

This article was downloaded by: [University of Swaziland]

On: 11 July 2011, At: 06:25

Publisher: Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Southern Forests: a Journal of Forest Science

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tsfs20>

The socioeconomic status of the non-timber forest product subsector in Swaziland

C S Dlamini^a & C J Geldenhuys^a

^a Department of Forest and Wood Science, Faculty of Agrisciences, University of Stellenbosch, Private Bag X1, Matieland, 7602, South Africa

Available online: 08 Apr 2010

To cite this article: C S Dlamini & C J Geldenhuys (2009): The socioeconomic status of the non-timber forest product subsector in Swaziland, Southern Forests: a Journal of Forest Science, 71:4, 311-318

To link to this article: <http://dx.doi.org/10.2989/SF.2009.71.4.9.1036>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan, sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

The socioeconomic status of the non-timber forest product subsector in Swaziland

CS Dlamini* and CJ Geldenhuys

Department of Forest and Wood Science, Faculty of Agrisciences, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa
* Corresponding author, e-mail: cliffsdlamini@yahoo.com

A wide spectrum of non-timber forest products (NTFPs) generally has a remarkable contribution to the household economy in rural areas. Most communities make a living either through their domestic or commercial use. The objective of this study was to review the current status of the NTFP sector and further compile an up-to-date list of major use categories of NTFPs. The review of the national study on the NTFP sector indicate an average annual value of the selected NTFPs groups of between US\$19.8 million and US\$79 million with a median value of US\$49.38 million. The most important group from an economic point of view is medicinal plants with an average annual value of US\$32.1 million, followed by fuel wood with an estimated annual value of US\$13.5 million. In the natural accounting study it was revealed that the contribution of natural forests and woodlands in flow benefits, including the highlighted NTFPs, was equivalent to 2.2% of the total GDP, 20% of agriculture's GDP and 439% of the contribution of forestry reported in the national accounts for 2000. This current study reviewed past national, regional and international studies and developed a new list of 19 NTFP use categories subdivided into direct, indirect and intermediate uses. Subsequently, a matrix of commonly used botanical NTFPs was designed and includes most highly preferred species such as *Sclerocarya birrea*, *Bauhinia galpinii*, *Berchemia zeyheri*, *Dichrostachys cinerea* and others. However, the study concluded that there is still a profound lack of information on the status and total value of NTFPs in Swaziland and recommended that government, NGOs, the private sector, communities, and other interested and affected parties (including resource users) should work together to conduct research in order to generate, compile and disseminate information on the quantitative and qualitative statistical data on NTFPs, their socioeconomic uses and ecological and environmental values.

Keywords: economic valuation, plant species, sustainable management, use categories

Introduction

Research has shown that in Swaziland non-timber forest products (NTFPs) are in common use (Dlamini 1998, 2000, DANCED 2000, GOS 2002, Hassan et al. 2002) and that NTFP utilisation as a secondary land use occurs alongside small-scale agriculture and extensive communal grazing. Non-timber forest products contribute to increased rural household incomes, and cash flow into rural areas and from abroad into the country. Furthermore, NTFPs can lead to improved management of indigenous forest resources, while maintaining traditional and cultural knowledge and practices (Falconer 1992, Clarke et al. 1996, Chapeskie 1999, Robles-Diaz-de-Leon and Kangas 1999). The NTFP subsector plays a vital role in improving rural food security and nutritional status (DANCED 2000, Shackleton et al. 2000, Dovie et al. 2001, Hassan 2001, Hassan et al. 2002, Shackleton et al. 2002, FAO 2003, Clarke and Grundy 2004, Geldenhuys 2004, Lawes et al. 2004, Shackleton and Shackleton 2004, 2005, Janse and Ottisch 2005). This is why NTFPs form a critical basis for the sustainable management and utilisation of indigenous resources (FAO 2001, Grundy and Mitchell 2004, Lawes et al. 2004).

In Swaziland there are about 3 400 species in 771 genera in 135 families, and 206 species are declared protected (GOS 2001). The list of plant species supplying the main

forest products harvested in the wild in Swaziland is well documented but quantitative statistical data on their economics and management is still lacking (Dlamini 1981, Ogle 1982, Braun and Dlamini 1994, Mander 1998, Brown 1999, Dlamini 1999, 2000, DANCED 2000). Accurate basic information on most aspects of the use and conservation of NTFPs is required, such as (1) information on species utilised, (2) information on amounts and values of species utilised, (3) information on species utilisation patterns, including indigenous management systems and intrahousehold tasks and responsibilities, (4) information on supply and demand levels, including end uses and end users, and sustainable harvesting rates, and (5) identification of factors determining utilisation patterns (Dlamini 1999, DANCED 2000, Hassan et al. 2002). Such information is a basis for sustainable forest management without which it becomes difficult to maintain a good balance between NTFP demand and supply (FAO 1995, Crafter et al. 1997, Hassan et al. 2002, FAO 2003, Geldenhuys 2004, Lawes et al. 2004, Janse and Ottisch 2005, Olsen 2005).

Most importantly, the classification and economic valuation of NTFPs remain a great challenge at the local, national, regional and international levels. There are efforts being made to develop and implement universal and standard

methodologies for the classification, assessment and valuation through an international expert consultation programme and individual researchers and scholars (FAO 2001).

The specific objectives of this study were:

- (1) to review the current status of the NTFP subsector in Swaziland;
- (2) to highlight past NTFP valuation studies in Swaziland;
- (3) to compile an up-to-date list of major use categories of NTFPs;
- (4) to rank NTFP species in their order of importance.

The associated research questions were:

- Are there any past national studies on the flow value and inventory value of natural forests and woodlands and what methods were used?
- What are the existing categories of NTFP goods and services?
- What are the most highly rated NTFP species in terms of multiple-use properties (specifically goods)?

The general hypothesis assessed was that there is insufficient research on the status, socioeconomic use and value of NTFPs in Swaziland.

Methods

The method used to compile the major use categories of NTFPs and further rank the NTFP plant species in their order of importance was modified from Ogle (1982), Lasschuit (1994, 1995), FAO (1995, 2001), Crafter et al. (1997), DANCED (2000), Gram (2001) and Hassan et al. (2002), where species are grouped according to use and subsequently ranked according to the number of uses, with multipurpose species ranking highly and put in descending order. The plant species with the least number of uses is placed last in the matrix.

Step one: overview of previous studies of NTFPs

A brief summary presentation of previous national studies on NTFPs was made. Only two recent studies on valuation of NTFPs exist in Swaziland and these were reviewed, mainly on the basis of the methods used and the results obtained. The first study was that of DANCED (2000), which presented a review of the NTFP subsector of Swaziland, and the second study was that of Hassan et al. (2002) on natural resource accounts for the state and economic contribution of forests and woodland resources in Swaziland. The main purpose of this exercise was to assess how far Swaziland has progressed in NTFP assessment and valuation.

Step two: categories of NTFPs

Existing literature was searched, from the relevant government departments, the University of Swaziland and through the interlibrary loan scheme of the University of Stellenbosch, and reviewed to identify and establish the main use categories of NTFP goods and services in Swaziland. Existing literature includes past studies on the national flora, protection-worthy areas, forest resource assessments, NTFP sector, natural resource accounting, the national red data list, the flora act, species utilisation patterns and other relevant studies. Consequently, an up-to-date list of the use categories of NTFPs was compiled

to reflect the national spectrum or coverage of NTFPs. Twenty-eight subject-matter specialists were interviewed to get some detail on the status of certain NTFPs.

Step three: highly rated multiple-use NTFPs

The main use categories developed through Step two for NTFP goods and services were used to select the direct use benefits (goods) for multiple-use analysis. The selected NTFPs were analysed in a matrix: the most highly preferred and commonly used species were matched with the different use categories, and scores were awarded according to the number of uses a species can be attached to. Species were ranked according to their order of importance. This was mainly to assess and establish the multiple uses of species from the natural forests and woodlands of rural Swaziland.

Results

Overview of previous studies on NTFP valuation in Swaziland

This section is a synthesis of past national studies on NTFPs rather than a comparison of the studies. The first study on the review of the NTFP sector by DANCED (2000) was mainly desktop with a few face-to-face interviews with subject-matter specialists and resource users. The second study on natural resource accounting by Hassan et al. (2002) comprised a field survey and literature review.

Review of the NTFP sector in Swaziland

The equations or models for calculating the values of NTFPs collected or harvested were adapted from those in Shackleton and Shackleton (1997). The main reason for this was that the NTFPs and types of people in Swaziland and in the Lowveld of South Africa have a lot in common regarding their forests and livelihood patterns. DANCED (2000) then used low and high estimates to derive minimum and maximum values for each product group to cater for uncertainties in the model or equation. A modified version of the original results, showing only the sum total for each selected group, is presented in Table 1.

The average annual value of the selected NTFP groups varied between US\$19.8 million and US\$79.0 million with a median value of US\$49.4 million. The most important group from an economic point of view (as this study was purely resource economics and not cultural) was medicinal plants with an average annual value of US\$32.1 million,

Table 1: Overview of annual economic value of selected non-timber forest product (NTFP) groups. Source: modified from DANCED (2000)

NTFP group	Value*	Median value*	Importance (%)
Medicinal plants	12.8–51.5	32.1	65.1
Fuel wood	6.2–21.6	13.8	28.0
Foods and drinks	0.4–2.9	1.7	3.4
Household items	0.4–2.9	1.7	3.4
Total	19.8–79.0	49.4	100.0

* US\$ million in 1999

followed by fuel wood with an estimated annual value of US\$13.8 million. Foods and drinks, and household items, are similar in importance with each group contributing an average annual economic value of US\$1.7 million.

Natural resource accounts for the state and economic contribution of forests and woodland resources in Swaziland

Hassan et al. (2002) conducted three surveys to collect primary data on resource use, harvesting rates and product prices from communities relying on the natural resource base for various uses: a household survey, a market survey, and a survey of traditional healers. The study was done in 10 selected vegetation strata in the four ecological zones of Swaziland to capture variability in climatic and socio-economic conditions between and within the ecological zones across the country. Only rural communities were included in the user surveys due to the low dependence of urban populations on direct harvesting from natural forests and woodlands (Hassan et al. 2002). The study by Hassan et al. (2002) identified and highlighted the value of seven major NTFP groups (fuel wood and charcoal, fodder, thatch, edibles, medicines, craft wood, and weaving grass), based on an economic valuation of the groups (see Table 2).

Fuel wood contributed 90.5% of the top seven NTFP groups with a total annual value of US\$32.7 million for these groups, followed by thatch grass (4.1%). The differences in the value of medicines between the two studies could be due to the different methodologies used, traders interviewed in the former did not want to cooperate and gave fictitious figures in fear of government tax, while DANCED was purely a desk study.

Non-timber forest product categories

A list of the 19 major use categories of NTFPs in Swaziland (Table 3) was compiled based on studies where products are grouped according to direct, indirect and intermediate use services (Campbell 1987, Falconer 1992, UNEP 1992, FAO 1995, Clarke et al. 1996, Shackleton 1996, Crafter et al. 1997, Shackleton and Shackleton 1997, Allen et al. 1998, Helles 1999, DANCED 2000, Shackleton and Shackleton 2000, Shackleton et al. 2000, Alexander and McLain 2001, Dovie et al. 2001, FAO 2001, Hassan 2001, Hassan et al. 2002, Shackleton 2002, Shackleton and Shackleton 2002, 2004, Clarke and Grundy 2004, Lawes et al. 2004, Janse and Ottisch 2005, Shackleton and Shackleton 2005). These

Table 2: Total annual value of non-timber forest product (NTFP) groups harvested for various purposes by ecological zone (US\$ million y^{-1} in 2001). Source: modified from Hassan et al. (2002)

NTFP group	Highveld	Middleveld	Lowveld	Lubombo	Total
Fuel wood	10.98	8.27	7.20	3.15	29.60
Thatch	0.36	0.46	0.47	0.03	1.33
Fodder	0.30	0.33	0.20	0.06	0.89
Weaving grass	0.27	0.15	0.07	–	0.50
Edibles	0.07	0.04	0.10	0.01	0.22
Medicines	0.01	0.09	0.03	–	0.13
Craft wood	0.01	0.04	–	–	0.05

NTFP categories are in line with international grouping of NTFPs and are open to improvement and further development. The Direct and Indirect Use, as well as Intermediate Services, are adapted from natural and environmental resource accounting. An example of a similar natural resource accounting model was done and presented by Hassan (2001) where a multidimensional matrix of the total value of a forest resource was presented.

Matrix of NTFP plant species commonly used in Swaziland (botanical NTFPs)

A survey of existing literature revealed that there is a total of 208 edible species, 39 species for household items, 338 species for medicinal use, nine species for fuel wood and charcoal, 53 species for handcrafts, nine species for fodder and grazing, 52 species for cultural rituals, 13 species for tannin and dyes, 17 ornamental species, and eight species for thatching (Compton 1976, Dlamini 1981).

The most preferred and commonly used NTFP plant species in Swaziland were selected from Compton (1976), Dlamini (1981), Ogle (1982), Mander (1998), Dlamini (1999), Cassidy et al. (2000) and Braun et al. (2004). A matrix was developed to rank the commonly used species based on 14 specific direct uses or goods. Only species with two or more uses are listed in Appendix 1.

The most preferred multipurpose plant species in terms of NTFPs are listed in Table 4.

Discussion

Previous NTFPs studies

In the DANCED study all quantitative information collected through face-to-face interviews supported the ranges chosen for the calculations for Swaziland. The study focused only on estimating the economic value of annual consumption of the selected main NTFP groups, and income accruing from wages paid to casual workers, during harvesting, processing, transport and sales activities connected to utilisation. Including these wages would increase the value of NTFPs to the Swaziland economy. This means that the value of NTFPs, when services such as contribution of plants to combat soil erosion and maintain soil fertility are included, is probably many times the value of plant products consumed (DANCED 2000, Hassan et al. 2002). This DANCED study illustrates the importance of NTFPs when based on market prices. If calculations were based on replacement costs of the products and services (e.g. replacing thatching grass with corrugated iron roof), it would result in very high values indicating that communities and government cannot afford their replacement.

In the Hassan et al. (2002) study the analysis of asset values and flow benefits of natural forests and woodlands in Swaziland was based on factual information. The contribution of natural forests and woodlands in flow benefits, including the highlighted NTFPs, was equivalent to 2.2% of the total GDP, 20% of agriculture's GDP and 439% of the contribution of forestry reported in the national accounts for 2000 (Hassan et al. 2002). Both previous studies highlighted above excluded indirect use benefits and intermediate services of the natural forests and woodlands (i.e. watershed

Table 3: Use categories of non-timber forest products (NTFPs) in Swaziland (goods and services)

Use category	Comments
Direct use	
1. Forest Foods and Drinks	Edible fruits, leaves, roots, buds, herbs, other edible portions that contribute to improving food security and nutritional status
2. Forest Medicines	Leaves, bark, fruits, roots, etc.
3. Thatching Material	Different grasses used as roofing material
4. Plant Tannins and Dyes	Plant dyes from bark and other parts, including vegetable tannin materials
5. Household Items and Fibre Products	Items made from indigenous forests found in households; include kitchen utensils, mats, sweepers, etc.
6. Handicrafts and Fibre Products	Everyday utensils, some also used in traditional ceremonies; weapons such as knob sticks; traded items made for tourists
7. Animals and Animal Products	Ivory, trophies, bones, feathers, butterflies, live animals and bushmeat, etc.
8. Fuel Wood and Charcoal	A major source of energy to both rural and urban households traded in large amounts throughout the country
9. Other NTFPs	Spices, insect products, natural plant pigments, essential oils, incense wood, latex, plant gums, waxes, etc.
Direct/indirect use	
10. Cultural Ceremonies and Rituals	Plants used in local and national ceremonies; use of bird feathers in traditional gear
11. Landscaping and Ornamentals	Shade, windbreaks, garden plants, and hedges; aesthetics and scenery
12. Fodder and Grazing	Trees, shrubs, grasses, and others that provide livestock fodder
13. Floral Greenery	Ferns, wild flowers, herbs, etc.
14. Other	Plants and animals used as indicators, e.g. Red-chested Cuckoo calling in the ploughing season
Intermediate use services	
15. Tourism and Recreation	Forests and trees provide habitats for animals and plants that attract foreign visitors and generate income; useful in biodiversity conservation; including aesthetics and scenery
16. Soil Fertility and Soil Conservation	Plant parts such as roots, leaves, fruits, bark, etc., that contribute to soil stabilisation and maintaining soil fertility
17. Pollination Services	Various insects such as bees, beetles, birds and bats that contribute to crop production
18. Hydrological Cycle and Water Conservation	Natural forests and woodlands play a crucial role in the water cycle, particularly in water holding and circulation
19. Other Environmental Services	Services such as oxygen production, acid rain deposition and carbon sequestration

protection, nutrient supply, pollination services, carbon sequestration, biodiversity conservation and others).

The two NTFP studies done in Swaziland show the socioeconomic contribution of NTFPs to local and national economies, and the high economic values attached to these resources (Hassan et al. 2002, Mbuli 2003). It is worth noting that the ecological and environmental role of NTFP goods and services has not been studied at the local level, and indicates that the current values are for direct use benefits, and are a conservative estimate of the total value of NTFPs in Swaziland (DANCED 2000, Hassan et al. 2002, Mbuli 2003). In particular, the variation in the economic value of the various NTFPs shows that there is still a great deal of research needed to capture the total value of the NTFP sector in the country. In view of the fact that resource valuation is a critical element of resource policy decision (FAO 1995, Crafter et al. 1997, Bhattarai and Hammig 1998, FAO 2001, Mogaka et al. 2001, Barrow et al. 2002), it is imperative that government, NGOs, the private sector, other development agencies and communities work together in raising funds to embark on a series of NTFP studies to capture the multidimensional value of NTFP goods and services.

However, the results from the two studies (DANCED 2000, Hassan et al. 2002) gave very different total economic values. This could be a result of differences in NTFP classification and in assessment and valuation methods, i.e. a lack of a standardised methodology. This argument is

presented by Gram (2001) in a study on the assessment of methodological shortcomings in the economic valuation of special forest products. Different methods were studied in relation to local uses of timber and NTFPs, including plants, fish and animals. Both products for the market and for subsistence use were included. The results of the analysis show that methods frequently used by scholars are subject to serious uncertainty, as is the case with the Swaziland case studies.

Non-timber forest product use categories

Although this section of the study was aimed at highlighting the main user categories of NTFPs, it was worthwhile to present an overview of the user categories of both goods and services to capture the complete status of the entire NTFP sector in the country, and later concentrate on the goods aspect of the sector in the subsequent section.

The classification of NTFPs into 18 major groups is a relatively new concept in the forestry sector in Swaziland. Dlamini (1999) and DANCED (2000) attempted to compile a list of main groups of NTFPs but omitted certain important goods and services such as charcoal, pollination services, floral greenery, wild flowers and herbs, and other forest products such as dung, stones, sand, small construction wood, water and clay. The category of forest foods was not well defined as to which are the main components, such as edible herbs, wild edible mushrooms, wild edible fruits and

Table 4: The 13 most versatile plant species commonly used in Swaziland based on number of non-timber forest product use categories

Category of species	Uses as per legend in Appendix 1
Species with six uses	
<i>Sclerocarya birrea</i>	Edible fruit (pulp and nut), Medicine, Fuel wood, Landscaping, Crafts and household items, Fodder
Species with four uses	
<i>Bauhinia galpinii</i>	Tannins, Fuel wood (and charcoal?), Landscaping
<i>Berchemia zeyheri</i>	Edible fruit, Fuel wood and charcoal, Building material and fences, Landscaping
<i>Dichrostachys cinerea</i>	Fuel wood and charcoal, Building material and fences, Fodder, Cultural plants
<i>Euclea crispa</i>	Edible fruit, Medicine, Fuel wood and charcoal, Building material and fences
<i>Syzygium cordatum</i>	Edible fruit, Fuel wood and charcoal, Building material and fences, Landscaping
Species with three uses	
<i>Acacia dealbata</i> †	Tannins, Fuel wood and charcoal, Building material and fences
<i>Acacia karroo</i>	Landscaping, Fodder, Tannins and dyes
<i>Brachylaena discolor</i>	Fuel wood and charcoal, Building material and fences, Crafts and household items
<i>Ficus sur</i>	Edible fruit, Fuel wood and charcoal, Landscaping
<i>Phoenix reclinata</i>	Edible fruit, Landscaping, Crafts and household items
<i>Pterocarpus angolensis</i>	Medicine, Fuel wood and charcoal, Crafts and household items
<i>Ziziphus mucronata</i>	Edible fruit, Fodder, Cultural plants

† Introduced species

berries, and edible animals and animal products, and as a result this study attempted to rectify this issue.

Multipurpose NTFP species in Swaziland

The results show that there are several truly multipurpose species of NTFPs, with the most versatile species being *Sclerocarya birrea* with six uses as reflected in the NTFP matrix. According to market research in southern Africa *S. birrea* is more popular amongst European consumers than apples, and fruit tree growers are planting more *S. birrea* subsp. *caffra* to try and keep up with the demand (Lawes et al. 2004). Other top species include *Berchemia zeyheri*, *Bauhinia galpinii*, *Dichrostachys cinerea* and *Syzygium cordatum*, which are associated with four use categories each (Dlamini 2007). This information confirms that some of the indigenous plant species in the natural forests and woodlands are fit for both timber and NTFPs depending on the intended use at the time. They need to be targeted for studies around integrated and multiple uses of the different products used by different users from the rural to urban areas. The ranking of NTFP species is a crucial aspect in the formulation and development of tree domestication and commercialisation programmes.

General summary of NTFPs in Swaziland

The above provides an overview of available information relevant to NTFPs in Swaziland. However, it is notable that there is no specific information on the inventory value and flow value of NTFPs in the four ecological zones of the country. This makes it very difficult to assess the impacts of harvesting NTFPs on the natural forests and woodlands. The GTZ and DANCED national forest inventories of 1990 and 1999, respectively, did not include NTFPs as a distinct component of the natural forests and woodlands and this warrants national inventories of NTFPs.

Conclusions and recommendations

NTFPs were undoubtedly a good source of direct benefits (commercial and subsistence) and indirect benefits

(ecological processes, biological diversity, cultural, ritual/heritage) as highlighted in Crafter et al. (1997), DANCED (2000), Shackleton and Shackleton (2000, 2004, 2005), Shackleton et al. (2000, 2002), Dovie et al. (2001), Hassan (2001) and Hassan et al. (2002). UNCED (1992) recommended the integration of conservation and sustainable use of biodiversity (of which NTFPs are a component) into all national and international decision-making. Swaziland should implement this recommendation in order to enhance the development and conservation of the vast array of life-supporting NTFPs in the natural forests and woodlands as well as man-made forest plantations.

There is, currently, a profound lack of information to capture and realise the full range of benefits that accrue from the wide array of NTFPs to individuals, communities and the national well-being. Decision-makers, forest managers and resource users (communities) lack a clear understanding of the potential and actual economic, ecological, environmental, social, cultural and political value of the existing NTFPs in the country. It is therefore recommended that government, NGOs and the private sector should work together to conduct research involving the resource users in order to generate, compile and disseminate information and quantitative and qualitative statistical data on NTFP resources, their direct socioeconomic use value and indirect ecological and environmental values.

In addition, government and other development agencies should support education and public awareness programmes for NTFP conservation through management for sustainable use. The national forest policy and other sectoral policies should promote the development of more NTFPs, as currently only a few are being utilised commercially and as a result the natural forests and woodlands are under-utilised for NTFPs, because of a lack of sustainable resource harvesting practices, and yet communities are faced with poverty.

A standard local NTFP classification system, resource assessment methods and economic valuation methods should be formulated, developed and implemented to guide NTFP development and sustainable use. These

methodologies should be developed in accordance with regional and international guidelines (FAO 1995, 2001).

Acknowledgements — The authors would like to thank the following individuals and organisations: Dr Isla Grundy, Professor G van Wyk, the University of Stellenbosch, the University of Swaziland, the Fort Cox College of Agriculture and Forestry, Tibiyo TakaNgwane, all communities involved in the research, government foresters in the Ministry of Agriculture and Cooperatives in Swaziland, subject matter specialists interviewed in the various government departments and sections in Swaziland, and all authors cited in the text.

References

- Alexander SJ, McLain RJ. 2001. An overview of non-timber products in the United States today. In: Emery MR, McLain RJ (eds), *Non-timber forest products: medicinal herbs, fungi, edible fruits and nuts, and other natural products from the forest*. Binghamton: Haworth Press.
- Allen JA, Pimentel DP, Lasoie JP. 1998. Fuel wood production and use in rural Swaziland: a case study of two communities. *Forest Ecology and Management* 25: 239–254.
- Barrow E, Clarke J, Grundy I, Jones K-R, Tessema Y. 2002. *Analysis of stakeholder power and responsibilities in community involvement in forest management in eastern and southern Africa*. Nairobi: International Union for Conservation of Nature and Natural Resources, Eastern Africa Regional Office.
- Bhattarai M, Hammig M. 1998. Environmental policy analysis and instruments for biodiversity conservation: a review of recent economic literature. Working Paper No. 18810. Clemson: Department of Agricultural and Applied Economics, Clemson University.
- Braun KP, Dlamini GM. 1994. Swaziland's plant diversity and its conservation. In Huntley BJ (ed.), *Botanical diversity in South Africa. Strelitzia 1*. Pretoria: National Botanical Institute. pp 117–123.
- Braun KP, Dlamini SD, Mdladla DR, Methule NP, Dlamini PW, Dlamini MS (compilers). 2004. Swaziland flora checklist. Southern African Botanical Diversity Network Report No. 27. Pretoria: SABONET.
- Brown AE. 1999. Plant conservation in Swaziland: a comparison of the densities of savanna tree species between protected areas and communal land. MSc thesis, University of Kent, UK.
- Campbell BM. 1987. The use of wild fruits in Zimbabwe. *Economic Botany* 41: 374–385.
- Cassidy L, Dobson L, Gooday D, Mamba P, Mlangeni N, Murdoch G, Nsibandze B, Shongwe T. 2000. Environmental impact assessment for proposed sugarcane development Magesisni East in the Lubombo Region of Swaziland, Simunye. Unpublished report. Mbabane: Swaziland Environment Authority, Ministry of Tourism and Environmental Affairs.
- Chapeskie A. 1999. Landscape and livelihoods: non-timber forest products in contemporary first nations economies. Paper presented at Nuu-Chah-Nulth Value-added Workshop, Port Alberni, 22–23 March 1999.
- Clarke J, Grundy IM. 2004. The socio-economics of forest and woodland resource use: a hidden value. In: Lawes MJ, Eeley HAC, Shackleton CM, Geach BGS (eds), *Indigenous forests and woodlands in South Africa: policy, people and practice*. Scottsville: University of KwaZulu-Natal Press. pp 167–194.
- Clarke J, Carvendish W, Covote C. 1996. Rural households and miombo woodlands: use, value and management. In: Campbell BM (ed.), *The miombo in transition: woodlands and welfare in Africa*. Bogor: Center for International Forestry Research. pp 101–136.
- Compton RH. 1976. The flora of Swaziland. *Journal of South African Botany* Supplement 11.
- Crafter SA, Awimbo J, Broekhoven AJ. 1997. *Non-timber forest products: value, use and management issues in Africa, including examples from Latin America*. Nairobi: International Union for Conservation of Nature and Natural Resources, Eastern Africa Regional Office.
- DANCED (Danish Corporation for International Development). 2000. Report on the non-timber forestry sub-sector of Swaziland. Mbabane: Ministry of Agriculture and Cooperatives.
- Dlamini B. 1981. *Swaziland flora: their names and uses*. Mbabane: Ministry of Agriculture and Cooperatives, Forestry Section.
- Dlamini CS. 1998. Provenance and family variation in germination, early seedling growth, fruit composition and seed mass in *Sclerocarya birrea* (A. Rich.) Hochst. sub-species *caffra* (Sond.) Kokwaro (Anacardiaceae): the marula. MSc thesis, University of Stellenbosch, South Africa.
- Dlamini CS. 1999. Edited report on the status of non-wood forest products in Swaziland. Mbabane: Ministry of Agriculture and Cooperatives, Forestry Section.
- Dlamini CS. 2000. Report on germplasm improvement in indigenous fruit trees of Swaziland. Mbabane: Ministry of Agriculture and Cooperatives, Forestry Section.
- Dlamini CS. 2007. Towards the improvement of policy and strategy development for the sustainable management of non-timber forest products: Swaziland: a case study. PhD thesis, University of Stellenbosch, South Africa.
- Dovie BKD, Shackleton CM, Witkowski TF. 2001. Valuing non-timber forest products – indicator for interplay between poverty, livelihoods and the environment. Paper presented at the Open Meeting of the Global Environment Change Research Community, Rio de Janeiro, 6–8 October 2001.
- Falconer J. 1992. *Non-timber forest products in southern Ghana*. ODA Forestry Series No. 2. London: Overseas Development Administration.
- FAO (Food and Agriculture Organization of the United Nations). 1995. *Report of the International Expert Consultation on Non-wood Forest Products: Yogyakarta, Indonesia, 12–27 January 1995*. Non-Wood Forest Products No.3. Rome: FAO.
- FAO. 2001. *Non-wood forest products in Africa: a regional and national overview*. FAO Forestry Working Paper FOPW/01/1. Rome: FAO.
- FAO. 2003. NWFP-Digest-L No. 03/03. Available at <http://www.fao.org/forestry/50077/en/> [accessed December 2009].
- Geldenhuis CJ. 2004. Meeting the demand for *Ocotea bullata* bark: implications for the conservation of high-value and medicinal tree species. In: Lawes MJ, Eeley HAC, Shackleton CM, Geach BGS (eds), *Indigenous forests and woodlands in South Africa: policy, people and practice*. Scottsville: University of KwaZulu-Natal Press. pp 517–550.
- GOS (Government of Swaziland). 2001. The Flora Protection Act 5 of 2001. Mbabane: Ministry of Agriculture and Cooperatives, Government of Swaziland.
- GOS. 2002a. National Forest Policy. Mbabane: Ministry of Agriculture and Cooperatives, Government of Swaziland.
- Gram S. 2001. Economic valuation of special forest products: an assessment of methodological shortcomings. *Ecological Economics* 36: 109–117.
- Grundy IM, Mitchell N. 2004. Participatory forest management in South Africa. In: Lawes MJ, Eeley HAC, Shackleton CM, Geach BGS (eds), *Indigenous forests and woodlands in South Africa: policy, people and practice*. Scottsville: University of KwaZulu-Natal Press. pp 679–690.
- Hassan R. 2001. Proposal for national resource accounting in Swaziland. Mbabane: Ministry of Agriculture and Cooperatives, Forestry Section.

- Hassan RM, Mbuli P, Dlamini CS. 2002. Natural resource accounts for the state and economic contribution of forests and woodlands resources in Swaziland. CEEPA Discussion Paper No. 4. Pretoria: Centre for Environmental Economics and Policy in Africa, University of Pretoria.
- Helles F. 1999. Review of forest economics, policy and legislation in Swaziland. Mbabane: Forest Policy and Legislation Project, Ministry of Agriculture and Cooperatives, Forestry Section.
- Janse G, Ottisch A. 2005. Factors influencing the role of non-wood forest products and services. *Forest Policy and Economics* 7: 309–319.
- Lasschuit P. 1994. Rural household energy strategies in Swaziland. Amsterdam: Interfaculty Department of Environmental Science, University of Amsterdam.
- Lasschuit PE. 1995. Urban household energy strategies in Swaziland. Amsterdam: IVAM Environmental Research, University of Amsterdam.
- Lawes MJ, Obiri JAF, Eeley HAC. 2004. The uses and value of indigenous forest resources in South Africa. In: Lawes MJ, Eeley HAC, Shackleton CM, Geach BGS (eds), *Indigenous forests and woodlands in South Africa: policy, people and practice*. Scottsville: University of KwaZulu-Natal Press. pp 227–235.
- Mander M. 1999. The value and commercialization potential of biodiversity in Swaziland: a preliminary discussion. Report for the Swaziland Biodiversity Strategy and Action Plan. Mbabane: Swaziland Environment Authority/United Nations Development Programme.
- Mbuli P. 2003. Economic valuation of the forestry sector in Swaziland – a natural resource accounting approach. MSc thesis, University of Pretoria, South Africa.
- Mogaka H, Simons G, Turpie J, Emerton L, Karanja F. 2001. *Economic aspects of community involvement in sustainable forest management in eastern and southern Africa*. Nairobi: International Union for Conservation of Nature and Natural Resources, Eastern Africa Regional Office.
- Ogle BM. 1982. Dietary utilization of wild plant resources in the ecological zones of rural Swaziland. MSc thesis, University of California, USA.
- Olsen CS. 2005. Trade and conservation of Himalayan medical plants: *Nardostachys grandiflora* DC. and *Neopicrorhiza scrophulariiflora* (Pennel) Hong. *Biological Conservation* 125: 505–514.
- Robles-Diaz-de-León LF, Kangas P. 1999. Evaluation of potential gross income from non-timber products in a model riparian forest for the Chesapeake Bay watershed. *Agroforestry Systems* 44: 215–225.
- Shackleton CM. 1996. Potential stimulation of local rural economies by harvesting secondary products: a case study of the central Transvaal Lowveld, South Africa. *Ambio* 25: 33–38.
- Shackleton CM. 2002. Growth and fruit production of *Sclerocarya birrea* in South Africa Lowveld. *Agroforestry Systems* 55: 175–180.
- Shackleton CM, Shackleton SE. 1997. The use and potential for commercialization of veld products in the Bushbuckridge area. Nelspruit: DANCED–Community Forestry Project in the Bushbuckridge Area, Department of Water Affairs and Forestry.
- Shackleton CM, Shackleton SE. 2000. Direct use values of secondary resources harvested from communal savannas in the Bushbuckridge Lowveld, South Africa. *Journal of Tropical Forest Products* 6: 28–47.
- Shackleton CM, Shackleton SE. 2002. Household wealth status and natural resource in the Kat River valley, Eastern Cape. Unpublished report. Grahamstown: Rhodes University.
- Shackleton C, Shackleton SE. 2004. The importance of NTFPs in rural livelihood security and as safety nets: a review of evidence from South Africa. *South African Journal of Science* 100: 658–664.
- Shackleton CM, Shackleton SE. 2005. Household wealth status and natural resource use in the Kat River valley, South Africa. *Ecological Economics* 57: 306–317.
- Shackleton CM, Shackleton SE, Ntshudu M, Ntzebeza J. 2002. The role and value of savanna non-timber forest products to rural households in the Kat River Valley, South Africa. *Journal of Tropical Forest Products* 8: 45–65.
- Shackleton S, Shackleton C, Cousins B. 2000. Re-valuing the communal lands of southern Africa: new understanding of rural livelihoods. *ODI Natural Resource Perspectives* No. 62. London: Overseas Development Institute.
- UNCED (United Nations Conference on Environment and Development). 1992. Agenda 21. Chapter 11: Combating deforestation. Available at http://www.un.org/esa/dsd/agenda21/res_agenda21_11.shtml [accessed December 2009].
- UNEP (United Nations Environment Programme). 1992. United Nations Convention on Biological Diversity (UNCBD). Available at <http://www.cbd.int> [accessed December 2009].

Appendix 1: Plant species commonly used in Swaziland by non-timber forest product (NTFP) product use categories

Latin name	Siswati name	Common name	NTFP product use category*													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
Species with six uses																
<i>Sclerocarya birrea</i>	<i>umGanu</i>	Marula		+		+		+				+	+	+		
Species with four uses																
<i>Bauhinia galpinii</i>	<i>luSololo</i>	Pride of De Kaap						+	+			+	+			
<i>Berchemia zeyheri</i>	<i>Tineyi</i>	Red ivory		+				+	+			+				
<i>Dichrostachys cinerea</i>	<i>luSekwane</i>	Sickle bush							+	+				+		
<i>Euclea crispa</i>	<i>inDvodzemnyama, umDlelanyamatane</i>	Blue guarri		+		+		+	+						+	
<i>Syzigium cordatum</i>	<i>umNcozi</i>	Water berry		+					+	+		+				
Species with three uses																
<i>Acacia dealbata</i> †	<i>umTfalo</i>	Silver wattle							+	+	+					
<i>Acacia karroo</i>	<i>umGamba</i>	Sweet thorn										+		+	+	
<i>Brachylaena discolor</i>	<i>umPhahla</i>	Coast silver oak							+	+			+			
<i>Ficus sur</i>	<i>umKhiwa/umKhiwane</i>	Cape fig		+					+			+				
<i>Phoenix reclinata</i>	<i>liSundvu</i>	Wild date plum		+								+	+			
<i>Pterocarpus angolensis</i>	<i>umVangati</i>	Wild teak				+		+				+				
<i>Ziziphus mucronata</i>	<i>umPhafa</i>	Buffalo thorn		+									+		+	
Species with two uses																
<i>Acacia brevispica</i>	<i>luGagane</i>	Prickly thorn							+	+						
<i>Acacia davyi</i>	<i>umGamba</i>	Corky thorn							+	+						
<i>Acacia gerrardii</i>	<i>siNga</i>	Red thorn							+	+						
<i>Acacia nigrescens</i>	<i>umKhaya</i>	Knobthorn							+	+						
<i>Acacia nilotica</i>	<i>umGamba</i>	Scented thorn										+		+		
<i>Acacia</i> spp.	<i>siTwetfwe</i>	Thorn trees							+	+						
<i>Acacia tortilis</i>	<i>umSasane</i>	Umbrella thorn							+	+						
<i>Azelia quanzensis</i>	<i>umKholikholi</i>	Pod mahogany				+							+			
<i>Aloe boylei</i>	<i>inHlaba/Lisheshelu</i>	Broad-leaved grass aloe				+						+				
<i>Annona senegalensis</i>	<i>umTelemba</i>	Wild custard apple							+							
<i>Asclepias</i> spp.	<i>siDzayi/umDzayana</i>			+		+										
<i>Boscia albitrunica</i>	<i>iNgwavuma lensikati</i>	Shepherds tree					+						+			
<i>Breonadia salicina</i>	<i>umHlume</i>	African teak							+	+						
<i>Clausena anisata</i>	<i>umNukelambiba</i>	Horsewood				+		+								
<i>Combretum apiculatum</i>	<i>imBondvo lemhlophe</i>	Red bushwillow											+		+	
<i>Combretum</i> spp.	<i>imBondvo</i>								+	+						
<i>Cordyla africana</i>	<i>Thunzikhulu</i>	Wild mango					+						+			
<i>Cussonia</i> spp.	<i>umSenge</i>	Cabbage tree					+						+			
<i>Elephantorrhiza elephantima</i>	<i>iNtfolwane</i>	Eland's bean		+	+											
<i>Erythrina lysistemon</i>	<i>umSinsi</i>	Common coral tree											+	+		
<i>Faurea</i> spp.	<i>siCalaba</i>	Beechwoods							+	+						
<i>Ficus</i> spp. (3)	<i>iNkhiwane</i>	Figs							+							
<i>Halleria lucida</i>	<i>umBinta</i>	Tree fuchsia							+					+		
<i>Lannea discolor</i>	<i>siGaganjane</i>	Tree grape							+							
<i>Pittosporum viridiflorum</i>	<i>umFusamvu</i>	Cheesewood				+		+								
<i>Strelitzia caudata?</i>	<i>iNkhamango</i>	False wild banana					+						+			
<i>Themeda triandra</i>	<i>iNtungu</i>	Red grass												+	+	
<i>Trichilia emetica</i>	<i>umKhuhlu</i>	Thunder tree				+		+								

* NTFP product use categories: 1, Edible leaves; 2, Edible fruits and berries; 3, Other edible plant parts such as bark and roots; 4, Medicinal products; 5, Tannins; 6, Fuel wood and Charcoal; 7, Building material and fences; 8, Floral products, including florist greenery; 9, Landscaping; 10, Crafts & household items; 11, Fodder and forage (grazing); 12, Dyes; 13, Thatching material; 14, Cultural plants

† Introduced species