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Review

Natural fibre plant resources of economic value found in wetlands of Swaziland: A review

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Indigenous fibre plants found in different geographical wetlands in Swaziland include *Cyperus latifolius* (*likhwane*) and *Phragmites australis* (*umhlanga*).Various products are made from these plants. Tourists place great value to natural products made from indigenous fibre plants of the wetlands and are often the biggest buyers of these handicrafts. However, global warming due to climate change is threatening biodiversity of these wetlands and their plants as far as continued survival and contribution to the next generation is concerned. There is need for strong intervention measures biologically and socially in terms of formulation of policy in order to strike a balance between economic gains from these plants and their preservation and promotion of biodiversity. The poor rural, and nowadays poor urban communities, derive a living from these indigenous plants which may if care is not taken be threatened with extinction. There is dearth of documented information pertaining to harvesting practices, plant processing, product making, marketing and economic value of the natural plant resources industry. This paper will document products made from several indigenous plants found in wetlands of Swaziland and ways of preserving the plants and indigenous knowledge systems (IKS) associated with them. These products include mats of various sizes, ranging from sitting mat, sleeping, burial mat, and mats for drying vegetables and baskets for various purposes, examples include winnowing baskets and those for general purposes as carrier packages. Data were sought through content analysis and interviews with key informants in communities that utilize plants of the wetlands.

Key words: Natural plant resources, ecological zones, wetlands, products, economic value.

INTRODUCTION

Swaziland is the smallest country in the Southern African Development Community (SADC) region. It has a land area of 17,400 km^2, located between 26° 30aS and 31° 30E. She is bordered by South Africa in the North, West and South and by Mozambique in the East, with a population of about 1,126 million (Thompson, 2008). The country has four geographical regions with distinct topography and climatic patterns. The western area called the Highveld is mountainous having a vegetation of mainly commercial forests with the bulk of the land being used for subsistence farming (Thompson, 2008; Government of Swaziland, 2007), it experiences a temperature range of 4.5 to 33°C (Dlamini and Lupupa, 1995). It has rivers, waterfalls and gorges with some protected and managed natural areas including Malolotsha, Hawane and Phophonyane (Government of Swaziland, 2005).

The next region is the Middleveld, with temperatures ranging from 2.5 to 37.2°C (Dlamini and Lupupa, 1995). This region has fertile valleys which favour intensive

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farming. It has the most diversely cultivated and heavily populated area in the country (Thompson, 2008). Protected nature reserve areas include Mantenga and Mlilwane (Government of Swaziland, 2005). Further east, there is the Lowveld with the largest area coverage of 40% of the country and is drought prone (Dlamini and Lupupa, 1995). It is vegetated by shrubs, and mean temperatures range from 2.6 to 41.8°C with the bulk of commercial farms cultivated under irrigation, including the three sugar estates in the country and citrus fruit plantations. The nature reserves in the area are: Mlawula, Hlane, Shewula, Mbuluzi, Simunye and Nisela game reserves (Government of Swaziland, 2007; Thompson, 2008). The last region is the escarpment called Lubombo plateau with an altitude of 600 metres above sea level and climatic conditions similar to the Middleveld (Dlamini and Lupupa, 1995). Given the mountainous topography, only one eighth of the land is arable and the rest is suitable for animal grazing (Dlamini and Lupupa, 1995).

Wetlands and its flora in Swaziland

Wetlands are defined as water pools with hydromorphic soils inhabitated by hydrophyte plants like *Phragmites australis* (*umhlanga*), C*yperus articulatus (incoboza), Cyperus latifolius (likhwane)* (Compton, 1976). They include swamps, lakes, rivers, streams, pans and marshes (Mathews and Fung, 1987; Masarirambi et al., 2010). Figure 1 shows wetlands in Swaziland.

Wetland areas are very valuable natural resources in Swaziland (Masarirambi et al., 2010) as they provide recreation and tourism attraction and are used for small-scale agricultural production (Mwendera, 2003). A number of plant species that are found in wetland areas are important economic resources for women in the country. For example, C. *articulatus* and *Schoenoplectus corymbosus* plants are used for making food mats, sleeping mats, bags, and baskets, hence provide economic livelihood to many women (Edje, 2006). Wetlands are also used for crop production, collection of building material (*Adiria microcephala*), edible fruits (*Syzygium cordatum*) and livestock grazing in some areas (Edje, 2006). Despite the social and economic importance of wetlands to livelihoods of the Swazi people, there is scarcity of information pertaining to their inventory, use and custodianship against the background of their fragility and potential threat to flora and fauna biodiversity in the country as a whole (Masarirambi et al., 2010).

From the three existing types of wetlands, the riverine system is the most common type that consists of small flood plains and swamps occurring along rivers and streams. It is one of most importance in terms of harvesting the pertinent plant resources of interest in this report. The plant resources are thus discussed further.

Cyperus latifolius (likhwane)

It consists of very robust plants that may be up to 1.2 metres tall, are broad leafed and endowed with bracts. It is available for harvesting only once a year from April to June. According to Boitumelo (2010) who took stock of handicraft products made from plant fibres in Manzini and Mbabane, the two major cities in the country, 70% of the surveyed products were made from *likhwane*. The long leaves are used to make sleeping mats, table mats, blinds, conference bags and folders (Mander and Letty, 2004; Zwane and Masarirambi, 2009). It is found in wetlands throughout the country, and the price of sleeping mats ranges from 50.00 to 180.00 Emalangeni (E) the local currency which is equivalent to the South African Rand (1US$=7R/E), depending on size.

Juncus krausii (indvuli/incema)

It is found in large colonies in wetlands where it grows up to 1.5 metres in height and may be classified as one of the wetland rushes. It is found in the wetlands of the Highveld around Mankayane and in the Lowveld around Sithobela area. It is green when harvested but end up brownish after drying. It is less durable than *likhwane* and as a result less expensive compared to *likhwane.* The price ranges from E30 to E100.00 per sleeping mat. It is also an important resource for wall hanging mats.

Cyperus articulatus (incoboza)

It is harvested from the wetlands in all four ecological areas of the country. Harvesting time is once a year, like the *likhwane*, around April and May. *C. atriculatus (incoboza)* is less durable compared to the two previously described plant resources, and it is priced in the range of E30.00 to E80.00 per sleeping mat.

Miscanthus capensis (umtsala)

It is a stalk harvested in the wetlands of the Highveld around Mankayane area. It is used to make regular sleeping mats and mats that are used as a ceiling in traditional Swazi thatched houses on the inside to give a neat finish that conceals the grass on the roof. It is also used as the core when making food mats that are covered or woven with X*yris rehmannii* (*umuzi)*, flower baskets, laundry baskets covered in *Phoenix reclinata (lisundvu)* and baskets for chickens to lay eggs. It looks more greenish than the other plant products from the wetlands discussed earlier. The price ranges from E30.00 to E 100.00 and it is the least durable fibre plant compared to those previously described.

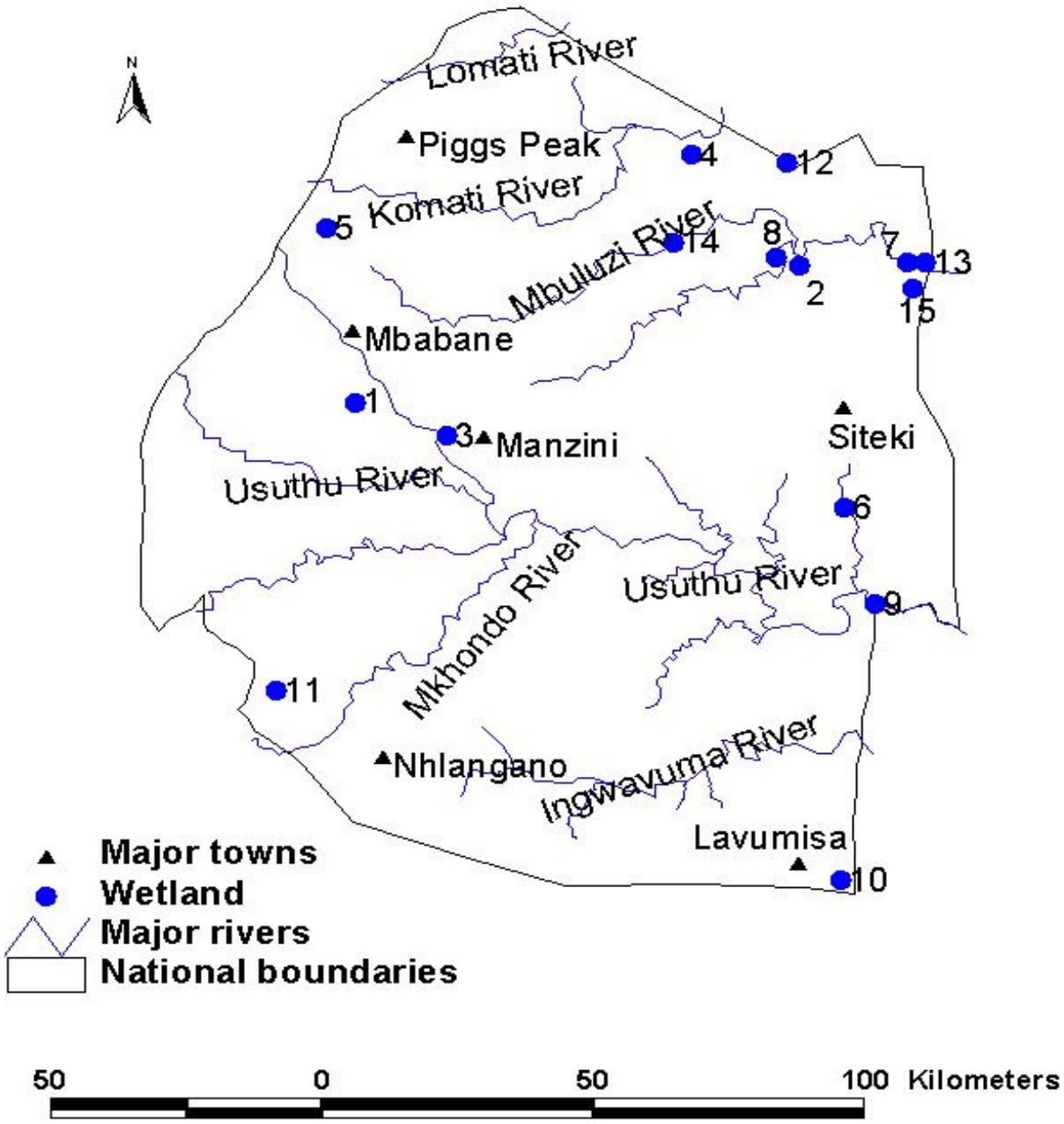

Figure 1. Major wetlands in Swaziland. Source: Masarirambi et al. (2010).

Xyris rehmannii* (*umuzi)

It is a stalk plant found in wetlands of mostly the Middleveld, but also available in certain areas of the Lowveld and Highveld. Specific areas include Nhlangano, Dvokolwako, Gundvwini and Hluthi. Its appearance is like a smaller version of *Cyperus articulatus (incoboza)* but it is used when weaving food mats for cutting vegetables into, and beer strainers. Prices for food mats range from E50.00 to E60.00 and beer strainers are priced at E40.00 to E50.00 depending on size and type.

The five previously discussed natural fibre resources from wetlands, their uses and economic value, are summarized in Table 1.

Harvesting and processing of plants

All five plants species from the wetlands are harvested more or less the same way by cutting the base or stalk or

Table 1. Plant species of economic significance from wetlands in Swaziland and their estimated values.

Botanical name	Authority family	Local name	Uses	Economic value (E)
Cyperus latifolius	Cyperaceae	*Likwane*	Sleeping mats	50.00 – 150.00
			Wall hangers	20.00 – 30.00
Juncus krausii	Juncaceae	*Indvuli /Incema*	Sleeping mats	10.00 – 60.00
			Wall hangers	10.00 – 20.00
			Window blinds	60.00 – 100.00
Cyperus articulatus	Cyperaceae	*Incoboza*	Sleeping mats	40.00 – 130.00
			Wall hangers	20.00
Miscanthus capensis	Poaceae	*Umtsala*	Traditional ceiling	150.00
			Traditional brooms	10.00
			Laundry baskets	80.00 – 200.00
			Flower baskets	20.00 - 30.00
Xyris rehmannii	Xyridaceae	*Umuzi*	Food mats	50.00
			Beer strainers	50.00

stem using a sickle. The harvesting is a regulated seasonal activity. Usable material is separated from unusable matter that may be dry or of poor quality. A bundle is made and tied with a rope and transported home usually on women's heads, and for far distances using modern transport such as trucks and buses.

Leaves are spread on flat land with short grass, for drying up the plant fiber material. When leaves are slightly dried and have become light brown in colour, they are measured for cutting to the required length in readiness to start weaving. Dyeing of plant material follows if necessary and then drying is done again.

Weaving commences using a wooden loom or frame with slits and strings tied to used-batteries to provide weights when weaving. This appropriate technology increases production and reduces fatigue to the worker. The 'loom' is called *"imbongolo"* which refers to a donkey that carries the craft. Water may be sprinkled during the process to reduce the brittleness and harshness of the dried leaves or stalks.

Economic contribution to women

Selling of handicraft used to be done by older women in yester years, but nowadays it is done by mostly women who have 'O' level education (Boitumelo, 2010) due to non-qualifying academic grades for entry into tertiary institutions and due to high unemployment rate in the country. Prices charged by crafters in Manzini are comparable to those charged by Zulu women of KwaZuluNatal province of South Africa as reflected in Mander and Letty (2004). The economic contribution of handicraft products to family lives is significant although difficult to quantify. This is supported by Dragan et al. (2010) who reported that about 80% of the population in the SADC region generate income from plants that grow wild or through cultivation. Dlamini and Geldenhuys (2009) found that medicinal plants generated an average of US$ 32.1 million per year followed by fuel wood that generated about US$ 13.5 million per year. Anonymous (2006) reported that the economic value of wild resources in Senegal found their ultimate destination of products from rural areas was the high value urban markets with very little consumption in local communities. Fibre products are sold in towns with the highest value for the products obtained from direct sale to tourists. These products represent the main source of cash income for many indigenous people (Jensen and Balslev, 1995).

Anonymous (2010) reported that harvesting and using sustainable renewable resources yielded six times the value of harvested timber for farm operations or infrastructure development. It is therefore vital to sustain wetlands so as to benefit or provide income to local communities not only today but in years to come. Wetlands are very fragile ecosystems which require proper management to preserve them, their flora and fauna and thus maintenance of biodiversity. However, uncertain weather and environmental conditions are a threat to the status of these plant genetic resources. In particular, climate change is affecting and reducing the wetland space in the country and in the region (Manyatsi et al., 2010). The rediscovery of the folk uses of plants in an area is not only of historical and scientific value, but

could also present future economic potential for given areas and their people (Salerno et al., 2005).

Storage of products and conservation of plant resources

Storage facilities for products made from plant genetic resources from wetlands are not usually ideal for most producers. The raw materials are stored in crafter's huts that are improperly built in many cases and may be infested with rats or other vermin that may damage raw materials resulting in subsequent poor quality crafted products. Damp conditions may also be ideal for mould (bacterial and fungal) growth, which may compromise the quality of the products.

Equally challenging are storage conditions for finished products. Often, products are hung on hanging wires from thatched roof or on elevated shelves in huts that may be prone to rats and dampness which predisposes products to moulds and rotting. Despite the challenging storage conditions, there are a few cases where ideal storage conditions prevail particularly for those crafters with concrete structures that are well ventilated, clean and dry.

The conservation of plant genetic resources may be either in-situ or ex-situ conservation. In-situ conservation is the most preferred type of conservation where flora and fauna are conserved in their natural habitat (Government of Swaziland, 2005). As a conservatory strategy, the Swaziland tradition system restricts the cutting of certain plant species at specific times of the year to allow for the plants to propagate or ratoon for sustainability (Dlamini and Lupupa, 1995). The traditional restrictions are also linked to the cultural beliefs that prohibit the harvesting of certain plants from wetlands in order to avoid occurrence of natural disasters (Masarirambi et al., 2010). This cultural practice aids in curbing the over exploitation and balancing of economic gains from the use of plant resources by community members with the aim of achieving sustainable use for future generations. Traditions of conservation are preserved through local IKS from one generation to another. Indigenous knowledge in nature conservation and utilization in Swaziland has previously been reported in detail (Edje, 2006). Elsewhere, communities have been sensitized against setting bush fires, indiscriminate felling of trees, farming in wetlands and stone quarrying with a view to reduce dependence on environmental capital and to allow natural plant regeneration (Nyeko, 2009).

With *ex-situ* conservation, plants and animals are conserved in non-natural habitats like zoos, seed storage facilities (gene banks) and Botanical gardens. A number of private nurseries in the country deal mainly with exotic species, and very few deal with indigenous species in Manzini, Simunye and Maguga areas (Government of Swaziland, 2005). There is a gap in the area of conservation which needs further investigations at local and ecological levels.

Prohibition of illicit exploitation of plant genetic material in many countries including Swaziland poses a challenge. According to Coetzee et al. (1999), in South Africa, the Protection of Indigenous Knowledge Act exists and it emphasizes the promotion and protection of indigenous knowledge. It does not prohibit the exploitation of indigenous plants, but promotes the use of indigenous genetic plant material with surety that the lawful owner is recognised in the development of any product. Recognition of lawful owner(s) in terms of a developed product is a subject of interesting Intellectual Property Rights discussions these days especially among indigenous communities of the world.

In Swaziland, the legal framework constitutes several Acts that are relevant on paper. The National Trust Commission Act of 1972, drafted by the Swaziland National Trust Commission (SNTC), promotes the conservation of indigenous fauna and flora and further protects the national ecology and environment of natural parks and reserves. This Act does not include the establishment of networks to protect areas that cover all ecosystems (Government of Swaziland, 2005). The SNTC is the custodian of wetlands in parks, but for areas outside the parks, the Natural Resource Board stipulated in the Natural Resource Act of 1951 governs the natural resources (Masarirambi et al., 2010). Another Act is the Environment Authority Act of 1992 that ensures that the environment, habitat of many indigenous plants and animals are not destroyed.

The flora Protection Act of 1952 repealed in 2005 provides protection of 200 species with harsh punishment for offenders. It also provides for the establishment of Botanical gardens (Government of Swaziland, 2005). It is the traditional 'legal' restrictions that are effective in policing people in communities on Swazi Nation Land, against over-exploitation of these natural resources.

Conclusion

There are various fibre plant species found in the four agro-ecological zones as described previously. The various plant species are of varying socio-economic importance to the local communities and nationally to the country as a whole. There is limited information pertaining to the inventory and economic value of the probably threatened fibre plant species in wetlands found around Swaziland and no clear policy for protection. Improving existing and developing new policies for efficient utilization and better conservation of indigenous species for the benefit of communities that protect them are of critical importance (Cunningham, 2001; Shanley et al., 2002; Kadzere et al., 2004). Further work is needed to take stock and quantify the value of these economic

plant species, ascertain custodianship and propose policies to protect the fragile wetland ecosystem to enable sustainability from generation to generation.

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