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Chapter 14

Commercial Harvesting of Marula (*Sclerocarya Birrea*) in Swaziland: A Quest for Sustainability

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Additional information is available at the end of the chapter

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Abstract

All across sub-Saharan Africa rural communities, and especially women, are harvesting natural products for income generation purposes. In recent times, the degradation of ecosystems in terms of loss of biodiversity has become a major concern, especially when the harvesting of the species in question has become commercialized as is the case of marula harvesting in Swaziland. This chapter reports on some of the findings of a study conducted to explore the impact of commercial harvesting on the future availability of marula. If current levels of harvesting are unchecked, overconsumption or even depletion of marula in Swaziland will deepen the existing poverty levels among the rural poor, particularly women, who are proportionately more dependent on marula for their livelihoods.

Keywords: marula, poverty, sustainability, commercial harvesting

1. Introduction

Many countries in sub-Saharan Africa encourage rural communities, especially women, to harvest natural products for income generation purposes [29, 43, 71]. This means that biodiversity has become the basis for ecosystem services that people primarily depend on for commercial harvesting to sustain their livelihoods and well-being. Hence, the increasing demands on these resources, the decrease in their availability, and the probable consequence of environmental degradation emphasize the need for a coordinated approach to their sustainable utilization. [62, 69] initiatives on biodiversity and natural resources conservation in the form of terrestrial and marine parks and protected areas, as well as commercial ventures into the harvesting of such resources, thus, often come into conflict with the livelihood strategies of

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local populations [5, 44]. Therefore, Hugo [24] rightly emphasizes that the sustainable management and use of such resources require an interdisciplinary approach and sound knowledge of each resource, while the ecological and socio-economic factors related to their use must be sorted out as well. Furthermore, since the long-term success of any initiative hinging on the utilization of natural resources depends on local benefit and support, it is imperative that local livelihoods and poverty reduction are considered during the formation and management of such initiatives [3, 31, 45, 74].

Currently, there are growing concerns about the effects of people on ecosystems and the reciprocal impact of ecosystem degradation on the quality of human life [30, 38, 72]. The degradation of ecosystems in terms of loss of biodiversity has particularly become a major concern, especially when the harvesting of the species in question and/or its products has become commercialized as is the case of marula harvesting in Swaziland. This chapter focuses on the recently introduced practice of commercial harvesting of marula products in Swaziland, and reports on some of the findings of a study conducted to explore the impact of commercial harvesting on the future availability of marula. The study aimed at identifying challenges faced by the harvesting of marula products and to explore opportunities for the sustainability of the marula species and harvesting of its products.

2. The ecology of marula trees in Swaziland

Marula is a wild indigenous fruit tree (see **Figure 1**) which is a member of the floral family *Anacardiaceae* [41]. *Sclerocarya birrea caffra* (the species found in Swaziland), is one of three species of *Sclerocarya*—the others being *S. gillettii* and *S. multifoliolata* [18, 60]. Marula is endemic to Africa and occurs in a diversity of vegetation types; mainly open woodland, deciduous savannah and semi-deciduous forest [14, 18, 22]. It grows well in altitudes ranging from sea level to 1800 m above sea level in areas that are frost-free, as the species is generally sensitive to frosty conditions [25, 47]. Marula trees also prefer areas where temperatures vary between 10°C



Figure 1. A marula tree (picture taken by first author, December 2013).

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(in high altitudes) and 40°C (in low altitudes) [9]. Such wide-ranging temperatures are beneficial for marula seed germination, which happens usually at temperatures between 27 and 37°C [19]. The marula tree species is relatively drought-tolerant and grows well in areas that are humid to subhumid with wide-ranging amounts (200–1500 mm) of annual rainfall [18, 19].

In Swaziland, marula trees grow abundantly in the lowveld and in the lower parts of the middleveld. The UNDP [70] estimated that about 2 million marula trees are growing in Swaziland and that each tree can produce up to 500 kg of fruits per year. Marula is a dioecious tree that grows to about 15 m in height with spreading crowns and dense foliage [41, 60]. When ripe, the marula fruits (see **Figure 2**) and kernels are edible and are rich in minerals, proteins, oils and vitamins [17]. The kernels are normally eaten fresh, mixed and cooked with other foods or stored for later consumption. This, according to Shackleton et al. [60] and also Wynberg et al. [75], makes marula an integral part of the diet, tradition and culture of rural communities in many southern African communities. Apart from playing an important role in cultural practices in Swaziland, Marula is also sought after for many commercial initiatives across the African continent and beyond.

Marula plays a fundamental role in the ecosystems and provides a number of important services to human beings and other living organisms. Being a keystone species, marula plays a significant role in the ecology of other plants and animals [22]. The marula tree is large and, usually, it is considered a community-dominant species [27, 47]. It also provides valuable shade that produces large areas with cool subcanopy environments that are good habitats for other plant and animal species. Marula is also a favorite food of numerous birds, mammals and insects [15, 22, 25, 42]. Therefore, removal of this large dominant species can threaten biodiversity and result in loss of many important subcanopy species such as mistletoes which grow on marula branches and wood roses that are often used by rural curio traders [10].

The leaves of the marula trees are also browsed by domestic and game animals, such as cattle, goats, impala, zebras and kudu. These trees are also host to various insect species such as butterflies and moths. The larvae of the edible kinds of these insects such as the mopane



Figure 2. The marula fruit (picture taken by first author, December 2013).

worm (*Imbrasia belina*) and the African moon moth (*Argema mimosa)* are used as food by many tribes in southern Africa [16, 21, 42, 55, 76]. The Swazis and Zulus also traditionally use the tough silk pupa cases of the moon moth for anklet rattles used in tribal dances such as the annual reed dance and *Buganu* ceremonies practiced in Swaziland. The barks of the marula trees are used by elephants and rhinoceros. The marula fruits, which are rich in vitamin C, are also eaten by animals, such as elephants, warthogs, porcupine, monkeys, baboons, millipedes, domestic cattle and goats and, thus, creating an intricate ecological linkage between the marula trees and other animal species [21, 27, 55].

The water-filled holes in the trunks of marula trees are very important breeding grounds for mosquitoes and other animals such as amphibians. These interrelationships such as the overbrowsing by animals can destabilize the population structure of marula trees as it affects the growth of marula seedlings and, thus, impacts on its successful regeneration and recruitment potential [19, 27, 55]. Marula seedlings are also susceptible to fire which also impact on its regeneration potential [23, 25].

3. Methodology

The study was conducted in the Lubombo region of the Kingdom of Swaziland—a small country in southern Africa which covers an area of 17,363 km^2 [77]. Both quantitative and qualitative research approaches to data collection and data analysis were employed. Two populations were targeted for the study, that is, the people of the Lubombo region and key informants from relevant stakeholder organizations. The quantitative research design was explanatory and descriptive in nature and was grounded in a cross-sectional socio-economic survey. The researchers selected respondents from all four chiefdoms of the Mpolonjeni constituency. A multistage probability sampling procedure was used to systematically select 411 households (based on a 95% confidence level and 5% confidence interval) from the population of 14,716 and then randomly select one adult individual from each of the selected households (or and oldest child in the case of child-headed households) [2, 53]. A structured filter questionnaire was used to collect data among the 411 household members. The questionnaire was pilot-tested at Ngculwini *Inkhundla,* which was not included in the study area. Both descriptive and inferential statistics were used to analyze the quantitative data. [39] the qualitative approach, on the other hand, entailed a purposive sampling method to select 20 key informants, while an in-depth interview schedule was used for data collection purposes. Data from the in-depth interviews were recorded verbatim after which the contents were transcribed and triangulated with the questionnaire findings [68].

In order to contextualize the findings of the study, we first need to reflect on the important role of marula in Swaziland, particularly from a social and economic perspective.

4. The social and economic importance of marula

As a low-middle-income country with a per-capita Gross Domestic Product of only US$ 5940 per annum (2014 estimates), the poverty rate in Swaziland is estimated at 69% and a large

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proportion of people live on an income below US$2 per day [40, 48, 57, 73].From time immemorial, people in Swaziland have harvested marula fruits and seeds for livelihoods in the form of food and for producing a traditional brew (*Buganu*). The brew is largely consumed during traditional festivals or sold to local customers to generate an income [34, 36, 49]. The people of Swaziland have used the marula kernels in relishes, eating the fresh fruits and seeds, using the bark for relieving stomach aches and also for spiritual reasons [64]. Marula products also feature in traditional ceremonies, such as the *Buganu* ceremony, celebrated annually where people gather with their King (The *Ingwenyama*) and Queen Mother (The *Indlovukazi*) to celebrate [34, 36, 49]. This ceremony normally marks the start of the *Buganu* season whereby, after the ceremony, every Swazi is free to drink the *buganu* brew [26, 63]. Recognizing its social, cultural and economic values, the Queen Mother in 2004 established two commercial processing plants (Swazi Secrets and Swaziland Marula) as initiatives to economically empower rural women through enterprising on marula harvesting and processing. In Swaziland, marula is traditionally harvested almost exclusively by women who pick up the fruits from the ground when ripe. The UNDP [70] has observed that the Swazi Secrets project alone is supporting 2400 rural women who earn a living through selling seed kernels from marula trees.

The establishment of commercial processing plants for marula is an initiative to augment the battle for economic growth and poverty alleviation in Swaziland. The challenges for economic growth in Swaziland have been compounded by the global economic meltdown that started in 2008, the reduction in Southern African Customs Union (SACU) revenue as of 2011, and the environmental challenge of global climate change which is impacting developing countries the most [4, 12, 58]. The consequences of climate change in turn present one of the most fundamental threats to biodiversity and the functioning of ecosystems [54]. Swaziland is therefore faced with two dilemmas: the grapple with the challenge of marrying economic growth and poverty alleviation; and at the same time, it is expected to exert efforts for environmental conservation and resource sustainability, among others of the marula species.

The past few decades have seen marula and its products gaining popularity in the international market due to demand for its many by-products, such as marula oil and the well-known Amarula cream liqueur [7, 8, 60, 64, 75]. The increased demand for marula products, coupled with the high incidence of poverty, especially among rural women in Swaziland, led to the establishment of the two marula processing plants in 2004. These initiatives have attracted a large number of Swazi women to scout the forests and fields around their homesteads in search of marula fruits and seeds to sell and earn an income. This commercially induced harvesting of marula fruits and seeds poses a potential threat to the marula tree species as more and more of the seeds that would support regeneration and recruitment of new marula trees are removed through increased harvesting.

According to Peters [56], when the bark, fruits, seeds, wood and other parts of a species are harvested for processing into various products at household and/or commercial levels, there may be significant impacts on the population structure and distribution of the species, depending on the nature and intensity of the harvest. This imposes a potential threat to the species in the sense that it might be driven to depletion and/or extinction if proper sustainability measures are not put in place. Therefore, it is clear that the potential depletion or extinction

of marula in Swaziland could compromise the livelihood activities and well-being of large numbers of the rural poor in terms of income generation, as they derive a substantial part of their livelihoods from harvesting marula products.

5. Findings

The researchers wanted to first ascertain the sources of livelihoods for the people in the study area. The majority (73.2%; n = 255) of the respondents depended on subsistence crop production, while 36.6% (n = 127) relied, to a very low level, on rearing/breeding animals such as cattle, goats and chickens. Others sourced income from selling marula products (50.4%; n = 173), which emphasizes the importance of marula to the Swazi nation. Others relied on harvesting and selling other wild fruits and seeds except marula (54%; n = 54). Some (12.4%; n = 37) relied on other sources, such as collecting Mopani worms, wild fruits (wild berries and guava) and wild vegetables [like Amaranthus (*umbidvo*), Black Jack (*Imbuya*) and okra (*ligusha)*], and other respondents are housewives who depend mainly on their husbands' income.

6. Use of marula and its products by households in the study area

The majority of the respondents (76.4%; n = 216) used marula for brewing *buganu*. Others used it as a source of food (67.5%; n = 191) and others sold the kernels (51.9%; n = 147) for income. The findings concur with observations by Marula Natural Products [35] and Mabaya et al. [33] who highlight different uses of marula. The respondents also indicated that marula is used for medicinal purposes (12.5%; n = 35)—a finding that confirms those of several other authors [11, 16, 32, 37]. The findings also show that marula is used in carving artifacts, as animal fodder, fencing homesteads, for cultural practices, for spiritual purposes including chasing away Gremlins (*tokolosi)*, divination counters and for banishing evil spirits. These findings agree quite well with those of Nwongwu [51] and O'Brien [52] who reported similar uses of marula. The respondents also indicated that the marula kernel is used for pressing out the oil for cooking and for home-made body care lotion, which is in concert with other authors, such as Abdalbasit and Ibrahim [1], Glew et al. [13] and Wynberg et al. [75].

7. Changes in consumption patterns of marula

Respondents were asked to indicate the number of years they have been involved in marula harvesting (**Figure 1**). The data showed that, out of the 219 respondents who responded to the question, 38% (n = 83) have been harvesting marula for less than 10 years, while 31% (n = 68) have harvested marula for 10–15 years and 31% (n = 68) have been doing so for 16 years and above. The data suggest that the 38% who have been involved in marula trade for less than 10 years joined the marula enterprise after the introduction of the marula processing plants in 2004. These marula processing plants could have attracted more people to join the marula

trade. This is a very significant number of harvesters added and, has increased the burden on marula resources. The increase in numbers of harvesters in this study agrees fairly well with the increase in the number of basket makers in the case of the introduction of basketry in Botswana in the 1970s [46] which contributed to the collapse of the basket industry due to resource depletion.

Also in Zimbabwe, Terry and Cunningham [66] reported that a weaving club that was started in 1986 with 20 members expanded to 500 people by 1988 due to the expansion in market demand and eventually contributed to the collapse of the weaving club. This means that the introduction of commercial market economy to natural products, such as marula, tends to attract more entrepreneurs to the enterprise which, in turn, leads to overharvesting and, subsequently, to depletion of the resource base. Our data indeed revealed that 53.8% (n = 171) of the respondents were of the opinion that marula is becoming less available than before, and attributed the decline to the increase in the number of harvesters. Once a communal resource is exposed to an improved market, it tends to attract many harvesters, which leads to overexploitation and depletion of the resource [20, 21]. These findings concur with those reported by Shackleton and Shackleton [61] where more than one-third of their respondents in the Bushbuckridge area in South Africa opined that there had been a decrease in marula following the introduction of improved market for marula products.

The Swaziland Indigenous Products (SIP) (2012) observed that the factors currently threatening the continued productivity and biodiversity in Swaziland are largely a result of socioeconomic changes without appropriate adaption, exacerbated by repeated droughts and, possibly, climate change, which are interlinked and, in some cases, form negative synergies. Other factors threatening biodiversity in Swaziland (and thus the sustainability of marula harvesting) include population growth, which has resulted into changes in land use and more intense use of natural resources, overgrazing, deforestation, erosion, and an increase in invasive alien plants [65].

Infestation of marula trees and fruits by pests in the study area has also been reported. This was confirmed by the Swaziland Minister of Tourism and Environmental Affairs when he pointed out that marula is commonly being affected by worms [50]. According to the Minister, the worms make the marula trees dry out in a very strange way, leaving them with no leaves and yielding no fruits, which disturbs the production of marula fruits. The impact of the pests on the marula tree not only affects the popular *Buganu* ceremony but also the production of various products by the two local commercial companies—the Swazi Secrets and the Swaziland Marula—as well as the livelihoods of the poor rural communities. Some respondents indicated worries on the pest situation, alluding to the fact that some of the trees are no longer yielding fruits due to the impact of pests. This worry was also echoed by the spokesperson for the Swazi Secrets marula company. Besides, storms frequently occur annually in Swaziland and when they do, marula trees fall down and, thus, reduce fruit yield which in turn impact negatively on the commercial marula enterprises and rural livelihoods in the country.

With regard to expected future availability of marula, if levels of harvesting and selling were to continue at the current rate, 44.7% (n = 140) of the respondents opined that marula will only be available in the next 5 years, while 40.0% (n = 125) thought it might still be available for the

next 10 years. These responses suggest that the respondents are aware that, with increased harvesting, marula will get exhausted in the near future. This seems to concur fairly well with Helm and Witkowski [21] who reported that marula is declining at an unprecedented rate in the Kruger National Park and other areas in South Africa. Aggravating the prospects for sustainable marula harvesting is the absence of dedicated leadership to start implementing strategies for sustaining marula, as there seems to be no government body or non-governmental organization helping in conservation activities in the area. In addition, it was observed that there is no overarching policy and no regulations were in place to govern access to and harvesting of marula products. If depletion of marula were to occur, it will adversely affect poor rural households that depend on it for income, food and other services. Observations around the households during the socio-economic interviews showed glaringly that the poorest households in the study area were food insecure and it was obvious that marula played a huge role as a source of food in those circumstances. Kirkland et al. [28] as well as Tibesigwa et al. [67] made a similar observation in their respective studies in South Africa.

8. Discussion

The study revealed that a large proportion of rural people in the study area relied mainly on marula harvesting for their livelihoods, in addition to subsistence crop production and subsistence animal rearing. The current production of value-added products from marula fruits and seeds in Swaziland has given impetus to rural people, especially women, to harvest marula products on commercial scale. The harvesting process itself, driven by market demand, is thus threatening the sustainability of marula harvesting and, inevitably, also the survival of the species. Every year during the marula season, the majority of rural people in Swaziland take up the opportunity of harvesting marula fruits and seeds for making an extra income to cater for multiple needs that the households face, ranging from payment of school fees to buying of electricity, medicines and food. As observed by Campbell et al. [6], as well as Shackleton and Shackleton [59], trade in marula products is one of the important local income-generating options available to the rural poor, and particularly women in southern Africa. The interface between poverty, rural livelihoods and marula harvesting in Swaziland reflects the dependency of impoverished rural populations on natural capital and, thus, demonstrates the intricate linkage between people and the ecosystems in which they live [69].

Apart from the commercialization of marula products in Swaziland, the study found that several socio-economic factors interlock to contribute to the intense harvesting of marula in Swaziland. Widespread conditions of poverty fuelled by low levels of education are well established in several places across southern Africa where a strong dependency on and wide range of uses of marula have led to the increased exploitation of the resource. All agricultural and grazing fields in the study area have been exploited for marula harvesting causing the level of regeneration of marula in those areas to be very low due to constant removal of the fruits and seeds. The multiple uses of marula products, combined with the introduction of the processing companies, have encouraged many people to harvest large amounts of marula in large

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quantities for income generation. This commercialized pattern of harvesting is considered a very important factor in accelerating the potential depletion of marula resources in Swaziland and is threatening the quest for its sustainability if appropriate measures are not put in place.

9. Conclusion

Marula plays a crucial role in the livelihoods of poor rural households in Swaziland. The current level of commercialized harvesting of marula products in Swaziland is unsustainable as it has negatively impacted on the regeneration potential of marula and, thus, requires deliberate monitoring and strict control of the harvesting process. Many socio-economic factors are interlocking to accelerate the harvesting of marula products beyond its sustainability thresholds to support the livelihoods of many poverty-stricken rural households in Swaziland. Therefore, overconsumption or even depletion of marula in Swaziland will deepen the existing poverty levels among the rural poor, particularly women, who are proportionately more dependent on marula, and therefore most vulnerable to the loss of a natural resource that will impact their livelihoods negatively.

10. Recommendations

To sustain the harvesting of marula in Swaziland, a combination of environmental and socio-economic policy interventions are imperative. The community members, for instance, should plant marula in the fields around the homesteads to replace the current old marula trees when they die out or stop producing fruits so as to ensure the reliable supply of marula products, and at the same time reduce the harvesting pressure in the agricultural fields and grazing areas. Therefore, the communities should dedicate the planting of marula in an agroforestry system to alleviate the pressure on marula and enhance its population size and structure, thus increasing the sustainable utilization of the marula species and the economic sustainability of the commercial marula enterprises in the country. The communities should furthermore restrict domesticated animals from accessing the agricultural fields to reduce the browsing of growing marula seedlings in those fields.

At a policy level, the local authorities should stop people from cutting down marula trees, engage the communities in education on the importance of marula conservation and the practice of not collecting all the marula fruits and seeds from the ground for purposes of regenerating new seedlings. Rural development policies in particular should be revisited and realigned towards encouraging job creation in the rural areas of Swaziland. The Ministry of Education should widen the base and access to quality educational opportunities in the rural areas through provision of adult education programmes which will increase the chances of rural dwellers, especially women, of finding employment opportunities. This would, in turn, empower rural communities and minimize overdependence on natural forest products, thus relieving the harvesting pressure on marula.

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