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Namibia is the driest and least densely populated country south of the Sahara Desert. It covers an area of more than 824,000 km² and has an estimated population of about 2.2 million people. Fortunately, Namibia is endowed with a rich biodiversity, including more than 690 rare and endemic or near-endemic plant species. A considerable number of these are also drought-adapted plants with actual and potential agricultural significance.

Sustainable wild harvesting and trading of INPs has the potential to contribute significantly to the alleviation of rural poverty and conservation of natural resources, partially through trade with developed markets internationally. Typically the poorest of the poor live in rural areas, and more often women who depend on INPs to improve their food security and who are increasingly engaged in the commercialisation of these products to improve their livelihoods. The positive impact and the economic value of natural products on the conservation of INPs in Namibia is gaining wide recognition with Government, civil society and community leaders alike, as rural communities increasingly assume more responsibility for the sustainable use and management of INPs.



Indigenous Plant Products in Namibia

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in Namibia



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foreword

Namibia at the forefront of INP Commercialisation

Although Namibia is the driest country in Southern Africa, it is fortunate to be endowed with an abundance of biodiversity. In Namibia, indigenous natural plant products (INPs) have made a valuable contribution to nutrition, health and body care of its people for millennia, and continue to do so today. Namibians have built up a substantial body of traditional knowledge and associated use of local plant resources. It is this knowledge and the increasing global trend towards natural products that have made the commercialisation of INPs in Namibia possible – and a success.

The Government of the Republic of Namibia through the Ministry of Agriculture, Water and Forestry (MAWF) recognised the important contribution that the commercialisation of INPs can make to poverty alleviation, job creation and biodiversity conservation. It is for this reason that in early 2000 MAWF supported the creation of the Indigenous Fruit Task Team (IFTT), which evolved in 2003 into the Indigenous Plant Task Team (IPTT) – a multi-stakeholder forum – to develop a coordinated approach and strategy for the promotion of the commercialisation of INPs in Namibia.

Namibia's indigenous plants are adapted to the harsh and drought-prone climate, and in many cases are more suited to the environmental conditions than conventional agricultural crops. The commercialisation of INPs is considered important, since it allows for the diversification of income-generating opportunities for rural Namibians, encourages better use of these resources and makes a positive contribution to farming systems and household food security, while stimulating the development of Small and Medium Enterprises.

MAWF takes its mandate from Vision 2030 where reference to 'sustainable development' and 'natural resources' is relevant and important to the continued development of the INP sector in Namibia. In particular, reference is made to creating an enabling environment to achieve the development of Namibia's 'Natural Capital' for the benefit of the country's social, economic and ecological well-being. In addition to the budgetary support the Ministry provides to the IPTT on an annual basis, it has also established the Plant Product Development Section at the National Botanical Research Institute. The role of this section is to coordinate national efforts to create benefits from INPs in Namibia.

MAWF understands that the commercial development of INPs is a long-term undertaking where issues such as product quality and reliable and sustainable supply are crucial for success in a market where competition is fierce and international regulatory requirements are challenging. MAWF emphasises the need for continued efforts towards building additional capacity focussed on local value addition to expand the opportunities for

and benefits to rural producers.

Many challenges remain to be overcome for the INP sector to realise its full potential. These challenges include dealing with aspects such as resource-base sustainability, management and technical capacity of producers, processors and local product formulators, managing supply and demand issues, undertaking local research and development, attracting appropriate investment, and consolidating and increasing markets locally and internationally. Addressing these challenges requires a long-term development view with necessary ongoing investments into all facets of the sector.

MAWF recognises the importance of the role played by other stakeholders, including line ministries, NGOs, the private sector and development partners in the growth of the INP sector in Namibia, and encourages them to continue doing so. For its part, MAWF remains committed to promoting this sector by providing resources and working with the other stakeholders to develop an economically thriving and internationally renowned INP sector in Namibia.

MAWF takes this opportunity to acknowledge the important contribution that the Millennium Challenge Account Namibia has made to the INP sector over the last five years, and commends the initiative of compiling this book on INPs in Namibia.



Joseph S. Iita
Permanent Secretary
Ministry of Agriculture Water and Forestry





introduction

Indigenous Natural Products in Namibia

Namibia is the driest and least densely populated country south of the Sahara Desert. It covers an area of more than 824,000 km² and has an estimated population of about 2.2 million people. Fortunately, Namibia is endowed with a rich biodiversity, including more than 690 rare and endemic or near-endemic plant species. A considerable number of these are also drought-adapted plants with actual and potential agricultural significance.

Namibia is now classified as an upper-middle-income country by the World Bank. This is, however, gravely misleading as Namibia's income distribution is probably one of the most unequal in the world and the country is still faced with chronic poverty in rural areas, where about 20% of the population is considered severely poor. The incidence of poor is 29% of the population, with more women than men considered poor. For rural communities, limited sustainable livelihood options contribute to land degradation and consequently a loss of biodiversity. Communities living in the harsh and already marginal agro-environments often depend on indigenous natural plant products (INPs) for their livelihoods. The challenge is to support them to benefit sustainably from that resource.

Sustainable wild harvesting and trading of INPs has the potential to contribute significantly to the alleviation of rural poverty and conservation of natural resources, partially through trade with developed markets internationally. Typically the poorest of the poor live in rural areas, and more often women who depend on INPs to improve their food security and who are increasingly engaged in the commercialisation of these products to improve their livelihoods. The positive impact and the economic value of natural products on the conservation of INPs in Namibia is gaining wide recognition with Government, civil society and community leaders alike, as rural communities increasingly assume more responsibility for the sustainable use and management of INPs.

So what are Indigenous Natural Plant Products or INPs as they are often more commonly referred to? Indigenous refers to something that is produced, growing, living, or occurring naturally in a particular region or environment, in this case Namibia. For the purposes of this book a simple definition of an INP: a product or products that are obtained from naturally occurring plants that would typically contain active components that could be used as ingredients in cosmetic, medicinal or food applications.

Up until recently (the late 1990s) much of the economic contribution from INPs originated from the informal trade sector, that is through local markets. However, Namibia's proactive approach towards further developing the INP sector on a more commercial basis has yielded significant economic growth opportunities, particularly at the local rural producer or harvester level. Some estimates have put the current annual value of the contribution to Namibia's Gross Domestic Product of INPs at between N\$30–50 million, with the potential to increase considerably. The growth in this sector is based on a strong and growing global demand for natu-

ral ingredients, including those currently harvested in Namibia for use in medicinal and cosmetic products. This book focusses on the following valuable species as the main pillars of INP commercialisation in Namibia: Inara, devil's claw, marula and ximenia oils, commiphora and mopane essential oils and the morama bean. However, there are several other species that have real commercialisation potential, including kalahari melon seed oil, manketti oil and other products derived from marula, such as juice. Many of the species that are now commercialised, were traditionally used as food, medicine and oil, and in other products.

The commercialisation of INPs in Namibia provides a good illustration of the relationships between resource conservation, poverty alleviation and the emerging trade in INPs in global markets. This is particularly relevant given Namibia's limited traditional agrarian (crop farming) potential where diversification of livelihoods provides supplementary income critical to rural communities. Income from INPs is used to buy food during periods when subsistence agriculture is not able to provide sufficiently for rural households. Supporting harvesters to form organised producer groups, which are able to negotiate contracts directly with exporters and manage the resource and its utilisation, is contributing to income generation and food security in rural areas. The challenge, on the one hand, is to forge appropriate linkages between producer organisations and international global markets, and on the other to gain widespread adoption of sustainable harvesting practices.

Another important factor of the INP sector is its contribution to the maintenance of biodiversity. This has been largely underpinned by Namibia's innovative Community Based Natural Resource Management (CBNRM) programme initiated just after Namibian independence in 1990. The premise of CBNRM is that resource management should be the responsibility of those living with and using the resources. The rationale behind this initiative is that they have a direct interest in the sustainability of the resources upon which they depend. One of the principles of CBNRM is that effective management of natural resources is

best achieved by giving the resource a focussed value. For wildlife resources in Namibia, these assumptions have held well, both on private and communal farmland. The same principles apply to the commercialisation of INPs in Namibia. Currently between 41–44% of Namibia's land is under some form of conservation, with close to 20% of this comprising communal conservancies and community forests, from which a large portion of INP commercialisation emanates.

For the successful commercialisation of any INP, it is essential to have an enabling policy and legislative framework to guide all stakeholders. The setting up of an enabling policy environment at an early stage is fundamental and something for which Namibia is internationally renowned. These devices provide clear guidelines for interventions and support at all the stages along the supply chain.

It is also important to understand that any investment in the development of INP enterprises should be seen as a long-term undertaking, since a viable INP sector is not built overnight. The industry is projecting strong and growing global demand in the future for natural ingredients, including those currently harvested in Namibia for use in medicinal and cosmetics products. Thus it is critical to address issues relating to improving quality while simultaneously increasing volumes to enable producer groups to meet market opportunities in the process of commercialising INPs. The establishment of private-sector partnerships is crucial from an early stage.

The purpose of this book is to provide a snapshot of the current status of the commercialisation of INPs in Namibia, as well as other relevant and related information. In doing so it is hoped that an increased in awareness and knowledge of INPs at all levels will be fostered, from informal markets to fully commercialised trade, and from income generation and food security to the maintenance of biodiversity. The intention is that this awareness will contribute to the continued growth of the INP sector in Namibia and place it at the forefront of INP commercialisation in the region and indeed internationally, in particular

policy, legislation and regulations

Creating an enabling environment

Dave Cole

There are a number of international and national policies, legislation and regulations that enable and guide the development of the commercialisation of Indigenous Natural Products (INPs) in Namibia. While they provide an enabling framework in which this can take place, they also provide regulations for the use of indigenous plants from a resource-sustainability perspective.

Although there are several cross-cutting international conventions, for example the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification (UNCCD), to which Namibia is a signatory, the most important and relevant are discussed below.

The United Nations Conference on Environment and Development (UNCED)

Probably the most important and relevant enabling framework for the commercialisation of INPs has its origin in the United Nations Conference on Environment and Development (UNCED). Known more commonly as the Earth Summit, it was held in Rio de Janeiro, Brazil in June 1992. At this time the Earth Summit was the largest gathering of world leaders in history, with 117 Heads of State and representatives from 178 nations. The main aim of the Summit was to reconcile worldwide economic development with protection of the environment, largely in response to ever-increasing concerns about environmental degradation at the expense of economic development. At the Summit the nations committed themselves nominally to achieve economic development in ways that would protect Earth's environment and non-renewable resources.

A significant result of the Earth Summit was the elaboration of the concept of sustainable development, which has now put environmental issues on the global political agenda. The concept originated from the Brundtland Report (1987), which was commissioned by the World Commission on Environment and Development in which Sustainable Development was defined as development which meets the needs of current generations without compromising the ability of future generations to meet their own needs. This definition has helped shape the international agenda and the international community's attitude towards economic, social and environmental development.

Important outcomes of the Earth Summit were the adoption of Agenda 21, the Rio Declaration on Environment and Development, and the Statement of Principles for the Sustainable Management of Forests. The Declaration on Environment and Development (Rio Declaration) laid down 27 broad, non-binding principles for environmentally sound development. Agenda 21 outlined global strategies for cleaning up the

environment and encouraging environmentally sound development. The Statement of Principles for the Sustainable Management of Forests – aimed at preserving the world's rapidly vanishing tropical rainforests – was a non-binding statement recommending that nations monitor and assess the impact of development on their forest resources and take steps to limit the damage done to them.

The Convention on Biological Diversity

Although the text was agreed upon at the Conference for the Adoption of the Convention on Biological Diversity (CBD) in Nairobi, Kenya in May 1992, the Convention was opened for signature in June 1992 at the Earth Summit. The CBD was inspired by the world community's growing commitment to sustainable development. The CBD has three main objectives: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources. The CBD has 194 parties to the Convention, with 168 countries having signed the Convention.

The Nagoya Protocol

An important milestone in the work of the CBD was the adoption of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation at the tenth meeting of the Conference of the Parties on 29 October 2010, in Nagoya, Japan.

The objective of the Nagoya Protocol is the fair and equitable sharing of the benefits arising from the utilisation of genetic resources. Utilisation includes appropriate access to genetic resources by appropriate transfer of relevant technologies, taking into account all rights over those resources and technologies and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its elements.

The fair and equitable sharing of the benefits arising from the utilisation of genetic resources is one of the three key objectives of the CBD. The Nagoya Protocol now provides a sound framework within which to achieve this objective.





In March 1997 Namibia's Parliament unanimously endorsed the CBD. Namibia was accepted as a signatory in May 1997 and in May 2014 Namibia became the 35th country to ratify the Protocol. The Ministry of Environment and Tourism (MET) is the Namibian Government's responsible entity for the implementation of these international treaties. It is duly obligated to compile regular reports on the progress made towards achieving the objectives of the treaties to which it is signatory.

National initiatives

While Namibia has a number of policies and regulations in place that are cross-cutting, the following are considered to be the most relevant for the development and commercialisation of INPs. There are possibly two key over-arching accountable entities of the Namibian Government directly responsible for INP development: the Ministry of Agriculture Water and Forestry (MAWF) and the MET, although others, such as the Ministry of Trade and Industry (MTI), also play important supportive roles.

The Namibian Constitution

The Namibian Constitution, which is widely recognised as one of the most forward-looking constitutions worldwide, lays the foundation for much of what takes place in Namibia. Key to sustainable utilisation and the development of INPs in Namibia is Article 95 (l) on the Promotion of the Welfare of the People, stating: The government shall actively promote and maintain the welfare of the people by adopting policies aimed at the... maintenance of ecosystems, essential ecological functions, processes and biological diversity of Namibia and utilisation of natural resources on a sustainable basis for the benefit of all Namibians both present and future.

This Article establishes a framework for environmental protection strategies and wise natural-resource management, thus laying a foundation for the way in which Namibia's cross-cutting environmental challenges can be addressed.

Vision 2030

Launched in 2004, Vision 2030 makes several references to 'sustainable development' and 'natural

resources' which are relevant and important to the continued development of the INP sector in Namibia. Under Chapter 6, with reference to Creating the Enabling Environment it states its objective as: ...to achieve the development of Namibia's Natural Capital for the benefit of the country's social, economic and ecological well-being.

More specifically, in Chapter 5 on Sustainable Resource Base under the forestry section, the sub-vision is: Namibia's diverse natural woodlands, savannahs and the many resources they provide, are managed in a participatory and sustainable manner to help support rural livelihoods, enhance socioeconomic development, and ensure environmental stability.

Linked to Vision 2030 are Namibia Development Plans (NDP), currently working under NDP4, which provide more specific reference to implementing the objectives of Vision 2030.

Legislative framework within the Ministry of Environment and Tourism

The key legislation that falls under the MET is the Nature Conservation Ordinance (4 of 1975). This Ordinance lists protected species (mainly for succulents) and stipulates that research permits are required for any research on these listed species. The Ordinance also makes provision for policies that set out sustainable-harvesting parameters for certain species, such as devil's claw and hoodia.

While Namibia's draft bill on Access and Benefit Sharing (ABS) is being finalised, the Interim Bio-prospecting Committee (IBPC) within the MET Environmental Commissioners' Office was established by Cabinet Directive in 2012. The aim is to regulate bio-prospecting and associated traditional knowledge using indigenous genetic resources, including plants.

The Nature Conservation Amendment Act (Act 5 of 1996) makes provision for the establishment of communal and commercial conservancies. This provided the basis for the creation of Namibia's Community-Based Natural Resources Management (CBNRM) Programme. The assumption underlying CBNRM is that resource management should be

the responsibility of those living with and using the resources. The rationale behind this argument is that such people have a direct interest in the sustainability of the resources upon which they depend. One of the principles of CBNRM is that effective management of natural resources is best achieved by giving the resource a value.

While this policy and legislation does not give members rights to the plant resources, it has resulted in functional local institutions that are representative of the residents. These local institutions have greatly facilitated the process of organising harvesters and enabling resource management.

Legislative framework within the Ministry of Agriculture, Water and Forestry

The Forest Act No. 12 of 2001 replaced the Forest Act (72 of 1968) and the Preservation of Trees and Forests Ordinance (37 of 1952). The Act makes provision for the establishment of Community Forests on communal land in Namibia. It is an area of land for which local communities have obtained the rights to manage forests, woodlands and other types of natural vegetation.

While the Conservancies gave communities user rights on wildlife and tourism-related activities, Community Forests have given the same in respect of ecological resources. The legislation is aimed at reconciling rural development with biodiversity conservation by encouraging individuals and local communities to manage forest resources on a sustainable basis.

Falling under the Directorate of Agriculture Research and Training in the MAWF is the National Botanical Research Institute (NBRI), which is chiefly responsible for maintaining plant diversity in Namibia. As regards the development of INPs in Namibia, the NBRI administers Material Transfer Agreements (MTAs).

These agreements set out conditions for the use of plant genetic material being exported for further research and development to ensure appropriate development, especially concerning intellectual property and the accrual of commercial benefits therefrom.

The MAWF Strategic Plan incorporates the goals and objectives of Vision 2030 and the NDPs. As part of the strategic plan, the Directorate of Research and Training has developed the Project entitled Support to the Processing of Indigenous Plants and Mahangu (Pearl Millet). Support, funding and a Secretariat, is provided to the Indigenous Plant Task Team (IPTT) through this programme.

The enabling environment created by the policy and legislative framework in Namibia has resulted in the development of a variety of local-level institutions that help harvesters to become organised, and facilitate the sustainable harvesting of INPs. The IPTT is one such institution.

THE INDIGENOUS PLANT TASK TEAM

Fourteen years of supporting the development of the indigenous plant products industry in Namibia

In early 2000 the Indigenous Fruit Task Team (IFTT), a multi-stakeholder forum, was created to develop a co-ordinated approach and strategy for the implementation of an economically sustainable promotion of indigenous fruit in Namibia. The formation of the IFTT was initiated by the Directorate of Agriculture Research and Training (DART) in the then Ministry of Agriculture, Water and Rural Development (now MAWF). The name was changed at a Strategic Planning Workshop in 2003 to the Indigenous Plant Task Team (IPTT) to reflect its widened mandate beyond fruits to include all indigenous plants. The purpose of the IPTT is to develop and coordinate the implementation of a national strategy for the promotion of products from indigenous plants and fruits in Namibia. Since its formation, the IPTT has made a significant contribution to the development of the indigenous natural products industry in Namibia, notwithstanding the constraints of funding and human resources.

The IPTT with its own Terms of Reference is a multi-stakeholder forum chaired by the Directorate of Agriculture Research and Training in the MAWF. It receives an annual budget from the MAWF, which is administered by the Namibia Agronomic Board (NAB). The IPTT comprises 14 core members, of

whom six have voting rights, and a number of other representatives with observer status. Members of the IPTT include government, non-government and community-based organisations, private-sector representatives, farmers' unions, research and academic institutions, and donor representatives. There is some fluctuation of observers, depending on what projects are being implemented at any given time. However, the IPTT is open to all interested parties involved in one way or another with INPs.

The IPTT plays an important steering and coordinating role in the promotion of the INP sector in Namibia. The IPTT meets quarterly, and to date has convened 77 meetings. During this time it has played an important role in the design and implementation of numerous projects, research and marketing initiatives. From time to time the IPTT also establishes sub-committees tasked to deal with specific matters related to the management or project aspects of the forum.

The IPTT has adopted a general pipeline¹ approach towards the development of opportunities from indigenous plants. This approach has allowed for the flexible allocation of limited financial and human resources to different resources in the pipeline to facilitate the movement of these resources towards developed products.

The “pipeline” approach is a strategic plan to proactively create sustainable economic opportunities in the trade of Indigenous Natural Products in Namibia.



The “pipeline” approach prioritises natural products with large and relatively quick market potential and promotes their commercial development through a strategy that addresses the entire value chain in partnerships with the private sector.

In October 2007, recognising the need to evolve and to be in a better position to serve the interests of the INP sector in Namibia, a Strategic Planning meeting of stakeholders was held. At this meeting, participants reiterated the need for the continued existence of the IPTT, but also recognised the need for changes in its organisational structure. Some far-reaching recommendations in this respect were made, although they have, for a variety of reasons, not been implemented.

In 2010, an organisational audit of IPTT funded by MCA-N was conducted. The audit recommendations included a change of structure and modus operandi, including the IPTT organisational structure for it to be able to continue playing a leading role in the development of INPs in Namibia, which were then endorsed at an IPTT Strategic Workshop held in September 2010. Another of the recommendations was that a Management Committee be established, leading to the formation of an interim Management Committee to oversee the transition. It was mandated to revise the Terms of Reference, develop an IPTT Strategy and Action Plan, and ensure the organisation of events at which a broad range of interested and affected parties would come together for the purpose of sharing information, stimulating cooperation and prioritising common actions that would further develop the INP sector in Namibia.

The Management Committee still meets frequently to discuss and make important programmatic decisions on aspects such as budgets, identifying and approving research projects, and reviewing and approving project proposals and reports. The IPTT has received over N\$7 million since 2001 to support activities undertaken by its members. A large portion of this funding was contributed by the Namibian Government and some donors, notably the Useful Plant Development Project, GIZ, the National Agricultural Support Services Programme, and more recently MCA-N. Interestingly, the existence of the IPTT was an important consideration for the inclusion of the INP Activity in the MCA-N programme, as it demonstrated an organised approach to the development of INPs in Namibia.

Over the past decade much has changed in respect of the indigenous plants products industry, with evidence suggesting there is much potential for further sustained growth in the industry. Namibia is well positioned to benefit from this growth. The growth in natural products worldwide, the growth in the number of Conservancies and Community Forests, and the specific investment by the MCA-N in the INP industry confirm this. It is clear, however, that the IPTT too must evolve within this shifting landscape, so that it can remain relevant to all stakeholders, thereby continuing to enable Namibia to be at the forefront of INP commercialisation in the Southern African Region.



Overview of the MCA Namibia INP activity

The Millennium Challenge Corporation (MCC) was established in January 2004 as a United States government corporation to implement the Millennium Challenge Account (MCA). Once the MCC has agreed to fund an entity, the entity becomes an MCA funded activity. The MCC's mission is to reduce poverty by supporting sustainable, transformative economic growth in developing countries that create and maintain sound policy environments.

When Namibia became eligible to receive an MCA grant, the MCA Namibia Compact was signed on 28 July 2008 between the Republic of Namibia and the United States Government, acting through MCC, providing grant funding of US\$304.5 million for public investments in Education, Tourism and Agriculture.

The Indigenous Natural Products (INP) Activity falls under the Agriculture component. Although it has the smallest share of funding, it has nevertheless been the single largest source of funding the INP sector has obtained since the formation of the Indigenous Plant Task Team (IPTT) in 2001. This section provides an overview of the MCA-Namibia (MCA-N) INP Activity, as much of the detail is contained in the other specific chapters in this book.

The goal of INP Activity was to increase the economic opportunities for INP stakeholders through improved organisational, business and technical capacities along the value chain. The INP Activity was expected to increase incomes for up to 7,000 primary producers (harvesters) and their households, benefiting approximately 35,000 individuals. The key objective of the INP Activity was increasing the direct participation of the primary producers in the marketplace along with value addition of raw, natural products such as marula, devil's claw, commiphora and ximenia.

The INP Activity has three sub-activities:

- Support to Producer & Processor Organisations;
- Provision of an Innovation Fund, and
- Delivery of market information on INP product and market data through the National Botanical Research Institute (NBRI) in the Ministry of Agriculture, Water and Forestry (MAWF).

Support to Producer and Processor Organisations

Capacity building of Producer and Processor Organisations (PPOs) in areas critical to sustainable organisations/businesses that can respond effectively to market demands for volume of quality products was the focus of this Sub-Activity. This was accomplished through the delivery of training and the provision of small Primary Production Improvement Grants (PPIGs) to PPOs. The name PPO generally refers to harvesters and/or col-

lectors that came into use with the MCA-N programme.

The rationale for awarding PPIGs was a response to alleviating INP production bottlenecks. The main motivation behind the PPIG scheme was to encourage INP PPOs to apply the training they received on sustainable harvesting, processing and marketing of INPs. In total there were eight rounds of grants awarded directly and indirectly to all the PPOs that had signed service agreements, amounting to a total of close to US\$300,000 or N\$3 million. The Natural Resources Institute (NRI) of the University of Greenwich teamed up with three Namibian organisations: the Centre for Research Information and Action in Africa Southern Africa Development and Consulting (CRIA SA-DC); Integrated Rural Development and Nature Conservation (IRDNC); and the Namibia Nature Foundation (NNF). All three these organisations are well known in Namibia for their work with indigenous natural products and community development to implement the activities associated with this contract. By creating and working with organised PPOs, the MCA-N INP Sub-Activity is ensuring that the benefits of current and future growth in the global market are reaching individual harvesters.

Highlights

- Worked with 67 Producer and Processor Organisations throughout Namibia
- Mobilised and trained over 9,000 producers (harvesters)



- Trained over 5,000 harvesters in devil's claw sustainable harvesting methods

Innovation Fund

The aim of the INP Innovation Fund (IF) was to provide grant funding to research entities, academic institutions, NGOs, and private firms for INPs, such as developing, testing, analysing and promoting improved technologies for processing. The broad objective was to contribute to the development of innovations for application in the INP industry that were considered essential to ensure their short- and long-term competitiveness in the global market place.

This was undertaken through a series of 'call for proposals'. As a result, INP IF Sub-Activity awarded nine grants over three rounds worth just over US\$1.9 million or N\$19 million. The grants awarded are:

- Inventory and Rapid Throughput Screening of Indigenous Utilised Plant Species for Development of New Natural Products
- Understanding Marula Fruit Chemistry to Enable Innovative Commercial Opportunities
- Optimal Oil Processing Technology and Competitiveness
- Namibian Essential Oil Innovation (NEOi) Project
- Innovative Joint Health Ingredient Obtained from Devil's Claw for the United States Markets
- Quality Improvement of Two Namibian Indigenous Oils and Devil's Claw
- Innovative, Safe and Active Cosmetic Ingredients
- Namibian Business Opportunities for the Opuwo Processing Facility (NOBO)
- Commercialising Marula Fruit at EWMM

Market Information Delivery on INP Product and Market Data

Market information is critical to sound business decision-making. Timely, reliable and transparent market information is not readily available to most INP stakeholders, especially to PPOs. For most PPOs, their sole source of market information comes from intermediate buyers. A third-party source to validate offers of buyers and/or provide a knowledge base from which to negotiate price can be a valuable decision-making tool.

In terms of the above, MCA-N in collaboration with the IPTT and the NBRI, compiled and produced six issues of the *INP Market Bulletin*. These provided figures on the trade as well as on other INP stories of interest and were generally aimed at increasing awareness of the INP sector among Namibian stakeholders. Under this Sub-Activity, funding and institutional support was also provided to the IPTT. In addition, MCA-N also funded a junior full-time position (INP Market Information Development & Support Officer) at the NBRI to support the IPTT secretariat.





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Acanthosicyos horridus



!nara

!nara (*A. horridus*)

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The Namib is a desert landscape that stuns with its awesome scenery and fascinates with its unique geographical features. The sandy habitat, developed by superlative geological processes over millions of years, hosts a myriad of life forms that have evolved and adapted to conditions that may appear to the uninformed as harsh and inhospitable. One of the most striking examples of adaptation to arid conditions is the desert cucurbit, !nara (*Acanthosicyos horridus* Welw. ex Hook.f.). The second part of the scientific name says it all – it is easily distinguished by its exceptionally spiny habit – but its rather formidable appearance belies the fact that this plant is a treasured and essential desert element. Not only does this flagship species play a vital support role to other organisms in the desert ecosystem, but is inextricably linked with desert-dwelling people to whom it offers a lifeline of sustenance, deeply entrenched within their cultural heritage. It can thus be considered both a keystone ecological and a keystone cultural species.

Description and distribution of !nara

!Nara is a leafless, thorny, melon-bearing bush that is endemic to the Namib Desert. The plants occur sporadically throughout this coastal desert from Port Nolloth in South Africa (last recorded in 1925) to Namibe in Southern Angola, with the greatest concentrations around the Kuiseb River Delta, and the most eastern distribution from around Sossusvlei. Recent explorative fieldwork has improved understanding of a more widespread occurrence in westward flowing ephemeral rivers of the northern Namib.



Plants are restricted to sand desert, often at the base of dunes, and are mostly associated with rivers ending in or flowing through the Namib, and their palaeochannels. They are absent from stony desert plains.

The plants form hummocks, which may extend over large surface areas, 1500 m² or more, ever-increasing as the sand continues to accumulate around the plant. The spiny domes of stems may project a centimeter to one meter or higher above the hummocks. !Nara, where it occurs, is usually the dominant feature in the landscape and is not associated with other vegetation, since few other plants can survive the wind-borne sand and rainless climate. The tangled, grey- to yellow-green masses of stems enable it to be easily recognised from a distance. As the plants are leafless, a desert adaptation taken to the extreme, it is these ridged stems and paired spines of 20–30 mm long, making up almost 50% of the total surface area of the plant, which enable the plant to photosynthesise. A thick, robust tap-root system, which may extend more than 50 m below the surface, efficiently draws moisture from deep underground. This, coupled with structural adaptations to limit evaporative water losses from the surface of the plant, enables the !nara to survive for many years without rain.

The plants are dioecious (male and female flowers on separate plants), with male flowers appearing throughout the year, and female flowers mostly during spring. Sex expression in cucurbits is controlled by environmental as well as genetic factors, and may explain discrepancies in the life-cycle events, such as flowering of northern populations, revealed during recent fieldwork.

!Nara fruit are round and melon-like, weighing mostly around 1 kg but sometimes reaching up to 2.5 kg. They are pale-green even when ripe, and spiny on the outside. The fruit has a mass of watery, orange-yellow pulp, which is sweet and aromatic, tasting like avocado or a cross between cucumber and pineapple. Toxic and potentially therapeutic compounds called cucurbitacins, which cause bitterness in the fruit, are currently under investigation in !nara. Further study of these compounds could elucidate taxonomic relationships; provide evidence to support the hypothesis of pre-selection as a husbandry practice; as well as present opportunities for novel pharmaceutical product development due to their professed anticancer properties. The large seeds are white to cream in colour with buttery kernels.

Taxonomy

Acanthosicyos horridus is a member of the Family Cucurbitaceae, a pan-tropical group of plants that is not closely related to any other plant family, but which includes several economically important crop species such as pumpkins and melons. Southern Africa is an important centre of diversity for the family, of which 46 species in 15 genera occur in Namibia. Several of these, including !nara, are endemic or near endemic. The only other species within this genus, *A. naudinianus* (gemsbok cucumber) is found on deep Kalahari sands, in the drier parts of Southern Africa. Fresh fruit pulp is a refreshing snack and thirst-quencher, while ripe fruit is cooked and eaten as a vegetable.

Ecosystem services

Studies in the Central Namib, mostly conducted in partnership with the Gobabeb Research and Training Centre, have repeatedly demonstrated the fundamental and irreplaceable role of this plant within the ecosystem. It is both a direct and indirect source of food to animals, while also providing shelter to a host of desert organisms. At least 26 vertebrate species depend on !nara, while the hummocks provide habitat for a host of invertebrates.



History of use

Significant data exist that intimate a long history of use. Fossilised plant roots occurring in Tsondab Sandstone suggest that !nara may have existed for as long as the Namib dunes. The earliest evidence of human use was documented through the identification of seed coat fragments from an archaeological site at Mirabib Hill shelter near Gobabeb, dated at approximately 8,000 years old. Several millennia after the initial introduction of pottery to Namib inhabitants, the appearance of wide-mouthed, soot-covered clay pots at 800-year-old archaeological sites indicates local innovation of cooking !nara fruit.

As evidenced by special praise songs that extol its virtue, !nara has a long association with and is central to the culture of the #Aonin/Topnaar people who have lived along the ephemeral Kuiseb River for more than 600 years.

Topnaar praise song for !nara

!Gubu ʔūse
You round food

//khuxa /khase
with many thorns

ʔgui samese
you many-breasted

ʔAoni-/gōan di gai-gai aose
foster-mother of the ʔAoni children

!nūse ta ga
even if I am far away

xawe ta nī ʔeisi
I will think of you

ti //naon ʔūse
you food of my ancestors

/urusi ta tite
I will never forget you

sas khemi ge deisi khois a /khai
there is no wet-nurse like you

Their renowned subsistence economy since precolonial times, based on a combination of harvesting natural resources on the verge of the desert and along the coast, and subsistence agriculture along the Kuiseb River, has been thoroughly documented, with most of this research focussed on the harvesting of !nara fruit. A maritime travel account from as early as 1677 records !nara use by indigenous people along the Namibian coast. British explorer, Sir James Edward Alexander, already found the inland region of the Kuiseb River to be densely populated with people and livestock in 1838, at which time the !nara was heavily but sustainably utilised.

However, historical sources and contemporary ethnography demonstrate other Khoekhoegowab-speaking peoples from elsewhere in the Namib, such as the Damara groups in north-western Namibia and the non-extant southern Namib Sān peoples still have or had similar practices and traditions, including inheritable exclusive utilisation rights. Harvesting !nara melons as a major food resource by some traditional communities has symbolically distinguished both the Kuiseb Topnaar and Damara peoples living from the Uniab to the Khumib rivers to be called *!Naranin* by their neighbours (a Khoekhoegowab name for people dependent on !nara). The Otjiherero-speaking Himba groups use the plant as an emergency food during famine and do not consider it a staple.



Harvesting and local use

In the past, !nara fields were divided into patches and allocated to different families, passing on to successive generations through inheritance, with ownership and access disputes resolved by the chief. This ensured sustainability of resource use. Today, however, !nara fields are largely commercialised, and have become a communal resource with no private ownership, thus affecting the direct relationship between the resource and those who have traditionally depended on it.



!Nara harvesting, during January to April, is a time- and labour-intensive process that requires an average of three hours to gather one kilogram of seeds. Harvesters usually spend four months at harvesting sites, collecting !nara for up to 11 hours a day, travelling to and between hummocks by donkey cart or on foot. A simple harvesting technique is employed – melons are loosened and teased from the thorny branches with long, wooden sticks. The modern use of hooked iron rods, often used indiscriminately by the inexperienced, can damage the fruit and bushes. The general rule is that when the melon is yellowish, the fruit is ripe enough to harvest. Unripe fruits are collected and covered with sand and plastic to ripen for three days. Harvested melons are then collected and returned to the huts in donkey carts. Harvesting is mostly undertaken by men, while women are mainly responsible for the processing.

The entire fruit is processed into a cornucopia of products. Sweet, juicy fruit flesh is eaten raw or cooked into a pulp. This processing involves scooping out and boiling the fruit flesh in large drums over open fires. Once reduced to half its volume, while being continuously stirred with long sticks, the pulp is strained and the seeds are removed. The pulp is eaten with porridge, or sun-dried for several days directly on sand or, more commonly of late, on plastic sheets to make '!nara chocolate'. This fruit-roll product, rich in vitamins, minerals and trace elements, is eaten on its own or with cooked maize porridge. The delicious, highly nutritious dried seeds, containing 57% oil and 31% protein, are relished as a snack. Both the chocolate and seeds are easily portable, can be stored without spoiling, and are eaten over many months. Not wanting to waste even a fraction of this valuable resource, the peels of !nara fruit discarded during processing are fed to donkeys and goats, and the unwanted seeds to chickens.

Although its importance as a staple has declined in recent years, being substituted by western food commodities, !nara is still consumed by the Topnaar because of its high nutritional value and their strong cultural association with this local food source. It remains a primary source of income and food security in many rural Topnaar households.

Medicinal uses of !nara abound and it is an important element in the traditional Topnaar pharmacopoeia. Eating fresh fruit pulp relieves stomach ache, while a decoction of roots is used as a 'life-elixir' to cure internal diseases; crushed root mixed with oil is smeared on wounds to hasten healing. Cosmetic applications include using the oil from raw or roasted seeds as a skin moisturiser or sunscreen.

Trade history

Some information, although largely anecdotal, exists for the formal !nara trade. Early accounts from the late 19th Century mention the export and sale of the seeds to the confectionary trade in South Africa, where they were marketed as 'butterpits'. This trade increased and reached a peak in the 1970s, when an estimated 26 tonnes of seed were traded annually. Over the ensuing years there has been a steady decline in trade from 15 tonnes per annum in the 1990s to less than four tonnes per annum. This trend has been ascribed to various factors, that range from environmental, e.g. the decline in the resource, to socioeconomic, such as change in cultural practices and alternate livelihood options; decrease in consumer demand; limited investment to explore product diversification.

Current !nara supply and value chain

As with all wild plant species, !nara fruit yields can vary considerably between and within populations, and are significantly impacted by a slew of external factors, including weather conditions and predation. A range of 20–500 melons has been recorded per individual bush, while each fruit can contain 50–200 seeds. Some 10–20 melons are required to yield 1 kg of seed. Using local knowledge, higher yielding, better quality fruit can be identified. Harvesters also recognise and differentiate between fruit with seeds to be retained for own consumption, shared with relatives, or sold.

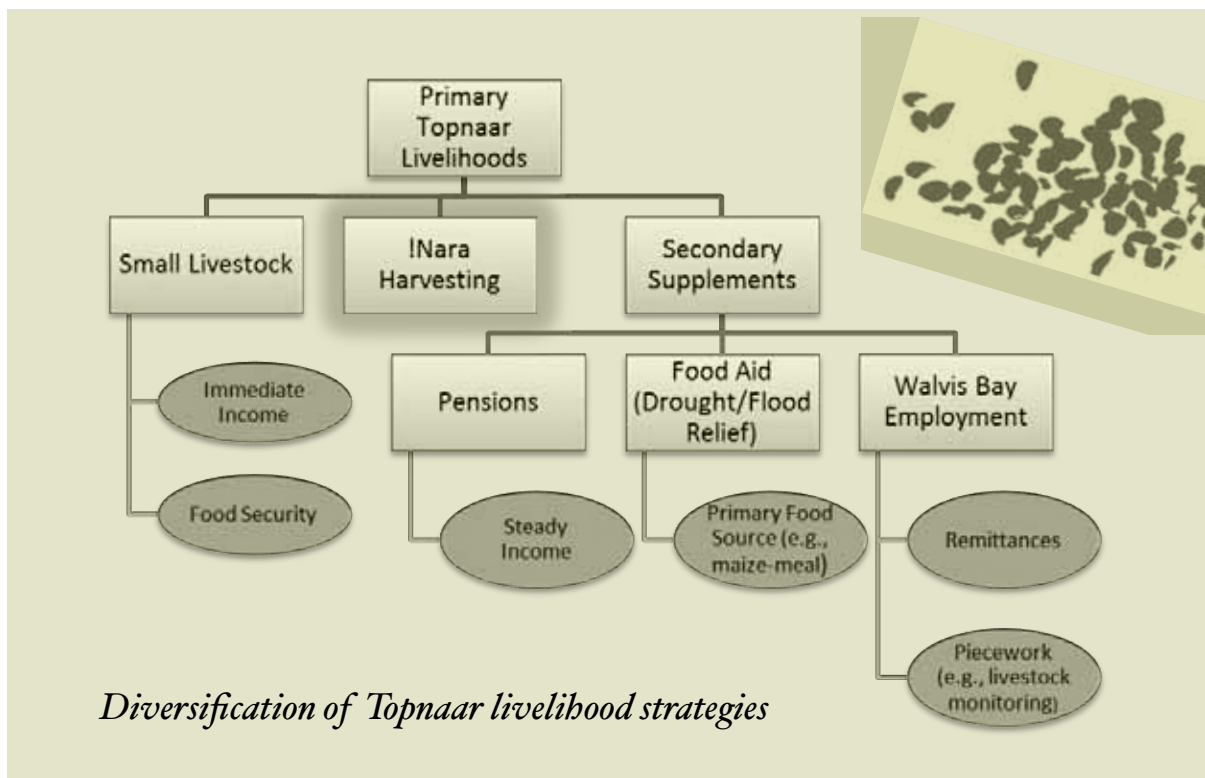
The current value chain is contained largely in-country. While primary production (harvesting) and processing of !nara melons are undertaken at household level, commodification follows two distinct market pathways. So-called 'coated' seeds are sold for direct consumption, primarily to consumers in Walvis Bay, in 1–2 kg plastic bags, with prices ranging from N\$10 to N\$20 per bag.

Harvesters also trade 'uncoated' seeds with Desert Hills, a Swakopmund-based, small-scale manufacturer, at a price of N\$22/kg. Currently, only about 15 harvesters supply seeds to Desert Hills, but many more offer seeds for sale after the harvesting season. Due to the small-scale nature of its operations, the seed demand from this enterprise is limited to about 3–4 tonnes per year.

Desert Hills further dries and sorts the seeds to ensure that only high-quality, uncoated seeds are processed to ensure good-quality endproducts. Value-addition processes include the cold pressing of fine virgin oil that is used in a variety of food and natural cosmetic products. The seed cake residue from the oil pressing is sold as livestock fodder to local farmers for N\$2.50/kg.

In 2004, the annual !nara seed harvest averaged about 490 kg per harvester, of which about 200–250 kg were sold. Based on prices at that time (N\$6–8/kg), the average annual income from seed sales was about N\$1,200–2,000 per harvester. These earnings were and still remain critical for the Topnaar harvesters, some 40% of whom have no other source of revenue. On average, about 43% of annual income derives from selling seeds, supplemented by state pensions and livestock keeping.





Although the !nara has obvious economic potential, sales volumes have steeply declined with the cessation of exports. Current income from seed sales is minimal, therefore commercial viability remains low. Investment into product diversification and development, supported by an improved understanding of the supply chain required to support value-addition, may open up opportunities to more fully exploit this resource.

Products from !nara

The oil produced from the seeds is bottled or mixed with other ingredients in food products or cosmetics. These products are available at the on-site Desert Hills outlet, as well as selected retailers in Namibia. International speciality cosmetic companies, such as The Body Shop, have previously expressed interest in the oil, but have been deterred by concerns regarding guaranteed supply of raw material.

Future of a nascent !nara industry

Given the obvious promise of !nara, it is somewhat surprising that the plant has not been prioritised in relevant INP programmes in Namibia. This reluctance has been ascribed to a plethora of complex and sensitive ecological, economic and social issues. During the early 2000s, a concerted effort to initiate multidisciplinary investigations into the biology and economics of this species was spearheaded by the Gobabeb Research and Training Centre and endorsed by the Topnaar Traditional Authority. The INP sector in Namibia has since matured and is gaining international credibility with the development and marketing of several successful plant derivatives, coupled with fair and effective benefit-sharing arrangements. A current resurgence of interest in the species, from a scientific as well as a development perspective, coupled with appropriate investment and a shared vision for its development, may elevate the !nara to its rightful place on the INP platform.

Challenges and opportunities

- A thorough investigation into the reported decline in yields from wild populations, coupled with agronomic trials to determine its cultivation requirements, will address concerns expressed regarding sustainability of supply, a prerequisite for investment by international concerns.
- Transdisciplinary studies can elucidate the centre of origin and diversity of this species, allowing for

standing that limits this culturally and geographically to the #Aonin / Topnaar of the Kuiseb. This has implications for the safeguarding of intangible cultural heritage, and for the development of access and benefit-sharing arrangements arising through commercialisation of species with existing indigenous values. In-depth ethnographic work can assist with ensuring inclusivity and fairness that acknowledges such complexity.



tracing back its ancestry and testing the hypothesis that this species has been preselected for certain agronomic traits by desert-dwelling people in ancient times. Valuable insights may be gained as to the evolution of farming as a land-use in Namibia.

- Scaling-up commercial exploitation opportunities using the fruit flesh, as well as seed oil, and exploring pharmaceutical benefits of cucurbitacins, should be considered to expand the portfolio of products from this species. This charismatic species, with strong cultural associations, is preconditioned to be a Namibian product to be marketed as a natural and exotic ingredient.
- !Nara knowledge and cultural heritage appears to be much more complex than the current understanding that limits this culturally and geographically to the #Aonin / Topnaar of the Kuiseb. This has implications for the safeguarding of intangible cultural heritage, and for the development of access and benefit-sharing arrangements arising through commercialisation of species with existing indigenous values. In-depth ethnographic work can assist with ensuring inclusivity and fairness that acknowledges such complexity.
- Changing cultural practices and increasing pressure from outside harvesters from Walvis Bay may shift utilisation to become unsustainable – “tragedy of the commons” effect. More effective regulation through the introduction of a harvesting permit system, issued through a national competent authority is required.
- A multi-phased business model for enhanced efficiency and value of the !nara commercial market should be developed, and support secured for its implementation. This model should incorporate the organisation and registration of harvesters as a Producer and Processor Organisation (PPO) or cooperative, equipped to manage resource use, and their capacity should be developed to maximise economic benefit to the community.

Successful business models developed for other INP commodities in Namibia, such as *Commiphora resin*, exist and could provide useful lessons learnt. Ultimately, a more influential role and a greater share of the benefits derived along the entire value chain should accrue to the harvesters.

- Understanding the generational dynamics regarding traditional practices is key to ensuring the ongoing viability of the entire !nara market system, and strategies need to be considered to incentivise Topnaar youth to embrace these practices, for example micro-opportunities for value addition within the harvester community.



Gobabeb and !nara – where science meets culture

“When I first came to Gobabeb as a research intern in 2011, I was welcomed by Aunty Caroline with a glass of !nara milk. When she gave me the glass, it looked more like banana-flavoured *osbikandela*, the Namibian cultured milk I grew up with. She took a sip and then told me to drink. Within a blink of an eye, the glass was empty. Of course, it didn’t taste anything like *osbikandela*. It had a bittersweet taste. I asked her what it was and she said, ‘This is the breakfast of the Topnaar people’.”

Rosalia Iileka is a graduate in natural-resource management. She was recently appointed at Gobabeb, specifically to support plant-related research. Nestled against the imposing dunes of the Namib sand sea and the riparian woodlands of the Kuiseb River, the Gobabeb Research and Training Centre has a long history of arid-zone ecological research and education. Over the course of several decades, staff at the centre have focussed their research effort on one of its signature plants !nara. Working in close collaboration with the local Topnaar community, a significant body of knowledge on this plant has been and continues to be generated by this world-renowned centre. Rosie hails from northern Namibia and has found working in the Namib to be a revelation. She has grasped the opportunity to develop her research skills and gain new knowledge about this unique desert and the species found here.

Caroline Swartbooi is a member of the Topnaar community. She was born and raised in a small village called Dabebdraes, which means ‘the corner of the grey bush’ in the local Khoekhoegowab language. Dabebdraes is located on the banks of the Kuiseb River, 33 km from the closest town, Walvis Bay, where Caroline attended high school. She grew up collecting !nara melons for eating and selling. Over the years, Caroline continued harvesting !nara and selling seeds so that she could send her children to school. Caroline now works as head of housekeeping at Gobabeb. She still has a very strong connection to !nara and readily assists with !nara research projects at the station. Even though she has formal employment, her life continues to revolve around this important plant resource, and she harvests !nara to supplement her salary. “I take my leave days around the harvesting months of December to January so that I can harvest enough before other people get it all” she says.

Caroline still goes to the field in a donkey cart, equipped with a small tent, and enough food and water, travelling until she finds a suitable place to harvest. She makes sure that she finds a good camping spot, preferably where there are tall trees to provide enough shade. Before nightfall, she sets up her tent and starts collecting firewood for processing the fruit pulp. Mornings in the !nara fields can be foggy and



quite chilly, so she waits for the fog to clear, but needs to work quickly before the scorching sun becomes unbearable. Harvesting starts at around 06:00, with a lunch break just like for any other worker. Before it becomes too hot, she carts the harvested melons to her camping site. Once there, she starts cooking them to retrieve the seeds. Caroline stays from two to three weeks in the field, moving from one area to another in search of ripe melons to harvest. In the past, her family used to own hummock dunes, but this proprietorship system has been abolished. “Nowadays anyone can harvest any plant. This causes damage, and people often harvest unripe melons,” she cautions. Harvesting methods have also changed, further endangering the continued supply of this valuable resource.

Coming from the north where local farmers cultivate and depend on mahangu (pearl millet) for their livelihoods, Rosie is interested to learn that the Topnaar, considered one of the most marginalised peoples in the world, depend on this endemic plant for their daily nourishment. “The !nara plant is one of the most important bush foods in the Namib Desert, as it has nutritional, medicinal and agricultural uses,” extols Caroline. She explains that the thorny plant is their main sustenance and various parts of the fruit are prepared and eaten in many ways. Seeds are roasted; pulp is mashed to make porridge; and oil is extracted from the seeds to make cosmetics.



After that first taste of !nara milk, and learning about the importance of !nara to the Topnaar, Rosie is eager to find out more. The young scientist and seasoned harvester set off on a short excursion to one of the !nara bushes not far from Gobabeb. The spiny, leafless bush is both intriguing and formidable to Rosie, who initially keeps well clear of the tangled mass, fearful of stepping on the painful thorns. In a second, Caroline plucks one of the melons, cuts it in half, and smilingly pronounces: “This one is ripe and must taste sweet.” Handing over a piece, Rosie’s verdict is that it tastes more like mango – she can’t stop licking her fingers. Caroline’s favourite !nara products are the milk and pap (porridge), but it seems that the delicious fresh fruit is definitely Rosie’s preference.

Caroline describes the !nara plant as integral to her cultural identity. If this resource is compromised, she and her community will suffer. Given its fundamental role in Topnaar culture and its significant potential for commercialisation as an indigenous natural product, investigation into the agronomic requirements of this plant seems an obvious priority. Future partnerships between the community and scientists may realise this promise, but for now, it continues to sustain the Topnaar living along the Kuiseb River, as it has for hundreds of years. Caroline only hopes that the younger generation will carry on harvesting !nara in a sustainable manner and appreciate its cultural significance, and that Gobabeb researchers like Rosie will find solutions to the concerns of the community – so that the !nara legacy lives on.



Chapter 2

Harpagophytum



devil's claw





devil's claw

devil's claw (*H. procumbens* & *H. zeyheri*)

Dave Cole

Devil's claw, known for its effective treatment of arthritis and rheumatoid arthritis, probably has one of the oldest histories in the commercialisation of any indigenous natural plant product in Namibia, starting in the 1960s. Found almost throughout Namibia, with the exception of the arid west, devil's claw is an important INP in terms of the number of the poorest of the poor earning much-needed supplementary cash income by being involved in its harvesting and trade. It is also important because of the volumes traded and the significant export earnings that Namibia accrues, which depending on volume, are estimated to be in the region of N\$20-30 million per annum over the last five years.

Harpagophytum, more commonly known as devil's claw, comprises two species: *H. procumbens* and *H. zeyheri*. The plant is a geophyte with a main taproot from which secondary or storage tubers extend, and it is these secondary storage tubers, which contain the highest concentrations of secondary compounds, including harpagoside, that are harvested for their analgesic and anti-inflammatory properties. Devil's claw derives its name from the fruiting body, which has sharp, re-curved hooks protruding off the fruit, which assist in seed dispersal by attaching themselves to almost anything, including animal pelts. Interestingly many of the local names for devil's claw (*gamagu* in Damara, *makakata* in Oshindonga, *omalyata* in Oshikwanyama, *otjibangatene* in Oshihenero and *malamatwa* in Silozi) in Namibia refer to this feature. The name devil's claw is a direct translation from the German name *Teufelskralle* whereas the English name for the plant is actually grapple plant.

Devil's claw harvesters are generally subsistence farmers living in communal areas where resources are limited and shared. Agricultural activities include rain-fed crop farming, which does not provide a secure source of food or market opportunity. Many households do not own livestock or only have small numbers of animals. These communities are most vulnerable during the dry months, especially if they have been unable to store sufficient quantities of grain during the rainy season to provide staple foods during the rest of the year. During these periods households need to buy food to supplement the limited amounts they have been able to produce

through agricultural activities and, in some cases, what they can harvest from wild foods.

Devil's claw harvesting and sales by harvesters to traders takes place after the end of the rainy season. The Namibian devil's claw policy states that devil's claw can be harvested from March to October, but harvesting generally starts in June, once the rains have ceased and crops have been harvested from the fields.

Historical overview

The indigenous inhabitants of Southern Africa, mainly the San, have made use of the plant's tubers for medicinal purposes for centuries. Ethno-medicinal uses have been recorded mostly for digestive disorders, fever, sores, ulcers and boils, and as an analgesic. Today, devil's claw is widely used in rural communities, mostly as a general health tonic, an analgesic and a treatment for digestive disorders.

Although the plants were first collected and described by European scientists in 1822, the medicinal properties of devil's claw were only 'discovered' in Namibia in 1907 by GH Mehnert, as a result of his access to the knowledge of the indigenous Khoi and San people. This early bio-prospector exported some dried devil's claw tubers to Germany, where they were first studied by B. Zorn at the University of Jena in the 1950s, whereafter the medicinal value of devil's claw for the treatment of rheumatism, arthritis and other ailments of this nature began to be recognised by 'western medicine'. In 1962, the Namibian company Harpago (Pty) Ltd started exporting devil's claw-tubers in larger quantities to the German company Erwin Hagen Naturheilmittel GmbH.

Devil's claw products are registered as Herbal Medicines in France and Germany, and as Food Supplements in the United Kingdom, Netherlands, the USA and the Far East. Lending credibility to its efficacy, devil's claw's applications are listed in various references, amongst which the following are considered to be the most important:



- **The European Pharmacopoeia.** Published in 1964, sets out common standards for the composition and preparation of substances used in the manufacture of medicines, with the aim of guaranteeing their quality. The monographs listed have the force of law, replacing earlier national pharmacopoeias. It supplies manufacturers with a list of 'reference samples', enabling them to ascertain and ensure the quality and conformity of medicines produced and marketed in Europe, or exported from it. It is recognised as one of the main authorities on medicinal quality and safety, and its cooperation with the European Union has resulted in the setting-up of a scientific research programme to standardise biological medicines, and an official network of medicine control laboratories. This pooling of expertise helps to ensure that the same quality standards are applied throughout Europe.
- **The German Commission E** (the German equivalent of the Food and Drug Administration (FDA) in the United States), is a governmental regulatory agency that was established in 1978 to evaluate and approve traditional, folk and herbal medicaments and to publish monographs listing uses and side effects. Under one of these monographs, devil's claw is indicated for the treatment of painful arthrosis,

loss of appetite and dyspepsia, and as a supportive therapy for degenerative disorders of the locomotive system.

- The monographs of **The European Scientific Cooperative on Phytotherapy** (ESCOP), founded in June 1989, is as an umbrella organisation representing national phytotherapy associations across Europe with the aim of advancing the scientific status of phytomedicines and assisting with the harmonisation of their regulatory status at the European level. ESCOP recognises it for the treatment of painful arthrosis, tendonitis, loss of appetite and dyspepsia.

More recently, in 2004, the EU Directive on Traditional Herbal Medicinal Products 2004/24/EC came into force aimed at making the entry of traditionally used medicinal products into the EU simpler, while at the same time ensuring that quality and safety standards are met, thereby providing safe usage information and giving the public confidence in the use of these applications. A seven-year transitional phase was granted for unlicensed products on the market to become registered. A necessary requirement for registration was that the product should demonstrate at least 30 years of traditional use, of which 15 years must have been in the EU. By April 2011, all herbal



medicinal products had to be registered under this directive to remain in the market. They could either be designated as ‘well established use’ or as ‘traditional use’. However, there seem to be differences in the interpretation of the above, for example, in Germany devil’s claw is approved under the ‘well established use’ category, while elsewhere it is approved under ‘traditional use’.

Clinical research has demonstrated the efficacy of devil’s claw as an analgesic, antirheumatic and anti-inflammatory agent in the treatment of, for example, back pain. Its main commercial use today derives from an extract from the root tubers which is added to various proprietary joint-care products. Active ingredients that have been noted include iridoid glycosides such as harpagoside, procumbide and harpagide, phenols such as acetosid and isoacetoside, and other substances including harpagoquinones, amino acids, flavonoids and phytosterols. The relative presence of these complex molecules constitutes the main chemical difference between *H. procumbens* and *H. zeyheri*.

In general, the level of active ingredients, in particular that of harpagoside, is used to determine the quality of dried tubers supplied. Aqueous or ethanol-based technologies are most commonly used for the extraction of the active ingredients, although extraction can also be effected with liquid carbon dioxide and a co-solvent. Various patents regarding extraction technologies have been registered.

Broadly speaking there are presently three key market segments for devil’s claw:

- as an extract in herbal medicines – generally referred to as ‘traditional herbal remedies’ – sold over the counter as opposed to on prescription from a medical doctor.

In Germany, the proportion of prescriptions from physicians for the treatment of poly-arthritis, and back and joint pains that included *Harpagophytum* had increased significantly from 40% in 2000 to 60% in 2001, accounting for approximately 74% of the treatments for rheumatism in that country. This, however, decreased when devil’s claw (and a number of other “natural products”) was removed

from the list of claimable items on medical aid schemes in 2004. By mid-2004, the sales of herbal medicines in Germany (including devil’s claw) had decreased by approximately 50%.

- as a raw material for veterinary herbal remedies or animal food supplements, or an extract in a proprietary veterinary ‘cure’; and
- as a herbal tea with therapeutic qualities.

Of these traditional herbal medicines are estimated to have the biggest market share (92%), followed by veterinary medicine (5%), and then herbal tea (3%).

Resource distribution, conservation and cultivation

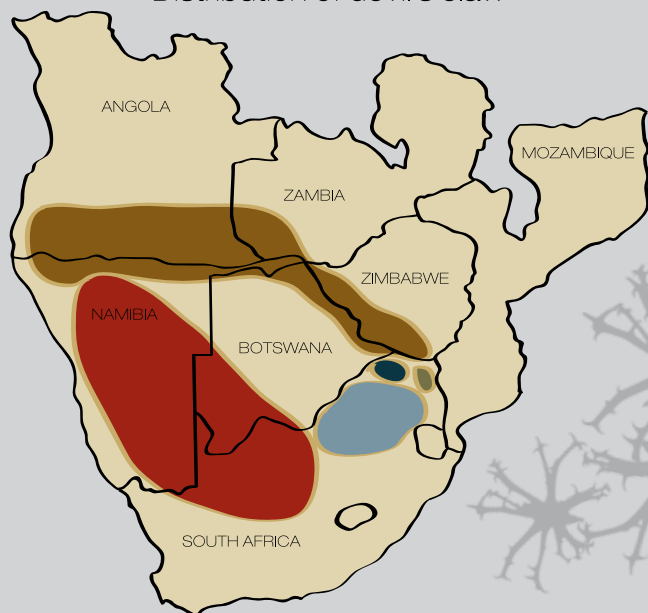
Devil’s claw or *Harpagophytum*, grows in many parts of Southern Africa, mainly in deep Kalahari sands that cover much of the region. Populations have been recorded in Angola, Zambia, Zimbabwe, Namibia, Botswana, South Africa and Mozambique. It comprises two species, *H. procumbens* (with two subspecies, *procumbens* and *transvaalensis*) and *H. zeyheri* (with three subspecies, *zeyheri*, *sublobatum* and *schijffii*)

Devil’s claw is a perennial prostrate vine and has a strong taproot with a number of secondary storage tubers growing laterally off of the taproot. *H. procumbens*, which is the more sought-after species due to its higher concentration of active ingredients, is concentrated in central and southern Namibia, north-eastern South Africa and central-western Botswana. *H. zeyheri* occurs further to the north, in both Namibia and Botswana, as well as in Angola, South Africa and Zambia.

Regulations and conservation

In Namibia, devil’s claw was listed in 1977 as a protected species by the former Ministry of Environment and Tourism under the Nature Conservation Ordinance of 1975 and, as a result, permits were required for harvesting, trade and export. This system was introduced due to increased trade and the subsequent concerns regarding the conservation status of the species. Devil’s claw is protected through similar legislation in both Botswana and South Africa and, more recently, Zambia but not in Angola.

Distribution of devil's claw



Adapted from Iblenfeldt H. D. & Hartmann H. 1970: Die Gattung *Harpagophytum* (Burch.) DC. Ex MEISSN. (*Monographie der afrikanischen Pedaliaceae II*). – *Mitteilungen des Staatsinstituts für Allgemeine Botanik Hamburg* 13: 15-69.

However, a Namibian study in 1986 established that only 10% of the harvested devil's claw was being harvested with a valid permit, and the permit system for harvesting, possession and transportation of devil's claw was subsequently discontinued, as it could not be effectively implemented. Permits thereafter continued to be required only for the export of devil's claw and were mainly intended as a way to monitor exports - no quotas or other limitations were imposed.

Increasing concerns regarding possible over-utilisation in Namibia were raised again in 1999. This was due to a dramatic increase in export figures of dried devil's claw from approximately 300 tonnes in 1996/7 to over 600 tonnes in 1998/9, and to reports of unsustainable harvesting practices (unsustainable harvesting refers to when the taproot is removed) and exploitative prices being paid to harvesters. This prompted the Government of Namibia to reintroduce an amended permit system for the harvesting of devil's claw.

In 1999 the government drafted a policy in 1999 concerning the use of devil's claw resources but never ratified it. With the support of the Millennium Challenge Account Namibia Indigenous Natural Products (MCA-N INP) Activity the Namibian Government

revised and ratified the policy in 2010. The MET has the task of enforcing the policy and uses traceability as a tool, where permits are required for all stages of production and the sale of devil's claw. One of the main aspects of this policy is that a 'harvesting season' (1 March – 31 October) was established with no harvesting permitted outside of this period. In addition, traders and exporters now have to complete a test on various aspects related to the policy in order to be registered with the MET as such.

Concern regarding the sustainability of the devil's claw resource was also highlighted at an international level when, in April 2000 at the Convention on International Trade in Endangered Species (CITES) eleventh Conference of Parties (CoP 11) held in Kenya, Germany proposed that both species be listed on Appendix II. Namibia and other Southern African range states did not support the listing and the proposal was withdrawn, primarily because of the absence of scientific data to support it.

There has been no comprehensive range-wide survey to determine the extent of the devil's claw resource within Namibia, largely due to the many difficulties, such as the vast area that would need to be covered, the remoteness and inaccessibility of many areas, as well as some difficulty in finding the plants, particularly in wooded areas. Population figures cited in the literature are therefore local and/or anecdotal. Reports of population densities vary from less than one to more than 2,000 plants per hectare. Plants tend to occur in definite population clusters, which can possibly be explained by the adventitious establishment of a single mother plant due to animal-borne seed dispersal, followed by a localised population increase from that mother plant. However, there might also be a correlation with groundwater availability, and competition for this resource from other deep-rooted plants.

While not essential in determining and ensuring sustainability some knowledge of the extent of the resource would go a long way in forecasting potential wild production levels.



Cultivation

As with many other indigenous plant products, ensuring consistent and increasing supply are not features that escape devil's claw. Commercial cultivation is now possible, and has been tested in both Namibia and South Africa. To date, however, the continued availability and the lower prices paid for wild harvested devil's claw has meant that only limited production has taken place. There has been considerable debate regarding the possibility of the supply of commercially cultivated devil's claw having a negative impact on harvesters of the wild product. In this respect, however, two scenarios can be considered, one which sees cultivation marginalising rural harvesters, the other benefiting them.

Negative impact: The supply of large quantities of cultivated material could impact negatively on the livelihoods of rural harvesters by taking up much of the market share. For a variety of reasons, such as the unavailability of capital, technology and, in some cases, access to land, it is unlikely that rural harvesters would be able to enter into commercial cultivation. If the cultivation methods that are currently being developed can succeed under a more favourable climatic, human resource and institutional/infrastructural conditions, but cannot be replicated in the context of the far less favourable conditions prevailing in traditional-use areas, the expropriation of the rights of the original providers of traditional knowledge regarding devil's claw will have been completed, with the only winners being the commercial farming and pharmaceutical sectors.

Positive impact: Appropriate cultivation efforts at a rural level could have a positive impact on the livelihoods of rural harvesters. For example, appropriate cultivation efforts, such as enrichment planting, could provide rural harvesters with the opportunity to increase their resource base, thereby ensuring their continued participation in the trade. At the same time, cultivation efforts could also provide an opportunity to 'rehabilitate' areas in which unsustainable harvesting has taken place. Enrichment planting involves planting seedlings into areas where devil's claw already grows but does not require any 'traditional' cultivation upkeep, such as weeding.

Supply chain

The harvesting of and trade in devil's claw in Namibia is characterised by a complex set of formal and informal arrangements. In the supply chain, material does not simply move from harvester to trader to exporter. There is a complicated network of trading that takes place between the harvester and the exporter. Understanding this system is further complicated by a lack of information and data, particularly regarding the informal



sector, which plays a large role in the supply of devil's claw. In terms of supply, three main groupings can be identified: harvesters, traders and exporters.

Harvesters

Harvesters in Namibia are drawn from the poorest segments of society, who eke out a living under the most marginal of agricultural and socioeconomic conditions and who rely on the harvesting and sale of devil's claw to generate some cash income. The importance of this income to household food security should not be underestimated. The exact number of harvesters of devil's claw in Namibia is unknown, however, some estimates have put this figure to be between 3,000 - 5,000 harvesters. The following generalisations can be applied to the organisation of harvesters:

Individual harvesters: These harvesters generally live within or close to a harvesting location, but may move to other areas during harvesting times. They are independent and will in most cases sell directly to an exporter. In some cases, however, devil's claw may be sold to traders.

Group harvesters: It is more common that harvesters are organised into groups who harvest in a particular area. The manner in which they are organised varies quite considerably and also determines the income they generate from harvesting. These groups fall into two broad categories:

- Organised into a group by a middleman and taken to a particular area in which they may remain for some months to harvest. The middleman will supply food and water when they collect the dried devil's claw from the harvesters. The cost of food and transport is often deducted from the wages that harvesters receive on completion of harvesting. In this scenario, harvesters are unlikely to receive fair compensation for their harvesting efforts. The bulk of devil's claw is supplied in this manner.
- In other instances, harvesters are organised into groups by other bodies (NGOs and church organisations), which attempt to maximise the benefits to harvesters. This has seen a prolific increase in recent years, particularly with the implementation of the MCA Namibia INP Activity.

The manner in which harvesters are organised and the benefits they receive have a direct impact on the sustainability of the harvesting practices.

Traders

In terms of the devil's claw policy of 2010 traders are now required to be registered with the MET. However their roles are largely unknown and there seems to be a fluctuation in and out of the trade depending on demand, economic incentive and need. Some traders operate on an ad hoc basis, while in other cases some exporters have highly organised supply networks with a number of traders directly linked to them. There are other, more opportunistic, traders, however, that will supply any exporter.



There is clearly a link between the number of traders, or marketing layers, between harvesters and product manufacturers on the one hand and the benefits derived by harvesters on the other. There is usually a chain of traders between harvesters, the exporters and the processors of the final product, and the poor price paid to harvesters is often a reflection of this.

However, traders could also play a positive role by linking poor rural harvesters to the market and by providing other services that would not otherwise be available to them. For a marketing system to be mutually beneficial, it would have to be organised in a manner that prevents the exploitation of harvesters by traders.

Exporters

Exporters are also required to be registered with the MET. The number of exporters of devil's claw from Namibia has also varied over the last decade or two. For example, between 1995 and 2002 there were 17 Namibian exporters who each exported two tonnes or more of dried devil's claw, with some exporting more than 100 tonnes. More recently, however, there appear to be no more than five main exporters. In general, all of them have additional sources of income and, in most cases, the contribution of devil's claw exports to their incomes is relatively small (between 2.5 and 25%).

In June 2014 these five main exporters decided to form a Namibia Devil's Claw Exporters Association as a Trust with the support from MCA-N which provided legal and technical assistance. The main thrust of the Trust is to promote and protect the trade in devil's claw in Namibia. This is a noteworthy achievement and, while it is still early days, should at least send a message to the international market that there is at last some form of collaboration and coordination in Namibia.

The vision of the Trust, is to promote a sustainable, profitable, active and quality-driven devil's claw industry in Namibia, while the objective is to constitute an entity to represent the devil's claw industry in Namibia with respect to resource sustainability, sustainable harvesting, supply-chain management and en-

suring benefits to all stakeholders, traceability, quality control, local value addition, policy development and generic marketing. The Trust will promote and aspire to the following core standards and values, in relation to the devil's claw industry in Namibia:

- Implementation of sound regulatory systems to control mandated standards and quality assurance around resource sustainability, production, processing and marketing;
- Promotion of export diversification and local value addition by increasing market access to competitive markets;
- Strengthening of relations with Government and key stakeholders leading towards improved collaboration and partnerships;
- Promotion of sustainable harvesting and trade of devil's claw in Namibia on a basis ensuring adherence to the Namibian policy on devil's claw;
- Promoting and ensuring that all devil's claw purchased, imported and exported from Namibia, is of the highest quality and fully traceable;
- Establishing a mechanism to undertake generic marketing, including the promotion of 'premium Namibian devil's claw', that is devil's claw that meets all the relevant standards.

The Sustainably Harvested Devil's Claw Model

Although for decades devil's claw has been an established product in the world market, the industry was not focused on sustainability or benefit sharing with harvesters. Prior to the introduction of the Sustainably Harvested Devil's Claw (SHDC) model, the industry's growth was based on exploitative relations of production and trade between harvesters and exporters, and between exporters and European buyers. Some estimates have indicated that Namibia captures between 1 – 2% of the value of the trade in devil's claw extracts and harvesters consequently not more than 0.5%.

The SHDC project started in 1997/98 as a pilot on one farm, namely Vergenoeg (an Afrikaans word meaning

‘far enough’), and by 1999/2000 had expanded to 17 other farms in the Omaheke Region. The project was implemented by the Centre for Research Information and Action in Africa, Southern Africa – Development and Consulting (CRIAA SA-DC). Its implementation was funded by a number of donors at that time.

The MCA-N INP Producer and Processor Organisations (PPO) sub-activity has enabled significant scaling up to occur in the last three years. The SHDC concept introduced a simple benefit-sharing model based on the insight that there is a growing congruence of interests linking ethical consumerism in the Northern Hemisphere to sustainable resource use and socioeconomic equity in the Southern Hemisphere.

In addition to the donors mentioned above, the involvement of the private sector was crucial to the setting up and sustainability of the project. Mike Brooke of the Organic Herb Trading Company (formerly Hambleton Herbs) in the UK was interested in sourcing sustainably harvested devil’s claw, and played a key role in the very early phases of the project. Another key SHDC project partner was the devil’s claw exporting firm Gamagu, owned by Mike and Sabine Krafft of Dordabis in Namibia, who supported the implementation by entering into buying agreements with the harvester groups, which ensured consistency and improved prices to harvesters.

The basis of the SHDC project is formed by the activation and organisation of groups of registered harvesters. Harvesters engage in an exchange of knowledge on sustainable resource use, and voluntarily adopt sustainable resource management practices which they have helped to formulate. Pre- and post-harvest ecological monitoring surveys help them to set sustainable harvesting quotas and to monitor compliance with sustainable harvesting techniques. These techniques were tested in a five-year research programme to investigate the long-term impact of regular harvesting on the plant populations’ regeneration and growth rates. Importantly, the research showed that there were no adverse impacts detected.

Key to sustainable practices introduced by the SHDC model is the harvesting only from mature plants, and taking only the secondary tubers. This is achieved by only harvesting a portion of the tubers from each plant over a two-year period with a further rest period of two to three years or harvesting all the tubers with a three-to four-year rest period between harvests. In addition, the taproot is not disturbed and the hole is refilled with soil after harvesting to enable re-growth in two to three years. The innovative SHDC model, however, is more than just a sustainable harvesting technique it considers mechanisms to maximise benefits to harvesters. Supporting harvesters to organise into harvester groups so that they can collectively sell directly to an exporter rather than to an informal trader is an important aspect of this strategy. The SHDC model includes the following key features:

- Training and registration of harvesters who apply for a group permit
- Management system for quality control and record keeping that guarantees product traceability
- Sustainable harvesting methods, compliance of which is ensured through harvest monitoring and post-harvest impact assessments
- Reliable partnership with local exporter, which secures a market and access to market information
- Premium price paid directly to harvesters

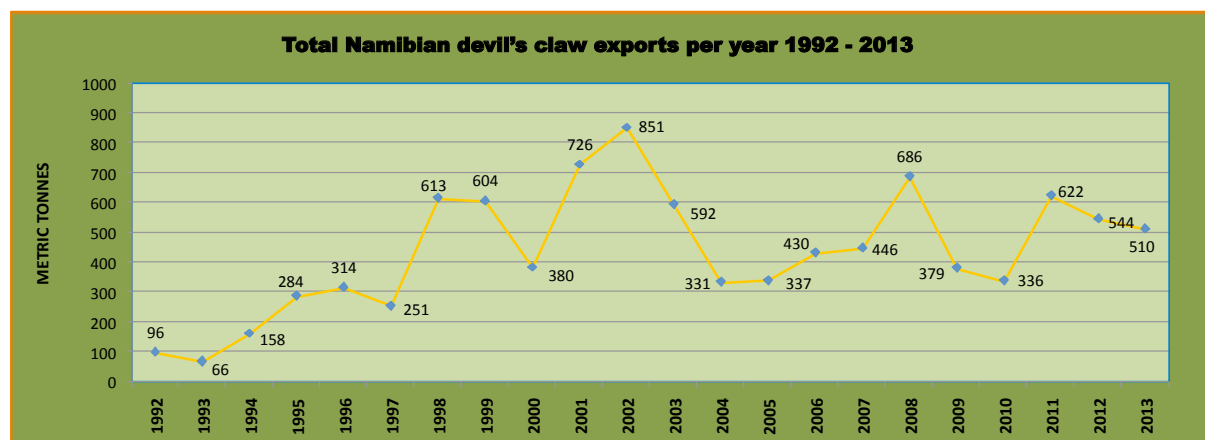
Prior to the MCA-N INP intervention there were nine organised harvester groups representing some 830 harvesters who supplied approximately 46 tonnes of sustainably harvested devil’s claw during the 2009 harvesting season. This generated almost N\$590,000, or about N\$710 per harvester. In 2011, there were 18 harvester groups supported by the MCA-N INP Activity who collectively produced more than 100 tonnes of devil’s claw, and harvesters earned approximately N\$1.9 million; with 1,321 harvesters, this equates to

N\$1,500 per harvester. In 2012 there were 23 harvester groups comprising 2,254 harvesters who produced and sold 215 tonnes with the collective contribution to harvester's income amounting to approximately N\$ 4.2 million, or about N\$1,880 per harvester. In 2013 there were 19 harvester groups who harvested and sold 104 tonnes and directly earned about N\$2.4 million, with 1,494 harvesters earning almost N\$1,660 per harvester.

PPOs that received support through the MCA-N INP Activity supplied almost 20% of Namibia's devil's claw exports in 2011, close to 43% in 2012 and approximately 20% in 2013. The decline in 2013 was largely due to a proposed ban by the MET on harvesting and trade in the Zambezi Region (formerly Caprivi) which did not materialise but took time to resolve. As a result it was considered by many harvester groups to be too late in the season to start harvesting and although it resulted in reduced revenue to harvesters, allowed the area to rest for the year.

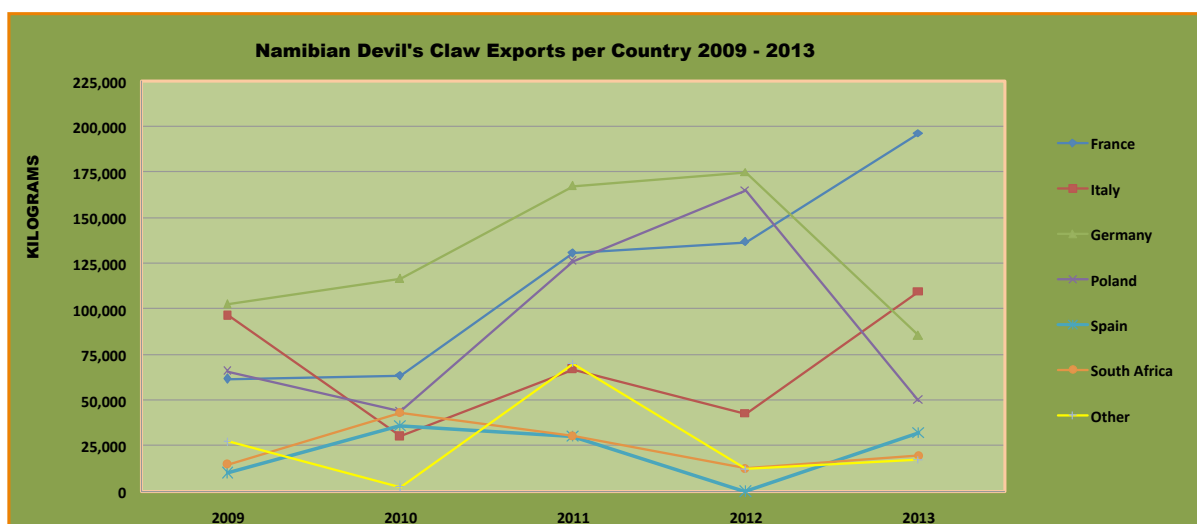
Market value

Namibia is by far the largest supplier of devil's claw in the world, providing at least 90% or more of the product used worldwide, although more recently significant quantities originating from Angola and Zambia have been reported. Other range States such as Botswana and South Africa also export, but to date in smaller quantities. However, records (where they exist) of production from all the other range States indicate some inconsistency attributable to numerous problems that occur in managing a harvesting permit system, including bypassing the system and under-reporting even where a permitting system is in place.



The first large scale exports of devil's claw from Namibia were recorded in 1962. Namibia exported a total of more than 9,500 tonnes to European and other markets between 1992 and 2013, with an average annual export of approximately 435 tonnes. Although highly speculative, the value of foreign export earnings to Namibia from devil's claw from 2011 to 2013 is estimated between N\$20–30 million per annum based on figures obtained from Namibian exporters. The reason for the speculation is that there is no fixed price for devil's claw exports and export prices received by Namibian exporters are kept confidential.

Although there is some variation in countries that import devil's claw from Namibia, France, Italy, Germany, Poland, Spain and South Africa were the largest importers between 2009 and 2013. In total, 12 countries imported devil's claw from Namibia during this period. The above mentioned countries all imported 100 tonnes



or more in total while the 'other' countries, Switzerland, China, Brazil, South Korea, United Kingdom and the United States imported less than 100 tonnes in total.

Trends in the export of devil's claw over a single year seem to indicate three main peaks in activity - March/April, June to August and October/November - with the last being the highest peak.

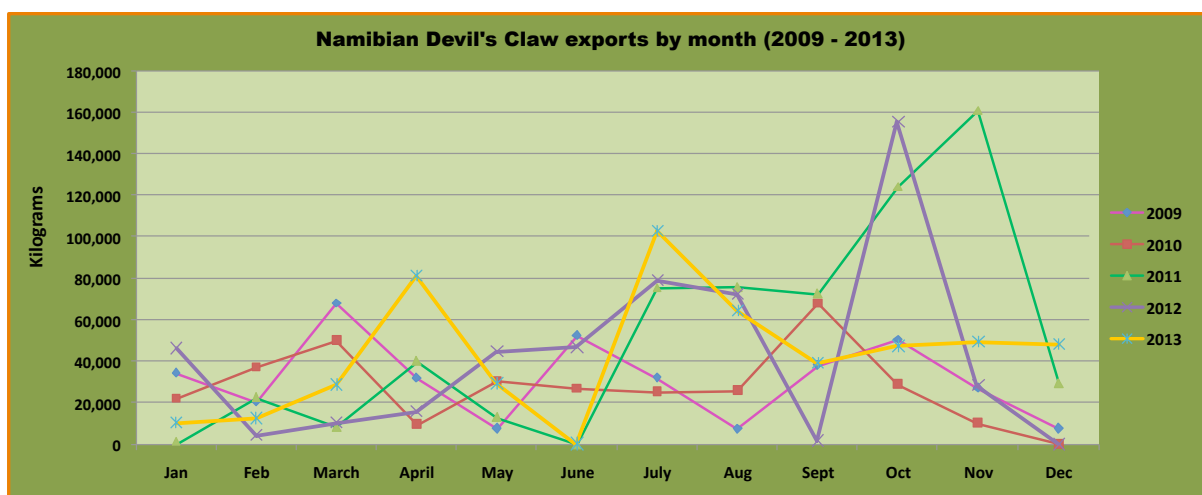
Value addition

Currently no in-country value addition takes place in Namibia apart from the initial slicing and drying, although a new initiative to develop an extract locally was initiated in 2012, supported by MCA-N. Although it is still too early to tell whether this will take off, preliminary indications are that such value addition would be economically viable.

In 2002 research indicated that although devil's claw from Namibia is sorted and bagged by the Namibian exporters before export, between 60 to 80% of it went to international buyers that only cleaned, graded, pre-processed (ground) and repacked it. Only about 12% of the exports went directly to extractors/manufacturers. The balance of devil's claw exported went to unknown buyers that may themselves have extracted or manufactured their own products. There is no real evidence that this has changed since 2002, with the exception of a Namibian company (ECOSO Dynamics) that now produces tablets and powder for the retail market. However, even they send the dried devil's claw to South Africa, where the tablets are manufactured under contract.

Once devil's claw has left Namibia, it moves through a complicated network of phyto-extract processors and end-product manufacturers, including:

- phyto-ingredient suppliers who stock hundreds of different plants in their unprocessed form;
- specialist phyto-ingredient suppliers who stock certified, cleaned and sliced devil's claw for the manufacturers of end products; and
- extraction companies who buy devil's claw for producing extracts that are either used in their own branded products or sold to other manufacturers of branded products.



Based on export data from the Ministry of Environment & Tourism Permit Office

Nevertheless 'value addition' remains a complex idea for devil's claw in Namibia. The Namibian market is small and would be unable to take up a significant quantity of a local value-added devil's claw product. Value addition is constrained further by a number of extraction and other patents that are held outside of the country. In addition, regulations governing export of a finished product into many countries are stringent and costly to overcome, and this, coupled with the costs associated with marketing a product internationally, make local value addition of devil's claw in Namibia rather unappealing.

The future

The harvesting and trade of devil's claw has come a long way since the 1960s. The fact that it is still in reasonably good shape is testament to the resilience and determination of those who continue to be involved in the trade. Current demand worldwide appears to be stable and should continue to be so considering the proven efficacy of devil's claw in the treatment of arthritis and rheumatism.

Significant progress in many areas has also been made in terms of resource management, sustainable harvesting and trade. With respect to policy and regulation, Namibia in 2010 amended its policy on devil's claw to strengthen the monitoring of various aspects of the trade with particular emphasis on ensuring traceability throughout the supply chain. Based on the Namib-

ian policy Zambia also introduced and promulgated legislation in 2013 that is aimed at improving resource management, harvesting and trade.

Noble efforts have also been made at expanding the SHDC model. Having been pioneered by one small group of harvesters, it is now implemented by 24 organised harvester groups throughout Namibia and presently probably covers in the region of 4 million hectares. Similarly organised groups, based on the SHDC model, are now also being established in Zambia and Angola.

Within Namibia there are estimated to be between 1,500 to 2,500 harvesters organised in such a manner. Added to those in Angola and Zambia this number could now be as high as 4,000. Increased harvester organisation has also been boosted by the formation in Namibia of the Namibian Devil's Claw Exporters Association.

This augurs well for resource management, quality control, improved harvester income and trade. However, Namibia and other producing range states remain price takers rather than price setters. Bold and innovative decisions will need to be taken if the opportunity that this presents is to be taken full advantage of.

Despite the advantages and improvements mentioned above, remain a number of challenges that will need to be addressed if this advantage is to be fully pushed home.

Firstly, all of the mechanisms and other institutional arrangements mentioned above will need to be maintained and grown.

Secondly, policy and regulation will be ineffective unless they are fully implemented and remain pragmatic in their approach so that while they address conservation issues they, at the same time, provide realistic guidelines to support sustainable harvesting and the trade, including local value addition, of devil's claw.

Thirdly, and perhaps most importantly, the harvesting of and trade in devil's claw offers a small but important opportunity for rural inhabitants to generate much-needed cash income. These benefits are available only for a limited season and are dependent

on environmental conditions. The socioeconomic issues influencing and impacting on devil's claw resource management, harvesting, trade and benefits cannot be seen in isolation from the broader socioeconomic issues facing people in the rural areas of Namibia today.

In this regard there is an ever-increasing pressure on the devil's claw resource as a means for rural inhabitants to generate much-needed income.

There is, therefore, an urgent need to create other income-generating opportunities to supplement the benefits obtained from devil's claw if there is to be any substantial improvement in the livelihoods of the rural poor.



Pioneers of sustainably harvested devil's claw

Early in the previous century, on his farm Nababis near Mariental, Gottreich H Mehnert observed how a seriously wounded Nama man, on whom European doctors had given up, was cured completely by a traditional herbalist. Intrigued, Mehnert tried to find out which plant he had used. The healer refused to share his secret, but Mehnert, with the help of his hunting dog, found the hole where the healer had dug up the tubers of devil's claw (*Harpagophytum procumbens*) and the aardvark hole into which he had stuffed the foliage to further safeguard his knowledge.

Mehnert subsequently used the tuber himself, and found it highly beneficial. While in the internment camp in South Africa during the Second World War, many of his fellow internees were in poor health and medical care was very limited. So he asked his friends to send him dried devil's claw from the farm and started experimenting with treatments, which proved to be surprisingly effective for arthritis and rheumatism; gall, kidney and digestive problems; pain in general; and for improving the overall health of his companions.

After the war, devil's claw was tested extensively in Germany and eventually certified as an effective remedy. Mehnert started to produce and sell devil's claw tea, branded as Harpago Tee. Devil's claw tea was also produced in Germany from material imported from the former South West Africa.

At the same time antibiotics were being used increasingly. Extolled as the ultimate panacea for almost every illness, they almost eclipsed herbal medicines. However, a few farmers continued to buy the tubers from harvesters, exporting them mainly to Germany and France. When the adverse

effects of antibiotics became evident, the attention once again turned to herbal remedies.

In the late sixties on their farm Ibenstein, Sabine and Mike Krafft were pondering how to broaden the income basis of their farm when devil's claw, among other options, was mentioned during a visit of Mrs Krafft's mother from Germany. Back in Germany, Mrs Krafft's mother overheard a conversation at her hairdresser's on the wonderful medicinal effect of devil's claw. She immediately approached the ladies involved, and learnt that they were connected to an importer of devil's claw. Contact with Ibenstein was made, and a market was established.

While growing up on Ibenstein, Mike Krafft also learnt about devil's claw from Hans Mehnert, a nephew of Gottreich Mehnert and farm manager on Ibenstein for several years. Initially, the Kraffts bought devil's claw from neighbouring farms. They subsequently arranged with certain residents of the Rehoboth area to collect and deliver cut and dried devil's claw, obtained mostly from San harvesters in the Kalahari and in the adjacent parts of Botswana. The Kraffts then registered 'Gamagu', the local name of devil's claw, as their trademark. Their business policy was and is to pay a fair price to the harvesters and to deliver excellent quality to their clients in Germany at a fixed price, irrespective of exchange rates.

The business thrived until the 1980s, when the trade in devil's claw declined sharply and almost came to a standstill, a low point that lasted from about 1985 until the early 1990s. However, from about 1994 onwards, the demand for devil's claw picked up again. The powder was now presented in the form of capsules and tablets, with the bitter

taste eliminated. Knowledge of its effectiveness and the absence of harmful side effects spread, as did the general trend away from chemical medication.

Then in 1997/1998 a new opportunity of being able to support harvesters of devil's claw directly presented itself. At this time a local NGO – CRIAA SA-DC (Centre for Research Information Action in Africa Southern Africa Development and Counselling) – was working with harvesters on the farm Vergenoeg in the Omaheke Region to develop the Sustainably Harvested Devil's Claw (SHDC) model. One of the cornerstones of this model depended on a fair price being paid to harvesters, and a commitment to purchase devil's claw from the registered harvesters. This suited the company philosophy well and soon the centre was engaged on a long-term basis with harvesters from this farm and many others in the region. The positive outcome of this relationship between the harvesters and the Kraffts has enabled this system to be duplicated throughout Namibia, with more than 24 harvester groups now harvesting and selling devil's claw today.



“I see this harvesting as something that gives life”

Fritz Kamti and August Jacobs are among the pioneers of the Sustainably Harvested Devil's Claw model that took shape in 1997 on the farm Vergenoeg situated some 130 kilometres north-east of the town Gobaabis in the Omaheke Region of Namibia. Fritz and August moved to Vergenoeg when the farm where they were employed was sold, leaving them without work. The Vergenoeg farm was purchased in the early 1980s by the then government as emergency grazing for communal farmers in the region.

Fritz, who is now 69 years old, is married to Frieda and has seven children, and August, who is now 68 and married to Martha, also has seven children. These two are both still very active harvesters of devil's claw at Vergenoeg. When they moved there, there were very few opportunities to earn an income. They survived by doing odd jobs for others living at Vergenoeg or on neighbouring commercial farms.



As a result they started to harvest and sell devil's claw to a commercial farmer in the vicinity. This was, however, erratic and only possible when asked by the farmer. Payment was meagre – all they received was about N\$1.00 per kilogram. Although they tried to harvest sustainably, the processing was done with little regard to product quality. “We used to dry the devil's claw on grass, either on the ground or on the corrugated iron roof.” The sustainable harvesting of devil's claw at this time was also eroded by this particular commercial farmer, who brought outsiders in to do the harvesting, and who wasn't concerned about taking care of the resource.

Subsequently a pastor connected to the Roman Catholic Church also started organising the purchasing of devil's claw from the residents when he came to Vergenoeg on Sundays to conduct church services. Although the price was slightly higher than the farmer was paying them, they were still unsure whether

they would sell their devil's claw, and when they would be paid. At this time there were also opportunistic 'bak-kie buyers', that is traders who frequently came to Vergenoeg to buy devil's claw. Although the devil's claw they bought was not weighed, the price they paid was probably in the region of N\$4.00 per kilogram.

It was in 1997 that consultants from the Centre for Research Information and Action in Africa, Southern Africa – Development and Consulting (CRIAA SA-DC) came to Vergenoeg to discuss the estab-



lishment of the Sustainably Harvested Devil's Claw project. "With this we started organising ourselves into a group and paid more attention to resource management and producing a good-quality product, as we now had appropriate knives to slice the devil's claw, and nets on which to dry it. We also started selling it by the kilogram to the exporting firm Garmagu, owned by Mike and Sabine Krafft of Dordabis. this was the first time we started talking about kilograms,, they explained. They add that there were certain challenge. At the time our need for

cash income was great, and this put pressure on the resource. However, we dealt with it by introducing a household registration/quota system, which made it fairer for all of us. We still had to deal with the 'bak-kie buyer', but their prices were lower and we now knew the real price of devil's claw.

Asked about their recipe for success, they reply: For you as a person, this is the only source of income, and therefore you must do it properly." They add that earning a reasonable income for their efforts had also motivated them to harvest sustainably and produce a good-quality product. "We were now organised as a group and were no longer selling as individuals. we also knew what the price was going to be before we started to harvest, so we knew that we would sell."

Asked about how they felt about the Sustainably Harvested Devil's Claw project expanding from Vergenoeg to 24 harvester groups in 2013, Fritz replies: For me, myself, I am pleased with what has been done from when we started until now, and as I said before, there is no other chance to earn money.

When I hear that it's time to harvest, I get excited. No one is forcing you to harvest. You are putting yourself in that situation, and as long as you do it the right way, you don't get problems.

August adds: "I am pleased to hear that the business has grown over the country. If you do it properly, there are no problems. I see this harvesting as something that gives life.

Both Fritz and August have travelled to meet with other harvesters, Fritz having visited the Nyae Nyae and Na#Jaqua conservancies, and August having visited harvesters in the Victoria Falls area in Zimbabwe. They have attended numerous workshops and meetings, promoting and encouraging others to follow suit. They are true pioneers of sustainably harvested devil's claw in Namibia.

Harvesting enriches life in Nyae Nyae,

In 1998 the Nyae Nyae Conservancy became the first communally-based conservancy to be gazetted in Namibia. It is also one of the largest conservancies, covering an area of just under 90,000 hectares (8,992 km²). It is situated in the Otjozondjupa Region, with the settlement of Tsumkwe situated in the middle of the Conservancy.

The San living in the Nyae Nyae Conservancy speak Ju/'hoansi. Although their ancestral land has been much diminished in size, they still reside on some of the *n!ores* (villages or farms that demarcate an area where residents of a village can hunt and gather). It is this *n!ore* system that provides the basis for the conservancy's devil's claw management plan.



The Nyae Nyae Conservancy provides a good example of how the Sustainably Harvested Devil's Claw (SHDC) project can improve various aspects related to the harvesting, trade and resource management of devil's claw. Up until recently devil's claw from the Nyae Nyae Conservancy was characterised by unsustainable harvesting practices,

exploitative prices paid to harvesters, and inferior quality. In 2003 the Conservancy initiated its own SHDC project, enabling harvesters to start organising themselves into groups on a village basis, receive training on sustainable harvesting and processing, use appropriate processing equipment, and negotiate a purchase contract with a reliable buyer.

Since 2010 the MCA Namibia INP Sub-Activity has continued providing support to harvesters and the Conservancy. In this way harvesters are given training that relates to resource management, including legislative compliance, sustainable harvesting and processing methods, as well as general institutional development. They have also received support to ensure that contractual arrangements with a buyer are in place before the onset of the harvest season. This process involves the negotiation of the annual price per kilogram, which is paid directly to harvesters, and a management fee paid to the Conservancy for management and monitoring activities, organising the buying points, and ensuring quality control.

Many of the devil's claw activities in Nyae Nyae would be impossible to implement if it were not for the important work undertaken by a number of key people in the conservancy management team. One such person is N!aici Kagece, aged 42, married and hailing from a small village called Makuri. N!aici became the Nyae Nyae Conservancy's devil's claw co-ordinator in 2010.

Each village has a local coordinator to assist N!aici. His main tasks are to train harvesters, register them, apply for harvesting permits, issue small processing equipment, assist the buyer on purchasing trips, and prepare documentation for the annual organic inspection.

N!aici says about his work: “It is good for me to do the job, as it builds my capacity and experience. It is also good to work with members of the community by assisting them to earn an income. Income is very important for people to buy food and clothes.” N!aici adds that although it is sometimes difficult to work with communities, the key to successful community work is: “...to engage with harvesters so that problems can be identified and addressed. Otherwise we will not move forward.”

However, due to logistical constraints, working in such a large area such as Nyae Nyae is not easy. “The Conservancy has a lack of transport and this hampers my work. I need to visit the villages and harvesting areas to ensure that the work is being done properly and in accordance with our (conservancy) rules.”

In 2011 harvesters in the Nyae Nyae Conservancy earned N\$252,188 directly from the sale of close to 11 tons of devil’s claw, while the Conservancy earned close to N\$54,000 as a management fee. In the following year, 68 harvesters earned N\$93,476 directly, while the conservancy generated only N\$15,025 from the sale of 3.756 tonnes of dried devil’s claw. In 2013 there were 118 harvesters who harvested and sold close to eight tons of devil’s claw, generating direct income of just over N\$262,000.

The reason for the drop in 2012 compared to 2011 is, as N!aici puts it: “Although harvesting is done sustainably, the resource is under pressure because income is much needed. Plants need to rest for two to three years before the tubers are big enough and they can be harvested again. In 2012 approximately seven villages (*n!ores*) decided on their own not to harvest, so as to give their plants a rest. This is a very difficult decision for people who desperately need income to make, but it shows their commitment to sustainable harvesting.

“It is important that we harvest sustainably so that we can continue to harvest and sell devil’s claw in the future. That is why we do monitoring both during and after the harvesting has been completed.”

The San in Namibia

Devil’s claw harvesters, mainly San, are among the most marginalised and powerless people in Namibia. They number between 32,000 and 38,000, comprising six groups each with a distinct language, custom and history. They are an indigenous community who historically hunted and gathered food throughout Namibia. During the colonial era, the former South African Administration in the then South West Africa forcibly evicted most of their population from land they had occupied for millennia. It is estimated that 80% of the San have been dispossessed of their ancestral land. Because of this displacement and a long history of marginalisation, the San are considered one of the most vulnerable minority groups in the country. Most San today have little access to employment or consistent income, with up to 68% of the Khoisan-speaking people of Namibia (largely comprising the San) being considered as poor. For the San, the prevailing conditions of landlessness, in tandem with a lack of education, means that the extent of their dependency and economic vulnerability is greater than that of any other language group in the country.

Life in the field of a devil's claw harvester

Due to its livelihood importance to rural Namibians, there is abundant research and data on devil's claw income generation, value-addition, market access, participation, and resource sustainability, amongst other things. Yet to my knowledge there has been little work on the practical lived reality and embodied experience of digging for this medicinal plant. For that reason, at six on a crisp July morning in the Kwandu Conservancy, Zambezi Region, carrying a tent and enough food

for a day or two, I set off with Vincent Kakuwe, Senior Ranger of the Kwandu Conservancy, for the forest – to go and 'get involved', as it were, and document 'A day in the life of the devil's claw harvester'. This wasn't the first time I'd been on a long trek through the bush, yet I never cease to be surprised by the apparent ease with which local people navigate the forest – negotiating the myriad narrow sandy paths that twist and turn around and between infinite trees with ease.



“Now you can see the path is just one, because those branches you saw before were just ways to go and collect the firewood,” Vincent told me. “This path is just to go and dig for devil’s claw.” The explanation was lost on me, but he seemed sure we were on the right track to find some devil’s claw harvesters, and for that alone I was thankful. After two and a half hours of walking, we suddenly came across several Chinese tents – splashes of bright pinks and oranges dotted throughout the otherwise featureless yellow surrounds. We had reached the harvester’s base camp. A bag containing maize meal and a couple of

pans further indicated the presence of people, but right now the place was lifeless. We had no time to dwell, however, and after quickly pitching my tent and leaving behind our excess baggage, we continued further into the forest. We spent another hour snaking our way through the teak trees before reaching a group of four women, each immersed in the earth to varying degrees. Women always harvest in groups, or ‘gangs’ (as those in the business often refer to them) in order to provide a degree of protection against wild animals when walking in the bush. The women – Precious (Vincent’s wife), Jennifer, Petra, and one



other who did not wish to reveal her name – were amused to see a white man in this part of the forest, but were sceptical as to my motives. Thankfully, after explaining I was simply a researcher who wished to learn about the daily experiences of harvesters, they seemed appeased. It would have been disheartening, to say the least, if they had told me to turn around and go back to whence I came.

And so I spent the day following and watching the harvesters, learning about the daily process – the initial scoping and searching the ground for signs of the plant; the careful digging around the mother root and tracing of the side tubers; the deeper excavation rendering the harvester a bobbing head above the dusty surface; the collation of tubers; and then covering the hole – before beginning the process all over again.



It's fair to say the pace of the harvesting relented as the day wore on, and at around four in the afternoon the women put down their spades. The four of them proceeded to slice their tubers before placing them in their individual bags, singing as they worked. By now the light was fading fast, and after saying farewell to Vincent, who returned to the village, we set off for base camp in single file, the women in front carrying the fruits of their day's labour above their heads, effortlessly, as the sun set behind them.

Foolishly, I'd taken only one litre of water with me, which was gone by mid-afternoon. By the time we'd completed the few kilometres back to camp, I was experiencing a thirst the likes of which I can only compare to a time when as a child I quenched it at the kitchen sink, having played football all day. I opened my tent and grabbed a tangerine – which seemed to take an age to peel – and devoured it. Soon after, realising the outsider had come woefully underprepared on the fluid front, Jennifer presented me with a two-litre bottle of water from their reserves. After a tin of tent-temperature baked beans and some traditional bread, I settled down to rest. All the while I could hear the women, huddled around fires, enjoying their pap, discussing the 'malamatwa' (the local name for devil's claw). I fell asleep thinking that no matter where you were in the world, or what your job might be, people tend to take their work home with them.

Each seeking their own bounty

I was awake bright and early the next morning, patiently waiting for the others to finish their porridge and begin the walk to the harvesting site. Before I knew it, the women were marching past my tent in single file, Jennifer shouting "You will get us there." "Not a chance," I thought, but by the time I had put my boots on and closed the tent, they were out of sight. I ran in the general direction they had taken, following their tracks and listening intently for the far-off sound of female chatter. Before long I had caught up with them, keeping close behind from then on. An hour later we reached the site, and the women collected their harvesting equipment – spades, grubbing sticks and plates – which had been stored overnight in a ditch. They didn't waste any time getting to work, and I found myself tagging along with Jennifer as the group members dispersed in search of their own bounty. "Yesterday I didn't get the big one – today I'm sure I'll get it," said Jennifer, as she began to dig in the earth expectantly. After an hour or so spent scooping sand from a hole as deep as she was high, Jennifer had harvested a substantial amount, which she was clearly happy with, albeit somewhat fatigued. "I'm tired, like a dog,"

she proclaimed. I helped her cover the hole, so as to let the plant re-grow, and we walked twenty yards before she found another plant. Granted, this one was not quite as yielding. Some forty minutes later she was working on another site ten yards away. Around ten-thirty Jennifer was moving on to her fourth site, still without a drink or a pause for breath. The pace was relentless. The other harvesters were far away by now, and for the first time I got the sense that Jennifer was in this alone. There was no camaraderie or singing now. This was one woman giving her all to get what she could from the land. I could hear the faint sound of spade hitting earth from about 200 yards away, but apart from that the eerie silence of the forest was broken only by the sound made when one woman harvests: earth and roots being struck, sand being shovelled or poked, and heavy breathing. The odd bird would sing from afar, making me wonder what kind of ecological niche could exist to warrant a creature of freedom making this place its home. But even that little bird's chorus could not detract from the feeling of isolation I experienced standing in the forest next to Jennifer. Like the other women, she had spent the last two months doing this, from daybreak to sunset, typically going to the forest on a Sunday and returning to the village on Friday evening in time for Saturday church.

Around midday, perhaps refreshed after her first swig of mahuwa (a milky maize drink), Jennifer said we should go and find the others. I carried her spade, wanting to feel useful. "Sit there, I want to walk," she said, as we approached Petra. This was not the kind of woman to argue with, so I slunk beneath a tree, seeking respite from the baking sun. I was starting to realise why this kind of research hadn't been done before. Then I noticed a man harvesting a few hundred yards away, so I went over to investigate. "Ah, so you are seeing how we are suffering here in Africa?" were the words with which he greeted me. His name was Masule, a man currently working in Windhoek, and spending his holiday in the forest with his wife, harvesting devil's claw.

It's just like chopping carrots

After a couple of hours harvesting, I walked with Masule and his wife to a clearing in the bush where they would slice their tubers, using a couple of dead logs as chopping boards. Knowing I had a knife in my bag, I sensed this was an opportunity to be of real use. I sat alongside them and put my pretty ineffective knife to work on the smaller tubers. "Even though you are only a student, you are cutting like an African," said Masule, suitably impressed. After spending the last two days feeling pretty useless as I watched people digging holes in a way that to me seemed completely at random, it was nice to feel I was contributing. "It's just like chopping carrots," I said.

By the time we set off back to camp, the skin was peeling from my hand. But I couldn't complain. Unlike Masule and his wife, I wasn't going to be lugging 25 kg of devil's claw through the bush for the next three hours. Upon reaching the camp, they laid out the day's harvest to dry, filling their bags with those tubers they'd collected yesterday. It is a rotational system, allowing the tubers to dry off a bit, in turn becoming lighter, before they carry them all the way back home. As we made our way back to the village, I asked Masule why he didn't just camp at the field for the week, like the female harvester gang I'd spent time with. "The problem is that we are having a small kid, just in grade 5," he told me. "He cannot stay in the courtyard once the sun goes down – he will just be waiting at the door, looking for us." It was a telling insight into the extra burden faced by harvesters who have family commitments back at the village, some three hours' walk from their place of work. The village I returned to seemed a great deal more metropolitan than the one I'd left only the previous morning. I felt as though I'd been away for a week. Nevertheless, the time I had spent at the coal face of devil's claw harvesting, so to speak, had given me a valuable insight into the daily practices and lived experience of those who dig for one of Namibia's most valuable plant resources – devil's claw.



Chapter 3



lipid oils
marula



marula

(*Sclerocarya birrea*)

Michel Mallet and Saskia den Adel-Sheehama

Lipids are fat-soluble molecules more commonly known as fats and oils. Examples of common lipids include butter, vegetable oil, cholesterol, waxes, and fat-soluble vitamins. A common characteristic of all of these compounds is that they are essentially insoluble in water but soluble in one or more organic solvents. Lipid oils should not be confused with essential oils, which are of a different chemical nature and application.

The indigenous natural oils referred to in this chapter are vegetable oils obtained from seeds of a variety of trees that are indigenous to Southern Africa. Oils that the natural product sector in Namibia has worked with include marula oil, ximenia oil and, to a lesser extent, kalahari melon seed oil, manketti oil, baobab oil, and !Nara oil. Baobab and !Nara have a very limited resource base, while manketti and kalahari melon seed oil could be produced in larger quantities, but the demand for them is currently limited. This chapter will focus on marula and ximenia oil because they have functional supply chains as well as a recognised market demand.

Namibian indigenous lipid oils are commonly marketed in international markets as cosmetic ingredients, but can be used for other purposes as well. marula oil, in particular, is popularly used as condiment in food, and is sold in both traditional and more formalised national markets in Namibia.

MARULA OIL

Cold-pressed oil from the seed kernels of the marula tree (*Sclerocarya birrea*) is a valued ingredient for skin-care products. It naturally softens, nourishes and revitalises the skin. It is absorbed easily and contains high levels of oleic and linoleic fatty acids, making it ideal for topical application. High in natural antioxidants, and one of the most stable oils available (ten times more resistant to oxidation and rancidity than olive oil), marula oil has been shown to improve skin hydration and smoothness, and to reduce redness. In comparative studies it has performed better than sweet almond oil for each of these properties.

Historical overview

The marula tree is widely distributed in sub-Saharan tropical Africa. Subspecies *caffra* is indigenous to Southern Africa. In Namibia this multipurpose tree is found mainly in the northern parts of the country. It has a long history of traditional use, especially in north-central Namibia. The importance of marula extends from social to cultural, economical, and nutritional aspects of people's lives.

From the shade of the tree to the use of the empty nutshells for firewood, marula is extensively used, including for food, drinks and medicine. In north-central Namibia women are, without doubt, the custodians of the marula resource. Although marula products are appreciated by men and women alike it is the women who own the trees, gather the fruits, and produce the wine, juice and oil.

The cultural significance of marula can be seen in the numerous traditional songs, dances, rites and stories around it. In some areas the tradition of bringing marula wine to the kings and headmen at the beginning of the marula season is dying out, but the season remains a time of festivity that cannot be compared to any other time of the year. In an area where homesteads are spatially spread, it brings people together in a time of giving, sharing, and togetherness. No other natural resource in north-central Namibia has an influence on life that is comparable to that of marula.

Because marula kernels are the main ingredient for *ondjove*, a favourite traditional condiment oil, they were sold in informal markets in smaller quantities long before more organised commercialisation started in the late 1990s. Early work on the feasibility of producing marula oil for international markets was started in 1996 by the Centre for Research, Information and Action in Africa – Southern Africa Development and Consulting (CRIAA SA-DC) with seven pre-existing producers' associations, which later formed the Eudafano Women's Cooperative (EWC). The first large customer was The Body Shop International (BSI). Not only was the company interested in the properties of the cosmetic ingredient, but the story around marula oil attracted their attention as well; the marula culture, and the fact that the product was supplied by a rural cooperative consisting exclusively of women.





EWC was formally recognized as a Community Fair Trade (CFT) supplier of BSI, a status that is still in place today.

From the first feasibility study and customer interest, it took a while for trade relations to materialise. Marula oil was an unknown product on the international market, and therefore safety and efficacy had to be established, and consumer products formulated. The first marula oil consignment of one tonne was shipped to a contract refiner of BSI in the UK in October 2000, and the launch of the first BSI facial cosmetic range containing marula oil was in 2002.

In the first few years marula oil was processed by the Katutura Artisans' Project (KAP – a processing incubation facility and R&D centre managed by CRIAA SA-DC) in Windhoek from kernels supplied by EWC. The processing technology was developed and tested by KAP/CRIAA SA-DC, and the volumes of production and sales were not substantial enough to be taken over as a successful business by the cooperative. This changed in 2004 when the first president of Namibia (Dr. Sam Nujoma) facilitated the sourcing of funds to build their own factory. The Eudafano Women's Marula Manufacturing Pty Ltd (EWMM) in Ondangwa is a company 100% owned by the cooperative, started processing marula oil from mid-2005.

Resource distribution

Marula is related to the mango. It is a large, single-stemmed tree with grey, mottled bark and a wide, spreading crown, and carries male and female flowers on separate trees. It is drought resistant and most common in open woodlands. The fruit is about the size of a plum, with a leathery skin that is butter yellow when ripe. The scented, juicy white flesh clings to a hard brown stone that contains two or three oil-rich seeds (kernels). The generic name *Sclerocarya* is derived from two Greek words, *skleros* and *karyon*, meaning 'hard' and 'nut', respectively, and refers to the hard stone of the fruit.

The north-central regions of Namibia – Ohangwena, Oshana, Omusati, and Oshikoto – are, by far, the most important marula-producing areas in the country, with regard to both resource availability and traditional use. However, marula is not equally distributed in these regions. It tends to be clustered in slightly higher-lying areas where it is not flooded by rising water levels in the oshanas or impeded by hard pans in the soil, but does not do very well in the highest areas or other places where the soil is too saline or dry. The resource is particularly abundant in the Cuvelai drainage system, an inland delta that is dry for most of the year, but is fed by rains falling locally and in Angola during the summer months. The elevated strips of land between the waterways have the best soils, and it is here where marula thrives. In addition, because of its better soils, the Cuvelai delta is more densely populated, and because of the intense traditional use of the tree, there is a strong positive correlation between human settlements and the distribution of the marula resource. Marula tends to grow where people live, possibly because fruit are discarded there, and the seeds in turn germinate and grow.



Marula trees are owned and typically grow on peoples' properties, rather than in open communal land. In 2010 a resource survey done by CRIAA SA-DC assessed the availability of marula fruit in the north-central Regions of Namibia. Ninety-four per cent of the 2,494 farms surveyed had at least one marula tree, with an average of 5.3 mature female (that is fruiting) marula trees per farm. The average population of the male marula trees on the surveyed farms was 1.4, making the male:female ratio 1:3.8. The number of young and old trees was consistent over all areas, with an average of 1.3 young trees per farm, and 0.14 trees that were too old to fruit. Young trees were defined as trees that were close to maturity, but not (yet) fruiting, so it was unknown whether they were male or female trees. Small marula trees that are young enough to be eaten by goats or to be destroyed otherwise were not counted. With almost ten times more young trees than old and dying trees, the marula population seems sustainable, which is consistent with peoples' perceptions of the resource.

The survey concluded that the marula resource base in the north-central regions was more than sufficient to exploit more commercial opportunities, provided issues of logistics, price and fruit quality could be adequately dealt with. Taking into consideration house-

hold use of marula and its products, it was estimated that, in principle, people would be willing and able to sell:

- 570 to 940 tonnes of fruit in the EWC associations directly surrounding the factory;
- 8,000 to 13,500 tonnes of fruit in the 10,000 households surrounding the factory;
- 85,000 to 141,000 tonnes of fruit in the marula producing areas in north-central Namibia.

There is no immediate need for marula resource management plans for a number of reasons:

- The marula tree is protected by traditional and national laws for example marula trees may not be cut down
- The harvesting of marula is non-destructive – the fruits are harvested from the ground;
- Due to the extensive use of marula around peoples' homesteads, there is a healthy population of marula seedlings;
- Commercialisation seems to have a positive effect on the resource. With the increased value of the tree and its products, people are more likely to protect seedlings;
- There is a general consensus amongst those working with marula oil that the resource base is healthy, and increasing.



In recent years there has, however, been increasing interest in capacity building regarding the propagation and cultivation of marula. Various stakeholders (EWC, CRIAA SA-DC, Directorate of Forestry, Ministry of Agriculture, Water and Forestry (MAWF)) have collaborated to develop training and promotional material and to provide training to communities on marula grafting techniques. Grafting is interesting because it can improve both the quality and the quantity of fruit, and can therefore contribute to the long-term management of Namibia's marula resource.

Supply chain

In north-central Namibia marula trees generally fruit between January and April/May, with the bulk of fruit being available in February and March. During the fruiting season women usually gather under the trees to make *omaongo* (marula wine). Making *omaongo* is a social event. Women invite their female friends and neighbours once the fruits have ripened and fallen to the ground. They gather under the tree to process the marula fruits while socialising, singing and joking. Typically, they use a cow horn to puncture the leathery skin of the fruit. The juice is squeezed out in one bucket or clay pot, and the remaining seed and flesh goes into another container. The juice is then simply left to ferment.

In most areas the fermenting juice remains with the owner of the tree, but each woman takes home some seeds with the remaining flesh and skin. Water is added to these to make *oshinwa*, a traditional non-alcoholic juice that is consumed mostly by children. After this, the seeds or stones are left to dry.



The marula kernels (*omabuku*) are extracted after the seeds have dried for a few months, during the time when people are less busy in their fields, typically from June/July until the end of the year, depending on when the rain starts. To extract the kernels, the women first cut off the 'head' of the nut by placing the nut on an upturned axe and hitting it with a piece of wood. They then use a flattened needle for taking out the kernels, which are then used to make the traditional condiment oil *ondjove*, or sold in informal markets or to EWC for the production of cold-pressed marula oil. The processing and selling of marula kernels is thus done solely by women, and the money received for the kernels is also controlled exclusively by them.

The Eudafano Women's Cooperative (EWC)

A group of women from the Oshana, Oshikoto, Omusati and Ohangwena regions first came together to discuss the potential for marula oil commercialisation in 1992. The same women formed the Eudafano Women's Cooperative in 1999. EWC initially consisted of nine founding marula women producer associations (Endola, Ohangwena, Okahao, Onakaheke, Ondangwa/Ongwediva, Ondobe, Ongenga, Outapi, and Tsandi), and was provisionally registered with the Division of Cooperatives in that same year. One woman from each association was elected to the board of EWC.

Eudafano means 'common understanding' in Oshiwambo. The main purpose of the cooperative is to act as a marketing body, promoting the economic and social interests of its members by providing effective services according to sound business and cooperative principles. Its main activities include coordinated collation and marketing of marula kernels (and other natural products) on behalf of members.

Requirements to become a member of the marula producer associations are as follows:

- female
- 18 years or older
- able to decorticate marula kernels
- local (living in the area where the association is active)
- payment of a once-off registration fee and an annual membership fee
- follow the internal rules of the association

Associations can become members of EWC if they have at least 50 paid-up members, pay their membership fees to the cooperative, and contribute to the cooperative share capital. All associations have a constitution, an annual general meeting (AGM), and elected Management and Supervisory committees. Four people from each association are elected each year to represent the association at the EWC AGM.

The cooperative owns a factory in Ondangwa that has been functional since 2005. Apart from marula oil, they also produce kalahari melon seed oil and marula wine/juice. EWC received their full registration as a cooperative in 2009. At present, in 2014, it consists of 25 associations, with around 2,000 members.



In the 2013 marula season 2,051 women organised in 24 associations supplied 37,500 kg of kernels to EWC, averaging a little over 18 kg of kernels per supplying member. The EWMM factory processed these kernels into over 11 tonnes of virgin oil, most of which was exported to Europe. After purification or refining, the bulk of the EWC marula oil ends up in various skincare, hair-care, and make-up ranges of BSI, which sells its products in over 2,600 retail outlets across 65 countries.

Markets, market value and value addition

In season marula kernels and *ondjove* are found in nearly all open markets across the north-central regions, as well as in the main urban centres where traditional consumers reside. They are also used in a few Namibian



restaurants. In some cases the products are locally traded or exchanged (as barter or gifts), especially at social events such as wedding ceremonies. Furthermore, traditional consumers in urban areas tend to source marula products from their relatives in the north-central regions. This multiform informal trade is difficult to quantify, but it can be assumed that it is far from marginal in volume, value and monetary terms on account of the very large number of rural producing households and urbanised traditional consumers.

Nevertheless, one of the pressing wishes expressed by rural women that led to the formation of the EWC was to open a large additional outlet for marula products, which could be produced and sold in much larger volumes than the traditional domestic market could absorb. Eudafano women have always explained that selling their marula kernels produced in surplus of direct home consumption was difficult, time consuming and costly, as they had to travel to sell, with no assurance of selling promptly at a remunerative price.

Cold-pressed 'cosmetic' marula oil and the recently developed marula food oil are also sold in national markets, either in pure form or through local SMEs that formulate and market a range of skin and hair-care products. Although there is potential for growth in many market segments, including non-traditional consumers and tourists, these outlets only utilise a tiny proportion ($\pm 5\%$) of the marula oil production of EWMM.

The bulk of the EWMM cold-pressed virgin marula oil is exported to the personal care and cosmetic product formulation industry, mainly in Europe and, to a far lesser extent, in the USA. Southern African market outlets are growing, but Eudafano is not the only producer of marula oil in the sub-region. Most of the exports go through the French company Aldivia, the contract refiner for BSI which, until now, has used the greater part of the Eudafano marula oil. A smaller portion of the oil is purified and standardised by Aldivia for other international cosmetic formulators.

Over the past four years (2010 – 2013) EWC members produced around 90 tonnes of marula kernels. This period includes a very poor harvesting season in 2011, when fruiting was seriously affected by adverse climatic conditions. Total income to individual producers reached over N\$2 million, with nearly N\$1 million earned in 2013 alone. From these kernels EWMM produced 30 tonnes of marula oil, an average of 7.5 tonnes per year, most of which was exported. The total income generated from marula oil sales over this period was in excess of N\$5.6 million.

Marula oil as a cosmetic ingredient

The main customer of Namibia's marula oil – the Body Shop International (BSI) – has many products containing the ingredient, but marula oil is not often the marketing focus of the product. The message that can be taken from this approach is that, although marula oil may be recognised within niche market circles and by the industry as an effective ingredient, it is not yet recognised widely enough by mass market consumers to use the word “marula” as a key ingredient on the label. Other companies do focus their entire product lines around marula oil and its efficacy, traditional use and/or ethical origin. Some of the key physical components that are used to market marula oil to end consumers include antioxidants, essential fatty acids, and its non-greasy texture. Below are three products containing marula oil that were launched in 2012: a) Beautifying oil (BSI), b) All-in-one BB cream (BSI), c) Pure Marula Oil (African Botanics)



International market demand for marula oil continues to grow, but supply has not been responding at the same rate, this despite the expansion of a number of marula oil producers and processors in Southern Africa, who may not all necessarily comply with new Access and Benefit Sharing (ABS) regulations and general biotrade norms. A new challenge may emerge in the form of the ‘commoditisation’ of marula oil under the pressure of some segments of the cosmetic and personal care industry, which may want to push for competition between African producers and pull down prices while looking for higher volumes. This could represent a threat (and perhaps a new but very challenging opportunity) to community-based producers/processors such as Eudafano, who are basing their marula oil business on quality, ethical trade, community benefits and respect for the heritage represented by the marula culture.

The future

The success of marula oil can be attributed to its intrinsic excellent and unique qualities, as well as to its ethical trade credentials that are rooted in rural Africa. The commercial success of the INP is also a result of the dedicated involvement of a number of key stakeholders, in Namibia and abroad, that eventually made it possible to link a women's producers' organisation (EWC) with a major global cosmetic company (BSI) that opened the international cosmetic market to this cosmetics ingredient.

EWC and its processing arm, EWMM, therefore represent an interesting and successful model of a community enterprise in biotrade, the sustainable and ethical commercialisation of biodiversity.

The potential for growth of Eudafano and other Southern African producers looks great, and overall production will need to increase to meet the growing market demand. Processing probably needs to be upgraded from its present artisanal form so as to resist any price erosion, improve quality, move up the value chain and diversify market access.

Time will tell whether these challenges can easily be taken up by community-based enterprises while retaining their credentials of quality, community fair trade, biotrade standards and preservation of the marula cultural heritage.

Sylvia Uugwanga -

“We keep our traditional knowledge close to our hearts”



Marula has always been a well-respected tree in our culture and we know everything about how marula trees can be used. This precious experience we learned from our grandmothers. My personal goal in life now, is to one day go to school, to college, to become a researcher and develop new Namibian products from our marula trees, new natural indigenous juices and ways of preserving our fruits so they have a long life on the shelf. I want to be a scientist and a trainer in these things. To grow our Namibian business and to pass this knowledge on to the ones still to come, and to my own kids, so they can grow this business and at the same time keep their unique traditional knowledge close to their hearts.

My name is Sylvia Uugwanga and i'm 42 years of age. I work full time on the marula project based in in north-central Namibia and I'm a member of the Eudefano Women's Co-operative (EWC). I'm a single mum looking after 8 children. Some of these are my sister's children as this is part of our culture, to look after our nieces and nephews. But I also bring up orphaned family members, as there is no one else to take care of them.

I've been working on the marula project for the last 9 years, since 2005, up to today. Our marula business focuses on the buying and processing marula fruits into marula pulp, juice and kernels. I walk about 6 km every day to work at the marula factory in Ondangwa where I work with about 13 other women and men. In my job we have to be flexible and able and willing to wear different hats. I do a variety of tasks such as training new women on the project, I'm an assistant at the buying points when we purchase marula in the rural areas, and I do secretarial jobs such as VAT returns for the marula project, as well as data entry on the computer to record the exact amount purchased at each marula intake. Sometimes I have to rush out to the rural areas and organise to buy fresh marula fruits or kernels when we have an urgent order from a buyer in Namibia or overseas. I then visit our women's associations, spread out all across north-central Namibia, who volunteer to sell us the marula we need for our factory.

My favourite part of my job is doing motivational talks for women thinking about joining our marula Project. As we are expanding all the time, from 9 women's Associations in 1999, to 24 associations today [2014], we are upgrading our technology such as introducing marula fruit presses so we are able produce much more marula than using traditional, hand-processing, methods.

I like getting training and acquiring new skills. I received tuition in computer skills and filing management with funding from the Millennium Challenge Account (MCA) and training from CRIAA SA-DC.

The salary I earn on the marula project is enough to pay for my kids school fees, for paying hospital visits, for buying all the food my family needs, and I manage to save a little bit each month. In 2001 I sold enough marula kernels to buy a donkey for ploughing my fields. This helps my family to be more self-sufficient in food. Now I'm employed full-time and earn enough to live from. But it is not enough to pay for big dreams.









ximenia



lipid



ximenia (*X. americana*)

Michel Mallet and Saskia den Adel-Sheehama

Commercial ximenia oil is cold-pressed oil from seed kernels of *Ximenia americana*, commonly known as sour plum or wild plum. Ximenia oil has attracted keen interest from the international market, mainly due to its anti-aging properties. It has been shown to be an effective treatment for dry skin prone to ageing, since it increases moisture levels, improves the function of sebaceous tissues and improves skin elasticity. It also has anti-inflammatory properties, while the presence of active fatty acids has been shown to improve blood flow in the skin.

Ximenia has a long history of traditional use, particularly in Namibia, although also across much of Southern Africa and other parts of the continent. In north-central Namibia, the fruits of *X. caffra* var. *caffra* (large sour plum) are commonly consumed fresh in season (ripe fruits are very soft and difficult to transport and store for long). Seed oil from *X. americana* is used as a traditional emollient and hair-care product. The oil is extracted by roasting, crushing and boiling the seed kernels, giving a very dark colour and strong smell to traditional ximenia oil (*omaadi eembeke* in Oshikwanyama, *omagadhi gombeeke* in Oshindonga). It is also reported that the oil has traditionally been used to soften leather and San people have used the oil to maintain their bows and bow strings. Roots, bark and leaves of ximenia are used in traditional remedies. Some medicinal properties have been documented by academic researchers since the 1930s, and several pharmaceutical and cosmetic preparations have been patented.

Because of its multiple uses, ximenia was included in 2001 in the “pipeline” list of priority species to be promoted by the then recently created Indigenous Fruit Task Team (later to become the Indigenous Plant Task Team – IPTT). Early efforts focussed on potential use of the fruit pulp and seed kernel oil. The unusual ximenia oil, which contains exceptionally long fatty acids for a vegetable oil, was considered commercially interesting, especially for cosmetic applications.

The first trial purchases of decorticated ximenia seeds were conducted from 2001 – 2003 by CRIAA SA-DC with the support of the IPTT/MAWRD and other developmental donors. The main purpose was to practically test the availability of ximenia kernels from rural community producers, as well as to develop a processing method to produce oil for further research and product development. It soon became evident that rural producers around Eenhana in the Ohangwena Region were very enthusiastic about the potential commercialisation of their ximenia resource, being relatively richly endowed with ximenia trees and using limited amounts of the *X. americana* fruits and seeds beyond domestic usage of the traditional hair-care oil

and its limited local trade. On the product and processing research and development side, it became clear that the traditional dark oil produced by roasting the kernels would not be suitable for eliciting commercial interest and that the more suitable cold-pressing of ximenia kernels was rendered difficult by the very sticky nature of the oil. This processing difficulty was eventually overcome using a hydraulic cage press developed at KAP for marula oil, and the first cold-pressed ximenia oil samples could be made available. In 2003, through the Southern Africa Natural Product Trade Association (SANPROTA), known today as PhytoTrade Africa, an initial 25 kg oil sample was supplied to a French company specialising in sourcing, designing and commercialising vegetable lipid oils for cosmetic and industrial use.

The period from 2004 to 2008 was characterised by both successes and difficulties. A main challenge was to increase volumes to give commercial credibility and confidence to this promising cosmetic ingredient. This was



done by optimising oil processing procedures at KAP and also by developing the supply base of Ximenia kernels, a task that was enthusiastically conducted by the emerging Tulongeni Twahangana Producers (TTP), a group formed by a number of communities in 2005 around Eenhana and Epembe with the support of key extension officers of the MAWF (particularly Mr Ephraim Weyulu, now retired and made an honorary member of the IPTT). On the other end of the emerging value chain were the difficulties involved in purifying and standardising the quality of this 'sticky' oil to make it acceptable for cosmetic formulation, and built its technical and marketing dossiers as a new ingredient to be promoted on the market – a task successfully performed by the French company Aldivia and negotiated by PhytoTrade Africa for the IPTT and the Namibian stakeholders.

This brief account tries to illustrate the complicated, time-consuming, multi-disciplinary and collaborative efforts that are very often needed to reach the initial commercial stage in the development of a new biodiversity product, in this case kernel oil from *X. americana* (var. *americana*) now registered in the market and used as a cosmetic ingredient.

Namibia presently remains the main commercial producer and exporter of *X. americana* oil. This is certainly an advantage brought about by the pioneering work conducted in Namibia and the strengthening of the ximenia producers of TTP, since May 2012 registered as a cooperative (TTC). However, this also represents a commercial challenge because while interest in this unique oil has constantly increased, annual production fluctuates according to weather conditions in the TTC harvesting area in the Ohangwena and Oshikoto regions.

Resource distribution

The genus *Ximenia* includes eight species. It belongs to the botanical family Olacaceae, which has a pantropical distribution and is found on most continents across the world, in Africa, the Americas and Australasia. The genus was named in honour of a Spanish monk, Francisco Ximenez, who wrote about the plants of Mexico in the 17th Century. Ximenias are drought-resistant, spiny shrubs. Their fruiting is largely dependent on rainfall and other weather conditions. In Namibia, botanists recognise two species, one with a single variety and the other with two varieties:

- ***Ximenia americana* var. *americana***, the species that is currently commercialised. It is most abundant in the current TTC area (Ohangwena and Oshikoto regions).
- ***Ximenia caffra* var. *caffra***, the fruit of which is commonly eaten. The oil of this species could prove to be commercially interesting as well, but it is different to the oil of *X. americana*.
- ***Ximenia caffra* var. *natalensis***, which is the least abundant subspecies in Namibia and is only rarely found in the far north-east of the country.

However, previously, an additional variety of *X. americana* – var. *microphylla* – was also thought to occur in Namibia. In fact, it was regarded as the more common of the two varieties. This project found that there did appear to be two distinct forms of the species, based on their different general appearance, fruit size and seed oil composition. In the dry Kunene Region, ximenia shrubs are mostly found along watercourses, but in drought years barely any fruits can be found. The large sour plum (*X. caffra* var. *caffra*) is commonly eaten, while *X. americana* is reserved for making the traditional oil used as a skin ointment. The variety occurring there was identified as *X. americana microphylla*, which presented an oil composition slightly different from the variety *americana*, the specifications of which is presently used in the international cosmetic trade. Kunene inhabitants to some extent harvest ximenia for their own use, but the resource is not very abundant. It is discussed below, but note that it could prove to be just a geographic variation of var. *americana* rather than a distinct variety.

- ***Ximenia americana* var. *microphylla***, also used traditionally for making oil, but the oil composition is slightly different from the variety that is currently commercialised. This variety is more dominant in the north-eastern and north-western regions of Namibia.

Although ximenia shrubs/trees are found in a wide area in the northern half of Namibia, from the Kunene Region to the Zambezi Region (formerly Caprivi) and down to parts of the Otjozondjupa Region, their abundance, species and varietal distribution varies between regions and locations.

In the Kavango and West Zambezi Regions, the ximenia shrubs are not associated with a particular vegetation type and occur sporadically throughout the various woodlands and shrublands. *X. americana* var. *microphylla* is generally more abundant than the other *americana* variety and *X. caffra* appears far less abundant.

Although the density of shrubs per hectare in some conservancy and community Forest areas was found to be similar to the prime harvesting area of TTC in the Ohangwena Region, it was observed that the fruiting productivity of the shrubs was very poor.

This was partly the result of frosts, to which ximania shrubs are sensitive, but also because of the direct impact of veld fires that are recurrent and widespread in these Regions. With the poor quality of shrubs in these Regions, commercial harvesting for community income generation does not seem a viable option at present.

In the North-central Regions where ximania is generically known as *Eembeke* or *Eembeke*, the abundance of ximania shrubs varies greatly. The thorny tree is mostly found on communal land in areas that are less populated. In the more densely human populated areas, the ximania resource has greatly reduced over the years, most probably due to the clearing of land, deforestation and grazing by domestic animals.

In some places ximania has almost completely disappeared. This greatly contrasts with the TTC harvesting area in the Ohangwena and Oshikoto regions where ximania is abundant, particularly in an area stretching from around Ondobe-Eenhana down to Ohepi and Omuthiya-Omuntele. It is in these areas that the variety *X. americana americana* is by far the dominant variety compared to the other ximania subspecies. Surprisingly, ximania is rarely found further east towards Okongo.

Although the distribution pattern of ximania is patchy, high densities of shrubs above 40 per ha (up to 140 per ha) have been counted in localised pockets that form the main harvesting areas, varying from less than 2 km to 7 km in diameter. Harvesters' estimates of the age of some of the larger trees ranged between 40 and 70 years, and young trees start producing a substantial fruit harvest after 4–10 years. Large numbers of seedlings and small plants of ximania species have been observed, indicating that recruitment is taking place in the harvesting areas, although the seedlings are often eaten by goats.



Ximenia fruit de-pulper and decorticator

Small-scale mechanisation of labour-intensive post-harvest operations offers an option to increase the volume of Ximenia kernels as raw material for oil processing, speed up the availability of kernels after harvesting and improve the quality of the raw material. Small-scale mechanisation is manageable by organised producer groups such as TTC and can be an opportunity to diversify the sourcing of raw materials by promoting processing of kernels produced at homestead levels by harvesters/primary producers.

Three machines were developed and tested at KAP by CRIAA SA-DC in 2013/14 through an R&D project co-funded by IPTT, MCA-N and CRIAA SA-DC.

- A hand-operated Ximenia depulper
- A scaled-up depulper driven by an electrical motor
- A decorticator driven by an electrical motor.

The manual depulper is appropriate for decentralised operations at homestead and village levels (including producers' associations). The electrical machines are suited for operating at a central processing facility.



However, ximenia shrubs are still felled for building poles, brush wood fencing, and clearing land, which represents a threat to the resource. This could potentially be counterbalanced by the new value given to the shrubs/trees by the commercialisation of ximenia products.

In the longer term, propagation of ximenia trees has the potential to increase harvesting volumes and reduce the present harvesting effort of collecting ximenia fruits from distant trees that need to be visited regularly throughout the fruiting season. Propagation also seems a necessity to counteract bad harvesting years, which make supply unreliable and are thus currently a threat to commercialisation of the resource.

Supply chain

Ximenia fruits are usually harvested from the ground under trees after they ripen and fall, which generally takes place from December to February. Harvesters carry the fruit to their homesteads, where they are left to dry and are then stored. Decortication generally takes place later in the year, from June/July, af-

ter cultivated crops have been harvested and people have more time. Dried fruits are coarsely de-pulped before the nuts are cracked. They are commonly placed on a stone or hard surface and cracked carefully with a stick, to ensure that the kernel can be taken out in one piece. At the request of the ximenia producers, some efforts have been made to find ways to mechanise this process.

Ximenia americana only has a limited traditional use, and is mostly found in the wild on open communal lands or in community forests, less commonly on peoples' farms. The communities living in an area, therefore, all have access to the resource. Ximenia is currently only harvested commercially in the Ohangwena and Oshikoto regions, and the ximenia harvesters are organised by TTC, which was provisionally registered with the Division of Cooperatives in the MAWRD in May 2012. TTC currently has 12 associations, which are in the process of becoming fully functional. Each association has its own constitution, bookkeeping and administration system and a Management and Supervisory Committee, members of which are elected at the AGM. The associations



also each elect four representatives to attend the TTC AGM, where the cooperative discusses main issues and resolutions, and a Board and Supervisory Committee are elected.

TTC membership is open to men and women alike, but the large majority of members are women. At present there are 809 registered members, of which only 13, less than 2%, are men. This is mostly because trees and tree products are traditionally the domain of women. All ximenia kernels supplied by TTP/TTC thus far have been sold through CRIAA SA-DC. The seeds are transported to Windhoek, where they are processed into crude ximenia oil at the KAP. From there the bulk of the oil is sold as a cosmetic ingredient to export markets. Because CRIAA SA-DC and KAP are not-for-gain organisations, it has provided these processing and marketing services on a cost recovery basis. In the not-too-distant future, TTC is likely to open its own processing facility and at that point CRIAA SA-DC will facilitate the process of capacity building and technology transfer.

Markets, market value and value addition

Traditional ximenia oil can be found, with other indigenous plant products, in open markets throughout the north-central regions of Namibia and further south in the urban centres. This informal trade and the local trade in its area of production have not been quantified. Although it is probably not marginal in terms of the overall volume of oil produced and traded, it remains very limited in providing a substantial income to a large number of occasional harvesters and home-based traditional oil producers.

Ximenia oil, either in its traditional or cold-pressed form, has been incorporated in a few local cosmetic products manufactured in Namibia by SMEs for local consumers. However, the overall volume of oil used has so far remained tiny. There are certainly avenues for growing Namibian demand for such products, starting by improving awareness of indigenous products and their benefits, but local demand will always be constrained by the small size of the domestic Namibian market.

The main outlet for the sizable volumes of cold-pressed ximenia oil produced in Namibia is through exports. Namibia has thus far retained its position as the leading exporter of *X. americana* oil, not only in Southern Africa but worldwide. Over the past six years (since 2008 when the export trade started to become firmer) over 17.5 tonnes of ximenia oil has been exported, representing an average of nearly three tonnes of oil per year. It must be noted that two of these six years were in very poor harvesting years, where fruiting was seriously affected by either frost or drought. Nevertheless, during these 6 years, nearly 70 tonnes of *X. americana* kernels were produced by the TTC harvesters, an average of 11.5 tonnes per year with considerable inter-annual variation. Consequently, annual income to producers of the kernels varied considerably from a low N\$140 per producer in the very poor season of 2012 (only 57 producers could harvest) to N\$626 per producer in the bumper 2008 season (with 363 producers). Nevertheless, TTC membership has significantly increased over the past few years, despite the adverse climatic conditions that have periodically affected ximenia fruiting.

These income levels may rightly look modest in absolute terms, but they represent very substantial cash income for rural producers, who are mainly women and single heads of households, for a seasonal part-time activity and where remunerated work opportunities are scarce. The export market for ximenia oil is still undeveloped, and has great potential for expansion providing that supply and production can be scaled up. Due to the occurrence of poor harvesting years, meeting market demand has been a challenge, making potentially new customers cautious about making substantial investments in product development and marketing. The potential for growth is based on the unique quality of ximenia oil, which is appreciated by the cosmetic industry; the ethical sourcing of the raw material; the history of traditional use rooted in Africa; and the efficacy of the ingredient backed by strong scientific evidence.

Ximenia americana kernel oil is non-drying and characterised by a high content of long-chain mono-unsaturated fatty acids. The fatty acid profile is unique,

and the long-chain fatty acids have been shown to have bioactive properties. Patents and published literature refer to anti-inflammatory properties, improved cutaneous blood microcirculation, regeneration of dry skin prone to senescence (anti-aging) and improved hair growth (improving the functioning of sebaceous tissues). Besides being used in skin and hair-care preparations, ximenia oil also has a history of use in various medicinal applications such as the treatment of sores and cuts.

Currently ximenia oil is exported to Europe as semi-processed oil (crude and decanted) and is further purified and standardised into a pure-grade oil that fulfils the required quality standards for inclusion in cosmetic formulations. This process is necessary to meet industry standards and specific customer requirements. The end market for ximenia oil and products that contain it is relatively niche and generally of higher value, primarily targeting consumers who seek natural, organic and efficacious products, and those who are interested in ethical trade. The oil is found in formulation with other ingredients, and as pure oil for use on skin and hair. The number of available products that contain the oil has increased over the past few years, reflecting an overall increasing demand for speciality natural oils.

Cosmetic and personal care brands that currently use ximenia oil in their products include The Body Shop, Melvita, Aromatherapy Associates and Louise Galvin. Product ranges within these brands include skincare, bath and body, anti-aging, and hair-care.

In order to market ximenia oil as an active cosmetic ingredient, robust scientific evidence and strong customer communication is needed. This is particularly relevant to a product that is competing against other active cosmetic ingredients which may be sold at lower prices.

However, a number of additional challenges remain to be addressed:

- Increasing volumes of production is essential to meet rising market demand and reassure customers that the capacity to supply the cosmetic ingredient is reliable. The up-scaling has to be done

Leena Simon – I watched the Co-operative grow

Leena Simon is 58 and has three children. She has been a member of the Tulongeni Twahangana Co-operative (TTC) since 2005. When she joined the cooperative, it was known as Tulongeni Twahangana Producers. “I watched the Co-operative grow since the days I took my bags to Eenhana and received very little money, but now the price has increased considerably.”

Leena, who lives about 10 km outside Eanhana, says the income is very important to her, as it enables her to look after her grandchildren and buy household goods. She is not receiving a pension yet, which makes this one of her few sources of income. “The equipment we received from MCA Namibia is really important. I now have a place

to sit and do the decortication work. I also have a dedicated bucket to store the kernels once they have been decorticated.”

Leena collects the seeds of the sourplum, *Ximenia americana*, which are pressed for their oil. The oil is used locally as a skin-softening agent, in hair-care and the branches of the tree are used as live fencing and firewood.

The equipment provided by MCA Namibia has acted as an incentive for new members to join TTC.

“They can now see that the cooperative is making progress. They realise they can buy things even if they’re not working,” says Leena.



while keeping the excellent credentials of the Namibian ximenia supply chain intact; quality, traceability, community-trade, ethical sourcing etc. This will be essential for improving the benefits to primary producers and ensuring the sustainability of the TTC producers' organisation.

- Ximenia oil is unusual, and difficult to process and purify. Conventional technologies used for processing and filtering other seed oils have, thus far, proved inappropriate with this very 'sticky' oil.

Solving these difficulties for application in Namibia would be an important step forward, but such investment might not be proportionate to the relatively small volume that has been produced thus far.

The future

The emerging commercial success of this INP is based on a combination of strong features. Ximenia oil is a new and unique ingredient, with proven efficacy, that has been supplied according to the quality standards required by cosmetic manufacturers.

It remains positioned in niche markets that recognise efficacy and the values of ethical trading, African sourcing, and community benefits consistent with the new Access and Benefit Sharing (ABS) norms.

The success is also based on the development of a robust supply chain of raw materials (ximenia kernels) bringing direct financial benefits to the harvesters-producers that are well organised in a cooperative.

This would not have been possible without their motivation, traditional knowledge and careful utilisation of the resource, as well as the collaborative work of a number of dedicated stakeholders, public and private, profit-making and non-profit.

Up-scaling volumes of ximenia oil without compromising its quality and credentials remains a priority so as to improve the income to, and the number of, primary producers benefiting; to strengthen the TTC cooperative; and to develop and diversify the markets for this unique oil.

Annual harvests in any particular producing area will remain unpredictable due to weather conditions, and to ensure the reliability of the supply to the market, different options will have to be explored, which may be complementary.

This includes expanding the supply from other regions in Namibia and Southern Africa, incorporating oil from other ximenia species. (provided the varying composition of the oils can meet industry specifications), and building a strategic stock of oil to supplement poor harvesting years.

Moving up the value chain so as to capture a greater part of the end value of the ingredient in Namibia will remain an important objective that needs to be carefully planned and implemented.

The development of a TTC facility for storage and processing in Eenhana is planned, whereby current processing technology will be transferred. Further technology and processing improvements will need to be tested before they can be adopted.

The relevance of ximenia trees in the promotion of agroforestry systems should not be underestimated. Propagation of ximenia through seedlings produced in nurseries could also be an important step forward with regard to long-term sustainability of the resource, market and income to producers.





essential oils

Commiphora





essential oils

commiphora (C. wildii)

Karen Nott

Essential oils are highly concentrated, volatile oils that can be extracted mainly from aromatic plants. A dictionary definition of an essential oil is 'a natural oil typically obtained by distillation and having the characteristic odour of the plant or other source from which it is extracted'. Their use dates back to ancient times, and their wide variety of aromatic, medicinal and culinary uses has ensured their continued popularity. More than 700 plants worldwide are known to contain useful essential oils. There are several methods to extract them, the most common of which is distillation.



Essential oils are located in tiny secretory structures found in various parts of plants such as leaves, berries, petals or flowers, roots, bark and wood. A typical essential oil will contain more than 100 different chemical compounds and many essential oils possess antiseptic properties. Many of the aromatic compounds of plants are volatile and quickly dissipate into the air, even at room temperature. Each volatile oil is made up of a unique blend of aromatic compounds, which gives the plant the ability to form unique essential oils.

When distilled, essential oils are extremely concentrated. These oils constitute important active ingredients, flavour additives and fragrances in many kinds of everyday products – toothpastes, mouthwashes, cleaning products, syrups, sweets, skin creams, lip balms, shampoos, bath salts, and soaps. Because they are so concentrated, often only small quantities of essential oils are used in the production of foods or cosmetic products. Essential oils even give flavour and aroma to the spices that are used in cooking. Nutmeg, allspice, thyme, oregano, basil, and cinnamon all contain essential oils.

The commonly used essential oils such as lavender, orange or rose are distilled from raw material that is harvested from cultivated plants. Some of the rarer essential oils are produced from wild harvested materials, of which the most well known are probably frankincense and myrrh. Other examples of these are the essential oil distilled from the wood of sandalwood trees or ambergris which is a solid, waxy substance produced in the digestive system of sperm whales and, as it ages, acquires a sweet, earthy scent which has been highly valued by perfumers as a fixative.

People in East Africa and the Arabian Peninsula have harvested and traded the resin from frankincense and myrrh trees for at least 5,000 years. Frankincense and myrrh were desired for personal, religious and medicinal use. The high demand for frankincense and myrrh created a booming trade in the Middle East lasting several hundred years. Today, demand for frankincense and myrrh has subsided, but are still used for the production of essential oils. Traditional collectors of

myrrh in East Africa distinguish between two types of myrrh. The distinction is made by the method in which the resins are produced. The superior resin is usually naturally exuded by the plants. The resin that is harvested after the bark has been cut (or damaged) is thought to be inferior.



Unsustainable harvesting from frankincense and myrrh trees has been documented in several regions – the Horn of Africa, the Arabian peninsula and India. China and Europe are the largest markets for both products, while the Middle East, the United States and North Africa import significant amounts.

Historical overview

Until recently, no essential oils were produced in Namibia. However, several researchers had previously documented that commiphora species in Kunene Region have long been used by Himba women as the major ingredient of their perfumes. The species, the part of the plant and how it was used, were not clear. In the early 1990s, IRDNC had been considering investigating this genus as a potential source of income for Himba communities, but was reluctant to do so until appropriate institutional arrangements were in place for the sustainable management of the resource, should it be harvested. With the change in legislation in 1996 and the subsequent registration of conservancies, the necessary community management structures now existed and the research was launched at the end of 2004. At that time, most conservancies derived their income from wildlife and wildlife-based tourism. A need to diversify sources of income for the conservancy members was identified, especially in areas with limited wildlife resources.

During 2005 and 2006, documenting of traditional knowledge, vegetation mapping, vegetation transects, a questionnaire survey, and trial harvests, indicated that *omumbiri* (*Commiphora wildii*) was the most important resin-producing plant used by Himba women for perfume. This work also indicated that the resin was harvested sustainably, since only resin that is naturally exuded from the tree is harvested. Further work in the 2006 / 2007 harvest season, estimated that about 50 tons of resin is produced every year in the five conservancies involved in this investigation – Puros, Orupembe, Marienfluss, Sanitatas and Okondjombo.

The first commercial harvesting of resin was started in October 2007. A total of five tons, worth US\$50,000, was harvested by 319 conservancy members, of whom 206 were women, between October 2007 and early February 2008. The harvesters earned just over N\$250,000. Between April and June 2008, harvesters and conservancy staff and committees were interviewed to review the first commercial harvest season and identify issues that needed attention before the start of the next harvesting season.

In Himba communities, the women are the managers of the plant resources and are responsible for harvesting the commiphora resins. For these reasons, this work initially focused on the women in the Orupembe and Sanitatas conservancies. All women interviewed rated *omumbiri* as the most important perfume plant used. *Omumbiri* resin is harvested in the dry summer months, when temperatures are high. The trees stop producing resin when it starts raining. There was unanimous agreement that the resin was easy to find and that there is more of the resource than is harvested. Resin is harvested by picking it up from the ground below the plant, or by picking it off the branches. Everyone interviewed confirmed that non-destructive methods of harvesting were used and that naturally exuded resin was collected.

Traditionally, a stone or piece of bark is often used to place the harvested resin on and to carry it back to the homestead, where it is sometimes placed in a cloth or bag for storage. It is used by placing it at the bottom of a container made from cattle horn. Animal fat and ochre are then added. The fragrance of the resin permeates the ochre and animal fat mixture so that when it is rubbed on the skin, it has a pleasant smell. Himba women rub their skins with this mixture on a daily basis. They mostly harvest what they need for a year, but the resin can be kept for several years without losing its fragrance.

Harvesting of *omumbiri* resin in the Kunene Region by the Himba people seems to have been for own use only, or for sharing with friends and family members who may not be able to collect it for themselves. Although several people interviewed in 2005 said

that they had sold *omumbiri* resin or bartered with it, no evidence could be found for regular trade and no price could be established.

Several studies were done to find out how long it takes to harvest one kilogram of resin in the Kunene Region. There are many factors that affect this – the distance that the harvester needs to walk to reach the harvesting area, the density of the trees, the production by the trees, and so on. Results show that, under good conditions, a harvester can collect about two kilograms of resin in one day.

The start of the commercialisation process was marked by the signing of a handwritten Prior Informed Consent document by conservancy representatives in January 2005. Marketing of commiphora resin was initiated in 2008 when samples of the resin and the essential oil were taken to the In-cosmetics Trade Fair in Paris. The commercialisation process was pioneered by the IRDNC with support from many partner organisations along the way.

- The initial study undertaken in Orupembe and Sanitatas conservancies was funded by WWF-UK, NNF and a grant from the People and Plants initiative with technical input from Tony Cunningham.
- The IRDNC team led by Karen Nott throughout this period. She assisted by various team members including Action Hambo, Fran Siebrits, Bonnie Galloway, Mathilde Brassine, Henry Tjambiru and Alu Uararavi. This was made possible through funding from IRDNC, WWF-UK, EED, WWF in Namibia, MCA-N and Big Lottery.
- Permission for this research to be undertaken was granted by the Ministry of Environment and Tourism through the granting of a research permit to the IRDNC.



harvesters during the development of the supply chain and the setting up of the enterprise.

- The IRDNC set up a revolving Fund to ensure that harvesters receive payment immediately when they deliver material to the conservancy buying points. The money for this fund was donated by Anders Johansson and Stefan Encratz, the ICEMA project and WWF in Namibia.
- Bonnie Galloway, with help from Jess Lavelle, supported six conservancies to register as community forests with funding from IRDNC, WWF-UK, The Big Lottery Fund and a grant from FAO.
- The Opuwo Processing Facility was started with funding from the ICEMA project and FFEM, with technical support provided by Pierre du Plessis. MCA-N supported the operationalisation and upgrading of OPF by providing equipment and technical support through the INP PPO Support Activity as well as through two Innovation Fund grants.
- The Visitor's Centre at OPF was funded by an SME grant from MCA-N through CDSS.
- The establishment of the Kunene Conservancies Indigenous Natural Products Trust was supported by IRDNC and MCA-N. The Trust was registered in 2013 and is the owner of the Scents of Namibia enterprise, the Visitor's Centre and OPF.
- Funding from MCA-N supported the product and market development of *Commiphora wildii* by



contracting the services of PhytoTrade Africa.

- A grant from PhytoTrade Africa contributed to resource inventory work done on *C.tenuipetiolata*.

Resource distribution

The Kunene Region has numerous species of commiphora, many of which are endemic or near endemic to Namibia, and several are endemic to that region alone. This genus, which consists of shrubs and trees, belongs to the Burseraceae, a family well known for its aromatic gums and resins, many of which have healing properties. Because of the low growth form of some of the endemic commiphora species, they are often collectively referred to as the dwarf commiphoras.

Commiphora wildii is usually a low growing shrub with thick, semi-succulent stems, branching near the ground.



These dwarf trees can be found growing on the rocky slopes of hills and mountains in the arid western part of Kunene region adjacent to the Skeleton Coast Park. They are near endemic to Namibia, extending from Southern Angola to just south of the Ugab River. Most individuals tend to grow horizontally, close to the ground, with a few branches growing upward. This is to escape the cold south western winds. In areas that are protected from the winds, individual plants are more erect. The bark is grey to reddish brown, smooth and shiny. Leaves are deeply lobed, resembling the leaves of an oak tree, hence the English common name 'oak-leaved corkwood'. The plant is deciduous, producing its first leaves in December and losing them again at the start of winter. Flowers are small, greenish yellow and borne on long stalks in the spring. The fruit are small, almost round, bright red berries.

Harvesting of the resin takes place in the Puros, Sanitatas, Orupembe, Marienfluss and Okondjombo conservancies and community forests. Between two and six tons are harvested each year, depending on demand. The resin is transported to Opuwo where the essential oil is extracted by steam distillation at the Opuwo Processing Facility. Raw resin is also sold to companies which have the technology to do the distillation themselves. The amount harvested is limited by demand and cash flow rather than the amount of resin available.

Supply chain

The supply chain within Namibia is well organised. Harvesters register with the conservancy or community forest and receive training from IRDNC. Buying points are established within the conservancies/community forests and staff members are trained to check the quality of resin, weigh it and record the data. Money from the IRDNC Revolving Fund provides funding for the harvester to be paid on the same day that she/he delivers it to the buying point. At the beginning of each harvest season, each conservancy is allocated a quota depending on the amount of cash available for purchase and orders received. The buckets or drums of resin are transported to Opuwo and stored at processing facility until they are sold or processed.

During the first few years of harvesting, the resin was stored until it could be sold to companies with the ability to extract the essential oil. Since the resin contains only about 6% essential oil, this meant that much of the material shipped to France was discarded as waste once the oil was extracted. In 2009 the Opuwo Processing Facility was built and equipped with a hydro-still. It took almost two years to make necessary changes to the equipment, sort out water quality problems and get OPF operational. Selling the essential oil instead of the raw resin has broadened the potential customer base. Several local and Southern African cosmetics manufacturers are now including *omumbiri* essential oil in their product formulations. The Opuwo Processing Facility is owned by the Kunene Conservancies Indigenous Natural Products Trust, which represents the harvesters from the five conservancies.

The number of people becoming involved and registering as harvesters in each of the conservancies/community forests is steadily increasing as residents realise that the opportunity to earn income from high value



plants is a reality. This was particularly evident during the drought conditions that existed in Kunene during 2012 and 2013. The income earned from harvesting helped many families buy food during this time. Almost all the members of these conservancies are also registered harvesters, although the female harvesters are the most active participants. Currently, 630 harvesters are registered in the five conservancies.

While *omumbiri* or Namibian myrrh is similar to traditional myrrh, its chemical profile and properties are different, and the market considers it to be a different product. The essential oils are sold to companies in Namibia, South Africa, France and Germany. The requirements for trading an essential oil in the EU are rigorous and a French company, V. Mane Fils which is based in Grasse, has been the commercial partner which has supported this process and assisted with the safety and other regulatory requirements.

The natural resources and the harvesters that manage this resource could easily increase the amount of resin sustainably harvested each season. Not only could the conservancies and community forests that are currently involved harvest more resin, but other community groups who also have the resource, could become involved in harvesting. The Opuwo Processing Facility has the capacity to produce more than 700 litres of

omumbiri essential oil each year. The research and development phase of product development, as well as getting the product known in the market place, takes time but demand is growing steadily, especially within the Southern Africa market. Over the next few years, most of the focus will be on marketing this product locally and internationally.

Essential oils from other commiphora species

Most of the commiphora species in Kunene Region are strongly aromatic. Three species of commiphora are considered to have an unpleasant smell and are known as omumbungu, tree of the hyaena. These are *C. kraeuseliana*, *C. dinteri* and *C. oblanceolata*. The resin from *C. kraeuseliana* is similar in colour and consistency to that of *C. wildii* and it is possible to extract an essential oil from this resin.

C. virgata exudes a thick, golden-coloured resin when an incision is made a few centimeters deep into the bark of the trees. *C. virgata* resin is said to have been used in the past by 'the old people' for perfume. This species does not exude resin unless it is damaged or tapped. While it has a pleasant smell similar to that of traditional myrrh, harvesting this species and the production of essential oils has not been promoted because of potential issues of the sustainability of use of the resource.

The gum from omumgorwa (*C. tenuipetiolata*) is used traditionally for soap. The trees exude a gum (not a resin), which is water soluble. The gum is collected and can be used as soap in two ways. It can be ground into a powder, which is then rubbed into the item (a blanket or a cloth) that needs to be washed. Once the powder is rubbed in, the item is then placed into water and rubbed until clean. Alternatively, the gum is collected and heated so that it forms a big lump. This lump is then rubbed against the item to be cleaned in a similar way as to using a cake of soap.

An aromatic extract can be obtained from this gum through the process of solvent extraction. Currently, the possibility of commercialising this indigenous natural product is being investigated. *C. tenuipe-*

tiolata has a much wider distribution than that of *C. wildii* and the amount of resin produced by each tree is also greater. Resource inventories have been done in nine conservancies to determine the extent of the resource. A trial harvest was done during the 2012/2013 harvest season in four conservancies. The quotas allocated to each were reached, with harvesters reporting that there was still a lot of gum available for harvesting. Work on developing *C. tenuipetiolata* as a commercial product is underway.

Market value and value addition

There are four broad sectors in which essential oils are used: food and flavours, pharmaceutical, fragrance and cosmetic, and industrial. The majority of essential oils are obtained from agricultural plants. However a number are collected from wild sources, including trees. Most of the trade in essential oils takes place in Europe, America and East Asia with very little, or insignificant, trade in Africa and, in particular, the SADC Region. Consumption by Asia, America and Europe are roughly equal and about one third of the global market. SADC's trade in essential oils is about 1% overall. In 2005 exports and imports amounted to US\$15.4m and US\$25.8m, respectively. However, there are many opportunities for the region to increase its share in the world trade.

It is unlikely that *C. wildii* essential oil will become as commonplace in the essential oil markets as the globally well-known oils such as lavender, because the latter have been used globally for generations, and their properties and uses are common knowledge to many people. Previously unexplored oils, such as *C. wildii*, still need to be extensively researched and used to uncover their benefits and enhance exposure. It will appeal to a small sector of the market, and is more likely to appeal to perfume makers for blending, and to professional aromatherapists who specialise in indigenous oils for their unique properties.

C. wildii has a fragrance that is very light; meaning that a lot of oil will need to be used in products for its scent to come through. Production of *C. wildii* oil is localised and it is produced in relatively small

The story of Veerii Tjivinda

Tucked away in the north-west corner of Namibia, the Kunene Region, an extremely arid environment, is not only home to the nomadic Ovahimba people but also to a large number of endemic plant species. The resin from *Commiphora wildii* is being sustainably harvested and traded to generate much-needed cash income. The Ovahimba women have been using these plants for their fragrance properties time immemorial.

Much of the important ground work has thus far been undertaken by Integrated Rural Development and Nature Conservation (IRDNC). Now the Millennium Challenge Account Namibia (MCA-N) with funding from the American government through the Millennium Challenge Corporation (MCC) is continuing to provide assistance to producers through support to the PPO sub-activity and the INP Innovation Fund (INP IF).

Veerii Tjivinda lives in the village of Otji-menje (meaning place of the springbuck) in the Orupembe Conservancy in the Kunene region of Namibia. Veerii who is now 19 years old has been assisting her mother to harvest *omumbiri* for the last five years. In fact her mother, who is still an active member today, attended the first workshop in 2004 where the project was initially discussed.



Veerii maintains the project of *omumbiri* is important for buying food and other necessities such as blankets and that is why we pay so much attention to it. Harvesters earn N\$50/kg, and an additional N\$20/kg is generated from sales to cover management and logistical costs. Veerii says she feels proud that people from elsewhere in the world are using *omumbiri*. The tree is important for providing resin. We are using it in our culture and it is helpful in maintaining our culture. She says she feels it is important that a steady and reliable market is developed so that they can continue to earn cash. Smiling she says, “I will do this for the rest of my life and just as my mother has taught me I want to teach others.”

quantities, limiting the supply available to the market place.

Along with the product development activities, brand development of these Namibian products has been initiated. The first step was to settle on a name for the brand – something that could succinctly capture the mystical, ancient feeling of the desert and the Himba culture. A logo has been developed and the trademark *Scents of Namibia* registered.

Omumbiri oil has several unique selling points that will contribute to the successful marketing of the oils. This essential oil is a true myrrh, generating interest in it from the outset. The story behind the essential oil – its traditional use, how it is harvested, produced and branded, and the harvesters who directly benefit from this also promotes sales.

The supply will always remain limited, and this makes it an exclusive product. The products under the brand name of ‘Scents of Namibia’ will become synonymous with products that are empowering local communities, are 100% natural and botanical, organic, ecologically sustainable and a completely Namibian product.

Harvesters are paid N\$50/kg of resin or gum when it is delivered to the conservancy buying point. During the three to four months harvesting season, individual harvesters can earn between N\$1000 and N\$5000, although the average earned is around N\$1500 per season.

C. wildii resin is sold at N\$100/kg while, after value adding, the essential oil is sold for N\$5,000/kg. Harvesters benefit from the sale of the raw material to OPF. Companies in Namibia and South Africa are using the essential oil to fragrance their cosmetic products.

The way forward

An opportunity to make truly Namibian products exists, not just from *C. wildii* and mopane, but also in combining other locally manufactured products and

raw materials. Namibia has a considerable and growing tourist sector, which has the potential to provide a market for this kind of indigenous product. The next step is to create awareness that buying Namibian is the right thing to do.

One recommendation is for the OPF to sell their own oils direct to the end user as far as possible, without having to partner with agents, traders and other third parties, which will drive up the price of the product, but not directly benefit the Namibians producing the oil.

The challenges presently facing successful marketing of the oils are to make them known to relevant buyers. But, until the analysis of the components of the oils are uncovered, it is unknown whether they have any specific properties that will help target which markets the oils should be aimed at.

The fragrance industry and creators of perfumes will have to experiment extensively to see if the oils exhibit those specific properties they are looking for. Then there is the issue of competition and guarding one's products. Mopane, for example is a very common species in the SADC Region, which means that other producers of the oil, their products and output will have to be taken into account.

The sustainable harvesting of gums and resins and the production and successful marketing of Namibian essential oils has the potential to make a significant impact on the livelihoods of many Namibians living in remote rural areas. Over the past ten years, much research has been done and this has laid the foundation for the successful establishment of sustainable supply chains. The development of sustainable markets for these products is the next challenge for the Namibian organisations supporting INP development.



Chapter 6

*mopane &
sarcocaulon*



essential oils



mopane & sarcocaulon

(*C. mopane* & *S. mossamedense*)

Karen Nott

Arid areas are characterised by extreme temperatures, low and variable rainfall, and high evaporation rates. These harsh conditions result in diverse ecological habitats, where vegetation is adapted to the unique conditions. Adaptations of desert plants to their environment involve a variety of strategies from physiological adaptations to store moisture, to morphological features such as hairy or waxy layers on their leaves and stems to restrict moisture loss and/or protect them from insolation. The incidence of aromatic plants is high in arid environments, and desert plants are known for their ability to produce aromatic gums, waxy barks and resins.

True gums are formed from the disintegration of internal plant tissues, usually of cellulose composition. They exude naturally from the stems of plants or in response to wounding of the plant, and are colloidal and soluble in water. Gums contain high amounts of sugar, and are sometimes so sweet that they are eaten. In the arid area in north-western Namibia, the sweet-tasting, edible gums of *Terminalia prunioides* and *Acacia erubescens* are favoured.

Resins are very complex and varied in chemical composition. Usually secreted in definite cavities or passages, the resin frequently oozes out through the bark, hardening on exposure to air. Due to their high antiseptic qualities, resins probably serve the plant by preventing decay. They may also lower the amount of water lost from the plant tissues and are likely to deter herbivores by making the plant tissues bitter and unpalatable. Unlike gums, they are insoluble in water, but dissolve in various inorganic solvents such as alcohol and ether.

Owing to its antiquity, the Namib Desert is home to endemic species, mostly highly adapted to the specific climate of the area and often aromatic, as is characteristic of many desert-adapted species. In addition to the highly aromatic commiphora species found in north-western Namibia, which is a centre of diversity for that genus, there are many other species that potentially could be harvested for the extraction of essential oils.

Historical overview

Other than the gums and resins produced by commiphora species, there are two other plants that are currently being harvested in the Kunene Region for the production of essential oils.

- The seeds of *Colophospermum mopane* are harvested and steam distilled at the Opuwo Processing Facility to extract an essential oil
- The waxy bark that remains on the soil surface after *Sarcocaulon mossamedense* plants have died and decomposed is collected. The extraction of the essential oil from this material cannot be done by steam distillation. Solvent extraction methods are used and, at the moment, the possibility of doing this extraction in Namibia is being explored.

The products from the two plants discussed in this chapter provide very different challenges. The mopane resource is abundant and the technology for extraction locally available. The challenge is to develop the market. The *Sarcocaulon* resource, on the other hand, is limited and technology for adding value is not available within Namibia, but there is considerable market interest in the product. Before either of these products can be sold in the EU, the regulatory documentation is required.

Mopane

The name *Colophospermum* is Greek for resin seed ('*kolophonios*' resin; '*sperma*' seed). Colophony is another name for rosin, a substance with a turpentine-like smell obtained from pine trees. The species name, *mopane*, is taken from the Tswana name for the tree.

The wood of *C. mopane* has many well-documented uses in Southern Africa, such as quality firewood, timber for building walls and roofs and making utensils such as cattle yokes. The bark is used for tanning and to produce rope, while the foliage provides dry season browse for game and livestock. One of the most important uses of this species is that it is a food plant for the edible mopane worm (*Imbrasia belina*), which is highly nutritious and is regarded by many indigenous people as a delicacy, besides also being eaten by animals and birds. Medicinal uses vary from the treatment of sore eyes, to treatment of chafing of the inner thighs, stomach pains, kidney stones and as a cure for madness. The leaves are used to disinfect wounds and reduce bleeding by promoting clotting.

While these many uses of mopane have been documented, there is very little reference to the use of the seeds of *C. mopane*. Although the seeds have a relatively high crude protein content animals do not generally eat them. There are secondary metabolites in spots of resin on *C. mopane* seeds which are not present in the leaves, and these presumably protect the seeds from being eaten by making them unpalatable.





The start of the commercialisation process of mopane seed in Namibia can be identified by the work done by Laura Weiss. Her thesis considered the ecological and social feasibility of *C. mopane* seed commercialisation in Namibia and concluded that the resource was in abundant supply and that commercialisation was unlikely to result in any negative social or ecological impacts.

- In 2006, IRDNC started organising and mobilising harvesters in selected conservancies and a trial harvest was undertaken.
- The Opuwo Processing Facility was developed with funding from the ICEMA project and FFEM, with technical support provided by Pierre du Plessis. MCA-N supported the operationalisation and upgrading of the facility by providing equipment and technical support through the INP PPO Support Activity, as well as through two Innovation Fund grants.
- The processing of mopane seeds at OPF started in 2011.
- Funding from MCA-N supported the product and market development of *C. mopane* oil, with support from the Natural Resources Institute, V. Mane Fils and Phytotrade Africa.
- In 2012, South African companies, Frazer Parfum and Terres d' Afrique, purchased mopane essential oil to include in their products.

Sarcocaulon wax

Sarcocaulon mossamedense is a semi-erect bush with spiny branches and pink flowers. When the plant dies and the woody parts have decomposed, a waxy bark remains on the soil surface for extended periods. The bark can be processed using solvent extraction methods, and the resulting aromatic extract used in cosmetic products. Because only the dead plant material is used there is no obvious ecological threat to the species from harvesting the plant material. This material is not known to be used by animals in any way. Participatory resource assessments indicated that there is no local traditional knowledge associated with this species and it appears to be of little value to the Himba communities, who refer to it as *okamuti*, meaning small tree.

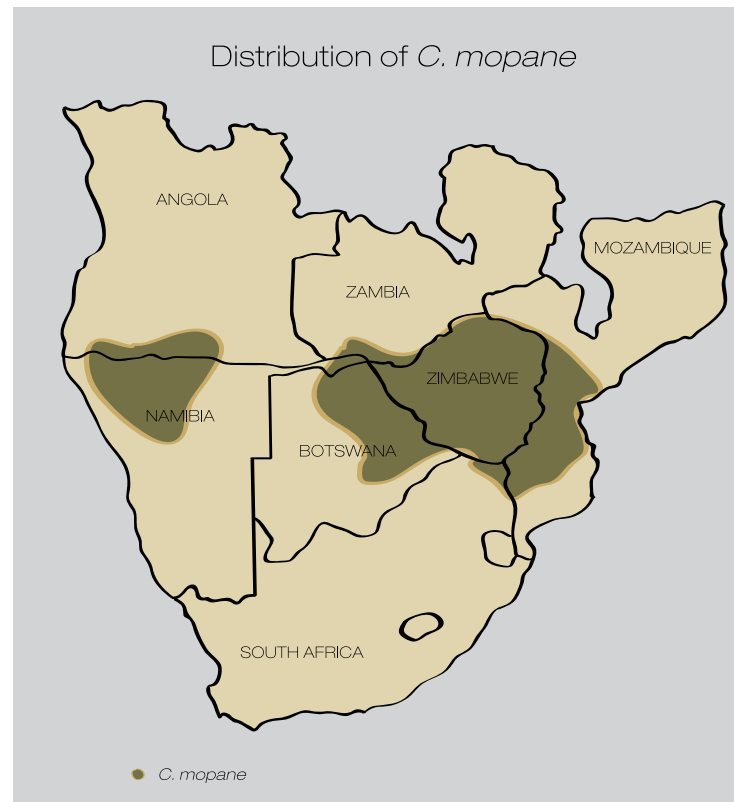
The lack of a more descriptive name indicates that the plant had received little attention from local residents until the possibility of collecting it to sell became known. Useful plants usually have descriptive names. French companies, Behave and V. Mane Fils, showed an early interest in this resource.

- The IRDNC has undertaken resource assessments in the Puros, Okondjombo, Sanitatas and Orupembe conservancies and community forests. Very limited amounts of this resource are found in the western extent of Okondjombo and Sanitatas where these conservancies and community forests are adjacent to the Skeleton Coast Park.
- Training has been provided to harvesters from the Puros and Orupembe conservancies and community forests in correct harvesting techniques. Only the dark wax, which remains on the soil surface after the plant has died and decomposed, is collected. While the plant is alive, the wax is a yellow colour and almost impossible to separate from the woody stems.
- Buying points have been established where conservancy staff monitor the harvesting activities and check the quality of the harvested material.

Resource distribution

Mopane

Colophospermum mopane is the dominant woody species over much of the arid parts of Southern Africa. The genus *Colophospermum* only occurs in Africa and includes only one species. *C. mopane* has many common names throughout its range, including: mopane, butterfly tree, turpentine tree, Rhodesian ironwood, *omutati* and *omusati*. Mopane trees grow in hot, dry, low-lying areas, in the far northern parts of South Africa, into Zimbabwe, Mozambique, Botswana, Zambia, Namibia, Angola and Malawi. It is found in alluvial and shallow alkaline soils which do not drain well.



Distribution of *C. mopane*

Sarcocaulon

Sarcocaulon plants, which belong to the Family Geraniaceae, are found only in the western parts of South Africa, Namibia and Angola. The name *Sarcocaulon* originates from the Greek words for fleshy (*sarkos*) and stems (*kaulos*). These plants have fleshy branches that are covered with waxy, translucent bark. They grow in arid areas and are generally found on rocky hillsides or mountainsides.

Sarcocaulon mossamedense was first collected in Angola by Welwitsch in 1859, and is the only species of *Sarcocaulon* that occurs outside of South Africa and Namibia. It is found from Henties Bay to just north and east of the port of Mossamedes in Southern Angola. It grows in extremely arid and bare localities, usually among rocks. It has been recorded in the Puros, Sanitatas, Okondjombo and Orupembe conservancies, as well as in the Skeleton Coast National Park. Populations of *S. mossamedense* are typically localised but, where they do occur, they can be found in high densities. Plants near the coast are dependent to a large extent on coastal fog for their water.



Supply chain

Mopane

Mopane seeds are collected by harvesters from the Sesfontein, Anabeb, Otjiu-West, Okongoro and Orupupa conservancies. Harvesting takes place from June to September, once the fruits have matured. Annually close to ten tons of seeds are harvested by about 400 harvesters. Seeds that have dropped from the trees recently, are also harvested. Harvesters are paid N\$2.50/kg when they deliver the material to the conservancy buying points. The seeds are packed in bags, labelled and transported to the processing facility, where they are steam distilled to extract the essential oil.

Since the bags of harvested mopane seeds are bulky, and the extraction rate of essential oils from the small spots of resin on the seeds is low, the development of this product would have been impossible without a local facility to do the essential oil extraction. The available resource is abundant and the technology is functioning well. However, marketing of this product remains a challenge.

Sarcocaulon

Resource inventories in the northern conservancies of the Kunene Region have indicated that most of the material available for collection is found in the Puros and Orupembe conservancies and, for this reason, research and training activities have focussed on those areas. Following resource inventories, fixed sites for monitoring have been established to monitor the population trends over time.

Small quantities have been harvested in the Puros and Orupembe conservancies and community forests. Harvesters need to be registered and attend training on appropriate harvesting methods before they are allowed to participate in harvesting activities. The estimated annual sustainable yield from these conservancies is between 1.6 and 2 tonnes. Currently, all raw material is purchased by V. Mane Fils and processed in France.

The Opuwo Processing Facility and Visitor's Centre

The Opuwo Processing Facility has received ongoing support from the MCA-N throughout the Compact period. This started with support from a technical expert to operationalise the stills at OPF and to make

the necessary adaptations to get the stills functional. Ongoing technical support and equipment has been provided as well as support for product and market development through two Innovation Fund grants (NEOi and NOBO). During this quarter a new commiphora still was installed and operationalised as well as a cooling system.

The official opening that took place on 27th February 2014 was to launch not only OPF but also the Visitor's Centre. The event was attended by representatives from MCC, MCA-N, NRI, CDSS, IRDNC and most importantly the owners of this development, the Kunene Conservancies Indigenous Natural Products Trust and the harvesters. Wet weather conditions made it a challenge for many to attend the opening but in spite of this, most of the key stakeholders were present.

The harvesters looked beautiful and self-assured as they sat in front of the proceedings and were duly honoured by the keynote speaker, Governor Hoebbe of the Kunene Region, as the keepers of the desert garden. One of the highlights for the harvesters was the viewing of the Visitor's Centre DVD in which several of them



featured. While these proceedings were taking place, the *commiphora* still was operating so guests experienced the wonderful fragrances and were able to view the distillation process and the production of the essential oil.

The sustainable harvesting of gums and resins and the production and successful marketing of Namibian essential oils has the potential to make a significant impact on the livelihoods of many Namibians living in remote rural areas. Over the past ten years, much research has been done and this has laid the foundation for the successful establishment of sustainable supply chains. The development of sustainable markets for these products is the next challenge for the Namibian organisations supporting INP development.

“This place has changed my life”



Three years ago, Isanee 'Jeckey' Kasaona's life took a 180-degree turn. While working as a part-time volunteer tour guide at the Kunene Village Rest Camp in Opuwo, he became a key player in setting up the Opuwo Processing Facility, where resin from the *Commiphora wildii* tree and seeds from mopane trees are processed to produce essential oils.

Karen Nott of the Integrated Rural Development and Nature Conservation (IRDNC) NGO, who assisted the community to set up the processing plant, had met Kasaona during her visits to the rest camp, and his hard work had impressed her. She asked Jeckey to translate for her during training courses

with the community on the budding processing plant project, which is owned collectively by a Trust representing five conservancies.

From there one thing led to another, and Karen decided that Jeckey would be the ideal candidate to help her kick-start the processing plant. The goal would be to add value to the resin of the *Commiphora wildii* tree and seeds of *Colophospermum mopane* by extracting the essential oils instead of shipping the raw materials overseas.

Jeckey remembers that when he started, he was unsure whether he could operate the machines effectively. But after a week of training, he had the hang of it. “At first I was a little scared of working with such big machines. I didn't find it easy,” he acknowledges. But once he understood the process, operations could begin. Jeckey became the first person to officially operate the extraction machines at the plant. He now works with two other men who help him in his position as production manager at the Opuwo Processing Facility. Jeckey describes working with the machines at the plant as ‘hard, physical labour’. But while it was challenging in the beginning, over the years it became enjoyable, he says.

Two steam distillation stills are set up at the plant, one for commiphora resin and the other for mopane seeds. A laboratory was added recently, where the last water moisture is extracted from the oils before they are bottled and sent to buyers in Europe. The commiphora resin is spread out onto sieves, which are layered in a container. Boiling water is pumped into the sealed walls of the container, causing water vapour to move through the resin, thereby releasing the oils. It takes about two and half hours for one litre of oil to be extracted from a batch of eight sieves. The oil from mopane seeds is extracted by steam distillation but in a slightly different way. The seeds in their shells are shredded and then put loosely into the container. Boiling water is mixed with the seeds, allowing the oils to be extracted and separated out. About 200 millilitres of oil can be extracted from 48.5 kg of seeds.

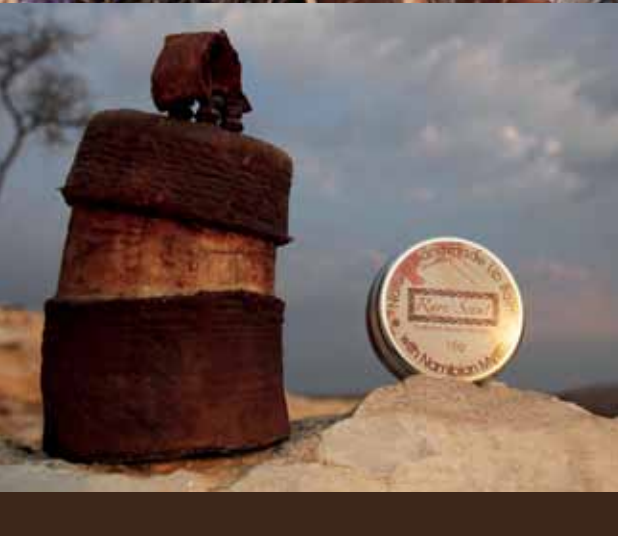
Jeckey's job involves close work with the communities that own and benefit from the value adding done at the processing plant. The fact that his work ensures an income for community members, is one of his greatest joys. He says working at the processing plant has changed his life in more ways than one. To start with there are the technical abilities he has acquired over the past three years. Operating the machines has forced him to become closely attuned to how they work, and to recognise their shortcomings. “You can't always go to the technical people. So you try to sort it out yourself. You soon figure out what to do.”

The laboratory work, where the last remnants of water are extracted from the oil, has further boosted his job skills. So Jeckey, the one-time student, has evolved into Jeckey the teacher who trains others to operate the machinery at the plant. “This is not just something I do for myself. I can make a positive impact on others. Of this I am proud,” he says. Jeckey has thought about the future and wants to intensify his direct working relationship with the conservancies in terms of training and mentoring in the field of indigenous resource management. “Conservancy members come here to ask questions, so I need time to meet with them and explain to them what we’re thinking and planning. I would like to reach out to them more.”



Overall it's clear that the communities are close to Jeckey's heart. He wants to ensure they can rely on him for the quick and efficient management of the processing plant. He says that while he was growing up in Sesfontein, he dreamt of becoming a tour guide. While his job has evolved into something rather different than he'd imagined, "I am proud of what I do." He is helping his community in a crucial way by enabling individual members to reap financial benefits from traditionally-used resources. "I try to process the resin as quickly as possible, so that the community members can have a quick turnover."

On the day we spoke, Jeckey was preparing for his first trip to South Africa. He and Karen were scheduled to meet up with a company to scout for a new, more advanced processing machine. This machine has been purchased and installed resulting in a more efficient processing of the resin.



Potential partner visits Kunene harvesting areas and OPF

Various representatives from international companies have visited the harvesters in Kunene and the Opuwo Processing Facility since it became fully functional in 2011. These visits have been with the view of determining the potential of using the essential oils in their products.

In November 2011 the Kunene Conservancies, IRD-NC and OPF hosted a visit by the President of the Americas region of the French company V. Mane Fils, Michel Mane and Stephane Piquart of the company BeHave to observe the commiphora and Mopane harvesting and processing into essential oils in the Kunene Region. V. Mane Fils is the third largest Flavours and Fragrances companies in the world. Ongoing collaborations with V. Mane Fils has resulted in additional products with potential in the fragrance sector being investigated e.g. *Commiphora tenuipetiolata* and *Sarcocaulon mossamedense*. The Kunene Conservancies Indigenous Natural Products Trust has signed a Term Sheet with V. Mane Fils who is supporting the Trust to acquire the required regulatory documentation for these products.

In December 2011, Tammy Frazer of Frazer Parfum visited Orupembe and Puros and the Opuwo Processing Facility. Frazer Parfum is a high-quality perfume house working only with the finest quality natural raw materials. Tammy Frazer sources all of her raw materials herself to ensure that ingredients are of a high quality and sustainably harvested.

She has already formulated a perfume with *Commiphora wildii* and mopane essential oils called 'Chapter 10'. The fragrance is produced in a perfume solide convenient for travel as well as a liquid eau de parfum spray. This perfume contains both commiphora and mopane essential oils.

Shannon Hess (Senior Manager Responsible Sourcing and Sustainability for The Clorox Company, incorporating Burt's Bees), was accompanied by John Cheesmond (CEO, PhytoTrade Africa) and Cyril Lombard (Manager Research & Development, PhytoTrade Africa on a visit

in November 2012. This visit provided an opportunity to explore the potential for responsible sourcing practices in community-based partnerships in Namibia.

Additionally, it allowed her to evaluate the level of responsible compensation to indigenous communities for cosmetic ingredients, and better understand the roles of the partnerships between NGOs and indigenous peoples (producer groups) to create viable business opportunities and stable supply chains. Burt's Bees was founded in the 1980s by Burt Shavitz, a bee keeper selling honey out of the back of his truck in Maine.

With a business partner they then started manufacturing candles and later lip balm from beeswax – hence the brand was born. Burt's Bees is the largest mass market natural personal care company in the USA with more than 30,000 outlets and 30 countries worldwide. Shannon Hess of Burt's Bees had this to say: "the team here is a true example of best practice and inspiration in responsible sourcing and community cooperation with real results."

In January, Bev Missing, the owner of the RAIN shops in South Africa visited the PPOs in Kunene and OPE. In the next five years, 60 RAIN stores will be opened in the USA and Bev is developing a new range based on the essential oils and products from the Kunene Region. Bev met with the PPOs and discussed her products and her vision for her new stores.

She went out with the harvesters into the field and experienced the desert, its plants and its people. At the PPO planning meeting, Bev handed out samples of some of her products to the delight of all present. Even the toughest of game guards could not resist testing the fragrant and moisturising creams!



“Harvesting helps women to be empowered”

A newcomer to the harvesting scene is Kaveura Muhenje, who delivered her first crop this season. Collecting mopane seeds that yield sufficient essential oil has become a sure means of earning cash in this unforgiving environment. But it is hard work.



A half-filled bag stood next to her the day we spoke. She said it had taken about five days, moving from one tree to the next, to fill the bag to that level. It would take another five or six days of harvesting to fill the bag completely. Kaveura lives in the Ombombo-Masitu Conservancy, which was proclaimed in 2012. Harvesting mopane seeds is one way in which conservancy members are currently benefiting from the natural wealth of their land. When it comes to collecting the seeds, Kaveura says, she is meticulous. This makes the job a genuine challenge. “Collecting the seeds is difficult, because some are not suitable. This means you have to move from one tree to the next, sorting the good seeds from the bad ones. It takes a lot of effort.”

At a workshop held in the conservancy earlier that year, the Integrated Rural Development and Nature Conservation (IRDNC) facilitators took

potential harvesters through the necessary steps, explaining the process of extracting essential oil from mopane seeds and then marketing it internationally. The seeds have to be dry green seeds are not suitable – and should be picked up from the ground rather than gathered from the tree. Ideally they must have been shed in the current season, as old, grey seeds or those covered in dust because of being muddied during the last rainy season are not suitable. The way to establish whether the seeds have enough oil is by looking at the seed sheath against the sun, which will indicate whether the resin on the seeds is still intact and whether they contain sufficient essential oil.

Kaveura and her fellow harvesters were taught how to identify seeds that were suitable and would yield the required quantity of essential oil. She says that traditionally the seeds were not used for anything, so she is curious to see how the project pans out. Moreover, she is excited at the prospect of earning money for her hard work. The seeds are currently purchased at N\$2 per kilogram when the bags have to be collected, and N\$3 per kilogram if the harvesters drop them off at the processing plant.

The income is a welcome relief in years of severe drought. Kaveura will use her earnings to pay for medicine and food. This is currently the only way she can support her family. She is also keen to motivate other women in her community to start harvesting mopane seeds, as this is a unique opportunity for them to make small amounts of cash, which can be used for basic necessities and personal requirements. Curiosity is intertwined with her entrepreneurial spirit. Kaveura admits that apart from making a profit, she is curious about how exactly the essential oil is extracted and what is done with it. Her curiosity will be rewarded once she visits the Opuwo Processing Facility, which is situated close to her conservancy. Overall the harvesting is a chance for the women to become ‘empowered’ Kaveura said in conclusion.







hoodia

Hoodia gordonii



hoodia

hoodia

(*H. gordonii*)

For centuries hoodia plants have been used to quench the thirst and hunger of hunter-gatherers in Namibia during expeditions through arid desert regions. Based on this traditional knowledge of the ‘first people’, hoodia recently developed a reputation as a potential new dietary supplement that could target the growing western obesity epidemic and was to allow the San communities to benefit from an ancient botanical tradition through a benefit-sharing arrangement with the developers of the new treatment.

There are a number of hoodia species in the western Southern African Region. Hoodia is a leafless succulent with multiple stems and sharp spines found growing throughout the north-western, western and southern regions of Namibia and South Africa, where it thrives in the marginal, arid conditions. The species of commercial interest, *Hoodia gordonii* is found from the fringes of the Kalahari Desert in the east through the southern and western regions of Namibia and South Africa, where it is common in localised areas in the transitional zone between the interior and the Namib Desert, that is its range corresponds roughly to the succulent Karoo biome and northwards.

The genus enjoys protection both locally and under Appendix II of the Convention on International Trade in Endangered Species (CITES).

Ten species of hoodia are found in Namibia, of which the most common are *Hoodia gordonii* and *H. currorii*. It is *H. gordonii* that has been targeted for cultivation for commercial purposes in Namibia. The genus enjoys protection both locally under the Nature Conservation Ordinance of 1975, and under Appendix II of the Convention on International Trade in Endangered Species (CITES).

The curious flowers of the hoodia exude a distinctive odour of rotten meat (this type of flower is known as a carrion flower), which attracts insects and flies, the latter being especially responsible for pollination. Ranging from very small (1 cm in diameter) to large (15 cm in diameter), the flowers are saucer- or bell-shaped, their colours varying from red, pink and brown to yellow.



Seeds are borne in horned, dehiscent pods. The drop-shaped seeds are attached to a tuft of silky-white hairs which act as a parachute to aid wind dispersal of the brown seeds when ripe.

Traditionally, the San and Nama of Namibia call the plant *//boba*. It has important medicinal applications for them. Its fleshy parts are used to treat conditions such as high blood pressure, indigestion and infections. It is said that the plant is also used as an energy booster, and was a vital component on long, arduous searches for food.

Following nearly a decade of research, the South African Council for Scientific and Industrial Research (CSIR) filed a patent application under the International Patent Cooperation Treaty (PCT) system based on a national patent application made in 1997 in South Africa. The patent covers the pharmaceutical compositions extracted from *Hoodia gordonii* and identified as chemical products having appetite suppressant activity, and the process of extraction. CSIR also made direct national patent applications in other countries, namely the USA, where it was granted in 1999. Since then developments by Unilever, operating under an exclusive licensing agreement with CSIR through Phytopharm, included clinical safety trials, trial product manufacturing and cultivation of *H. gordonii* in South Africa and to a very limited extent in Namibia, as part of their production.

Although the CSIR/Unilever exclusive development model meant that the plant material for their purposes was derived solely from their own cultivated plants, it did not prevent the rise of illegal, relentless wild harvesting, resulting in major conservation concerns around the wild population in Namibia and South Africa, leading to the listing on CITES App.II in 2005.

While the research and rigorous development of a product for entry into a highly specialised market attracted much of the interest and attention, excluded Namibians and South African growers were seeking to enter products into the less rigorous herbal markets. They could make no claims regarding the appetite-suppressant properties and promoted it for its general health benefits.





Namibian growers proceeded to organise themselves with the support of the Namibian Government. They formed an association to represent their interests, established a fledging supply chain that included commercial farmers, communal farmers, conservancies and community organisations, developed a business plan for commercialisation with links to the association members, and reached out in the region to South African growers. Traditional knowledge holders were also to be producers and would obtain equity shares in the commercial operation. European Union funds were obtained to strengthen the supply chain by providing community-based growers with nursery infrastructure, start-up growing packs that included seedlings and seeds, and training in nursery management and quality issues.

When the CSIR/Unilever initiative failed to meet with expectations, the message from Unilever was that they had efficacy and safety concerns in the way they were trying to formulate their product based on the extract. This negative outcome, after such a large investment into the research and development and all the media hype, led to a plummeting international demand for hoodia material and resulted in the collapse of the emerging herbal-based industries in Namibia and South Africa.

The future of hoodia in Namibia

Although the demand for hoodia material has been depressed since the CSIR/Unilever attempts to develop a product, the demand for material has not disappeared entirely. There remains some limited commercial activity with a few Namibian growers still cultivating.

- A total of 11,223 kg of dried hoodia powder with a market value of just over N\$700,000 was produced in 2011, while dried powder with an estimated market value of over N\$145,000 was produced in 2012. Unfortunately, these volumes have not translated into sales of the same magnitude.
- Export of hoodia capsules have been reported, with more than 366,000 capsules valued at N\$293,528 exported in 2011 and 206,250 capsules worth an estimated N\$165,000 exported in 2012.
- The main importers of hoodia capsules are New Zealand and European countries, notably Austria. Some African countries also import hoodia capsules.

The full potential of hoodia is still to be investigated and opportunities other than for weight loss, in many cases based on traditional knowledge, are worth pursuing further. At this stage, investment in research for new products that may lead to new commercial opportunities in new markets is required.



marama

(*Tylosema esculentum*)

Percy Chimwamurombe

The marama is a high-value plant from the Namibian Kalahari agro-ecological region. It is a perennial species, producing a prostrate vine with numerous prostrate stems of up to three metres long, which spread from an enormous woody tuber below the ground. The tubers have reddish-brown bark and usually taper to a thinner neck-like structure near the soil surface, from where the annual branches grow during the rainy season.

The plant occurs in the deep sandy regions of eastern, central tropical and Southern Africa. In its natural habitat, the marama bean takes between 18 to 24 months to reach reproduction maturity, and between eight to 21 days to germinate on wet soils. It then grows vegetatively for the next five to six months. During this time a tuber develops underground, which lies there for the next three to four months until the start of the next rainy season, when the new runners sprout from the tubers. The marama bean plant produces flowers after one to four months of vegetative growth. The flowers are usually yellow. They are pollinated by a solitary carpenter bee, and the first pods with seed will set. Thereafter marama bean runners will die back and re-sprout again as the cycle repeats itself perennially.



While the economic importance of the marama plant, *Tylosema esculentum*, has been known for a very long time, Burchell introduced it to literature only in 1824. For millennia this perennial creeping leguminous plant has been widely used by the Khoisan and Bantu people in Namibia and Southern Africa. Today it still has a huge potential for addressing the problem of malnutrition and hunger in Namibia and other dry countries.

Also known as gemsbok bean in English, *maramaboontjie*, *elandsboontjie* and *braaiboontjie* in Afrikaans, *marama* or *morama* in Tswana, *maramama* in Thonga, *tsi-tsin* in !Kung, *gami* in Khoi and *ozombanui* in the Herero language, the marama bean is an excellent source of good-quality protein, from 29% to 39%, and has an oil content ranging from 24% to 48%.

The protein content of the seed is comparable to or even slightly higher than that of soya beans. The oil content is twice that of soya beans, approaching that of peanuts. The young tubers also contain protein, and are even more nutritious than potatoes and yams.

While marama is also a good source of micronutrients such as calcium, iron, zinc, phosphate, potassium, magnesium, and B vitamins, its primary agronomic potential is based on the high nutritional value of its seeds.



Holding the marama bean tuber are Kahepako Kakujaha and Prof Percy Chimwamurombe. These tubers can easily weigh up to a 100kg after ten years. Kakujaha is the Field manager and participating farmer from Omipinda in Epukiro Constituency in Omaheke region, where the University of Namibia does selection trials for the marama bean domestication programme, supported by the Kirkhouse Trust, UK.



The chemical composition and nutritional status of the marama bean has been determined, and a potential list of prototype products has been produced. This list of products includes but is not limited to marama cooking and salad oil; marama cosmetic oil; marama butter; marama high-protein flour to supplement cereal flour for protein; snacks eaten at breakfast; meat analogues; marama roasted nuts, marama biscuits, cookies, muffins, bread and ice cream, and canned marama beans in tomato sauce.

Development of natural-product value chains

PhytoTrade Africa is a non-profit trade association supporting producers of indigenous natural products from Southern Africa. Some 65 members, including SMEs, cooperatives, research organisations and other parties seeking to commercialise indigenous plant products for sustainable economic development, come from Botswana, Madagascar, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe.

The association was established in 2001 with strong connections to the early commercialisation of marula oil in Namibia. Since then it has worked extensively in the development of natural-product value chains, from point of harvest through to markets and end customers.

In recent years there has been an ongoing megatrend for health and wellness, which is clearly reflected in the increased demand for natural ingredients in several sectors, including food and beverages, cosmetics, and personal care. Indigenous products (INPs) are of particular interest to these sectors in new product development (NPD), as they not only meet the demand for 'natural', but also offer other sought-after attributes such as sustainability, ethical practice, innovation and novelty. To fit these consumer demands in this health-and-wellness trend, new products are required to demonstrate biological activity and health functionality. Ingredients with properties substantiated by science and which are shown to have known effects are in high demand.

Where INPs are subject to research and development, and the use of traditional knowledge is applied towards commercialisation, the Nagoya Protocol on Access and Benefit Sharing (ABS) must be taken into account and adhered to. The Protocol will enter into force on 12 October 2014. PhytoTrade Africa has played a key role in ABS dialogues in the region, where the organisation is well positioned at an interface between providers, regulations and industry users of genetic materials, bringing the various stakeholders together for open and transparent dialogue. Access and benefit sharing is a key element in PhytoTrade's activities, where the objective is to support the development of ABS-compliant ingredients from INPs for the local, regional and international markets. As part of ABS, PhytoTrade works with members to move them up the value chain to points of higher and more secure return, simultaneously keeping as many of the value-addition processes within Africa. This is an important component of benefit sharing through processes such as technology and knowledge transfer. Through close interaction with industry, PhytoTrade is in a position to facilitate the understanding of industries and place their roles and responsibilities.

In addition to access and benefit sharing, the sustainable commercialisation of INPs must also address several other regulatory hurdles. Each country, market and sector has its own legal obligations.

One example in the food-and-beverage sector is the development of baobab fruit powder as a Novel Food ingredient in the European Union, and a GRAS (Generally Recognised As Safe)-approved ingredient in the United States of America. To access these regional markets as a food ingredient, approval must be received, which requires significant resources and a thorough understanding of the characteristics, history of use and intended applications of this ingredient. Furthermore, products must be of a quality that meets statutory market specifications and voluntary standards such as organic certification. PhytoTrade Africa supports its members to achieve the required standards and specifications through the preparation of product dossiers. This includes upgrading processing technologies and training in best practices such as Good Manufacturing Practices (GMPs).

PhytoTrade works along the value chain, supporting and representing its members and their customers in the development of solid, long-term commercial partnerships to create sustainable and successful INP businesses in Southern Africa.





informal markets

Trade at Informal and open markets

Dave Cole

In Namibia 20% of the population living in rural areas is considered severely poor. Cash income in these areas is becoming progressively more important, in particular for the poorer members of society who are not formally employed. One way to earn such income is to engage in trade with indigenous natural products at informal or open markets.

Typically, it is the poorest of the poor living in rural areas who use indigenous natural plant products and who are increasingly engaged in trading these natural products to improve their livelihoods. The influx of people into the urban centres of Namibia has also created an opportunity for traders to trade in indigenous natural products, as many of the products are linked to local culture and tradition. People continue to yearn for such products, even though they are now living in an urban environment. Normally these products are also cheaper than other commercial products found in the shops and supermarkets. While this increased trade does provide an opportunity to generate income, it also presents a potential threat to resource sustainability, an aspect that will have to be addressed in future.

Although Namibia has made huge strides in the commercial trade of indigenous natural products, particularly in the export of devil's claw, marula and ximenia oil, the trade of these products at the various informal or open markets throughout Namibia remains just as important for rural economies. In the development of products for formal markets, therefore, there is a responsibility to ensure that they do not have negative or detrimental impacts on the livelihoods of those involved in the informal sector. While there are many traders selling indigenous natural products in cities and towns in Namibia, three individuals have been selected from three towns to tell their stories.

OPUWO

At the Opuwo 'open market' many of the indigenous natural products being sold relate to Ovahimba traditional usage. These products are essentially ingredients used in traditional cosmetic products, mostly fragrances.

Hilma Paulus, pictured on the left, is 33 years old. She is married and has three children, two girls and a boy. She has been living in Opuwo for a 'long time', having moved here from Ruacana where she was born.

She learnt about the uses of natural products from 'older' people, in particular her grandmother and grandfather. She has been selling products in the informal market for almost 10 years. Products she sells include whole and crushed ochre, commiphora resin, lichen and tree bark. She also blends and produces her own



‘natural fragrance’ powder. The income she makes from the sale of these products is very important, as it enables her to buy food and clothes, and to pay for school fees and visits to the clinic.

Hilma harvests some of her products herself, and buys others from alternative sources. For example, the shells are bought from a supplier in South Africa. She is concerned about the sustainability of the resources of some of the products she sells. “I think it may become a problem to harvest in the future.” She adds that sometimes people don’t buy enough. “Traditions are changing and people are now not using natural products as much any more.” They are more likely to go to supermarkets to buy commercial products. Knowledge of the use and preparation of the many products she sells is also dwindling.

OSHAKATI

In the bustling market in Oshakati, two sisters help their mother during school holidays at her stall selling an array of natural products. Pictured on the opposite page are Ndapewa Ndimulunde, who is 20 years old, and her sister Kauna Pawa, who is 14 years old. They come from Omungwelume, a small village in the Ohangwena Region in north-central Namibia. Ndapewa, who is in Grade 10, has been assisting her mother (51), for many years. She says she enjoys helping her mother. “Otherwise we will suffer a lot without this money.” She says the money is important because it contributes towards paying school fees, and water and electricity. The stall has a daily turnover of approximately N\$200 to N\$400 per day.



However, not much of what is for sale is produced or harvested by the two sisters. The marula and kalahari melon seed oil are purchased in bulk in Ondangwa, and the decanted oil is sold here. The ximenia oil is one of her best sellers, since many people use this oil to apply to their skin and hair.



Ndapewa would like to join the Namibian Defence Force once she has finished school, while her sister Kauna would like to become a pilot.



KATIMA MULILO

In the furthest north-eastern section of Namibia is the town of Katima Mulilo. The vibrant market here sees trade in many products, from doors made out of locally harvested timber to cosmetic products, fresh vegetables and some indigenous natural products. The availability of these products is dependent on the seasons. One of the traders in Katima Mulilo is Catherine Kaela (49), pictured below, who is single and has five children. Catherine was born in the village Malindi, which is located some 50 km from Katima Mulilo. She has been selling goods at open markets for many years. Having started selling in Oshakati and Ondangwa in north-central Namibia and then in Grootfontein, she has now moved back to Katima Mulilo, where she has been selling her products for almost 20 years. During this time the market has developed considerably, and Catherine has progressed from selling under a tree to renting a stall at the open market, for which she pays a monthly rental of N\$100.

She purchases her products from other people. "I make sufficient income to take care of myself and my children." One of her main products is hibiscus or *mundambi*, as it is known in Silozi, the main local language. Although tea can be brewed from hibiscus, its primary use is as an ingredient of a relish that is served with fish, chicken and meat dishes. She also sells wild spinach at the stall.



Gender and Vulnerable Groups

Diverse and inclusive

Saskia den Adel-Sheehama

The Indigenous Natural Product (INP) industry in Namibia is characterised by a large diversity in resources, sociocultural practices, gender relations, regions and commercial opportunities. This diversity makes it difficult to make generalisations and implement strategies that are suitable for all. However, as a common factor, the harvesting and processing of INPs is undertaken mostly by poor or marginalised communities, and in many cases by the women in those communities. INP activities have proven attractive to vulnerable groups, and for various reasons particularly to the rural poor and households headed by women.



INP harvesting and primary production require no or very limited start-up or working capital. As it is part of traditional work, harvesting and production of INPs is done mostly either without tools, with very basic tools that every household owns, or with very cheap tools. Marula fruits, for example, are picked up from the ground. Their skins are pierced with a cow horn for juice production, the nuts are carried to the homestead in a basket or bucket, the dried nuts are cut open with an axe, and the kernels are taken out with a flattened needle. Most households in this part of Namibia will own an axe, baskets and a cow horn, and a flattened needle can be bought

for a few Namibia dollars. It is much the same for devil's claw – only a basic knife for cutting the side tubers in slices may have to be bought. In the MCA-N INP Producer and Processor Organisations programme all trained harvesters and producers of ximenia, marula and devil's claw have been provided with basic harvesting/production kits. The main reason for providing the kits was to improve the quality of production, but if the absence of tools was a barrier, this was remedied by the project.



The natural resources are accessible to all. With a few exceptions, the INPs that are commercialised in Namibia are found on communal land, in conservancies, or in community forests, and all people living in that community, conservancy, or community forest are allowed in principle to harvest the resource sustainably. During the implementation of the MCA-N INP PPO project, a few cases of illegal fencing of communal land were found. These have been taken up by the Legal Assistance Centre. In other instances the resource may be less accessible due to distance. In some of these cases harvesters were assisted in making fair deals with transport providers. For devil's claw some cultivation trials were conducted, which may help solve issues of accessibility in future. For marula the story is slightly different, as marula trees in north-central Namibia grow mostly on

Harvesting and the primary production of INPs can be combined with other work and household tasks. In rural households women especially have many tasks. They are often the ones responsible for the children, fetching water and preparing food. In subsistence farming, communities spend a good part of the day working on the land. This means that many of them would not be able to have full-time jobs, even if these jobs were readily available. The harvesting and processing of INPs, however, can be done in combination with other work or household tasks. Ximenia fruits can be picked up on the way from a relative's farm, and cracking ximenia nuts can be done for one or two hours in the afternoon, before starting with the cooking. The harvesting of INPs as a full-time activity for a certain part of the year is possible only for some people. When it comes to



farms, and are owned by women. However, marula trees have been protected traditionally. A recent survey showed that most people in the area where the Eudafano Womens' Cooperative is active do have marula trees on their farms. And even if women do not have their own marula trees, they can still have access to the nuts, as neighbours and friends are usually invited to process *omaongo* during the fruiting season, and women can traditionally take the nuts of the fruits that they have processed home. As a result, households with the largest availability of female labour rather than households with many trees have better access to the marula nuts.

devil's claw, for example, harvesters travel far to the resource and camp in that area for a couple of weeks in a row. In these few cases alone you can see that less women are involved than men.

In many cases, INP harvesting and processing are traditionally the domain of women. Before commercialisation marula, ximenia, and commiphora were harvested and processed exclusively by women. Of these, marula is still handled by women only, and the Eudafano Womens' Cooperative and its associations do not allow any male members. The cooperative of ximenia producers is open to anyone in the area over

18 years old, but 97% of its active members are female, despite the mobilisation of the former male chairperson. Men have joined in the harvesting of commiphora resin since the product was commercialised, but women still constitute the majority of harvesters, earning 57% of the total income from commiphora in 2013.

In areas where devil's claw was used traditionally, it was harvested and processed by both men and women. Today, in the producer organisations that the MCA-N INP PPO programme is working with, 59% of the devil's claw harvesters are women, earning 53% of all the income generated by the resource. Mopane is a newly commercialised resource that has not been harvested traditionally. Women have taken control over that resource as well. In 2013, 68% of the mopane harvesters consisted of women, earning 80% of the total income from mopane.

INP activities generally require a considerable amount of time and labour, and have limited financial benefits. None of the primary processing of INPs is mechanised. Digging for devil's claw tubers is labour intensive. Extracting a kilogram of marula kernels can easily take a full day, and the harvesting of commiphora resin requires people to walk very long distances. The commercial harvesting and processing of INPs is therefore not always attractive to rural households that are relatively better off and have income from salaries or other sources. Households that have other sources of income may regard the potential earnings from INP harvesting and processing as marginal, and they may not have time to become involved. For the more vulnerable households, however, INP activities may be one of the few opportunities to earn the cash income that is essential to pay for basic needs such as water, education, medical costs, and extra food in times of scarcity.

Strategies for gender and social integration

With women and vulnerable groups naturally more involved in harvesting and processing of INPs, supporting producer organisations can be seen as a strategy for gender and social integration in its own right. By strengthening the capacity, negotiation skills and bargaining power of producers organised in groups, you increase the opportunities and benefits for women and disadvantaged groups. Furthermore, 'bringing the value chain to the village' – setting up producer groups and organising procurement at village level – is an effective strategy for solving major gender-based constraints such as the lack of mobility and limited access to markets, information, and linkages. It reduces the dependency of otherwise isolated women and marginalised communities on middlemen and local traders by offering opportunities for more favourable market engagement. However, some issues and challenges with regard to the participation and benefits of women and vulnerable groups were identified, thus the following additional strategies were developed to deal with them:

- With not all trainers and field workers being naturally gender sensitive, it is essential to train and mentor trainers in gender and social awareness issues, and in practical ways to increase participation, access and benefits for women and vulnerable groups. This includes basic factors such as the importance of consulting with women with regard to the time and place of training and support activities. It is also crucial to have a gender balance in employed training and technical support staff.
- In most of the conservancies, the majority of members in the management committees making decisions were men. Aimed at increasing the understanding of the gender and social issues, and the importance of involving women and vulnerable groups in all activities, including decision making, a training course on 'gender and social awareness for management committees' was developed and conducted with many of the groups. The full training included an exercise on social and gender analyses, and the development of a practical gender and social integration plan.

- In communities where women are traditionally not part of decision-making processes or expected to speak their minds, it is a challenge for women who are unable to verbalise their issues during meetings, even if elected onto management committees. In these cases communication workshops for women were conducted, improving their confidence and public-speaking skills.
- Some of the devil's claw producer groups had a rule whereby only one member per household could register as a harvester. In many of these cases more members of the household would work together, but only one person would receive the money for their work. It was not clear how the money was divided internally. With the new National Devil's Claw Policy, every individual harvester has to be registered. This was explained in detail during the harvester and management committee training events, and the changes were implemented accordingly.
- To ensure that the benefits are spread according to the harvesting and processing that took place, management committees were trained in the management of buying points. Purchasing events were often monitored by the service providers to avoid irregularities.
- In empowering vulnerable people, one of the main advantages of working as a group is the increased negotiation power. Producer groups were made aware of this, a template of a basic contract was developed, and the MCA-N INP PPO project provided training and technical assistance with regard to contract negotiations with buyers.
- In cases where new technologies are introduced, individuals who are better connected tend to become more interested, creating a risk that they will take control away from the harvesters/producers. In the MCA-N INP PPO project, there were no such incidents, but you have to analyse and be aware of this potential risk, and ensure that

through additional training and technical support, women and vulnerable groups remain involved.

A special category for vulnerable groups refers to children. Children require a different strategy than other vulnerable groups, as their full involvement in INP harvesting and production should be avoided rather than promoted. Although all harvester and producer organisations have set 18 as the minimum age for registration and/or membership, it was found that children often assist with the harvesting and production of marula and ximenia kernels.

If children do light work in the home environment that does not interfere with their schoolwork or general development, it is called child work, which can be seen as positive. Child work can contribute to the children's development and to the welfare of their families, and provide them with skills and experiences that assist in preparing them to become productive members of society during their adult life.

If, however, children work long hours and this interferes with their schooling, and/or are involved in work that can be hazardous to their health or development, it is called child labour, which is not acceptable and should be avoided.

Whether or not particular forms of 'work' can be called 'child labour' depends on the child's age, the type and hours of work performed, and the conditions under which it is performed. The MCA-N INP PPO project has assisted both the ximenia and marula producer cooperatives in the development and implementation of a code of conduct with regard to the assistance of children in the production of ximenia and marula kernels.

The rules and regulations in this code of conduct are in accordance with the Namibian Constitution and Labour act of 2007, as well as Conventions of the International Labour Organisation (ILO) that Namibia has ratified.

Impacts of INP commercialisation on livelihoods of vulnerable groups

The commercialisation of Indigenous Natural Products in Namibia has proven to have the tendency to provide a little cash income to a lot of people, rather than a lot of income to a few people. And although the income is often regarded by outsiders as marginal, especially when expressed in foreign currency, it is reaching the poorest parts of the rural communities and is of utmost importance to the people earning it. During a survey among devil's claw harvesters in the Kavango Region, for a large majority of harvesters the income they were earning from devil's claw was their only income.

As subsistence farmers, pastoralists, or hunter-gatherers, the rural communities participating in the harvesting, production and sales of INPs do not spend money on a daily basis, but they do need cash to pay for basic needs such as education, medical costs, communication, transport, tools, extra food in times of scarcity, and in some cases, water. For many of the rural poor involved, the income from INPs has proven crucial in this regard.

By 31 March 2014, more than 9,000 harvesters/producers of INPs had been trained by the MCA-N INP PPO project. With such a large number of people participating, consisting mostly of women and vulnerable groups, INP commercialisation is definitely having a positive impact on livelihoods and food security.





Access to genetic resources

ABS is not as complicated as it sounds

Pierre du Plessis and Sem T Shikongo

In international law states have the sovereign right to exploit their own resources pursuant to their particular environmental policies, and a responsibility to ensure that activities within their jurisdiction or control do not damage the environment beyond their borders. That this sovereign right also extends to biological and genetic resources was clarified and confirmed by the United Nations Convention on Biological Diversity (CBD), adopted at the first Earth Summit in Rio de Janeiro in 1992, and ratified by Namibia in May 1997.

Article 15.1 of the CBD is very clear about this: 'Recognising the sovereign rights of states over their natural resources, the authority to determine access to genetic resources rests with the national governments and is subject to national legislation.' Article 15.2 is equally clear: 'Each Contracting Party shall endeavour to create conditions to facilitate access to genetic resources for environmentally sound uses by other Contracting Parties and not to impose restrictions that run counter to the objectives of this Convention.' Governments therefore have a right to control access to genetic resources (GRs), but also a duty to conditionally facilitate such access.

The objectives of the CBD are: 'The conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising from the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources, and to technologies, and by appropriate funding.' It has often been pointed out that these three objectives are interlinked and should be interpreted in a holistic manner. Benefit sharing provides an incentive for sustainable use, which leads to conservation. Conversely, conservation allows sustainable use and enables benefit sharing.

The concepts of access to GRs and of sharing the benefits arising from their utilisation, although distinct in origin, are now commonly combined into one, known as Access and Benefit Sharing (ABS). After a long process of international negotiations, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation to the Convention on Biological Diversity was adopted in October 2010. The protocol (which Namibia ratified in May 2014 and is expected to be enforced by October 2014) seeks to increase legal certainty on ABS issues by providing more comprehensive guidance on access (which must be with Prior Informed Consent (PIC), utilisation of GRs, benefit sharing (on Mutually Agreed Terms (MAT)) and compliance (including user measures to prevent illegal utilisation).

Behind all this legalistic language is a simple and straightforward concept: if the people who live closely with biodiversity and make day-to-day decisions about its management receive a fair share of the value derived

from the sustainable use of that biodiversity, they will have an economic incentive (in addition to other more abstract incentives) to conserve their environment. Namibia's proactive efforts to develop a sustainable Indigenous Natural Product (INP) industry are strongly aligned with the concept of benefit sharing, driving sustainable use, and conservation, as is its Community Based Natural Resource Management (CBNRM) programme in general.

Traditional knowledge – the link to the land

In addition to confirming the sovereign right of states over their natural resources, the CBD also recognises the important role that traditional knowledge (TK) of indigenous and local communities (ILCs) plays in the conservation and sustainable use of biodiversity. Traditional knowledge in this context can be defined as a body of knowledge built up by a group of people through generations of living in close contact with nature. Such TK systems typically include a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resources use.

Article 8(j) of the CBD calls on each of its members to 'subject themselves to its national legislation, [to] respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and [to] promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilisation of such knowledge, innovations and practices'.

Key concepts

It is important to have a very brief overview of the key concepts around ABS if one has to have a better understanding of the article and issues surrounding it. ABS has three central concepts.

Bioprospecting – which is “the collection, search for, research and use of biological and/or genetic material that are isolated, if possible synthesized, patented for purposes of applying the knowledge and products derived there from for scientific and/or commercial purposes.” Bioprospecting can also be viewed in short as the systematic research, collection and utilization of biological resources. This process involves researchers collecting many different kinds of plants and animals from their natural habitat often guided by local knowledge about the location and use of these resources.

Biotrade – refers to the “trade in biological resources”. The sale of hoodia, devils claw and other natural products constitute biotrade. Namibia initially started with biotrade and has gradually moved into bioprospecting.

Biopiracy – when ABS procedures have not been followed correctly then this is referred to as ‘biopiracy’, or the “unauthorised and uncompensated taking and use of biological resources for valuable research purposes or in other words the illicit appropriation of genetic resources and/or associated information and the generation of profitable products.” This misappropriation of genetic resources and use of traditional knowledge by some firms led these firms to be called biopirates.

The aim of Namibia's legislation on access to genetic resources and associated traditional knowledge is to regulate access to genetic resources and the associated traditional knowledge. This legislation is the tool that will be used to implement the provisions of the Nagoya Protocol on ABS. In principle it is to regulate the matters discussed in this article.



All over the world TK is in decline as a result of formal schooling and migration from rural to urban areas (where TK is not much used or is irrelevant). This means the loss of valuable shared knowledge about, for example, natural resource management, ecological processes, traditional medicine, traditional land-use practices, and so on. Sustainable farming system strategies developed over the ages by indigenous peoples of all continents – almost all based on a sophisticated management of genetic diversity – are also being lost along with traditional farming practices.

While there are separate policy processes underway in the CBD around ‘traditional lifestyles relevant for the conservation and sustainable use of biological diversity’ (Article 8(j)) and ‘customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements’ (Article 10(c)), ABS and the Nagoya Protocol are generally concerned mainly with TK ‘associated with genetic resources’.

Not all genetic resources have such ‘associated TK’ (most microorganisms don’t, for example). When it comes to INPs, however, most are strongly associated with TK developed over centuries of use, often by very specific ILCs. By proactively developing income opportunities based on these INPs, Namibia is also creating incentives for the protection and promotion of the associated TK.

But traditional knowledge, skills, practices and innovations cannot be conserved without also conserving the sociocultural and ecological context of TK systems. ILCs know that their social, cultural and economic futures are intimately tied to decisions concerning natural resources management and the quality of the environment in which they live. Without the land and its resources, the knowledge of ILC about the land, the respect they hold for the land, their communities and their way of life could not exist, because the land and the people are one.

Any outside intervention – whether to harvest, protect or preserve – potentially has serious economic, biodiversity and health impacts on ILCs, and on their com-



munity coherence. Such interventions must therefore be designed to maintain or improve access to the land and its resources, within a framework of regulation, monitoring, cooperation and appropriate benefit sharing with the affected communities.

One of the most innovative aspects of the Nagoya Protocol is that it adds substance and guidance to the CBD's provisions on traditional knowledge. In particular the protocol recognises that traditional knowledge associated with genetic resources should be utilised only with prior informed consent or approval and involvement of the knowledge holders, and that the knowledge holders should receive a fair and equitable share of the subsequent benefits.

The protocol also recognises that ILCs often have rights over GRs and stipulates that where this is the case, the PIC of the relevant ILC is required for access to its GRs and it should receive a fair share of the benefits. This strengthens the link between ILCs, their TK, the GRs to which the TK applies, and the land on which the GR occurs. As Namibia's successful CBNRM programme has shown, confirming people's rights over their resources and allowing them to benefit directly from sustainable use of those resources can be a powerful incentive resulting in excellent conservation outcomes.

ABS as a driver of development

There is a good reason why the CBD's third objective on benefit sharing goes into such details as 'appropriate transfer of relevant technologies, taking into account all rights... and by appropriate funding'. ABS, if it is done correctly, can contribute to developing countries achieving 'green economies' – sustainable systems of production and consumption, based on the sustainable use and conservation of biodiversity and other ecosystem assets. To date Namibia's INP industry has barely scratched the surface of what is possible in this regard.

Sound ABS implementation offers Namibia multiple opportunities, through partnerships and training, to develop its national human resources and technical



capacity to do more research and development (R&D) on its INPs and add optimal value before selling them into value chains. This potentially also allows the country to create valuable intellectual property (IP) based on its GRs and the TK of its people, and strengthens its hand in the negotiation of mutually agreed terms (benefit-sharing contracts). In fact, securing any of these benefits requires that Namibia engage actively and astutely with users by promoting access to and utilisation of its GRs and TK – because without such access and utilisation, no benefits can be created, or be available for sharing.

There is a small but significant risk that inefficient national implementation of ABS measures can have a negative impact on future growth of the Namibian INP industry. The possibility of a slow and/or cumbersome decision-making process in concluding MAT and granting PIC in particular can put potential clients, partners and collaborators off, stifle R&D and cause investment and/or opportunities to go elsewhere. INPs traded and utilised as commodities, without prior R&D, should be recognised as such and conditionally exempted from ABS rules, so as not to catch biotrade in a net set for bioprospecting.

As a general strategy, Namibia should ideally use ABS measures to first create markets for its GRs and TK, and then to pull back as much as possible from the resulting value chain, making the value-adding opportunities available to primary producer organisations (PPOs) and national SMEs.

Don't just sit there – do something

Discussions around ABS are often cast in the language of bio-piracy. In this version of the story, developing countries and their ILCs who are the custodians and providers of GRs and TK, are constantly and relentlessly ‘ripped off’ by multinational corporations that register patents over their resources and knowledge, reaping billions in profits from this misappropriation. And unfortunately there is some truth behind this sad tale of victimhood, even if it does not have much of a future.

But there is also another story, illustrated by the Namibian INP industry, wherein countries and commu-

nities take ownership of their GRs and TK, and use these proactively as development assets to alleviate poverty, create rural incomes, build new industries and open new markets for novel products. Yes, they still need technical and commercial partners, sometimes including multinationals, and yes, they still sometimes sign bad contracts and get ‘ripped off’. But they are moving forward and learning, while they are building their national capacity to use their biodiversity as a competitive advantage. They are not victims; they control their destiny.

It is an illusion to imagine that provider countries and ILCs can sit back and wait for users to approach them, sign favourable benefit-sharing agreements in exchange for access, and then wait for the royalty cheques to roll in. Such miracles might happen occasionally, but they are very rare. It is much better to become proactively involved in and promote specific resources, invest in their development and create benefits for primary producers and TK holders. ABS can be a useful tool to this end, but should not become an end in itself.

The ideal outcome is ABS-compliant value chains supporting sustainable use and conservation.

Article 5.1 of the Nagoya Protocol specifies: ‘Benefits arising from the utilisation of genetic resources as well as subsequent applications and commercialisation shall be shared in a fair and equitable way.’ Article 9 states: ‘The Parties shall encourage users and providers to direct benefits arising from the utilisation of genetic resources towards the conservation of biological diversity and the sustainable use of its components.’

When GRs and TK are legally accessed and utilised, and the benefits arising from ‘subsequent applications and commercialisation’ (namely final products) are shared as a result of consumers willingly paying a conservation premium, which is then used to support ‘traditional lifestyles relevant for the conservation and sustainable use of biological diversity’, we will know that we are (almost) doing ABS right.



Linking Producer and Processor Organisations to Enterprises

Ben Bennett

The main objective with sustainability for indigenous natural product (INP) harvesting is that communities have a reason to protect and manage their resources when those resources pay them a suitable, regular income.

Forming a long-term healthy commercial relationship between harvesting groups (Producing and Processing Organisations – PPOs) and upstream companies that develop and promote products from INPs is one of the essential steps along the way to proving this idea works. Namibia has, arguably, one of the richest recent histories of developing such PPO/commercial INP enterprise models, and there is much to learn from considering the range of approaches that have been adopted.

In this chapter the aim is to share the range of models and enterprise/PPO interactions tested during the MCA–Namibia INP Programme period, many of which build on a much longer history of similar efforts going back to colonial times. We will draw some conclusions about what models might be suitable to meet the current and future problems facing the INP sector in Namibia and what important lessons we have learned.

Six main types of INP – SME relationships (sometimes called ‘models’) are identified. These are the ‘Trader model’, ‘NGO model’, ‘Government model’, local ‘SME-led model’ and ‘PPO model’, and a ‘future model’. Considering the INP sector today, it could be said that all of these models are now present and working in parallel.

The trader-led harvester SME model

INPs have been traded for further value addition outside Namibia since pre-colonial days. !Nara (*Acanthosicyos horridus*) seeds, for example, were probably traded to areas surrounding Namibia and the Cape long before tourists discovered Swakopmund. The largest INP exported as a raw material to be processed in Germany was, and remains, devil’s claw (*Harpagophytum* sp.). Typically, trade in INPs up until Namibian independence was between individual harvesters, traders or middlemen (and women), INP exporters, INP importers and companies making extracts. This model worked (for example people were paid, often with goods rather than money) but was far from the best way to do this because it failed to make the link between the management of the resource in the field, and the value of the product for its intended use. This has, in some cases, resulted in over-harvesting. It also resulted in a very small proportion of the final product value being retained by

the original INP harvester. Estimates done in 2007 indicated that less than 2% of the on-shelf value of devil's claw in shops in Germany reached individual harvesters. This highly unbalanced and exploitative type of INP development might be termed the 'trader-led' model because the key actor in this phase was the individual trader, commonly a local 'commercial' farmer seeking an additional income from INP sales.

The NGO-led SME-PPO model

In the post-independence period (that is since 1990), a number of international Non-Governmental Organisations (NGOs) started operations in Namibia and many new local NGOs were registered. Many of these had a conservation agenda and in the early days were associated with the emerging Community Based Natural Resource Management (CBNRM) movement. Notably, an NGO, CRIAA SA-DC, moved into the INP field. This area of work was largely free from other development actors in the 1990s.

The model that emerged was of dedicated INP harvesting groups supplying raw materials or semi-processed product to a central harvesting group-apex association that worked with the NGO to link with an international buyer for the raw material. In

harvesters. Key elements of this model were based on a cooperative idea: harvesters would be registered and paid a 'fair' price negotiated between the NGO and the end user. All buying and selling is seen by everybody. The cooperative has an elected management team, and the cooperative aims are to maximise member benefits rather than the individual's profit. The two key examples of this are the successful entry of marula kernel oil into the Bodyshop range of products, and the organisation of devil's claw harvesting groups into Organic and Fair Trade cooperatives with full certification.

Since independence, the Government of Namibia has, to some extent, intervened in the agricultural sector because it believes that markets do not work properly for the majority of farmers. While shying away from the direct purchase of INPs, the Government of Namibia has invested in INP development through the Ministry of Agriculture, Water and Forestry since the late 1990s through the highly enlightened approach of financing the broadly representative national INP stakeholder group, the Indigenous Plants Task Team (IPTT). The creation of the INP governance and coordination body, and the financing of a huge range of small technical steps towards development of individual INP opportunities has, over the



the mid-2000s, with grant funding from Government and donors, this model added local processing of cosmetic oils and organic certification aimed at increasing the proportion of final value retained by

years, differentiated Namibia's INP development experience from those of other countries, even though most of Namibia's competitors have more abundant INPs.

However, Government sometimes goes too far, to the extent that well-meaning policies can discourage private investment. In Namibia, there have been a number of instances where Government, NGO and private sector have experienced tension. A good example in recent years was government policy changes aimed at ensuring local processing of natural resources. Whilst an excellent and sensible policy in principle, the consequences for some INPs requiring huge investment in extraction plants with very low potential for viable cost-recovering throughput, could have been to drive these products out of the market. Some investors may have shied away from taking up Namibian INPs because of a fear that future government policies might limit the supply of raw material, notably in the devil's claw sector. It is the unintended consequences of government intervention that is the greatest cause for concern and the biggest potential break on private investment.

The key problem with both the NGO and the Government models has been that of PPOs becoming dependent on hand-outs. What will happen when donor funds, NGO support and government intervention is withdrawn? Is the business model sufficiently strong for harvesters and their representatives to take over some of the functions previously by NGOs, for example, such as negotiation with potential INP buyers, valorisation of intellectual property, management of the financial aspects of group formation (paying for meetings and keeping accounts) and future investment in INP upgrading to capture a larger share of value?

The local SME-led model

Except for bulking, cleaning and consignment, traders add little value to INPs, but do at least convert product into cash. A few SME processors have emerged in Namibia, notably in the cosmetic oil area. Traditionally, the SMEs have chosen to buy INPs on the open market rather than from PPOs, and have not collaborated closely with NGOs because of different raw material pricing policies (for instance NGOs tend to set higher producer prices and manage overheads with donor support, and local processing SMEs are unsupported and profit-making).

The Government of Namibia has strongly supported the emergence of INP PPOs and would like to encourage more being established. However, issues such as Access and Benefit Sharing, fair pricing and proper resource management have not been resolved.

PPO-led model

Over the past four years, endeavouring to move the Namibian INP SME/PPO way of working forward and addressing these challenges, MCA Namibia has been supporting a new, PPO-led model of enterprise/harvester interaction. The central element of this model is not to drive out existing support actors such as NGOs, but to raise the capacity of INP harvesting groups to undertake many of the key business functions of these NGOs themselves. This built on the idea that sustainability in business relationships will result from direct contact between upstream INP processing and retailing enterprises and downstream harvesting groups represented by PPOs.

To illustrate the evolution of the PPO model over the past four years, we offer three case studies of different INP commodity/market groups. These are cosmetic oils, essential oils and medicinal plants. Value chains for INPs are far from uniform. Fractured sources of demand and complicated ranges of actors are normal, so results cannot be generalised. However, these three commodity groups do illustrate some of the Enterprise/PPO challenges.





Cosmetic oils

MCA Namibia has supported the further development of two major cosmetic oils: marula kernel oil and ximenia kernel oil. Whilst marula has a well-developed, government-supported, production facility and a strong market pull from the Body Shop, at the start of the MCA Namibia INP PPO project, the value chain for ximenia can be described as 'young'. The key issues facing ximenia development were quality control, increasing supply to meet the demands of a major international buyer and harvester organisational development. Focussing on developing the strength of the PPOs involved was a clear objective at the outset of the project. Challenges included refreshing the leadership of the ximenia PPO assessing the possible volume of production available (given a series of droughts) and building the capacity of a ximenia producer cooperative to deliver economic volumes of ximenia to a high-standard market. It was hoped that the ximenia producers would be in a position to own and operate their own oil-extraction facility by the end of the project. The reality is that this is still a few seasons away.

Essential oils

The launch on the international market of new sources of essential oils is very challenging. There are significant regulatory constraints to a new product launch in this sector. The essential oil market is dominated by a small number of essential-oil traders who hold stock for and supply the major users such as fragrance houses. Entering this sector requires a long view and significant investment in regulation and market development.

At the outset of the MCA Namibia programme, a view was taken that, in order to obtain 'buy-in' from an SME that would invest in the development of the 'basket' of oils available, we would have to offer some degree of exclusivity. As a result, the young PPO groups in the Kunene Region were taken through a process of developing an agreement with a major fragrance 'house' in Europe. Even with the best will in the world, this did not really work. Not all the regulatory hurdles were overcome (there were many and it

was ambitious to expect this to happen) and communication between the project, the various NGOs and the major enterprise involved was not good enough. When it was realised that the hoped-for demand for essential oils would not be realised, the project took a new tack and re-focussed on generating a range of new markets, both domestically and internationally – a diversified strategy, in fact.

Medicinal plants

The value chain for devil's claw from Namibia to processing companies in Europe can be described as 'mature'. A small group of Namibian 'buyers' takes the entire harvest and consigns unprocessed (sliced and dried) devil's claw to various phytochemical companies, largely in Europe. These buying 'houses' set the price. The MCA Namibia INP PPO pro-

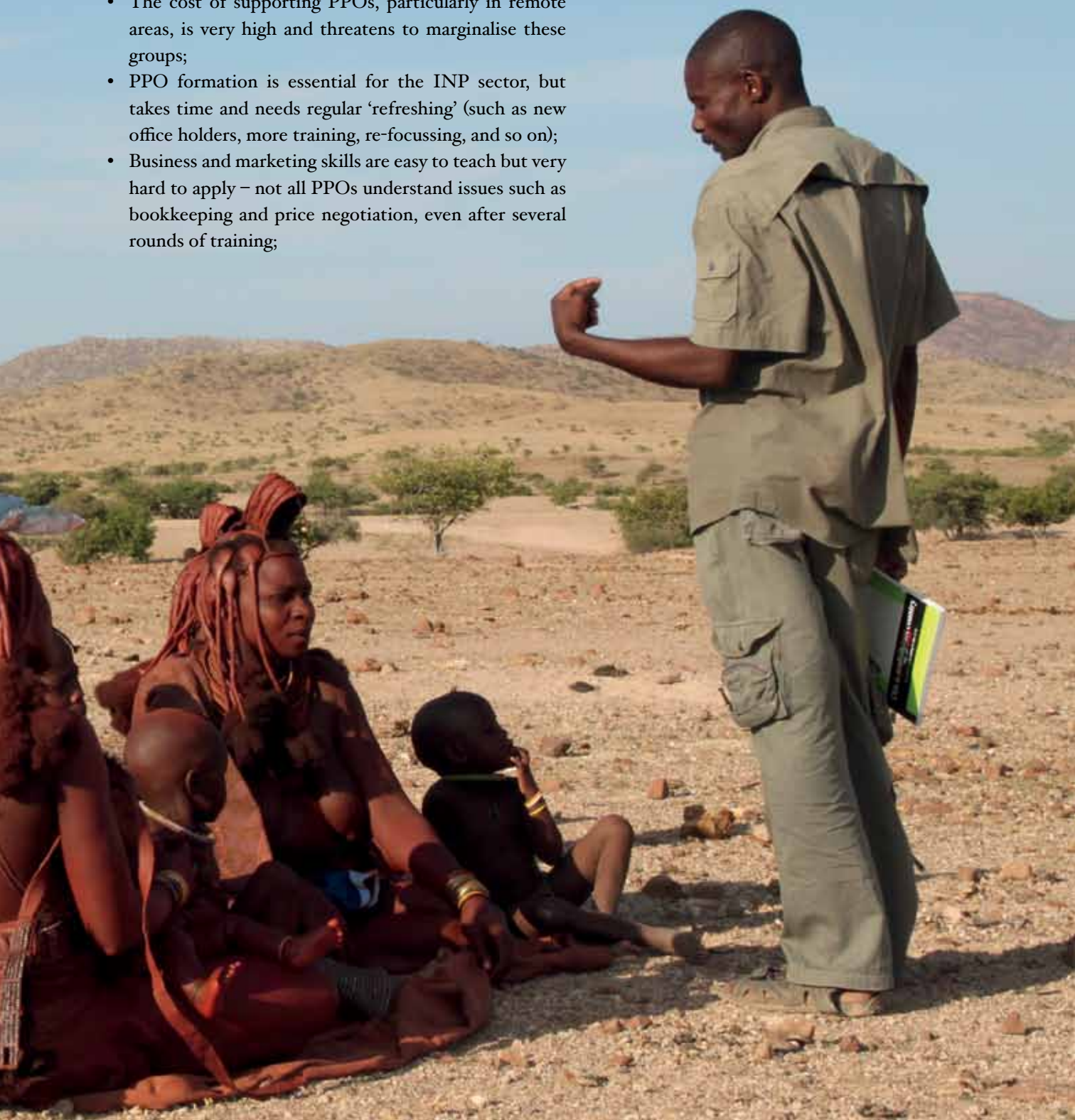
gramme focussed on trying to shift this unhealthy and exploitative model of trade in devil's claw to a new 'healthy' model based on PPOs negotiating with traders from a position of strength.

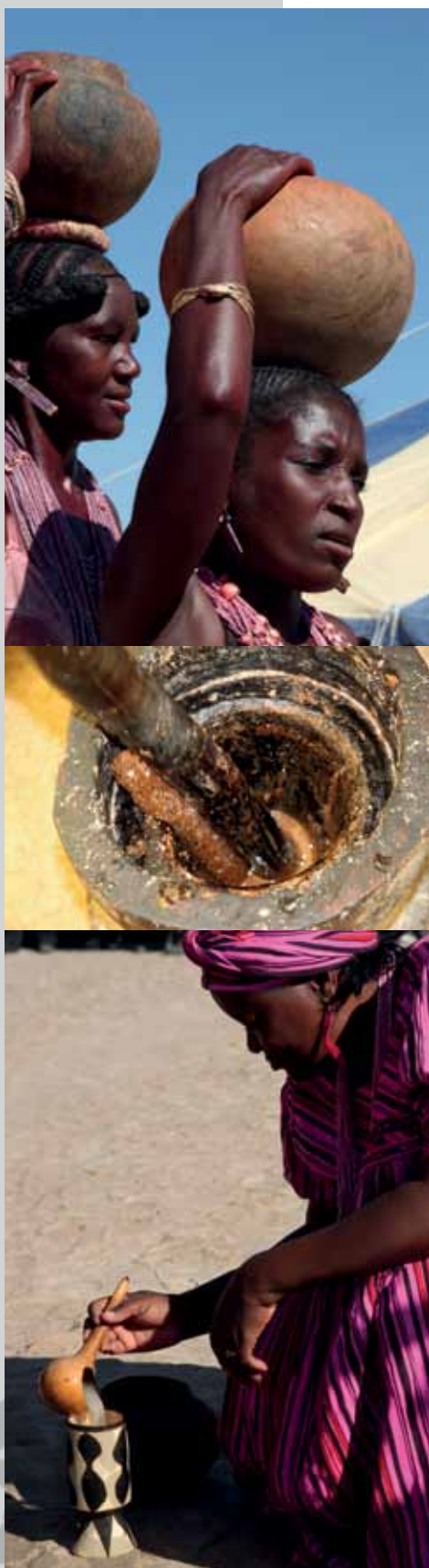
To achieve this, support was initially, given to a new trader in the Namibian market who was prepared to pay a sustainability/fair trade premium. This buy-in to the project objectives was repaid with strong capacity building and infrastructure support to PPOs, particularly a large group of new PPOs in the Zambezi Region. In the final year of the programme, an open Expression of Interest was offered to all the Namibian devil's claw traders to buy from the programme-supported PPOs under at least the same conditions as the first trader was offering. It is early days, but this seems to be challenging attitudes in the devil's claw trade.



Selected lessons from these case studies:

- There is no one-size-fits-all model of PPO/Enterprise development;
- Exclusivity is attractive, particularly at start-up, but will probably not always be the right option;
- There is no substitute for taking time to explain each step with the PPOs if you want full buy-in;
- The cost of supporting PPOs, particularly in remote areas, is very high and threatens to marginalise these groups;
- PPO formation is essential for the INP sector, but takes time and needs regular 'refreshing' (such as new office holders, more training, re-focussing, and so on);
- Business and marketing skills are easy to teach but very hard to apply – not all PPOs understand issues such as bookkeeping and price negotiation, even after several rounds of training;





- Maintaining initial INP price points is not realistic – markets go both up and down – so driving efficiency gains at the harvesting end of the value chain is important for underpinning harvester income and maintaining the incentive for resource management;
- Creating competition for INPs can be healthy; and
- It is important not to neglect possible local markets in the rush to meet the needs of an exciting international opportunity.

Future model

A fifth potential model for the MCA Namibia INP PPO and Enterprise interaction is emerging. This model revolves around the opportunities created by the new Access and Benefit Sharing legislation and aligns Namibia to new technical possibilities that might come from regional integration of INP valorisation. With higher throughputs, greater PPO equity ownership, and new levels of investment, there is a potential for basic raw-material processing at scale locally. More excitingly, the potential for real value addition through new intellectual property might emerge with the marketing of INP fractions created for specialist market applications.

Summary and conclusion

Drawing together the collective experience of INP/Enterprise development models in Namibia shows considerable depth of learning. Namibian INP stakeholders have tried to engage with producer groups to create new businesses in a surprising range of different and imaginative ways (not all are discussed here – there are several others that could be mentioned, such as certain hoodia species and !nara). Some have worked well but have bumped up against purely commercial models. This tension emerged in the 2000s when conflict arose over the NGO model with a local businesswoman over harvester price setting. Both models were largely in the right: the NGO's objective was harvester price maximisation, while the oil-extracting business wanted to maximise profit. Both of these aims are perfectly acceptable and are supported by government policies. However, when it comes to

wild harvested resources, this ideological clash proved too difficult for Government to resolve and the parties had to seek different geographies as a way to address the impasse. This problem will return when resource limits are reached.

We conclude that sustainable harvesting of INP and stewardship of the commons is probably best done through a model that includes some form of PPO. This conclusion is particularly important if ABS requirements are to be met. However, experience suggests that to accomplish this, it will be necessary to support PPOs in their relationships with INP processing enterprises for some years to come.





about the authors

Dave Cole was born in South Africa and has lived in Namibia for the past 26 years. Having started out as a lecturer in Sociology he has since worked in the field of rural development for the last 22 years with the last 15 years being directly involved with the development of the indigenous plant products sector in Namibia. He has been at the forefront of developing the Sustainably Harvested Devil's Claw model working closely with rural producer groups with particular emphasis on not only ensuring sustainability but also maximising benefits to harvesters. He has written widely on this subject and made numerous presentations at various fora both regionally and internationally. For the last five years he has been working for MCA Namibia as the manager of the Indigenous Natural Products Activity.

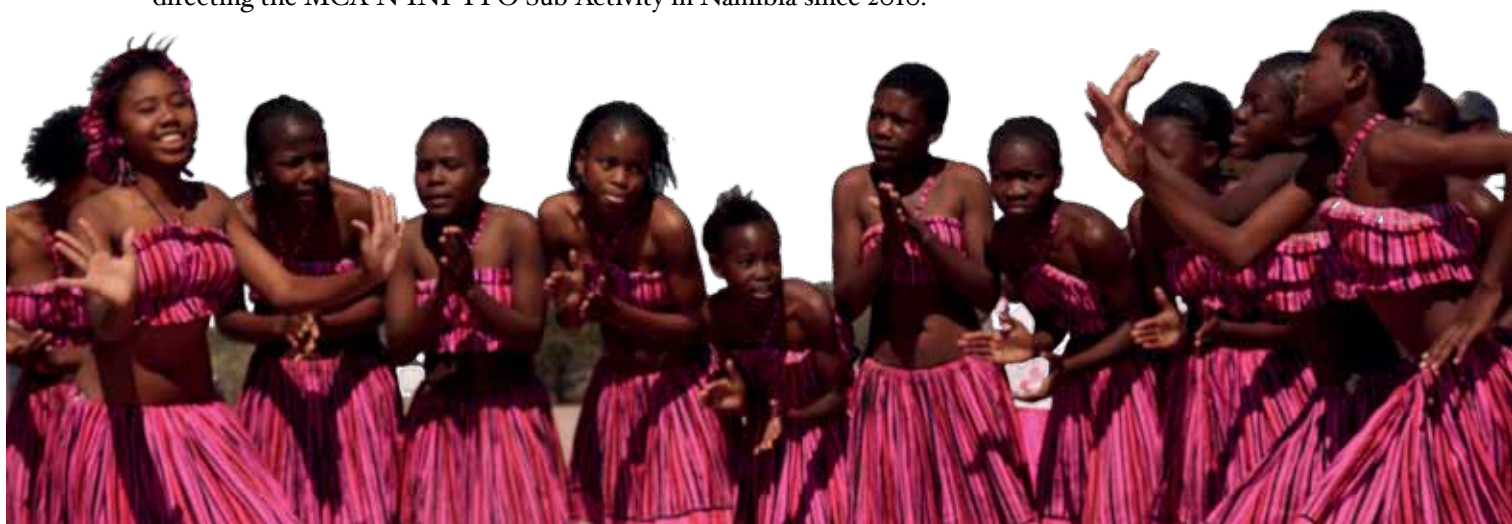
Michel Mallet, born in Paris (France) and resident in Namibia since 1991, is an agricultural engineer by training. He has been the Executive Director of CRIAA SA-DC since its formation in 1997, has been working in the Southern African Region for 30 years, particularly in Zimbabwe and Namibia, and has travelled extensively in most SADC countries. In Namibia, he has been closely involved in CRIAA SA-DC's work on commercialising indigenous crops and natural products, with particular emphasis on the organisational development of rural producers, local and export value-chain management, technical research and new product development, and biotrade policy. He has been assisting various rural producers' organisations such as the Eudafano Women Cooperative with marula products and the Tulongeni Twahangana Co-operative with the blue sourplum (ximenia). He is also a driving member of the Namibian Indigenous Plant Task Team (IPTT), a multi-stakeholders' body coordinating the national development of economic opportunities arising from the utilisation of indigenous plants. Michel also played an active role in the conceptualisation of PhytoTrade Africa in the early 2000s, and has been serving on its Management Board since 2005.

Gillian Maggs-Kölling, Rosalia Iileka, and Tunehafo Gottlieb are all current staff at the Gobabeb Research and Training Centre, while Esther Uushona is a student associate and previous staff member. Although Gobabeb has a long association with !nara, and many scientists and students have succumbed to its allure over many decades, these contributors have a particularly close affiliation with this awe-inspiring desert plant. Gillian conducted her doctoral studies on the Family Cucurbitaceae and its agricultural potential in Namibia through the Royal Veterinary and Agricultural University in Copenhagen, Denmark in 1998; Ruusa recently completed her honours degree at the Polytechnic of Namibia (2013), submitting a project on the population structure, health and ecosystem services of !nara; while Esther is currently enrolled for a BSc Honours degree at the University of Cape Town, where she is investigating the presence of cucurbitacins in !nara fruit. Rosie, a B Tech degree holder from Nelson Mandela Metropolitan University (2013), is earnestly familiarising herself with !nara and considering various options for further studies related to this taxon. The opportunity to work together on this project has allowed for a merging of talents, experiences and interests, while making a valuable contribution to the indigenous natural products sector on behalf of one of Namibia's foremost research organisations.

Karen Nott is a Namibian who has been involved in education and training in Namibia since 1990. She is currently employed by the IRDNC (Integrated Rural Development and Nature Conservation), an NGO that provides support to conservancies and community forests in the Zambezi and Kunene regions. In addition she worked as Institutional Development Specialist on the MCA Namibia Indigenous Natural Products programme, which provided training and technical support to producer and processor groups in the northern communal areas of Namibia. Karen started her career in the Namibian Ministry of Environment and Tourism, where much of the focus of her work was on desert plants. She is the author of a wide range of educational materials and has been involved in formal and informal training programmes throughout Namibia, as well as in training needs assessments, curricula development and training in Zambia, Zimbabwe, Mozambique, South Africa and Botswana. She is married, has two children, and lives in Omaruru, Namibia.

Percy Chimwamurombe was born in Nyanga in Zimbabwe, and trained in Zimbabwe, the Netherlands and South Africa to obtain skills in Biochemistry, Microbiology and Biotechnology. Currently resident in Namibia, he holds a PhD in Genetics and teaches Biotechnology and Microbiology at the University of Namibia. He is highly experienced in research in conservation genetics and sustainable utilisation of natural plant and microbial resources, and is interested in indigenous plants and knowledge systems. He has applied molecular genetics tools to promote food security and enhance household livelihoods in rural and urban settings, and is consulted and published extensively in this area. Prof Chimwamurombe is a member of several professional organisations, and has served as a management committee member in the Indigenous Plant Task Team (IPTT) of Namibia and the Interim Bioprospecting Council of Namibia. He is skilled in power negotiation, scenario building, participatory research, coping with and adapting to climate change, value-addition techniques, university teaching and coaching community members to effectively negotiate access to genetic resources and benefit sharing. He is an Alexander von Humboldt Fellow and a Fellow of the Zimbabwe Academy of Sciences. His current research interests include domestication of the maramba bean and studying host-microbe interactomes.

Ben Bennett is Head of the Food and Markets Department at the Natural Resources Institute, University of Greenwich, UK. A recognised expert on trade and value chains for numerous agricultural commodities and novel products, Ben was Advisor to the Namibian Ministry of Agriculture, Water and Forestry for eight years. During his time in Namibia, he helped initiate the Namibian Indigenous Plants Task Team (IPTT), the Devil's Claw and Hoodia Working Groups, and other national stakeholder platforms. Since returning to the UK to take over a Department of the University of Greenwich, he has continued a strong interest in natural-product value chains including aspects of intellectual property with the IUCN, value-chain performance with ICRAF (World Agroforestry Centre) and different aspects of market access for various donors. Ben's ongoing research interests include all aspects of agricultural marketing in the developing world. He has been directing the MCA-N INP PPO Sub-Activity in Namibia since 2010.



Saskia den Adel-Sheehama was born in the Netherlands. She first came to Namibia in 1993 to do field research for her Master's Degree in Social Anthropology. After working for various CBOs and NGOs in Oshakati and Windhoek, mostly as a volunteer, she started working for CRIAA SA-DC in 2000, a non-profit organisation. Here she has been working as a consultant, researcher, project coordinator, training manager and gender expert towards the development and commercialisation of indigenous natural resources. Saskia believes in development strategies from the bottom upwards. She says the favourite part of her job is the practical field-work, when she sits under a tree with rural communities, making plans to get things done.

Pierre du Plessis has a degree in economic history from the University of Cape Town. He has 27 years of experience in different aspects of capacity building, sustainable development, natural resource management and environmental governance, with a particular interest in developing commercial opportunities for products derived from indigenous Southern African plants. Since 1999 Pierre has been a senior consultant member of the Namibian non-profit organisation CRIAA SA-DC. As a consultant to the Indigenous Plant Task Team (IPTT) he coordinated Namibia's national programme from 2000 to 2007 to promote the sustainable use of indigenous plants. He served on the PhytoTrade Africa Management Board from 2001–2005, including three years as Chairman, and was re-elected in 2014. Since 2006 Pierre has increasingly specialised in matters related to Access and Benefit Sharing (ABS). He was one of the lead negotiators of the African Group during the Nagoya Protocol process and has represented Namibia and Africa at meetings of the Convention on Biological Diversity, the WIPO Intergovernmental Committee on Genetic Resources, Traditional Knowledge and Folklore, and the FAO Commission on Genetic Resources for Food and Agriculture, where he is currently one of two African representatives on a team of technical and legal experts on ABS. As a consultant to the ABS Capacity Development Initiative, he is also currently the lead author on a team developing the publication African Union Guidelines for a Coordinated Implementation of the Nagoya Protocol in Africa.

Sem Shikongo, currently Director of the Tourism and Gaming Ministry of Environment and Tourism, holds postgraduate degrees in Psychology and Environmental Biology. A leading figure in international environmental negotiations and a lecturer at the University of Namibia, Mr Shikongo has chaired and led negotiations in several United Nations Conferences, and served on the Bureaus of the United Nations Convention on Biological Diversity and the United Nations Convention to Combat Desertification. As Chief Negotiator for Africa at the Nagoya Protocol on Access to Genetic Resources, Mr Shikongo led the African Group to become a powerful force in the adoption of the Nagoya Protocol. He authored components of Namibia's Biodiversity Strategy and Action Plan 2001–2010, guided work on Access and Benefit Sharing (ABS) in Namibia and is a founder of Namibia's Interim Bioprospecting Committee (IBPC) mandated with the coordination and implementation of all activities related to ABS in Namibia.