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Assessing the Sustainability of Uses of Wild Species

Case Studies and Initial Assessment Procedure

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Rush cutting in Natal, South Africa

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Introduction

The salt marsh rush (*Juncus kraussii*), or ncema as it is called in Zulu, is harvested as a fibre source by the Zulu people in Natal. The plant typically grows in monospecific stands fringing estuaries. It produces spike-like culms (stalks), each 4-8 mm in diameter and 40-120 cm tall. When dried, the culms are strong and pliable and are highly suitable as a durable fibre material. The most important use of ncema is for the manufacture of traditional sleeping mats, which are used in most rural households and are given as gifts to the bride at traditional Zulu wedding ceremonies. In addition, ncema is used to weave other articles such as sorghum beer strainers and modern craft items such as baskets and place mats.

As human populations increase, and as much of the salt marsh habitat in which ncema grows is lost to development, so the demand for the remaining ncema stocks has increased. Nowadays, ncema occurs in significant quantities at only four sites in Natal. Three of these sites are within designated nature conservation areas (Greater St Lucia Wetland Park, Kosi Bay Nature Reserve, and Umlalazi Nature Reserve) and the fourth (at Umgababa) is under tribal authority. Since it is highly sought after and scarce, ncema is vulnerable to overexploitation.

Ncema is usually harvested by women. The woman grasps a handful of the culms, and cuts them at the base with a sickle or long-bladed knife. She then holds the handful at the top, grasping only the tips of the longer culms, and with a vigorous shake discards all the short culms. The preferred length is greater than 60 cm. She then inspects the longer culms and discards all flowering stems and culms with blemishes or deformities. Because of such careful selection only 25% of what is cut is retained (Heinsohn 1991). Not only is this wasteful, but the discarded material is often thrown onto the living plants, seriously reducing their ability to grow.

After cutting and sorting, the ncema is dried by spreading it out in the sun. It is turned regularly and taken in at night so that the dew does not wet it. Drying takes several days, until the culms become golden-brown and are dry enough to be stored. Once dry, the plant is ready to be sold or used for weaving.

At St Lucia, where an estimated 80,000-120,000 kg (wet mass) of ncema is harvested annually, a considerable ncema-based economy has developed. On average, about 1,000 people cut the ncema, each cutting for three to five days. Extensive informal transport networks have developed to bring the harvesters to St Lucia, some of whom travel more than 300 km. An informal distribution network transports and retails the dried ncema, which in Natal is estimated at more than 116,000 kg (dry mass) per year (Heinsohn 1991). Large numbers of finished craft products made of ncema are on sale at markets and curio shops throughout Natal.

Management of ncema at St Lucia

The St Lucia harvest site is in the Greater St Lucia Wetland Park, which is controlled by the Natal Parks Board (NPB), the agency responsible for nature conservation. Since the late 1960s, the NPB has allowed controlled harvesting of ncema at St Lucia, where 400-500 ha of the plant grows. This harvest started as a small scale operation, but over the years has expanded to become a major industry. Ensuring that the use remains sustainable and the resource is not depleted requires considerable management by the NPB.

Since the late 1970s, the NPB has levied a small charge for a permit to harvest ncema. Over the years, this charge has increased, but it is still small; and the income is not sufficient to cover management costs. The fact that the users are willing to pay indicates that they value the resource.

A harvesting zone has been designated, covering about a third of the area in which ncema occurs. The zone is part of an already established high intensity use zone. It was considered necessary to protect the remaining two-thirds from exploitation because little is known about the long term effects of harvesting. Zoning also

aids control as it confines the people who harvest ncema to specific areas. Harvest areas are rotated: ncema stands are inspected, and areas where the plant appears to be growing less vigorously are rested. Usually each area is rested every second year.

Some harvesting occurs all year, but most is from March to July, peaking in June. Based on this pattern and on the results of plant phenology studies, a harvest season was initiated in 1982. This starts at the beginning of May each year. At first the season lasted 8-12 weeks; but, because of increased use, it is now terminated once most of the ncema has been cut – usually within one to three weeks. The harvest season allows for better and more cost-effective control, since the game guard force has to be deployed only during the season. It is a more equitable way of controlling use than limiting the number of harvesters. Some harvesters travel great distances to cut ncema and cannot be turned away once they have arrived.

Increasing harvesting selectivity and reducing waste

To increase the selectivity of the harvest and reduce waste, the NPB has changed its permit system, imposed restrictions on cutting implements, and introduced an incentive scheme.

Instead of selling a ticket (permit) that allows the holder to cut an unlimited quantity of ncema for one day, the NPB now sells tickets that allow the holder to cut one bundle of ncema per ticket. A bundle is defined as an armload with a circumference of 100 cm (the wet weight is about 20 kg). This system encourages the ticket holder to be selective and cut only the ncema she wants to keep. She may buy as many tickets as she wishes, and on average most women harvest two to three bundles per day. We believe that this system has been successful. Not only has it encouraged more selective cutting, it has made control easier, because each harvested bundle must have a ticket fixed to it. It is easier to check bundles than harvesters, because many of the people in the ncema beds are not harvesting but are transporting the rushes and do not require tickets. Another advantage of the system is that it allows the NPB to quantify better the amount being harvested.

Also to increase selectivity, the use of sickles was banned and the length of knife blades limited to less than 20 cm. This was unpopular and had to be enforced by the game guards. These restrictions remain contentious and, from a public relations perspective, have not been entirely successful.

Cutting implements are also the focus of an incentive scheme. At Kosi Bay, where the ncema is generally longer and more robust than at St Lucia, the women often harvest the plants by selecting individual culms and plucking them one at a time. The NPB tried to encourage the women at St Lucia to do the same. However, this method is very hard on the hands – especially at St Lucia where ncema has narrower culms – and met with little success. The NPB then developed a small knife, consisting of a disposable hook-shaped cutter blade mounted in a handle, which could cut only one culm at a time. Large numbers of this knife were handed out. Then, once the ncema stocks for the year were almost depleted, the women who were prepared either to pluck the ncema or use the small hook-bladed knife were allowed to harvest in the area that was being rested that year. Unfortunately, the privilege was abused. After some of the women were found to be using nonselective methods, the experiment was abandoned.

Substitutes

Substitutes and other ways of reducing pressure on wild populations of ncema have been considered. Other species, such as some *Cyperus* species, are used for crafts but are not as durable as ncema. There is no substitute for ncema for the ceremonial wedding gift of a sleeping mat. The Institute of Natural Resources of the University of Natal has investigated the feasibility of cultivating ncema. Ncema grows well in non-saline soils as long as it is not shaded out by competing plants (Heinsohn 1991). Small scale cultivation is possible and would reduce demands on the wild populations. Rushes could also be imported, but this is unlikely to be a viable option because the users are poor.

Conservation education

The NPB recognizes the need to concentrate more on the social aspects of the ncema harvest. In 1982, it set up an interpretation and conservation education programme, which included radio programmes, talks, audio-visual presentations, and the use of game guards as interpreters.

Information about the ncema harvest was broadcast on the Zulu language radio programmes. This was partly to notify people of the starting date of the harvest season, and partly as an interpretation exercise. The broadcasts explained the concepts of sustainable use, rotational use, and how to care for limited resources. These seem to have increased the general public's awareness of the ncema harvest.

One of the NPB's Zulu education officers gave talks and an audio-visual presentation to the women who came to harvest ncema. This was not very successful

because the women had travelled far and paid a lot of money to cut ncema, and were not inclined to listen to presentations. They were also too awed by the audio-visual equipment to pay attention to the message.

The NPB set up a programme to inform its game guards, who oversee the ncema harvest, about its conservation aspects. Before the start of the harvest season, field days were conducted to educate the guards in all aspects of the ncema industry. They were also taken to the experimental agricultural farm where they saw trial cultivation of ncema. Now the game guards communicate their understanding individually with the harvesters, in the course of their daily law enforcement activities. This has proved to be the most effective way of communicating a conservation message to the women cutting ncema.

Representation by the users

The NPB has set up committees with representatives of the ncema cutters for them to communicate their concerns. To date, success has been limited. Ncema harvesters are not a cohesive community, and it has been difficult to get them to nominate representatives.

I believe that the main shortcoming in the management of the ncema harvest has been the lack of effective representation for the harvesters to give them direct involvement in decisions on the use of ncema. Unless this is achieved in a manner that enables users to develop a sense of participation and formal rights to use ncema, it is unlikely that they will value ncema as a sustainable resource. Lack of participation and rights has resulted in no one valuing the conservation of ncema or its habitat. The resource is regarded as nobody's property, towards which the prevailing attitude is, "if I do not take the maximum I can now, someone else will take what I leave – so why should I leave anything?" This is the so-called "tragedy of the commons" (Hardin 1968).

Recently informal cartels seem to have been established to harvest, transport and sell ncema. These started with various people employing women to cut ncema for them; and then developed into a situation in which certain individuals demanded protection money from anyone wishing to harvest ncema. This makes management difficult and inequitable.

Future management strategies

As a result of the development of cartels, the NPB has considered several ways of managing the ncema harvest. The aim is to be equitable and follow free market principles as far as possible. The strategies include:

- Small scale subsistence use. This is the current situation, but it is becoming inequitable as cartels form and a few individuals monopolize the industry.

- Small scale businesses, in which prospective users tender for rights to harvest a specified patch of ncema. This would be more efficient than the present system but would exclude the small user. Control would be easier, and the money paid to the NPB could go directly into the management of the ncema harvest.

- A cooperative business, placing control of the ncema industry in the hands of a neighbouring community. This would be unfair to people from further away who have been harvesting ncema at St Lucia for more than two decades. However, its advantage is that the park's neighbours would benefit from it, so promoting (it is hoped) greater recognition of the regional value of nature conservation. Greater participation of the users in decisions on the ncema harvest would be essential for this to work.

- Harvesting by the NPB or by a concessionaire on its behalf, who would then sell the ncema to the users. This would be efficient and require less management than the alternatives, but would harm the small scale user and might be perceived as autocratic.

- Joint ventures between the NPB and people wishing to harvest the ncema. This could be a powerful strategy as a group with technological knowledge and financial backing would be teamed with people who have a traditional understanding of how to harvest the resource. This may provide the best balance between equity and efficiency.

Assessment of ncema harvesting

The controlled ncema harvest at St Lucia has developed over the past two and a half decades. Through trial and error, supported by a limited amount of research, it has become a successful harvesting project. It has evolved to cope with increasing demands and, although there are still challenges to be met, much can be learnt from it.

Is the ncema harvest sustainable?

It is extremely difficult to know whether the use of ncema at St Lucia is sustainable. The NPB is responsible for ensuring that harvesting does not impair the long term viability of the ncema beds or have an adverse impact on associated species or the ecosystem within

which ncema grows. No study or risk assessment has been done to see if this is the case. The nature and magnitude of the effects of the harvest should be considered in the context of the natural dynamics of the ecosystem. Various temporal and spatial scales need to be born in mind. Annual seasonal patterns affect growth and hence crop size; wet-dry cycles have a periodicity of about a decade; and large floods, occurring once every 20 to once every 50 years, control the geomorphology of the area.

We have to be aware of the different perspectives of these temporal and spatial scales. We also need to separate human-caused changes from the natural dynamics. The detailed monitoring required to detect such changes would be very expensive. For instance:

- In some localities, there has been an invasion of *Phragmites* reeds, which shade out and displace the ncema plants. This may be due to subtle changes in soil-water relations or reductions in salt concentrations in the soils. But the concern remains as to whether the delicate balance between ncema and *Phragmites* has been altered by human exploitation.

- It is possible that continued harvesting will lead to long term nutrient depletion. The effects of this would be difficult to detect.

- The area where the ncema beds occur is subject to flooding. Major floods cause considerable erosion and transform the landscape. This may modify the physical characteristics of the site where the ncema grows.

Impacts on non-target species are difficult to discern. However, since ncema grows in monospecific stands at St Lucia we believe that harvesting has few impacts on other species.

What are the benefits to the users and to nature conservation?

A better understanding is needed of the socioeconomic benefits resulting from the use of ncema obtained from a protected area. Detailed economic surveys are required to understand fully the value of ncema in Natal. This information should then be communicated to the users and general public so that they realize the value of the resource and of nature conservation.

Associated problems

Problems associated with the people who harvest the ncema need to be addressed. These include the lack of accommodation for the influx of people, litter, inadequate drinking water supplies, sanitation problems, crime, and the incompatibility of this form of land use with tourism in the St Lucia holiday resort. The rights of the home owners, town residents, visitors and holiday makers need to be considered.

Possibly these problems could be minimized by providing the harvesters with a campsite with enough space for them to dry their crop. A site could also be developed for the display of their weaving and sale of their crafts. This would help the ncema and tourism industries to benefit from each other.

Lessons for future programmes

There are two ways to set up a sustainable use programme. One way is to start small and gradually expand until the carrying capacity of the resource is reached. This is the adaptive management method that was used with ncema at St Lucia. The NPB addressed problems, one at a time, as they became apparent. This requires monitoring, which can be expensive, but the costs can be spread over several years. Ideally, a system should be developed so that the running costs are born by the users of the resource. Some of the users should be trained to carry out some of the monitoring.

The other way is by conducting a rapid assessment and establishing the programme at its maximum sustainable level. A team of experienced resource use facilitators would carry out the assessment. The team would base its initial assessment on theoretical understanding and expertise and traditional knowledge. The team would consider supply factors, such as plant population size, distribution, dynamics and production, impacts of use, and habitat change. They would balance these against demand factors, such as human population density, type of economy (for example, subsistence or commercial), consumption rates, and form of use (for example, craftwork) (Cunningham et al. 1992). Traditional use systems could then be adapted to develop viable harvesting systems and set sustainable use levels.

There will be few cases in which comprehensive field-based research can be afforded. Consequently, expert systems, or similar decision support systems that can accumulate empirical knowledge, are needed. These can be used to control the harvest and guide monitoring programmes. Monitoring is essential to manage both the ecological and the social and economic aspects of the programme. We need to know how the users respond, whether the programme is integrated into the fabric of the economy, and how it fits into established social systems.

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