrace system descending stepwise from 40 m to sea level, on the eastern side [15,16]. Despite the fact that the eastern side is mostly dominated by coralline limestone, the soil's makeup varies somewhat randomly, ranging from solid, hard coral rag with just a few pockets of softer soils, to a mixture of crumbled coral rag and more fertile soils [15,16].

Ten mangrove species have been documented around the bays and beaches of Unguja and Pemba [17,18]. The mangroves of Zanzibar Island include all mangrove species known in the Western Indian Ocean countries [17,18]. *Rhizophora mucronata, Bruguiera gymnorrhiza, Ceriops tagal, Sonneratia alba, Avicennia marina, Xylocarpus granatum, X. moluccensis, Heritiera littoralis, Lumnitzera racemose,* and *Pemphis acidula* are among them [17,18]. *Rizophora mucronata* and *Bruguiera gymnorhiza* are the two most prevalent [19]. More than half of the mangrove forests in Unguja and Pemba were thought to be covered by the two mangrove species, in 1930 [17,18]. Due to their significance as the major source of bark for export to American and European markets, both were regarded to be more valuable [17,18].

The population of Zanzibar is 1,889,773, according to the 2022 census [20,21]. The island is one of the world's most densely populated rural areas, with an average population density of 712 persons per km² [20,21], with an annual growth rate of 3.1% [20]. About half of the households are unable to meet their basic necessities, and 13% of them cannot afford to eat three times a day [20]. Since the 1990s, Zanzibar's economy has undergone liberalization. Since then, tourism activities have increased dramatically, notably along Unguja's east coast. Although tourism accounts for around 25% of Zanzibar's income, it does not meet the economic needs for the coastal communities [20].



Figure 1. Location of the major mangrove areas in Unguja Island in Zanzibar, Tanzania.

2.2. Data Collection Methods

A focal group discussion (FGD) was used to collect the primary data in the study. The focus groups were suitable for obtaining multiple perspectives from the stakeholders—this method was meant to solicit the attitudes and perceptions, knowledge and experiences, and practices of the participants, concerning the conservation of mangroves in Zanzibar. The focus groups are quick and comparatively easy to set up—they can also provide more information, compared to individual data collection [22]. As well, FGDs are advantageous in gaining the understanding of topics that are difficult, when using other methods of data collection [22]. A FGD was conducted in each of the following wards—Charawe, Chwaka, Ukongoroni, Unguja Ukuu, and Uzi. The participants were thought to possess in-depth knowledge of the policy and regulatory framework used in the conservation and management of Zanzibar's mangroves. The targeted individuals were shehas (local administrative leaders), villagers who have vast experience in mangrove conservation and rehabilitation, and boat builders, retired and active fishermen, previous and present mangrove cutters and dealers, traditional healers, as well as fish vendors, and non-governmental organization (NGO) and ward-level forest officers. The questions in Appendix A were used to guide the interviews for government officials and FGDs.

The purposive sampling was also used to attract key government officials. A semistructured interview was used to interview 24 government officials. The participants included were directors in the Ministry of Agriculture and Natural Resources, the deputy general secretary of the ministry, four members of the House of Representatives (Zanzibar Parliament), the regional commissioner and district officer for the South Region. The topics selected for the semi-structured interviews were:

The importance of mangroves;

- Factors that led to the degradation of mangroves in Zanzibar;
- History of the conservation of mangroves in Zanzibar;
- Policies for the protection of mangroves in Zanzibar;
- Factors in the successful mangrove restoration;
- Community-based mangrove conservation;
- How Zanzibar is doing in the conservation of mangrove forests, compared to other countries;
- The future of mangroves in Zanzibar;
- The role of technology in the conservation, protection, and awareness of mangroves.

Appendix A shows an interview schedule for government officials and the FGD guide.

A review of the literature on the mangroves of Zanzibar was also conducted, including the management plans and research reports. Relevant peer-reviewed articles were searched in the web-based databases. A review of previous and present memorandums of understandings (MoUs), policies, laws, agreements, and legislation regarding mangrove forests and the related natural resources, was also conducted. Information on the status of mangrove forests, use patterns, and past and present management regimes were analyzed. Most of this data were taken from documents accessed from the Zanzibar National Archives (ZNA) and from libraries at the Department of Forest, the University of Dar es Salaam Marine Institute—Zanzibar, the State University of Zanzibar (SUZA), the Western Indian Ocean Marine Science Association (WIOMSA) in Zanzibar, as well as the Zanzibar Indian Ocean Research Institute (ZIORI). The information acquired from the different sources, using the different methods was compared to check for the missing links and to clarify indistinct issues.

2.3. Sample Size and Sampling Design

The study's primary focus was the heterogeneity of the participants, which was important, in order to obtain a wide range of perspectives from the FGD members. The selection of the key informants, was based on age (\geq 40 years), the desire to share information about mangrove forests, an understanding of the history of the mangrove management in the ward, whether one was born and stayed in the ward, and the influence they had in mangrove decision making. Twenty-four government officials were interviewed.

2.4. Data Evaluation and Analysis

Two techniques for the qualitative data analysis were used to examine and process the information acquired for this study—constant comparison and discourse analyses. In the initial stage of the constant comparison analysis, the data were grouped into small units, and then codes were attached to each of the units. Secondly, the codes were grouped into categories. Finally, themes that expressed the content of each of the groups were developed [22,23]. The discourse analysis involved the assessment of language use by members of the FGDs—to understand them in detail [22–24]. The qualitative data analysis assisted in examining the points of departure related to policy and regulatory practices in the management and conservation of Zanzibar's mangroves by various actors over time. Therefore, the policy analysis associated with the relevant aspects and other related policies, was carried out as one of the enabling factors in putting the study's recommendations into practice. The outcomes of the policy review identified policies and related stakeholders, as well as their roles and obligations.

3. Results

3.1. Characteristics of the Respondents

This study included government officials who have served in the department for no less than 15 years (19 males and 5 females), villagers, heads of wards (Shehas), representative from the Department of Forestry, fisherman, people who collect medicine and poles from the mangrove, a forest officer at the ward level, a member from the local NGOs. Gender balance was considered in selecting those who participated in the FGDs. The age of respondents varied from 40 years to 84 years, and their educational level varied from an informal education to tertiary education. The monthly earnings of those who participated in the FGDs ranged between USD 121 to USD 148. Their main source of cooking energy was firewood. About 44% of the participants' houses were connected with tap water and 54% of their houses were supplied with electricity.

3.2. Stakeholders' Analysis

Both the 1992 National Environmental Policy and the 1992 Forestry Policy used an integrated strategy for the resource management [6,18]. The Department of Environment is taking a coordinating role in implementing the integrated coastal management (ICAM) approach [6]. The regional and district levels have the roles of managing the natural resources—the staff are well-trained and well-equipped to manage the coastal area sustainably and to balance between the environmental, social, and development needs [6,18]. The natural resource management sectors, such as fisheries, forestry, and agriculture have district officers who oversee the conservation and use of natural resources-including mangrove forests [6,18]. Higher education institutions are crucial for studying and consulting on issues relating to forests-yet they receive little financial assistance from the government. Government-managed councils at the local level are in charge of creating and carrying out their local development plans. Additionally, there are NGOs that are focused on the conservation of coastal resources—examples are the Zanzibar Association for Cleaning Environment and Development of Youth (ZACCEDY), the Zanzibar Climate Change Alliance, the Zanzibar Volunteers for Environmental Conservation (ZAVECO), and the Jozani Environmental Conservation Association (JECA). Faith-based organizations have not involved themselves in matters of environmental conservation.

3.3. Underlying Drivers of the Mangrove Loss in Zanzibar

As in many other parts of the world, the loss of mangroves in Zanzibar can be largely attributed to the development and population growth along the coast [5,25-29]. The specific reasons include urbanization, aquaculture, agricultural conversion, and timber overexploitation [5,25–29]. The losses are significant because mangroves offer both nature and people a wide range of services and benefits. Mangroves have been a significant source of building materials and firewood for Zanzibar's coastal communities since the precolonial era [25]. From the mid-nineteenth century, there has been increased pressure on the exploitation of mangroves and other aquatic resources [26]. In the 1840s, the Omani-Arabs Sultanate established its headquarters in Zanzibar, and developed cloves and coconut plantations—large tracts of land and forests were turned into agricultural land [6]. Near the coast of Malindi, a new capital, known as Stone Town, was established [19]. The marine environment and resources, including mangroves, were not exempted from the adverse effects of such developments [29]. The deforestation and degradation of mangrove forests, which took place before the First World War (WWI), continued even after the Second World War (WWII) [29]. Currently, the rapid population increase and rising poverty levels have contributed to the further destruction of the mangrove ecosystems [29].

Information on the area coverage of Zanzibar's mangroves remains scanty [30]. Ngoile and Shunula [19] used a planimeter to perform a visual estimation of the abundance of mangrove species in some creeks in Unguja and Pemba Islands. Leskinen and Silima [31] used 1989 aerial photographs to calculate the volume and distribution of mangroves in Zanzibar—Unguja and Pemba Islands had a volume of 205,000 m³ and 436,100 m³, respectively. The mangrove area coverage for Unguja was 5003 ha and 10,943 for Pemaba. Shunula [32] reported on a mangrove forest of *c*. 14,000 ha in Pemba Island and 6000 ha in Unguja Island. Leskinen et al. [33] reported on a mangrove forest cover area of 5829 ha in Unguja and 13,919 ha in Pemba. According to MANR [34], an inventory completed using RapiEye satellite images showed that the mangrove forests in Zanzibar covered 5274 ha in Unguja Island and 11,214 ha in Pemba Island.

3.4. Mangrove Governance and Policy in Zanzibar

3.4.1. Mangrove Utilization and Conservation Policy Interventions between 1890 and 1933

Initially, the forests were managed communally, according to laws established by forest guardians, elders, and their chiefs [19]. In 1890, the British colonial administration made significant administrative and economic changes, many of which had an impact on how Zanzibar's mangrove forests and other marine resources were used and preserved. The colonial authority aimed to secure markets for manufactured goods from Europe, while minimizing and funding the operational expenditures [35]. In the 1930s, urbanisation and the rising population accelerated the use of mangroves, affecting their conservation. The colonial authority of Zanzibar regulated the coconut and clove farming for export, since the island lacked mineral resources [36]. Other items traded during this period included mangrove poles and bark [37]. The government placed mangroves under the Department of Agriculture-two units, namely Agriculture and Forestry, made up the Department and each was governed by an agriculture officer and a forestry officer, respectively [38]. The Department of Agriculture was in charge of guaranteeing the preservation and sustainable usage of mangrove forests, as well as ensuring that mangroves retained their economic potential [38]. The Pemba and Unguja forestry officers were tasked with surveying and evaluating the state of the mangrove forest before recommending, to the Director of Agriculture, the issuance of permits for mangrove concessions and harvesting [35]. The British resident in Zanzibar was authorized, under the constitution, to give contractors or merchants concessions on mangrove products [6].

Prior to the colonial era, Zanzibar's agricultural economy was based on slave labour, until the abolition of slavery, in 1897 [39]. Agricultural productivity was severely affected, as well as the economy, as a whole. As a result, there was a significant decrease in mangrove use because the number of wealthy traders and farmers decreased, resulting in the lower demand for houses [39]. Furthermore, in the early years of British colonialism, a decline in the export of mangrove poles was recorded [37]. Around the same time, the British forbade the construction of mud houses in Zanzibar Town that used mangrove poles and coconut palm thatch for roofing, and this led to more mangrove poles for construction [39]. Zanzibar's population was growing rapidly, so did the demand for mangrove poles, therefore, the British colonial government made attempts to intervene and control the invasion of mangrove forests—this severely affected Zanzibar's economy [36].

In order to increase the sustainable land production and manage resource usage in Zanzibar, the colonial authority developed a number of land administration laws, regulations, and arrangements. While some of them indirectly impacted mangroves, others were specifically added to control how mangrove forests were used. In 1909, the government passed the "Land Acquisition Decree" with a view to acquiring land for public use [40]. The colonial authority created the "Land Survey Decree" in 1912 to supervise and regulate all survey activities in Zanzibar [40]. The British stepped up their attempts to produce cloves in 1915 [41]. By the 1930s, the colonial government diversified into the exportation of mangrove bark [37]. During the British colonial era, such decrees laid the path for highly detailed regulations and policies that governed the management of mangroves in Zanzibar.

3.4.2. Mangrove Utilization and Conservation Policy Interventions between 1933 and 1950

The colonial authority gave little attention to the oversight and management of marine resources during the Second World War (WWII) [37]. The establishment of clove plantations, and later a British colonial government campaign to increase the food production, led to an increase in the clearing of forests [42]. Additionally, because mangroves were a part of the culture and a source of income for the communities engaged in the mangrove business, it was exceedingly challenging to maintain control over them [6]. The number of forest guards was insufficient; therefore, the mangrove bark business was in disarray [43]. Thus, mangroves were overexploited—they never recovered to their original status. In fact, the requirement for bark stripping on *Rhizhophora* and *Bruguiera* mangrove species, a minimum diameter of 8 inches, was no longer in place after WWII [6]. However, in addition to trying

to preserve and safeguard the seized mangrove bark markets, the colonial authority also needed money to fund its operations [40]. As a result, it was necessary to reduce the minimum diameter requirement for bark stripping, which was set at 6 inches [6].

Once the slave trade was outlawed, the agricultural production declined to the point where debt arrears caused clove producers to lose their farms [6,37,40]. In addition, cloves from Zanzibar were facing stiff competition from Madagascar and other African countries [6,37]. The 1935 Land Alienation Decree was put in place to regulate and restrict the transfer of land ownership [6]. Later on, the Department of Surveying and Registration was established in 1936. In addition to all of the efforts made by the British government, cash crop famers returned to the mangrove business during the 1940s [6,37]. In 1945, the "Wood Cutting Decree" was introduced by the colonial government for the purpose of protecting all types of forests, mangroves included [6]. In 1949, the colonial government established the "Land Acquisition Decree", in order to make sure that the land tenure system was clear and the government land was protected [6]. From 1940, the colonial government introduced several tree plantations to meet the high demand of forest products [6,37,40,44]. This was followed by the introduction of the "Forest Reserve Decree" in the 1950 to encourage village dwellers in planting trees in their farms [6].

3.4.3. Mangrove Utilization and Conservation Policy Interventions between 1950 and 1963

Following the introduction of the "Forest Reserve Decree", three forest reserves were gazette within the next 15 years [41]. In the 1950s, any portion of public land could be designated as a forest reserve by the British residents in Zanzibar [44]. The decree prohibited any socio-economic activities in the protected forests. According to the decree, new buildings were not permitted in the forest reserves. No one was permitted to take any forest products out of the forest reserves without authorization-neither cut, damage forest produce, cultivate, construct roads, construct cattle enclosures or graze cattle, be in possession of an implement meant for cutting, or removing forest produce, unless it was proved that the implement was not for the purpose of contravening any provision of the decree [38,44]. According to a government official, the government developed a number of community-based ownership programs, as part of the implementation of the forest reserve order to involve locals in the management and conservation of the forests. By 1955, the colonial government had put in place several rules and regulations—the Forest reserves rules—to strengthen the management and conservation of Zanzibar's planned forest reserves [6]. The Town and Country Planning Decree (1956) developed the process and guidelines to be used when submitting proposals for planning schemes in both urban and rural areas [40,45]. Table 1 shows the policies that were applied to conserve and manage mangroves in Zanzibar under the colonial rule.

Year	Policy	Aim
1890s	The town began to grow rapidly	To accelerated the demand for mangroves
1890	Zanzibar was officially declared a British Protectorate	To set up a colonial economy
1900	Establishment of the Land Survey Section	To control land management
1909	Land Acquisition Decree	The purpose of securing space for public services
1912	Land Survey Decree	To regulate all survey activities in the protectorate
1930	Expansion of foreign markets for mangrove bark	To finance the colonial government
1935	Land Alienation Decree	To control the over use of land
1935	Land Survey Section	To control and limit the transfer of land ownership
1936	Department of Surveying and Registration	To guide land management
1945	Wood Cutting Decree	To control the cutting of mangroves
1949s	Comprehensive mangrove study by Dr. A. L. Griffith	Identifying mangrove species, threats and coverage
1949	Land Acquisition (Assessment for Compensation) Decree	To control land management
1950	Forests Reserves Decree	To place mangroves under government control
1955	Forest reserves rules	To concretized the management of the forest reserves

Table 1. Policy and regulatory frameworks that led to the conservation of mangroves in Zanzibar during the colonial era.

3.4.4. Mangrove Utilization and the Conservation Policy Interventions after Independence

Due to the importance of mangroves for both the local communities and the nation as a whole, the historical mangrove use in Zanzibar has led to degradation in many areas, highlighting the need for management measures [6,29,46]. Bark stripping for mangroves was outlawed after independence [46]. All mangrove forests in Unguja and Pemba Islands were declared forest reserves by the Zanzibar government in 1965, under the Forest Reserve Order. In accordance with this directive, the forests were closed and made harvestable every ten years. In light of this, the preservation of mangrove forests in Zanzibar was ideally aimed at controlling the resources from further degradation [6,47]. The Forest Reserve Order also placed restrictions on other uses, such as lime burning, charcoal production, pole gathering, and bark collection. In the 1990s, the Zanzibar Integrated Land and Environmental Management project (ZILEM) was established [48]. Zanzibar's NLUP (National Land Use Plan), which established a physical planning framework with a perspective goal by the year 2015, incorporated the Tourism Zoning Plan (TZP) and Coastal Zone Management Plan (CZMP) [48]. The TZP identified tourism development zones and proposed strategies for implementing them, while the CZMP provided for the most sustainable long-term use of the nation's terrestrial and marine resources [48]. A number of marine protected areas (MPAs) were created by the Revolutionary Government of Zanzibar (RGZ) in Unguja and Pemba, including Chwaka Bay, Misali, Mnemba and Chumbe Islands, and Menai Bay [47]. These strategies were not sufficient, since mangroves experienced overexploitation—reported by a forest officer. It was clear from the FGDs that, the failure to control the mangrove forest degradation might have been caused by a lack of community involvement in decision-making and a sense of loss of community ownership of the mangrove resources. The National Forest Conservation and Management Act of 1996 laid the legal groundwork for the introduction of the participation of the local communities in the conservation of mangroves [6,40]. Furthermore, the FDGs reported that a lack of awareness among local communities, on the fragility of mangrove forests, the politics of Zanzibar, and the lack of livelihood options, accelerated the failure of the act to work accordingly.

The Zanzibar National Forest Resources Management Plan 2008–2020 was intended to protect, conserve, and develop forest resources for the social, economic, and environmental gain of the present and future generations of Zanzibar [49]. In order to achieve this objective, the plan was developed to have collaborations between sectors, such as fisheries, tourism, land, water, and local administrations.

Table 2 shows the policies that were applied in the conservation of mangroves in Zanzibar, after independence.

Year	Policy	Aim
1964	Decree for the nationalisation of land and other properties	To control resources and means of production
1965	Government gazetted all mangroves under the Forest Reserves	To conserve and manage mangrove forests
1965	Establishment of cooperative societies	To reduce mangrove degradation
1965	Prohibition of trade in mangrove bark	To enhance mangrove conservation
1970	Cooperative societies were more political than economic	To control mangrove degradation
1980	Government policies began to be participatory	To involve local communities to conserve mangroves
1980	New liberalisation policies, e.g., marine protected areas	To strengthen the conservation of mangrove forests
1982	Establishment of land policy	To protect land resources
1985	Establishment of the Zanzibar Tourist Corporation (ZTC)	To reduce the over-dependance on natural resources
1986	Private Investment Act	To spearhead privatisation and to promote tourism

Table 2. Policy and regulatory frameworks that led to the conservation of mangroves after independence in 1963.

Year	Policy	Aim
1989	The Commission for Lands and Environment	To reconcile between the changing land organizational systems
1989	Land Adjudication Act	To control land, land ownership, control boundaries of government land and reserve zones, as well as environmental activities
1989	The Registered Land Act	
1992	The Land Tenure Act	
1993	The Land Transfer Act	
1994	Land Tribunal Act	
1995	Introduction of the multiparty system	To enforce more restrictions against the foreign trade of mangrove products

Table 2. Cont.

4. Discussion

4.1. Mangrove Utilization and the Conservation Policy Interventions in Zanzibar

This study attempted to comprehend the institutional and legal frameworks that have governed mangroves in Zanzibar from 1890. In Zanzibar, the management of mangrove can go back in history to the colonial era—in 1890 [6,39]. The effective governance is essential for the conservation of mangroves, but it is challenging, given the number of agencies and parties-the tourist and aquaculture sectors, global carbon sequestration interests, and regional subsistence users [50]. Mangroves are also both terrestrial and marine, in nature, therefore the boundaries of their range are sometimes ill-defined, as a result of shifting intertidal zone boundaries [6,51]. Mangrove conservation measures range from conventional methods, such as designating areas as protected from clearing, and enacting legislation that limits or forbids clearing, to conservation, education, and restoration initiatives on a local, national, regional, or global level [6]. A number of colonial laws that addressed the land management concerns in Zanzibar, only had a small, indirect impact on the utilization and preservation of mangrove resources. The "Wood Cutting Decree" for mangrove forests, in 1945, guided the recovery of the severely damaged mangroves [45]. Although finding a balance between the use of forests and other natural resources and their conservation has been a significant challenge. In some places, the mangrove degradation covered extensive areas, such that they were declared closed for mangrove cutting [6]. The 1950 "Forest Service Decree" ensured that mangroves and forest resources, in general, were not degraded. The decree also guided the restoration of trees in degraded areas, and the sustainable exploitation of forest resources. Unfortunately, the decree disregarded local traditional and customary demands concerning mangrove forests and associated resources—this sparked conflict between the colonial government officials and the local communities [6,28]. The colonial government imposed a 10-year harvest rotation in the corresponding mangrove reserves, to impose sustainable use and the conservation of mangroves [6].

By 1958, the increasing urbanization accelerated the need for the construction of homes, many of which required the use of mangrove wood and coral stones—this degraded mangroves in many areas [36,52]. Between 1964 and 1990, the Zanzibar government attempted to manage marine resources—including mangroves—by enforcing strict laws that forbad any trade, especially outside the country. However, the illegal extraction of mangrove products continued. The Zanzibar government began to change its policies in the 1980s to reflect the rapidly changing global environment. Local communities and international development partners—the Finish International Development Agency (FINIDA), Women in Development (WID), and the World-Wide Fund for Nature (WWF)) worked together to manage and conserve the mangrove forests [53]. With the creation of marine protected areas (MPAs), the new forest conservation measures began.

The Zanzibari social, political, and economic systems were affected by the Zanzibar Revolution of 1964 [54]. In 1965, the government issued a decree for the nationalization of all property, particularly land, and confiscated and reallocated private properties, such as houses, schools, shops, farms, and enterprises [54,55]. This had an impact on the use of forest resources, including mangrove forests. It resulted in an influx of emigrants, particularly from Tanganyika, by putting additional strain on the natural resources, such as mangroves. Both urban and rural areas saw an increase in the demand for charcoal and firewood—this might have encouraged the increased illegal mangrove harvesting [6].

According to the 2012 Population and Housing Census, the population of the Mjini Magharibi (Urban West) was approximately 593,678, accounting for 46.0% of Zanzibar's population [21]. Therefore, despite the government's effort to restrict the use of mangroves, there was a lot of strain on mangroves and other natural resources [42]. During the same time, some measures were put in place to control the invasion of mangrove forests. The government placed an embargo on harvesting forest products—to the contrary, the Forest Department had the obligation of generating revenue for the state by charging license and harvesting fees for forest products—the government needed more money to run its operations [6,56].

The Zanzibar Revolution led to a number of significant reforms, including in1965—all mangrove forests were designated as forest reserves, and a ban was imposed on mangrove bark, and mangroves, as a source of firewood [46]. Nonetheless, despite the Government's increased protective measures, pressure on the demand for mangrove resources increased. The conservation of mangrove forests and other marine resources, after independence, was interpreted in such a way that there was too much control from the government the locals felt deprived of the natural resources that surrounded them [6,46]. Generally, the greater the number of users, the greater the prevalence of the unlawful cutting of mangroves—this might have affected mangrove conservation activities. A major concern is that when illegally extracting mangrove products, one is not bound to follow conservation regulations. This has an adverse effect on the conservation and management of mangroves. The FGDs reported that, even after the ban, mangrove forests were invaded, especially by people who lived next to the forests. Evidence suggested that there were some instances where mangroves were overharvested, exceeding the number of trees that were legally permitted [57]. The Chwaka FGD concurred that because the government was not offering a dependable alternative source of energy to the rural and urban populations, the locals continued to engage in other prohibited activities in the mangrove forests, such as illegally collecting firewood and extracting bark on a small scale for use. Furthermore, mangrove barkwas harvested illegally by fishermen to protect the cotton fishing nets from insects. The discovery of the synthetic tannic materials helped to prevent the further degradation of the mangroves by reducing the exploitation and use of the mangrove bark [6].

New land and environmental rules and regulations in Zanzibar were made possible by the establishment of the Commission for Lands and Environment, in 1989 [58]. Additional statutes and rules include the Land Adjudication Act (1989), the Registered Land Act (1989), the Land Surveying Act (1989), the Land Tenure Act (1992), the Land Transfer Act (1993), and the Land Tribunal Act (1994), as well as the Forest Resources Management and Conservation Act (1996), the Environmental Management for Sustainable Development Act of 1996, the Plant Protection Act (1997), the Land Transfer Act (2007), and the Land Commission Act No. 6 of 2015. These acts have been amended several times to address issues that have arisen over time—they were crafted solely for the purpose of managing land resources—including mangroves—in a sustainable manner. The Zanzibar National Forest Resources Management Plan (2008–2020) was aimed to meet the demand of the country's forest policy frameworks, contribute to the attainment of the Vision 2020, the Zanzibar Strategy for Growth and Reduction of Poverty (ZSGRP), the millennium development goals (MDGs), and the ongoing policy reform affecting the forestry development in Zanzibar [49].

4.2. Community-Based Management of Mangrove Forest as a New Approach

Once the local communities felt they were denied access to the maritime resources, the government of Zanzibar developed more participatory methods of policy and decisionmaking as a way to involve them in what was known as community-based conservation. In particular, the National Forest Conservation and Management Act of 1996 established the legal foundation for the formation of community forest management committees, and granted them user rights to community forests. Community forest management was first tested by the Zanzibar government in the 1980s [27,59]. The local community's participation in the protected area management gave them the chance to manage marine resources, including mangrove forests. Community-based forest management agreements were developed and signed between the community conservation committees and the Director of the Department of Forestry. According to the act, a community forest management area must be managed, in accordance with the terms of a community forest management agreement drafted, in accordance with the act [59]. The community management group states the types of activities it proposes to undertake in the proposed area. Except as otherwise provided in the management agreement, the community management group's obligations and rights, under the agreement, include the right to harvest and sell forest products and to utilize other benefits of the area, in accordance with the management agreement.

According to the Forest Resources Management and Conservation Act No. 10 of 1996, the goal of a community forest management area is to give local communities a way to acquire the secure rights to plan, manage, and benefit from their local forest resources. This was to be achieved in a sustainable manner, in order to meet their needs, promote economic growth and income generation, and improve the environmental stability [59]. The growing community participation in the forest management, in the 1990s, drew international donors, primarily through non-governmental organizations (NGOs), to fund community-based conservation programs [47]. Examples include the Jozani Environmental Conservation Association (JECA), a local village-based NGO, which was established by the Cooperative for Assistance and Relief Everywhere (CARE) in 1995, to involve local residents in natural resources management activities and in sharing revenues from the reserve [57]. The 1996 launch of the Integrated Coastal Zone Management (ICZM) plan in the Chwaka Bay area was another significant undertaking [60]. The ICZM was supported technically by the University of Rhode Island's coastal resource center and funded by USAID. Later, the international donor community changed its funding priorities and stopped giving the state direct aid [47]. In response to corruption and human rights violations related to Zanzibar's elections in 1995 and 2000, a number of international donors withdrew their support [61].

4.3. Stumbling Blocks in the Forest Governance of Mangroves in Zanzibar

Policymakers acknowledged that the population growth and poverty were major factors impeding the government's efforts to achieve the sustainable management of Zanzibar's mangrove forests. The scarcity of resources makes the population turn to the protected areas in search of livelihood. The local communities consider themselves to be entitled to the ownership of and access to the benefits provided by mangrove forests. Almost in all five FGDs, the participants were indifferent when asked if they are aware of their rights under the law and regulations governing forest management. There are still villagers who believe that there is unequal access to forest resources—they do not see the need to participate in mangrove conservation activities. The problems connected to the conservation and management of mangrove forests may not be addressed by flawed forest policy and legal frameworks for the forest law enforcement and governance. Conflicting policies, due to overregulation, have further exacerbated the problem—overregulation is considered one of the main drivers of environmental degradation [62]. Additionally, a forest policy may place little emphasis on giving forestry programs the financial and technical resources they need. In Zanzibar, the community-level management systems are very new, and the personnel lacks the knowledge and expertise needed to effectively manage the mangrove resources. There are not enough well-designed organizations and procedures in

Zanzibar to guarantee that management regimes can incorporate civic traditions. In some cases, the operational regulations may be unclear and open to arbitrary interpretation by those in charge. The laws that are perceived as being unfair, such as those that ignore or even punish local customs and norms, can be socially unacceptable. Thus, poor or absent public participation in their design and decision-making processes, may have long-term, irreversible effects on the social, economic, and environmental conditions [62,63]. The forest-adjacent communities will not comply with forestry laws if they believe they will jeopardize their livelihood [62,63]. The responses from the FGDs reported that, small producers and disadvantaged rural communities may disregard forestry-related laws and regulations because they perceive them to be prohibitively expensive and burdened with complex legal requirements. Furthermore, logging bans enacted to combat illegal logging in mangrove forests have had little effect [6,46]. Forest land tenure is also unclear and/or discriminatory, posing significant barriers to the effective mangrove forest governance in Zanzibar. Despite the fact that the communities near the forests may have been the original owners, traditional rights may not be recognized by the law [14]. Therefore, a lack of secure and legal forest land tenure may lead to a never-ending conflict between communities and the government [63]. Due to a lack of political will, institutional failure, discrimination to some ethnic background, corruption, or outright criminal mentality, forestry laws may be underutilized or not used at all [62,63]. As a result, forestry laws and regulations are selectively applied and enforced, creating opportunities for neglect and abuse, resulting in poor forest governance. The villagers and the decision-makers concurred that corruption makes it difficult to manage the mangrove forests sustainably. Leakage in law enforcement and low penalties for offenders make many people perceive the law as unfair [63]. The poor enforcement and governance of forestry laws are caused by a lack of sufficient human and financial resources [62]. This makes the monitoring of mangroves nearly impossible. Weak government institutions have encouraged illegal activities in mangrove forests, because the likelihood of punishment is low [62]. In most cases, forests are subject to more intense and detailed regulation than other land uses, but over-regulation is frequently associated with increased corruption [62].

The FDGs concluded that, the community-based mangrove forest management could result in significant advantages—however, there were worries that the strategy was not as pro-poor as it appeared because co-management procedures and institutional arrangements were easily manipulated by the more powerful members of society, casting doubt on the strategy's longer-term viability. However, the most powerful people in society understand how to navigate the complex web of forestry laws and regulations, in order to obtain permission to harvest forest resources [62–64]. Undoubtedly, others in society, who are less affluent, will come up with their own schemes for breaking into forests to steal the forest resources. The issue is made worse by the lack of regular training for community members, on their roles, rights, and obligations in forest conservation and the need to conserve them for the greater benefit. Programs and policies for institutional and policy reform are delicate and may take years, as they do in Zanzibar. As a result, it may not be evident which reforms to governance and law enforcement will or will not be successful. The commitment and political will of the government are critical. A forest officer reported that, a weak judicial system remains another challenge toward the mangrove conservation in Zanzibar. According to a senior forest officer from the Department of Forestry, the courts are mostly understaffed and underfinanced, corrupted, politically affiliated, and overburdened with caseloads. Therefore, for the effective application of forestry laws, a reasonably functioning judiciary is necessary. Furthermore, the training of judges who deal with typical forest-related issues may be inadequate and may not include any training in forestry laws.

4.4. Recommendations for an Improved Mangrove Forest Governance in Zanzibar

Through improved governance frameworks, Zanzibar can claim a better management of the mangrove forest resources. Major institutional, legal, and policy changes have been made to achieve this. Recommendations are presented here on areas that require special attention, in order to achieve a sustainable forest resource management. Concerning the conflicting regulations resulting from various forestry laws, this study proposes that such laws must be harmonized, in order for them to be consistent with one another, and be able to specify who is responsible for what [62]. Moreover, the mangrove ecosystem management is challenging because these ecosystems are both terrestrial and marine, and are valued differently by stakeholders. Stakeholders may be different government departments, learning institutions such universities, forest research institutes, independent researchers, or even faith-based institutions, financial institutions, such as banks, loan boards, and development partners, such as the European Union, Africa Development Bank, World Bank, etc. The tenets of legitimacy, justice, and integration play a significant role in determining whether mangrove conservation projects succeed or fail. This underlines the significance of the stakeholder involvement at all phases of the mangrove management. Natural resources are typically managed and owned at several levels, from private to public ownership—therefore, all governance actors should have roles that are clearly defined, that stakeholders are informed in a transparent manner about the policy development, that both the process and the results be fair, and that sustainable access to conservation resources be carefully taken into account [6,62,63]. Assuring transparency, preventing corruption, fostering a greater equity, minimizing the unwarranted influence of the "powerful" in society, and advancing the rule of law, are all benefits of a participatory approach to forestry law-making. This will allow stakeholders to air their grievances and protect their rights from absolute unilateral decisions made by governments. A forest policy that is widely accepted demonstrates a sense of shared ownership—the involvement of stakeholders from all sectors legitimizes the policy in society. Furthermore, a coordinating unit involving all stakeholders in charge of developing the mangrove conservation and management plans should be instituted to ensure the proper implementation of the same. Accurate and recent data should be used to support the measures included in the plans—the collection and disseminating accurate data enables the science-based decision making. The mangrove conservation implementation plans should be funded from, for example, the Zanzibar Forest Service and the Zanzibar Forest Fund, to avoid a dependency on donors.

The capacity for law enforcement is low—due to a lack of sufficient human and financial resources. Therefore, more funds are required to achieve effective policing. Although another issue with law enforcement is the contradictory and/or impossibility of complying with regulations governing the forest sector. In cases where regulations reduce profitability, preventing realistic compliance, the government may provide assistance, such as financial incentives and/or compensation, to encourage forest actors to willingly follow the law [62]. However, incentives for the mangrove conservation must be aligned with the sustainable exploitation of mangrove forests [62,63]. It is obvious that the Department of Forestry does not receive sufficient funding from the state—it should strive to secure a budgetary increment from the government, as well as engaging development partners for the funding of mangrove conservation activities (although the over-dependence on donor funding has its shortcomings-reparation and subsequent implementation of the National Land Use Plan depended entirely on the financial assistance from FINNIDA, and when it pulled out in June 1996, many of the planned activities could not be implemented. Other innovative ways of raising revenue ought to be sought. For example, several popular destinations around the globe have introduced a tourism tax as they reevaluate, following the COVID-19 pandemic. With the return to normalcy, the use of these fees has shifted towards the conservation of natural tourist attractions and surrounding amenities. Zanzibar can implement such initiatives to boost the conservation of its mangroves and the raise economic status of its people. More funds will also help to acquire more personnel and working facilities. The Arab countries, such as Oman, are key development partners for Zanzibar and regularly fund conservation projects in the country.

Finding practical alternatives for local residents' livelihoods is a foreseeable way to curbing the invasion of mangrove forests in Zanzibar—but it is a challenge for both the

government and the communities [27]. Because the land surrounding the bays is primarily coralline soil and typically unsuited for agriculture, farming is not a potential alternative livelihood for the locals who completely depend on fishing and mangrove goods. As a result, additional research is needed to find communities alternative means of support. One possibility is to integrate the local communities in tourism—even non-marine related activities should be sought [14,27].

Statutory systems do not take into account the customary mangrove tenure rights or mangrove usage and management practices. According to research, tenure agreements that grant complete ownership or longer-term rights seem to be more beneficial for the mangrove protection than the opposite. Therefore, various community management approaches should be used in an effort to increase the tenure rights and advantages. Gender equity is a crucial component that Zanzibar's management and protection of mangroves lacks. Local customs significantly restrict women's participation in the mangrove maintenance and rehabilitation—they are forced into low-skilled work and excluded from local resource group leadership. The management and conservation of Zanzibar's mangroves should give women more opportunities. It is necessary to create laws and regulations that are tailored to the unique management requirements of mangroves, since mangroves are governed by legal frameworks meant for forests, the environment, water, land, or marine fisheries. There is no single legal instrument that can address all of the threats to mangrove conservation, therefore, a variety of legal tools can be applied to address the threats to the mangrove forests [14,30]. Institutions with an expertise in forestry research, both local and international, should cooperate and adequately address the key problems impeding the implementation of a sustainable mangrove forest management. The forestry governance institutions, along with other stakeholders, should advocate for broad judicial reforms. The judiciary's often inadequate knowledge and appreciation of forestry law issues should be addressed through professional training programs in forestry and related natural resource laws [62]. Finally, the following should also be implemented [14]:

- Frequent national mangrove inventories;
- Strengthen the institutional capacity at all levels;
- Mangrove conservation and sustainable use should be grounded in constitutional norms and international obligations; and
- Adoption of a dedicated nation-level policy/plan.

Examples of mangrove success stories that Zanzibar needs to emulate are:

- 1. Gazi Bay in the Kenyan coast—it is the world's first conservation project to connect the mangrove forests to the global carbon market [65]. The project sells carbon credits to people and organizations willing to lower their carbon footprint—this supports the planting and conservation of mangrove trees [65]. The payments for "mangrove carbon" are also used in the provision of fresh water to the community, to buy textbooks for local schools, and to improve the infrastructure in the neighbouring schools [65]. About 4000 mangrove seedlings are planted annually, resulting in carbon savings to generate direct income for the local community [65];
- 2. The state of Maharashtra in India—as part of the intensifying conservation in the urban region, constant patrolling was entrusted to armed personnel. For the mangroves owned privately, the government constituted a committee to deal with all mangrove-related cases [66]. Overall, the following measures had been put in place [66]:
 - A ban on the cutting of mangroves;
 - Immediately stopped all construction within 50 m of all sides of mangroves;
 - Banned the development permits in respect to any areas under mangroves;
 - All mangroves on government land were declared as Protected Forests; and
 - Cleaning solid waste from mangrove areas.

A substantial increase in the mangrove cover, from 186 km² in 2013 to 304 km² in 2017, was recorded in Maharashtra [66]. A different approach was adopted in rural areas—mangrove co-management communities, which were formed in coastal panchayats, were

allowed to practice community-led village ecotourism and employ the livelihood activity that best suited their needs [66].

- 3. Guyana—a national-scale mangrove planting program showed that, in some cases, restored mangrove forests thrived more than forests that were intact over the last decade [67]. According to Ram et al. [68], "Aboveground biomass in restored sites (103 Mg ha⁻¹) was 13 and 99% greater than intact (89.4 Mg ha⁻¹) and degraded (0.12 Mg ha⁻¹) sites, respectively." Therefore, planting new mangrove seedlings can very well restore degraded mangrove forests [67]. Therefore, planting new seedlings has proved to be a way of regaining some of the ecological benefits of mangrove forests [67];
- 4. Madagascar—since 2015, men, women, and children from the village of Manombo in the Melaky region on Madagascar's west coast, have become key players in the mangrove conservation and restoration [69]. This was after the local populations were sensitized on the importance of mangroves and how to maintain a healthy environment—people were willing to voluntarily avail any information on land-use changes, such as illegal activities in logging or agriculture [69]. Mangrove restoration benefits the local communities by improving access to fish and crab stock, which provide a regular income, and builds resilience against climate change [69];
- 5. Vietnam—due to the fact that forest management in Ca Mau has become more decentralized on paper, the following measures were proposed to be applied at the local level by public servants and officials [70]:
 - Distribution of mangroves and forestland to households for long-term use;
 - Management rights between contractors and sub-contractors;
 - Equity in benefit sharing;
 - Allocating forests to different organizations; and
 - Improved monitoring and control mechanisms against corruption.

The remote sensing and GIS techniques were also used to detect mangrove spatial/temporal changes, in response to either natural or anthropogenic forces, or both—in order to facilitate the appropriate planning, management, and regulation of coastal wetland [71].

5. Conclusions

Marine resources, particularly mangrove forests, have contributed significantly to the socioeconomic success of the Zanzibar population since pre-colonial times. The mangrove management in Zanzibar has faced numerous challenges, as a result of overexploitation for commercial and subsistence purposes. Both the colonial government and the Revolution Government of Zanzibar (RGoZ) tried other forest conservation and management approaches, but the community-based forest conservation approach by the RGoZ has proven to be effective. Communities that are close to mangrove forests are involved in managing the forests in a way that improves the communities' quality of life and conservation awareness. Because of this strategy, people have felt a sense of ownership and are now actively involved in forest conservation efforts. Despite the efforts to raise awareness of the threats they face, promote alternative livelihoods, and improve forest management, mangrove forests continue to face a myriad of threats. There are specific underlying issues in the current policy and legal frameworks that have been identified because they deter the adequate conservation and management of mangrove forests. Recommendations have been made that will help streamline and strengthen Zanzibar's Forest policies and laws. Still there is a need to have appropriate policy interventions that specifically address the conservation and management of mangrove forests in Zanzibar. Another challenge remaining is in coordinating and involving the relevant stakeholders, including those who will be impacted by the mangrove use and conservation policies. Therefore, national policies should incorporate future mangroves needs and trends, in order to develop a broader vision for Zanzibar's forestry sector.

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Appendix A

An interview schedule for government officials and FGD guide

- 1. Why are mangrove forests important?
- 2. Describe mangrove species and abundance in Zanzibar.
- 3. Outline the history of the conservation of mangroves in Zanzibar.
- 4. What are the main factors contributing to mangrove deforestation?
- 5. Where does most deforestation occur in Zanzibar?
- 6. What are some of the devastating effects that can be attributed to the loss of mangroves?
- 7. What is your opinion on the destruction of mangrove forests and loss of biodiversity?
- 8. How can mangrove forests in Zanzibar be saved?
- 9. Do you think appropriate policies have been effected for the protection of mangroves?
- 10. Do you think integrating the concept of community participation is a key move in championing forest conservation and management practices at the local level?
- 11. Which measures have been introduced to enhance participation by the local community in the conservation and management of forests?
- 12. Do local communities benefit from the maintenance of mangrove forests?
- 13. How is Zanzibar doing in the conservation of mangrove forests, compared to other countries?
- 14. What is the outlook for the Zanzibar's mangrove forests in the future?
- 15. Do you advocate more governmental regulation?
- 16. Does technology play any role in the conservation, protection, and awareness of mangroves?

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