Harnessing Indigenous Knowledge and Management Systems of Marine Ecosystems Among the Mijikenda of Coastal Kenya

Khamati Shilabukha

Institute of Anthropology, Gender and African Studies, University of Nairobi, Kenya

dennis.shilabukha@uonbi.ac.ke

https://doi.org/10.62049/jkncu.v5i2.298

Abstract

This paper presents findings of a study on the indigenous knowledge and management systems of the Mijikenda people of marine resources. The objective of the study was to investigate how Mijikenda indigenous knowledge system provides a foundation sustainable management of marine resources. The study was guided by the theory of neo-structuralism and was undertaken between 2013 and 2022 in villages stretching from Vanga on the border between Kenya and Tanzania in the south coast to Matsangoni in Kilifi County in the north coast of Kenya. The study employed the exploratory design which was descriptive. Data collection methods included in-depth interviews, focus group discussions (FGDs), key informant interviews, informal interviews and transect walks. Data was analysed using both qualitative and quantitative approaches. The findings indicate that the community has been managing mangroves, fisheries and corals through indigenous systems over the years. The systems used to manage and conserve the resources include seasonal bans, demarcation of some species or ecosystems as sacred or taboo as well as the use of metaphors. The community has done this through observation of characteristics such as behaviour related to feeding, breeding, style of movement in the sea as well as seasonal appearance in certain locations.

Keywords: Culture, Ecology, Indigenous Knowledge, Management Systems, Mijikenda

Introduction

For millennia, humans have cohabited with natural resources, including those in marine ecosystems in harmony (Obiene *et al.*, 2022). The imperative being that as long as people have lived next to bodies of resources, is an indication of indigenous management, whether deliberate or inadvertent (Ameneshewa *et al.* 2023). Since communities, especially those in coastal regions, highly depend on the resources found in proximate ecological zones for various livelihood and subsistence reasons, they have developed elaborate management and governance systems. These systems have in essence evolved a sustainable and symbiotic relationship between them and resources (Chaonan and Li, 2024; Ameneshewa *et al.* 2023). Indigenous management systems are functions of the considerable body of indigenous knowledge of the ecosystems the communities possess because indigenous ecological knowledge is based on detailed observation of the dynamics of the natural environment, feedback learning, social system/ecological system linkages, and resilience-enhancing practices (Shilabukha, 2018). While they may be presented as biological in nature, ecosystems are in most part socially constructed, therefore, resource management and conservation practices in indigenous systems are based on social processes. Indigenous resource management systems, thus, are experiments in successful living (Holling *et al.* 1973:3).

New development paradigms brought about by colonialism and the resultant globalization have brought about different ways of managing natural resources (Shilabukha, 2018). This is most evident nowhere more than regions inhabited by indigenous communities (Barrow, 1998; De Juan and Lleonart, 2010). Many countries have adopted this approach, the emphasis being enhancement of biological and ecological integrity of the resources through restriction of human activities conservation areas (De Juan and Lleonart, 2010). In this way, the government determines the types and levels of use and benefits that may accrue, by whom and under what circumstances (Shilabukha, 2018). The practice does not only deny local communities' direct role in management of the resources but also the co-benefits of living in the proximity of the ecosystems (Obiene et al., 2022). In many cases, such communities are considered a threat to the ecological integrity of the ecosystems (Barrow, 1998).

In Kenya, for example, legislation relating to mangroves has generally been included in that for terrestrial forestry (Semesi, 1998). The same applies to fisheries where parts of the sea are marked as marine parks or marine reserves. The story is replicated in other parts of the region such as Madagascar, Mauritius and Mozambique. This philosophy runs counter to indigenous people's concept of nature, considering the complexity of managing marine resources (Semesi, 1998; UNESCO, 2005). The implication is that these approaches do not look at the wider socio-economic implications of marine resources management, especially the application of cultural values, norms and practices of local communities, such as the Mijikenda (Shilabukha, 2018).

Theoretical Framework

This study was guided by the theory of neo-structuralism, which revolves around the idea that social unity is knotty and should not be taken for granted (Ericson and Murphy, 2008). Human beings are essentially forced to repeatedly construct social life and reality against those forces in the natural world that threaten to destroy or distort it. In neo-structuralism thinking, ecological survival requires communities to observe a much larger system and recognise that they are part of this expanded system. Ecological survival, consequently, is a cultural concept.

As part of the indigenous natural resource management framework, beliefs should be treated in relation to the environment similar to kinship systems (Harries-Jones, 1992:159). Linking ecology to the presentation of myth and belief systems merges them such as in Lévi-Strauss' discussion of totemism (Lévi-Strauss, 1963), the reason why the environment is much more than a set of material possibilities, the way it is framed in the protected areas approach. Ecosystems and the resources in them are characteristically non-linear and multi-dimensional, sustained by an adaptive indigenous ecological epistemology (Bateson and Bateson, 2004). The argument is elastic enough to further postulate that indigenous knowledge and management systems are integral to this symbolic system in the sense that they are grounded in the assumption that humans are animals suspended in webs of significance they have spun themselves. The study of the relationship between culture and nature is, therefore, not an experimental science in the search of laws and facts, but rather an interpretive one in search of meaning. Such meaning is not locked in the minds of individuals, but in the networks of significations that are on public display, through belief, practice and context in lived experience.

Therefore, indigenous management systems, through indigenous knowledge, is emergent from a multifarious structural system composed of three subsystems: context, practice and belief. Indigenous knowledge as contextual is based on history, demographic factors and biophysical features of place. Indigenous knowledge as practice depicts meaningful action, through physical interaction and experiential learning. Knowledge as belief portrays the influence that spirituality, laws, norms and values have on how indigenous people such as the Mijikenda of coastal Kenya, act interact with the marine resources.

Methods and Measures

Research Site

The study was carried out in the area between Vanga in Kwale County and Matsangoni in Kilifi County. In Kwale, the study was undertaken in Vanga, Wasini, Shimoni, Mkunguni and Munje villages. In Mombasa, the study site included villages in Kisauni and Bamburi, while in Kilifi County, it was done in in Shanzu, Mtwapa, Kanamai-Majengao, Takaungu and Matsangoni.

Data Collection Methods and Analysis.

The study employed both primary and secondary data collection methods. Primary data was collected through in-depth interviews (IDIs), focus group discussions (FGDs) key informant interviews (KIIs), observation and informal interviews. Data from IDIs, FGDs, and KIIs was analysed using content and thematic approaches. That from observation was collected through a checklist and field notes, while data from informal interviews were collected from field notes. These were analysed through thematic categorisation. The findings are presented through anecdotal quotes and descriptive discourse.

Findings

Overview of Beliefs on Marine Resources

The Mijikenda, through their culture, have ways of managing the marine ecosystem as demonstrated through a system of indigenous ecological knowledge. In Mijikenda cosmology, the boundary between the human and the natural worlds is dialectical and sacred. The vastness of the ocean and its associated resources plants the seed of reverence in the community. The ocean itself is believed to be a sanctuary to

sundry spirits, both benevolent and malevolent. Irrespective of their nature, the elders insist on caution when dealing with them since their temperament is very fragile, hence the different rituals that are performed on land and the sea. Besides, the running belief is that marine resources belong to ancestors, thus, in many instances, elders enforce rules of access and use as part of management, as one elder in Munje village in Kwale County explained:

There are instances where people are lured by spirits into the sea and they drown. Such people are usually culprits of environmental degradation and pollution. Then we have other sacrilegious individuals like sorcerers, defilers the incestuous, rapists or thieves. Such people attract societal curses, which culminate in their removal from society. But you know no human being has the power to reduce the life of another. The spirits do it for us. The sea spirits lure them into the water from wherever they are to drown. At times, some people become insane and throw themselves into the sea.

The sea is also considered the safest place for the disposal of the effects of sorcery. Among the Mijikenda, it believed that sorcerers install their malevolent formulae in pots, which they bury in the homesteads of their target victims or near riverbanks. Sorcerer hunters exhume those pots and throw them into the sea to make it difficult for the owners to retrieve them due to the immensity of the sea. Coming to mangroves, it is believed that each tree belongs to the ancestral spirits. More so, medicinal species such as *mchu (Avicennia marina)* are highly venerated. According to one male elder from Shimoni, Kwale County:

Ancestors not only direct the herbalist to the right tree but also instruct him or her on the amount of dosage to be administered.

Proverbs and Sayings Touching on Marine Resources

Interconnected with the aspect of rituals, is a system of proverbs associated with marine resources. These proverbs form part of the corpus of values and beliefs that maintain the structure and function of Mijikenda culture. The proverbs may be used in common conversations as a way of demonstrating versatility in language use. However, inherent in their deep meanings are lessons on various aspects of marine resource management. Some of the proverbs are presented in the succeeding section and their link to marine resources demonstrated:

Ndio mwanzo mkoko unaalika mauwa -It is just the beginning; the mangrove tree is yet to invite its flowers.

One meaning of this proverb is that the mangroves should be allowed to mature before they are utilised. It may also mean that one should not look at an old mangrove tree and dismiss it as useless. It still has value. It warns against dismissing things off hand. The proverb teaches about intrinsic value inherent in everything. It also teaches patience as a virtue.

Mlinga ndio mkoko – "the testa or propagule is the mangrove tree.

Mlinga is the testa, seed of the mangrove. This proverb teaches family morals about child rearing. It equates the transformation from childhood to adulthood through the process of socialization to the development of the mangrove tree. A child (the seed/testa) is the adult (tree), thus, just like a child, the mangrove seed should be taken care of since it is the source of life in the mangrove forest.

Mkoko huleta neema – "the mangrove tree is the source of grace, favour, mercy or blessings.

The teaching is that people should not look far for virtues or blessings. They can be found in the most unusual, unexpected places. This proverb teaches the deep connection that exists between the mangrove ecosystem and the wellbeing of the community, the reason the community extolls the virtues of conserving the mangroves for prosperous posterity.

Mkoko ni kama roho - —the mangrove tree is like the heart.

This ecosystem is the heart of the environment among the Mijikenda people. It is very important, just like the heart is to the whole body of an organism.

Ngangari kama mkoko - "hard or resilient as the mangrove tree

The proverb teaches persistence in the face of adversity in life. Life is like the surroundings of the mangroves, full of ups and downs, requiring fortitude to sail through. This proverb is sometimes used in reference to men who are sexual athletes, those with the staying power.

Avumae baharini ni papa, lakini wengine wamo - —the shark is best-known in the sea, but there are many others.

The teaching is that no one is indispensable. No particular individual can make up the whole community, however strong or famous.

Tunza mikoko ikuhifadhi na majanga - protect the mangroves so that they also protect you from disasters.

This proverb is tied to the interdependence of organisms in an ecosystem, pointing to the importance of mangrove forests in protecting not only humans but all those other organisms.

Tunza mazingira yakutunze- —protect the environment for it to protect you.

This proverb recognises the fact that the environment is the source of everything that humans require for their survival. Thus, it is only prudent to take care of it.

Mazingira ni uhai —the environment is life.

This proverb teaches prudent use of environmental resources, because our fate is entwined with that of the environment. Our lives depend on a clean environment. Therefore, conserving the environment is linked to preserving your own life.

Mwenda tezi na omo marejeo ni ngamani -whether one goes forwards or backwards, one must come back to the middle of the raft to control it.

Apart from teaching moral steadfastness, the proverb also has immense implications for those joining fishing expeditions, implying that leaders of expeditions must be scrupulous and reliable, setting a good example when guiding young people. Those who go fishing are warned to concentrate on the business of fishing and never joke with the sea as it is unpredictable.

Hasira ya mkizi furaha ya mvuvi - —The anger of the mullet/cuttlefish is the joy of the fisherman.

Folklore has it that the angry cuttlefish, when caught on the line, will jump out of the water into the boat of the fisherman. The moral of the proverb is that an angry person hurts himself most often.

Samaki mkunje angali mbichi - Bend the fish when it is still wet.

This proverb is commonly used to inspire families to instill good manners in their children. The implication is that we should train a child in the way he/she should go and when he/she is old he will not turn from it. Every family should take the obligation of raising a child when he/she is still in early stage of her/his ages what you teach him/her will not go astray up to his/her old age!

In all these proverbs we can see that marine resources are elevated in the day-today activities of the Mijikenda community as an integral part of culture. They are part of metaphors, enhancing stylistic communication and teaching ethos which are instrumental in shaping marine resources management.

Sacred Sites, Species and Shrines

Several areas in the forests and parts of the sea are designated as sacred for use by fishers and other community leaders to perform rituals. There are taboos related to the utilisation of resources in these areas, including bans on eating certain marine species because of beliefs based on religious influence or prohibitions against cutting trees or parts of them. Therefore, there are several sacred mangrove forests in the research site. One of them is *kwa Mwakirunge* mangrove forest in Kisauni, Mombasa County. The name literally translates to mean Mwakirunge's place, named after a person called Mwakirunge. According to one of the male respondents:

It is not known why the forest is sacred. All I know is that Mwakirunge was a healer and an oracle. He used to live near the shore, and he would consult the spirits in the adjacent mangrove forest and provide solutions to various problems. It is believed that even though he is dead, his extraordinary powers have allowed him to protect the forest. We, therefore, do not under any circumstances, go into that forest. It is forbidden for any ordinary person to go into the forest

Then there is Kwa Kipicho mangrove forest, also located in Kisauni at the extreme end of the Mtwapa Creek, straddling Mombasa and Kilifi Counties. According to one male respondent in the area:

It is named after a person called Kibicho, who was a great prophet and medicine man in the community. In fact, it was him who used to give individuals permission to go fishing or cut mangrove trees. No one would defy him since fishing and mangrove cutting were sacred activities only permitted by revered individuals who had the power to communicate with ancestors and spirits. This forest is extraordinary. The most interesting thing about it is that there are a lot of baobab trees in the adjacent land. Among the Mijikenda, the baobab is a sacred tree. Having it near a mangrove forest is an amazing phenomenon. For us, we believe that Kibicho is still lurking in the area, protecting his dwelling. As such, elders use the forest as a shrine for rituals and other secret society events.

We also have the Custom mangrove forest in Mtwapa. Legend has it that a long time ago, even before the Portuguese came to the coast of Kenya, part of the Mazrui family used to live there. They established homesteads, mosques, and cemeteries. With the migration of the family and abandonment of the homestead, the houses and mosques collapsed, and the cemeteries were abandoned. This made the mangrove forest expand and cover part of the former homestead and graves. At the same time, there was a *panga* (temple or sacred place) where people used to pray. This has transformed the forest into a sacred forest. The implication is that the forest is a massive body of different mangrove species and other organisms that rely on mangrove forests for food, spawning and protection from predators. The sacredness of the place emanates from the many caves which have been transformed into holy places due to the shape of the stones that make up the caves. The stones are triangular, making them look like they were carved.

Another sacred mangrove forest is *Jumba la Mtwana* (the male slave's big house) in Mtwapa. It is believed that another part of the Mazrui family lived in this place, the palace which later became a shrine, engraved in the forest. Then, Matsangoni forest, just after Kilifi town towards Malindi, which derives its name from the local word for the womb, translates to mean inside the womb. According to the respondents, elders periodically hold ceremonial events to cast away evil and ask for blessings and forgiveness. The ceremonial process for the rituals starts from the mainland and ends up in the forest where elders take the lead in casting away evils. The forest is considered sacred because the people believe that evil spirits come from the ocean through it to cause unexplained deaths and poor harvests. This prompts elders to organise ceremonies to return the evil spirits to the ocean.

Then we have the Vuma Mangrove Forest in Takaungu. According to the men's FGD in Takaungu, the adjacent area to the forest is Arab dominated. The Arabs conduct several ceremonies inside the forest as thanksgiving to their God as well as fortune seeking. Their traditions are still very strong, and people are scared of tempering with the forest for fear of punishment from the Gods. The most popular ceremony that takes place here is *kutoa chanu* (thanksgiving), during which elaborate rituals are performed, like taking valuable minerals like gold and silver in small vessels (*chanu)* and which are burnt in *udi* (a pan) with bananas. The Arab elders also slaughter animals like chicken and goats in the forest, cook the meat and rice, which is offered to their God deep in the forest in expectation for blessings. The remaining food is eaten on the sandy shores with dance to traditional songs and drums.

Next are Maya and Ushini forests surrounding the Kilifi Creek, near Kilifi town. These forests are considered sacred because there is a magic island between a place called Mtongani and the forests, a very small island that can barely be a homestead. This island has never been swallowed by water as long as people can remember, in spite of its size, even with very strong winds and high waves. The community considers the island and the adjoining forest sacred and has transformed the island and the forest into a shrine, a place where people pray when things go wrong such as property being stolen or untimely death in the family. An elder in the area had this to say:

When one prays to the ancestors on the island and forest, punishment immediately comes to the offenders.

In the community, trees in the sacred mangrove forests cannot be cut simply because it feels wrong for the environment. Following this up, I noted that it is possible to take this deeper and conclude that putting thoughts about the environment on one side and the feelings of the community about the same environment on the other side not only leads to the community losing their connection with the environment but also gives them a feeling of disorientation, disconnection and loss of their sense of balance. That is why, as the elders noted, trespassing through sacred mangrove forests hurts to a very deep level, making conservation of the mangroves much more than an environmental issue.

The forests are related to healing, a sacred calling practised mainly by women, who know a lot about mangrove species that have medicinal value. Their knowledge has very important implications about the relationship between the community and the mangrove forests. The forests are an essential component of the healing practice since they are a source of herbs and roots. Therefore, the mangroves are tied to the health of the community, through the health of individuals within the community. Thus, mangroves are revered sources of wellness (*uzima*). Humans transform this wellness from the forests through the art of healing. Healers are the custodians of all forests, mangrove as well terrestrial.

Mangrove forests in general and the sacred ones in particular are tied to well-ness in the community. Entry into the forest for herbs and roots is a function of commands from spirits. And harvesting medicinal parts of the trees requires spiritual guidance. So, if the spirits require a healer to fetch medicine from the forest, they usually command the healer to a particular tree; needless to observe that there are numerous similar trees in the forest. The healer, therefore, has to do as commanded and go to that particular tree.

The sacred forests are places of worship, holiness, sacred shrines, where special prayers and sacrifices are held. Indeed, through observation, which was guided by a checklist, I noted that the sacred forests were pristine, thick, and largely undisturbed with dense and luxuriant growth, with no signs of freshly cut trees. In fact, in all the sacred forests, there was only one designated route leading into the forest and no other access route was visible. The declaration of mangroves as sacred or spirit-infested has the effect of restricted entry and this has the implication of allowing the forests to flourish without interference.

Indeed, some mangrove species are considered sacred. In particular, medicinal mangrove trees such as *mchu (Avicennia marina)* and *mkandaa (Avicennia tagal)*. According to Mzee Hamisi of Kikambala:

Their roots, leaves and bark have active medicinal properties. Therefore, we have taboos to ensure that these trees are protected and allowed to replenish for posterity. That is why not everyone qualifies to undertake indigenous medical practice. It is the preserve of particular families, lineages or clans. This makes sure only those who know how to relate with the trees are allowed to deal with them. Can you imagine if everyone was allowed to deal with the trees? How would they know which tree is sacred and which tree is not sacred? All the trees would be gone by now.

Apart from the restrictions in mangroves, other strict taboos relate to the sea and operations in the sea, especially fishing as illustrated by the elaborate rituals that are undertaken at the beginning of the fishing season. According to the men's FGD at Kisauni, Mombasa County, the fishing season begins with an elaborate ceremony in which a group of fishers prepare because they represent the remnants from the previous season. After the meal has been prepared, the fishers take their boats to a specific place called *kitwani* (head) in the deep sea and anchor them, the place fishers belonging to a given expedition always go to at the start of every season, for the installation of a new expedition leader and pray for a successful season.

There are many *kitwani* places in the sea. The place is chosen through tradition. However, it is unknown why it was chosen. A number of rituals are performed with prayers and libations are poured into the sea to appease the gods and ancestors. After the praying they burn *ubani* (or incense), a perfume often used in the rites of various religions. To confirm that their prayers have been received well, one of the fishers must experience a seizure. The fisher who gets the seizure is then given *chetezo,* a small water vessel, and a wooden sculpture called *chano*, dives into the sea to commune with the ancestors and spirits of the sea for half an hour. The vessel contains ashes of burnt incense, believed to appease ancestors and mollify malevolent spirits in the sea. The sculpture is itself a piece of abstract art. It is a generic representation of ancestors, the reason why it is gender neutral.

According to the respondents, the immersion makes him messenger to the origin of the community, to bring back fresh knowledge about the sea and the land for the new season. He connects to the origin, differentiation, migration and creative deeds of the ancestors, from the very beginning of the world and continuing with the establishment of the traditional order and cementing the roots of the present generations.

The immersion anticipates culture as the creation of nature unfolding in utilitarian management, a prelude to unity of purpose between the human and natural world, which forms the basis for ecological behaviour. The immersion also reveals the geography of the sea that is at once mythical and real, thus serving as the basis for behavioural options within this territory. This ritual is a model of reality that combines myth with the empirical nature through culture because it brings forth information about the coming season. The knowledge is defined through the borrowed authority of the ancestors and other benevolent spirits of the sea. This ritual seeks to deflate and deflect the influence of negative forces of nature in the sea.

At the end of the half hour, he resurfaces unscathed, upon which the ceremony begins in earnest with the eating of the food that was carried to the open sea shrine. After the ceremony, the fishers disperse, marking the beginning of a new season of plentiful fishing. The fishers are very categorical that the ritual is about minimizing the negative events such as drowning while at sea, acknowledging that they cannot eliminate them all. There are some individuals in the community who will still commit crimes that attracts the wrath of ancestors, and the repercussions of these crimes will affect even innocent people.

Likewise, there is strict observance of prohibitions and rules of conduct before fishing gets underway every day, such as restrictions on joining a fishing expedition or even individual fishing in the sea before bathing after sex. This is due to a belief that intercourse ritually pollutes the body. According to one elder in Msambweni:

The ocean is the home of evil spirits and, according to our beliefs, the spirits dislike meeting with an impure person. This taboo must be strictly observed so as to avoid misfortunes during fishing activities.

Related to this taboo is an observation about fishing without success. The respondents reported that if a hand line fisher spends some time without any success, he does not continue but rather returns home because it is a sign that something is wrong at home. For example, his wife could be having sex with another man or there may be a death in the family. Hand line fishers also cancel fishing activities if they hook up a bottle from the ocean, another bad sign. This then restricts fishing and, in the process, preserves fisheries. There are also restrictions on fishing for menstruating women. According to the Mijikenda, menstruating women are considered ritually impure, therefore, not allowed to mix with other people, including fishing because it would bring misfortune. This taboo inadvertently protects fishing habitats near shore reefs.

Fishing is undertaken at given times of the year when the sea is *fertile and welcoming*. However, even during these times, the sea can decide to be rough and hostile, making it unsafe to go fishing, whether in groups or individually. Thus, there are restrictions on fishing during strong winds and heavy rains. It is taboo for the artisanal fishers to fish during normal or unexpected heavy rains and strong winds. This unintentionally allows some marine fish species to breed and grow. According to Mzee Mfuko of Mtwapa:

This is time the sea spirits are getting rid of bad elements in their midst. If one goes into the sea at this time, one will interfere with the rituals of the sea and one is likely to face the wrath of the spirits. This may lead to illness or even death.

Sometimes fishers get lost at sea, an event which leads to cessation of activities until the lost man is found, dead or alive. This is observed to show respect for fellow fishers, even if they are from far away including the border with Tanzania. In the same vein, when there is a death event in the village, no fishing activities take place until the body is buried. According to the respondents, if this taboo is not observed, misfortunes would occur. This taboo inadvertently limits pressure on marine habitats in the study area.

According to one elder in Mtwapa, mentioning names of terrestrial animals while fishing is prohibited. Thus, fishers cancel fishing activities if one among them inadvertently mentions the name of a terrestrial animal. According to him:

This is considered to be a sign of bad luck. Related to this is alcohol consumption. It is taboo for Mijikenda fishers to drink alcohol when going out to fish. This taboo is connected to the Islamic religion which says that consuming alcohol makes the body impure. If a fisher is identified by others as having consumed alcohol, he is dropped off to avoid misfortune and other dangers during fishing.

This again helps to minimise fishing and allows the fisheries to breed and grow. It can, therefore, be regarded as an inadvertent conservation technique. Another related taboo concerns meeting with one particular person. In Mtwapa, it was reported by the men's FGD that that some fishers cancel fishing activities if, when going out to fish or check nets/traps, they meet with a particular person. For instance, if the person going fishing has a son as first born, he considers women as a bad omen. On the contrary, it is considered a lucky sign to meet a man. On the other hand, meeting with two or more people of whatever gender when a fisher goes out fishing is considered a good omen. The implication is that if many fishers were to avoid fishing on account of this taboo in a day alone, many fisheries would be preserved in the process.

Impurity of fishing vessels and gear is another important aspect of restrictions on fishing. In Shanzu and Bamburi, it was reported that fishing vessels and gears must be free from impurity of any kind. For example, fishers believe that nothing will be caught if a goat urinates on the basket traps. It is also taboo for fishers to defecate or urinate inside or near the fishing vessels. If that happens, it is believed that nothing will be caught on that day. Should one of the fishers relieve himself near the fishing vessels or gear, the fishing expedition will be suspended for that day until the vessels or gear are cleansed. This is because ancestors and other spirits that guide fishing will be angered, and the fish will run away from the pollution. The cleansing is only undertaken by a recognised healer. If the healer is not readily available, the fishers will have to wait until when he will be available.

Apart from taboos and restrictions on fishing, there are fish species which are considered sacred. These include *mkunga* (snake fish [eel]), *bocho, nguva, tsovya, chale*, and *ngogo*. *Mkunga* is believed to be the protector of other fish species. Its name is derived from the title of a traditional birth attendant or mid-wife, who is a very important person in the community as she is the first person who comes into contact with a new born, even before the mother herself. Thus, if one catches it, he should abandon fishing because he will get nothing or may end up in misfortune. On its part, *bocho* (stone fish) is also a bad omen presaging ill luck or misfortune like *mkunga*. *Nguva* (mermaid fish), a type of fish that looks like half-human and half-fish in physical features, is believed to occasionally to fall in love with fisher men. If it happens deep in the sea, the boat will capsize and the object of its affections will drop into the ocean never to be seen again.

The community also has beliefs and taboos concerning corals and reefs. Some reefs are declared shrines and used for traditional rituals to avoid misfortunes. The rituals are performed for various reasons, although the main ones are for averting misfortunes in the community or atoning for immoral or criminal activities such as adultery, incest, sorcery, murder and rape and are performed any time they are required. Those rituals concerned with fishing activities are usually performed when the fish catch decreases. Thus, impure people are not allowed to go in these areas and neither sweet foods nor perfumes are permitted into the reefs. In addition, many people do not fish in these areas to avoid death and any other ill-luck. Likewise, there are some reefs which are associated with evil spirits, which use such reefs to conduct their prayers. People are afraid of fishing in these areas, especially at noon and on Fridays.

The Question of Ownership

From the findings, it is evident that for decades, management of the marine resources has always been in the hands of elders in the community, who enacted rules and regulations for access and use of the resources. Some of the indigenous methods of conservation were rotational extraction of mangrove, fisheries and coral resources. For example, mangrove cutters harvest trees and tree products from one area and then proceed to another after exhausting the mature trees and their products in that area. Another technique is to place a taboo or restriction on entry to a given area of the forest for some time due to ritual pollution or mistreatment of the trees through wanton destruction. The elders can also declare a certain species or part of it sacred for some period of time. The same may apply to fisheries, corals and coral reefs.

However, with the application of the new management approach, a new structure emerged which removed the mandate of management from the community and placed it in the hands of the government. The current management regime is premised on the idea that the community does not have the capacity to manage marine resources prudently, which sidelines the Mijikenda community. With the change in the management regime, the State Departments of Environment and Fisheries are mandated custodians of marine resources. It is under these departments that the Kenya Forest Service (KFS), Kenya Wildlife Service (KWS) and Kenya Marine and Fisheries Research Institute (KMFRI) fall and these are the bodies mandated to manage marine resources in different capacities. For instance, the Kenya Forest Service (KFS) operates a licensing system that allows people to operate in the mangrove forests as timber harvesters or firewood collectors. As one elder in Munje, Kwale County put it

How do you ask us to seek permission to use what our ancestors left for us?

On their part, officers of the government agencies that manage the resources refute the local community's assertions. They argue that the management regime is very appropriate because it keeps poachers and those who want to over-exploit the marine resources. According to one of the KWS officers:

The state corporation maintains marine parks and game reserves. This helps to regulate fishing as some of the people who fish do not have appropriate gear for fishing. Once fish are in the Marine Park or reserve, they are out of bounds for the fishers. This then helps to stem over-fishing and facilitates the replenishment of the stocks in the ocean.

According to key informants from KWS, efforts have been made for the conservation of the marine resources in the area especially the fisheries. On its part**,** KWS has created marine parks and marine reserves. In the marine parks, human activities such as fishing or disposal of waste are prohibited. The authorities, however, allow limited fishing in the marine reserves. These sentiments were echoed by the KFS officers, who felt that the local community does not understand the value of the marine resources.

They cite the level of poverty in the community as an impediment to conservation and prudent use of mangroves and fisheries. For them, until the problem of poverty is addressed, it will be good to protect the mangroves and other marine resources against the rapacious harvesting techniques of the local community. They also pointed out that it would be appropriate to educate the local community on the importance of conservation. An officer with the KFS noted that:

If you consider the mangrove cutters, for example, the economic realities have made some cutters to be impatient such that they do not allow the forests enough time to replenish after cutting. They exploit the forests to the point of degrading some areas to bare levels.

However, some of the Kenya Marine and Fisheries Research Institute (KMFRI) officers seem to have a different perspective on how the local community should be engaged in the management of the marine resources. According to them, the community has something to contribute to the process of managing the resources. As one argued:

In fact, degradation is encouraged by the government officers who abet poaching resources in the sea and mangrove forests. I can tell you that from the experience the community has with the marine resources over the eons is enough for conservation. In any case, should the resources be depleted, it is the community that will lose most.

From an ethical perspective, one issue that emerges is the interface between location of the mandate for the management of the resources and the utilisation of the same resources, bringing forth the question of ownership. This elicited interesting and varied responses. The local people consider the resources to belong to them by ancestral and divine right. The government only came in recently to take over what rightly belongs in the realm of their kinship relations and instruments, they have no alternative but to follow what it dictates. On closer scrutiny, it is evident that the ownership of resources has been very fluid over the years. Some of the resources are owned by the local community and presided over elders in the community to guide the interaction between the community. Fishers are always interacting with the sea when they go fishing while mangrove cutters cannot do without the forests. Women and girls collect firewood and sea vegetables *(mirindi koko)* from the mangroves. Such resources are used at designated periods of the year or never at all. According to one respondent in Shanzu:

Entry in such areas is prohibited, at most or sparingly allowed. These are some of the ways in which the community owns the marine resources and manages them. These are traditional regulations for the management of resources, and no one is ready to disregard them. And breach of these regulations leads to heavy penalties, which only elders can determine.

Even with the presence of government agencies, there are also indigenous rules of utilization where the community is in charge. In Kanamai, Kilifi County, one respondent indicated that there is no picking of shells or anything from the beach. At the same time, non-members of local community-based organisations involved in marine resources management are not allowed to utilise the resources. Destructive methods of fishing such as beach seining and dynamite fishing are not allowed in the areas controlled by elders, where only fishers who have traditional rights assigned to them by the elders are allowed. Elders are responsible for the decisions on access and use.

The foregoing suggests that the community has developed a conservation ethic in the utilisation of marine resources. This ethic is part and parcel of their culture, encapsulated in their cosmology and social metaphors through language and rituals. At the same time, the findings suggest that the community is aware

of the challenges to their efforts to conserve the marine resources. These challenges arise out of the interaction between people and the resources, most of which is not sustainable. From the findings, the running thread of the argument is that the exclusive management of resources by the government is not acceptable across the board. For example, while the Kenya Wildlife Service (KWS) and Kenya Forest Service (KFS) officers are of the opinion that the government is capable of managing the resources on its own, the community and, to a large extent, KMFRI officers, feel differently. In fact, the feeling from the Mijikenda is that the government's role is to blame for the deteriorating status of the management process. In fact, some respondents argued that government officers are lax, corrupt and allow illegal harvesting of the resources. Furthermore, they not only allow illegal extraction but also destructive harvesting methods. According to the men's FGD in Gazi, Kwale, County:

In the mangrove forests, it is actually the licensing process that is to blame for the degradation. Some licensees corrupt their way into being allowed to harvest trees from larger areas compared to what their licenses indicate.

To show that the community is serious about staking its claim to the management of the marine resources, some people have formed community-based organisations to protect and conserve the resources and work hand-in-hand with the government and other institutions concerned with the protection and conservation of the resources. This makes the local community feel that it is fully responsible for the management of the resources and may explain why some respondents felt that it is the moral duty of everyone to safeguard the environment and the resources therein. Moreover, the role of the local community in resource management is emphasized by senior forest and NEMA officers in Mombasa. According to them, the local people interact with resources on a daily basis. This means they are expected by both culture and livelihood pursuits to take care of the resources. They advocate for the formation of BMUs to ensure sustainable use and exploitation of resources, the reckoning being that the laws of Kenya allow communities to play a significant role in the management of resources in their proximity. According to a forest officer:

If the fisheries sector is organised, capacity building and resource monitoring will be more efficient. This will actually bring the community into the fold more effectively. What is more, sensitization on sustainable use of resources by training people on how to mobilise resources and play their roles will be enhanced. This will also utilise the perception of the community in conservation of marine resources. The community members appreciate the role played by the marine resources in their lives.

Community members and officers from government institutions were in agreement that development affects the use and management of marine resources. The most cited impact of development activities on the marine resources was the presence of hotels on the shoreline. These establishments encroach on mangroves, fish handling sites and beach access points. According to NEMA officials, the establishments do not consider the riparian zones as stipulated by the law. Apart from building them close to the sea, they also pollute the marine ecosystem through the disposal of waste in the sea and mangrove areas. This is why the community blamed the state of affairs on the location of mandate for the management of the marine resources. In this case the local community is of the opinion that the government alone cannot effectively manage the resources. If everyone is involved, each actor will maximise on its strength and be compensated in its weaknesses by the strengths of the other actors. This is the basis of consensus-building in resource management.

Discussion of the Findings

Over the years, the management of marine resources has been changing. From the findings, the government of Kenya, through various pieces of legislation and institutional mandate, has taken over the management of natural resources, including marine resources. KWS, KFS, KMFRI and NEMA, through various Government Ministries and Departments, are now mandated to take charge of managing natural resources in the country. The government has introduced regulations such as licensing and protected areas in the management of these resources. This explains the licensing system in the utilisation of mangroves and marine game reserves and parks as a way of restricting resource use and prevention of depletion.

From the findings, we can infer that, to some extent, this system is working. However, the community is worried about degradation of the environment and depletion of resources, including disappearance of whole species. The implication is that the community members are not satisfied with the efforts of the current mandate to properly manage and utilise the marine resources. There is evidence of poaching and corruption in the issuance of licenses for mangrove utilisation. There is also awareness about other causes of marine resource depletion such as pollution, encroachment, overexploitation and uncontrolled as well as unplanned development in areas close to the sea.

The findings also suggest that there is some form of rapprochement between the community and the various government agencies mandated to manage marine resources in the research area. This can be identified through the way the community members view the various development projects as providers of employment and economic empowerment. However, it is important, as the findings suggest, to mitigate their effect on the marine resource. This is because of uncontrolled developments, especially along the shoreline such as hotels, encroaching on mangroves, fish handling sites and beach access points. Thus, it would be important for the local community to play a role in the management of the marine resources. The argument for this is the fact that the community has always played a role in the management of resources because they interact with resources on a daily basis and in the process, they are expected to conserve the resources because they benefit more. Should the resources be depleted, it is the community which will suffer most. Furthermore, the formation of Beach Management Organisations (BMOs) is a pointer to the community's efforts to ensure sustainable use/exploitation of resources. Hind (2007) talks of the role played by the Great Barrier Reef, referring to the role played by the indigenous community to conserve the ecosystem. They consider the Reef to be sacred and home to many species, this symbolises all that generous in nature and serves to remind us of the sacred duty of communal guardianship.

The spirit of public participation as a Constitutional requirement allows the community to play a role in management of those affairs that affect it directly. Marine resources fall in this category for the Mijikenda. The formation of community forestry associations (CFAs) which deal with terrestrial forests could be harnessed to facilitate participation in the management of the resources in this area. In this case, the role of the government should be to regulate and provide advice on the sustainable use of marine resources. This will ensure that the natural resources sector is more organised. This resonates very well with various anthropological studies which indicate that hot spots of high biodiversity are associated with regions where traditional societies are frequently found. In this circumstance, indigenous groups offer alternative knowledge and perspectives based on their own locally developed practices of resource use (Berkes *et al.* 2000; Hiepko, 2006) or known as the indigenous knowledge-practice belief complex. The studies have also demonstrated that Indigenous knowledge and biodiversity are complementary phenomena essential to

human development. Thus, the studies confirm that indigenous knowledge of ecological zones, natural resources, agriculture, aquaculture, forest and game management, to be far more sophisticated than previously assumed. Furthermore, this knowledge offers new models for development that are both ―ecologically and socially sound (Johannes, 1998).

The findings of this study suggest that marine resources are threatened by developments along the shoreline and unsustainable resource use patterns such as beach seining, trawling and dynamite fishing. As Semesi (1998) and Johannes (1998) have noted, the rate and variety of human influences have increased to the point where a large proportion of the marine resources, especially the mangroves, are threatened with destruction. Semesi notes that the resources severely affected are either close to the urban centres or have been transformed into aquaculture. In many of the cases, these are commercial ventures, where the local communities are not directly involved or cannot afford the requisite large-scale capital investments. However, where resource areas have been declared sacred, such ventures have not taken off, vindicating the findings, which suggest that involvement of local communities in management decisions could pay off, especially when their cultural values are incorporated in the process.

Within the neo-structuralist framework, societies or social assemblages are more than the ecosystem. The Mijikenda can be viewed as a structural ecosystem made of practices, beliefs, norms and knowledge. As a unique ecosystem, this society differs from other ecosystems and has unique properties, including its indigenous knowledge on marine resources. Therefore, allowing the Mijikenda to participate in marine resources management will not only bring on board indigenous knowledge in the process but also incorporate local ethical considerations in the conservation regime. Mijikenda indigenous knowledge and ethics systems are not only hinged on a practical platform of biological interrelationships but extend to the ritual and belief systems. Thus, the Mijikenda have the ecological knowledge and technology which facilitate their adaptation to the physical environment, particularly the marine ecosystem. Through norms, beliefs, taboos and linguistic forms, their culture has evolved ways of managing the fragile marine ecosystem that is a source of their livelihoods. And overtime, they have been able to adopt various solutions from a number of alternatives. This is the basis of indigenous knowledge in the management of marine resources.

It is this cultural and ecological significance of the marine resources that has driven the Mijikenda to apply every vein of scruples in managing and conserving them in the process. The marine ecosystems symbolically mirror the community's cultural and ecological resilience. This may be reflected in the linguistic metaphors such as taboos and proverbs. The proverbs, for instance, reflect a glowing tribute to the marine resources. For the mangroves for instance, the metaphors talk of strength, protection and resilience. The ritual significance of the resources is manifested in the myriad prohibitions and taboos that regulate their utilization. For instance, the taboos on interchanging the species in use is meant to instill a sense of responsibility and ethical treatment of natural resources. Then there is the declaration of seasonal harvesting of resources from the ecosystem and the declaration of whole species as sacred. These are demonstrations on the part of the community of the desire to be part of the conservation efforts for posterity outside the realm of official government conservation efforts.

These findings provide insights into the symbolic aspects of the social appropriation of the marine resources. There is not only an extension of social relationships between resources and humans and the accumulation of local environmental knowledge, but the relationship also involves formation and symbolic

expression of links with the spiritual world. That is why discussions of and responses to the beliefs on marine resources describe conceptions and representations of the natural world and its resources. From the neo-structural perspective this differs greatly from the industrial and market-oriented society in the urban areas of Kenya. It would appear as if there are two different societies in one. The basis of the difference is to be found in the attitude to and perception of the natural world and its resources, which ultimately defines the mode of exploitation. For neo-structural anthropologists interested in natural resources management, this may represent the extension of the borders of culture, to include ideas about ecology and natural resources.

We can then infer that Mijikenda belief system, relating to marine resources through indigenous knowledge, demonstrates the human world's underlying non-material bond with the natural world, which is the heart of our material relationship with nature. This relationship unites three key components of knowledge: representation, organisation and legitimacy. Thus, by representing, organising and legitimising human relations with nature, we proceed to understand the process of material production. This understanding is essential to symbols and myths used by indigenous communities to represent ecosystems and the various resources found in them, in this case fisheries, mangroves and corals. Thus, the nature and extent of the exploitation of the environment is dependent on the way natural resources are tied to other behavioural aspects of the community. And herein lie the links between cultural and ecological survival.

For the Mijienda, like many indigenous communities, the production process involved in natural resources generates a range of symbolic elements. These are the elements through which resources users act not only upon nature but in concert with super-natural forces. It should be emphasized that the super-natural forces regulate resource use through a system of reward and punishment. Thus, together with defining a space for food production and projecting principles of social relations, marine resources are seen as the locus of representations and of the mythological imagination of indigenous communities.

The intimate relation of these people with their surroundings, and their greater dependency on the natural world when compared with urban-industrial societies, result in the cycles of nature (such as the arrival of schools of fish and the abundance of crops) being associated with mythical and religious explanations. In the final analysis, this may explain why fishers, for example, tie seasonal fishing to the cosmology about the turbulence of the sea during the periods when they are not allowed into the sea. We could extend this argument to include reasons behind the keen observations about the behaviour of the sea before any fishing is undertaken.

The findings on proverbs on marine resources provide us with insights into what anthropologists have always been fascinated about the complex interface between society, language and culture. These proverbs demonstrate that different languages seem to encapsulate different world views and different social realities. This is particularly crucial for natural resources management. This is because human beings gather knowledge basically for two purposes: survival and meaning. For the Mijienda, the marine resources provide for both ends. The resources provide sources of survival and social meanings in their realities. This then may explain why the resources are very important for the community. It is through linguistic metaphors that humans try to understand and come to grips with the environment in order to survive.

Thus, the marine resources give the Mijikenda reasons for survival that go beyond the intuitive reaction to physical threats. The use of mangrove, fishery and coral metaphors in everyday conversation reminds the

community of the symbolic importance of the resources. The resources are part and parcel of all kinds of activities which aim at building up social order. What this means is that the environment is much more than a set of material possibilities to which cultures, social organisations and kinship systems adapt. It is part of a very large communication system.

The language and semiotic system of the community is anchored in environmental landscapes, which in turn provide the epistemological system for the world view. This is not just at the structural level of cultural survival but rather extends to the symbolic level where meaning is derived from environmental cues. Thus, in looking at the manner in which resources relate to culture, we may understand the symbolic structure of culture in relation to norms, beliefs, practices and knowledge in the human mind. These structures are expressed through language and their different genres and metaphors such as riddles, songs, proverbs and taboos.

It can, therefore, be argued that proverbs are one channel through which we can see the stability between nature and the human mind through culture. Cultural structures then stabilize themselves with nature through indigenous knowledge. Since indigenous knowledge is rooted in the socialization process, proverbs are part of the process through which it is passed down generations. They provide society with an information base which facilitates communication and decision-making on everyday activities as well as long-term experiences. They are part of the dynamic information system influenced by cultural creativity and experimentation. The proverbs also demonstrate the process of learning attitudes and values for a sustainable future.

Therefore, indigenous knowledge can help to develop sensitive and caring values and attitudes and, thereby, promote a vision of a sustainable future. That explains why indigenous communities have lived in harmony with the environment and utilise resources without impairing nature's capacity to regenerate them. The Mijikenda way of living, like other indigenous communities, is sustainable. Indigenous knowledge shapes their values and attitudes towards the environment, and it is these attitudes and values which guide their actions and make them sustainable.

On the basis of learning through culture, we can infer that indigenous knowledge is stored in culture in various forms, such as traditions, customs, folk stories, folk songs, folk drama, legends, proverbs and myths. The use of these cultural items is very effective in bringing indigenous knowledge alive for the environmental management strategies. They help in the conceptualization of the universe and places not only in the local area but also beyond their immediate experience. The idea is that indigenous knowledge accumulated by these people and communities constitutes a reservoir of adaptations that are imperative for long-term sustainability. The inference we can draw from the findings is that in reality, cultural diversity and biological diversity are two sides of the same coin. Living diversity in nature corresponds to a living diversity of cultures. It is also notable that the use of traditional ecological knowledge in the form of customary ecological management practices is potentially a powerful conservation mechanism, particularly in countries where indigenous cultures are still largely extant.

Conclusion

The Mijikenda have a rich and elaborate knowledge of marine resources from which they have been tapping to manage them sustainably over the years. By situating resource use within this larger social system, the community ensures that cultural regulations are followed. It also ensures that resources are tended properly,

and that the communal system of ownership and control of resources continues. Taboos and prohibitions on catching certain fish species at a given age, for example, is a conservation measure presented as superstition or taboo. There is also evidence of seasonal bans on catching certain fish species or entering mangrove forests. Some of societal protocols also entail seasonal bans and a declaration of certain resources or whole ecosystems as sacred. The community even goes to the extent of declaring some mangrove forests, reefs creeks and parts of the sea as sacred, where human activities, apart from cleansing and sacrificing, are not allowed. As such, coming together during the beginning of the fishing season reinforces social relations and cultural knowledge to maintain kinship ties to the marine ecosystem through feasting, cleansing, and other social events.

The Mijikenda clearly possess a traditional conservation ethic, meaning they are aware that they can deplete or otherwise damage their natural resources. Thus, they perceive a relationship between their activities and the state of their natural resources. In spite of the years of acculturation through external influences, those who directly deal with mangroves, fisheries and corals still hold onto the traditional conservation ethic, which has enabled a cosmic labyrinth of relationships and detailed concepts and symbols related to the resources. This cosmology is applied to the marine areas used by community members, which guides their behaviour and resource extraction strategies and is essential for predicting situations where sustainable marine resources management can be successful.

In a sense, this knowledge directs resource use patterns. It produces a conservation ethic based on culturally patterned resource use. These patterns and structures as related in neostructuralism, are products not of the physical environment and its resources per se, but of the cultural ecological, taxonomic and kinship perceptions or culturally formed images of the environment and its resources. Since this ethic exists, it provides an excellent foundation on which to build marine resource management and governance systems. These systems can then be planned around accepted local norms, practices, beliefs, symbols, values and associated customs. The fact that this ethic is still prevalent among the Mijikenda, may help explain why culturally sensitive and low cost efforts on the part of the government and other agencies can have a major impact on locally-based management. In this way we can incorporate indigenous marine resources management systems into modern methods of conservation. This is likely to improve awareness of fishing community concerns and their origins, which can lead to more informed interpretations of community-government management relations and allow for policies that better support not only local livelihoods, but also conservation objectives.

References

AGRA. (2018). *Africa agriculture status report: Catalyzing government capacity to drive agricultural transformation* (Issue 6).

Aguilar, A., Carranza, E., Goldstein, M., Kilic, T., & Oseni, G. (2015). Decomposition of gender differentials in agricultural productivity in Ethiopia. *Agricultural Economics, 46*(3), 311–334. https://doi.org/

Ameneshewa, W., Kebede, Y., Unbushe, D., & Legesse, A. (2023). Indigenous knowledge and forest management practices among Shekachoo people in the Sheka Biosphere Reserve: A case of Shato core area, South-west Ethiopia. *Cogent Social Sciences, 9*(2). https://doi.org/10.1080/23311886.2023.2275937

Aregawi, T., & Heilestasie, T. (2013). Role of co-operatives in promoting socio-economic empowerment of women. *International Journal of Community Development*.

Awokuse, T. O., & Xie, R. (2015). Does agriculture really matter for economic growth in developing countries? *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie, 63*(1), 77–99.

Barrow, E. (1998). Community conservation in East Africa. In D. Moffat & M. Kyewalyanga (Eds.), *Local and community integrated coastal zone management* (pp. 23–42). Zanzibar: WIOMSA.

Bateson, G., & Bateson, M. C. (2004). *Angel's fear: Towards an epistemology of the sacred*. New York: MacMillan.

Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications, 10*(5), 1251–1262.

Boserup, E. (2011). Women's role in economic development. In N. Visvanathan (Ed.).

Caroline, C. K. (2017). *Determinants of women participation in agribusiness development projects in Sotik Sub-County, Bomet County, Kenya* (Doctoral dissertation, University of Nairobi).

Chaonan, C., & Li, F. (2024). Ecosystem restoration and management based on nature-based solutions in China: Research progress and representative practices. *Nature-Based Solutions, 6*, 100176. https://doi.org/

De Juan, S., & Lleonart, J. (2010). A conceptual framework for the protection of vulnerable habitats. *Ocean & Coastal Management, 53*, 717–723.

FAO. (2011). *The role of women produce organisations in agricultural value chain: Practical lessons from Africa and India*. Rome.

FAO. (2016). *OECD-FAO agricultural outlook 2016–2025*. http://www.fao.org/3/a-bo092e.pdf

Fapojuwo, O. E., Ogunnaike, M. G., Shittu, A. M., Kehinde, M. O., & Oyawole, F. P. (2018). Gender gaps and adoption of climate smart practices among cereal farm households in Nigeria. *Nigerian Journal of Agriculture*.

Gandhi, M., & Sen, K. (2021). Missing women in Indian university leadership: Barriers and facilitators. *Educational Management Administration & Leadership, 49*(2), 352–369. https://doi.org/10.1177/1741143219896048

Harries-Jones, P. (1992). Sustainable anthropology: Ecology and anthropology in the future. In S. Wallman (Ed.), *Contemporary futures: Perspectives from social anthropology* (pp. 157–171). New York: Routledge.

Hiepko, P. (2006). Eipo plant nomenclature and classification compared with other folk taxonomic systems. *Willdenowia, 36*(Special Issue), 447–453.

Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics, 4*, 1–23.

Idahosa, G. E. (2019). African women in university management and leadership. In O. Yacob-Haliso & T. Falola (Eds.), *The Palgrave handbook of African women's studies* (pp. 1619–1637). Palgrave Macmillan. https://doi.org/10.1007/978-3-319-77030-7_115-1

International Co-operative Alliance. (2018). *The ICA adopts ILO recommendation on the promotion of cooperatives*.

International Labor Organization Statistics (ILOSTAT). (2020). *Labour statistics on women*. https://ilostat.ilo.org/topics/women/

Johannes, R. E. (1998). The case for data-less marine resource management: Examples from tropical nearshore fin fisheries. *Trends in Ecology & Evolution, 13*(6), 243–246.

Juma, C. (2015). *The new harvest: Agricultural innovation in Africa*. Oxford University Press.

Kassahun, M., & Zeleke, B. (2021). *Status of women in leadership positions in the legislative, executive, and judicial branches of the government of Ethiopia*. UN Women.

Kenya National Bureau of Statistics. (2020). *Economic survey, 2020*.

Kuagbedzi, N. F., Dhlamini, N., & Njenga, B. (2022, April 28). The struggle of women for power and leadership in agriculture. FAO. https://www.fao.com/post.php?story=20220426094831132

Kuzhabekova, A. (2021). Women's leadership in higher education in Kazakhstan. *International Briefs for Higher Education Leaders, 9*, 13–15.

Lévi-Strauss, C. (1963). *Structural anthropology*. New York: Routledge.

Li, L. C., & Kam, I. C. P. (2021). Women in higher education leadership: Challenges in Hong Kong. In R. Schendel, T. DeLaquil, R. Matross, & H. K. Godwin (Eds.), *Women's representation in higher education leadership around the world: International perspectives* (pp. 11–13). ACE and CIHE.

Moodly, A., & Toni, N. M. (2017). Accessing higher education leadership: Towards a framework for women's professional development. *South African Journal of Higher Education, 31*(3), 138–153.

Mwangudza, J. A. (1983). *Kenya's people: Mijikenda*. London: Evans Brothers.

Netting, R. M. (1968). *Hill farmers of Nigeria: A cultural ecology of Kofyar of the Jos Plateau*. Seattle: University of Washington Press.

Odhiambo, G. (2011). Women and higher education leadership in Kenya: A critical analysis. *Journal of Higher Education Policy and Management, 33*(6), 667–678. https://doi.org/10.1080/1360080X.2011.621192

OECD. (2020). *Policies and practices to promote women in leadership roles in the private sector*. https://www.oecd.org/corporate/OECDG20-EMPOWER-Women-Leadership.pdf

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.

Ramohai, J. (2019). Women in senior management positions at South African universities. *Gender in Management, 34*(3), 217–232. https://doi.org/10.1108/GM-10-2017-0138

Ramohai, J., & Marumo, K. (2016). Women in senior positions in South African higher education: A reflection on voice and agency. *Alternation, 23*(1), 135–157.

Selzer, R., Howton, A., & Wallace, F. (2017). Rethinking women's leadership development: Voices from the trenches. *Administrative Sciences, 7*(2), 1–20. https://doi.org/10.3390/admsci7020018

Semela, T., Bekele, H., & Abraham, R. (2019). Women and development in Ethiopia: A sociohistorical analysis. *Journal of Developing Societies, 35*(2), 230–255.

Semesi, A. K. (1998). Mangrove management and utilization in eastern Africa. *Ambio, 27*, 620–626.

Shilabukha, D. K. (2000). *The role of indigenous knowledge in the management of mangrove biodiversity in Msambweni Division of Kwale District, Kenya* [Unpublished master's thesis]. University of Nairobi.

Shilabukha, K. (2007). Indigenous knowledge, biodiversity, technology and economic values: Rethinking the link. In T. Babawale (Ed.), *The place of research and studies in the development of Africa and the African Diaspora* (pp. 171–184). Lagos: Centre for Black and African Arts and Civilisation.

UN Women. (2023). *Progress on the Sustainable Development Goals: The annual gender snapshot*. UN Women.

UNESCO. (2005). *Local and indigenous knowledge of the natural world: An overview of programmes and projects*. International Workshop on Traditional Knowledge, Panama City, 21–23 September 2005.

World Bank. (1997). *Knowledge and skills for the information age*. The First Meeting of the Mediterranean Development Forum. http://www.worldbank.org/html/fpd/technet/mdf/objectiv.htm