

## **Traditional Knowledge of Medicinal and Food Plant Uses for Sustainable Community Livelihoods: A Case of Batswana Communities in South Africa**

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**ABSTRACT** This paper uses the case of the Batswana people to demonstrate the use of indigenous knowledge (IK) on plant species for medicine and food. The study showed that traditionally the Batswana have a rich indigenous knowledge about the plant species diversity of their environment including community uses of the plant species. The sustainable utilization of these indigenous natural resources was governed by certain socio-cultural protocols, which included the veneration of ancestors. The study recommends further research including validation of the already documented IK of the biodiversity, identification of the actual location of the documented indigenous plant species in order to develop conservation mechanisms, promotion of this knowledge by incorporating it into the school curriculum so that it is not lost, and development of mechanisms to protect this knowledge and plant species from exploitation by outsiders.

### **INTRODUCTION**

Kokwaro (1994) states that since time immemorial, plants have been indispensable sources of both preventive and curative traditional medicine preparations for human beings and livestock. Some of the plants have been used for both food and medicine. Historical accounts of traditionally used medicinal plants depict that different medicinal plants were in use as early as 5000 to 4000 BC in China, and 1600 BC by Syrians, Babylonians, Hebrews and Egyptians. Most of the indigenous knowledge, from these earliest times, is also linked with the use of traditional medicine in different countries (Aman 2000; Adams 2000).

Saray (2001) and Davis (1998) indicate that the knowledge of and uses of specific plants, insects and animals for public healthcare in African communities is an important component of African indigenous knowledge systems and culture. Africa has a wealth of biological diversity from which to collect efficacious plants, animals and insects for food and nutritional security. African lowlands, highlands, inland lakes and variable climatic conditions produce a multitude of biotopes. Indigenous knowledge plays a crucial role in the public healthcare of African local communities in the absence of adequate government healthcare services.

The World Health Organization (WHO) (2002) defines public healthcare as an aspect of health services concerned with threats to the overall health of a community. It includes surveillance and control of infectious diseases and promotion of health behaviors among members of the community. Public healthcare promotes not only the absence of disease but also mental, physical, and emotional wellbeing of the community.

The term Indigenous Knowledge Systems (IKS) refers to a distinctive body of knowledge, innovations and practices that have been developed over many generations outside the formal educational system, and that enable communities in their specific natural and cultural environments to survive (Mascarenhas 2004). Furthermore, the World Bank (2004) elaborates that IKS is a systematic body of knowledge acquired by local people through the accumulation of experience, informal experiments and intimate understanding of their natural and cultural environment. In this discussion, IKS refers to the knowledge and practices associated with properties of natural materials especially plant species for medicine, food and nutrition.

According to Lama and Ghimire (1996), traditional medicine refers to any ancient, cultural-based healthcare practice different from scientific medicine that is commonly regarded as

indigenous, unorthodox, alternative or folk and largely orally transmitted practice used by communities with different cultures. The World Health Organization (WHO) (2010) also defines traditional medicine as health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises applied to treat, diagnose and prevent illnesses or maintain well-being.

Traditional medicine encompasses a great variety of methods of diagnosis and treatment, including physical, mental and spiritual therapies (United Nations Educational, Scientific and Cultural Organization (UNESCO) 1997). The application of such knowledge, practices and methods is largely influenced by the culture and belief systems dominant in a particular local community to the extent that they may be ineffective when applied in a different socio-cultural context.

Lamabert et al. (1997) add that besides their use in fighting various ailments at the local level, different medicinal plants are used as export commodities, which generate considerable income. These plants are normally traded in dried or freshly preserved form as whole plants and their global markets are found in China, India, Germany, France, Italy, Japan, England and USA. Currently, large numbers of medicinal plants have found their way as raw materials of the modern bio-pharmaceutical industry.

#### **African Traditional Medicinal and Food Plant Uses: A Regional Context**

Shangamu (2003) and Anand (2005) show that the Maasai people of East Africa (Tanzania and Kenya) have for centuries, due to isolation and limited accessibility to modern medical care systems, depended on herbal medicine. They have accumulated knowledge of herbs that can be used as remedies for many conditions. The Maasai use herbs, bark and roots, which are prepared in different ways, for example, boiled as soup that is drunk in order to improve the condition of the stomach and the blood. They use drugs derived from trees and shrubs for curing ailments such as gonorrhoea, stomach infections, throat problems, pregnancy disorders, tooth problems, eye infections, children's diseases, colds, swollen legs and painful joints. For example, the herb *olkiloriti* in the Maasai language

(*Acacia nilotica*) is taken as a digestive, excitant used to prevent hunger and even thirst. Maasai accounts show that warriors before going on raids took *olkiloriti*. It was also reputed to prevent fatigue and fear.

This rich indigenous knowledge was passed from one generation to another. It was the duty of every Maasai child to learn about the medicinal value of herbs as he or she grew up. Teenage boys were taught about all the grasses on the range. Traditionally, boys were assigned the task of looking after small stock (goats and sheep) around the homesteads. In the process, they also picked up the knowledge of herbal medicines used in the home. Girls received their knowledge of herbal medicines from their mothers and grandmothers, with whom they spent a lot of time (Saifa 2004).

Van Wyk et al. (1997) express the concern that despite the enormous richness in indigenous plant species in South Africa, relatively few of these indigenous natural resources are economically utilized by local communities for poverty alleviation and income generation. Indigenous medicinal plants are used by more than sixty percent of South Africans in their health-care, nutritional needs or cultural practices. Approximately 3,000 species are used by an estimated 200,000 indigenous traditional healers. However, due to urbanization, a large informal trade business has been established with medicinal plants. Unfortunately, utilization of the plants has depleted the wild populations, resulting in many plant species being considered vulnerable, and being lost from their natural habitat. Raw materials of medicinal plants can be delivered in sustainable quantities (Venter and Van Den Heever 1998; Dash 2004).

Sakar and Margules (2002) and De Klerk (2004) indicate that in South Africa, African local communities have a long history of using traditional medicinal plants for combating various ailments. Plant remedies are still the most important and sometimes the only source of therapeutics for nearly eighty percent of the population in African communities. The current loss of medicinal plants in the country is due to natural and anthropogenic factors mixed with the miss use of valuable indigenous knowledge associated with the plants. This strong link suggests a need to conduct ethno-botanical research and to document the medicinal plants and the associated indigenous knowledge. Such

studies are useful in identifying threatened plants and to take appropriate conservation measures (Low and Rebelo 1996).

This paper concentrates on the Batswana indigenous knowledge on plant species for medicine, food and nutrition. The researchers are based at the North West University in the North West province of South Africa. The Batswana are the predominant African indigenous ethnic group in the North West province in South Africa. They are composed of various ethnic groupings, some of them are found in both South Africa and Botswana. Some of the Batswana ethnic groupings found in the North West province and their locations in brackets, are Barolong (Mafikeng), Bafokeng (Phokeng), Bakgatla (Moruleng), Batlhaping (Taung), Bahurutshe/Batshweneng (Lehurutse), Batlokwa (Tlokwen) and Baphiri (Mabalstaad) (Nuri 2002).

In recent years, there has been an increasing interest with regard to Batswana indigenous knowledge on medicinal and food plant species for both community sustainability and commercial purposes. This interest has also brought about debates regarding intellectual property rights (IPR) and community resource protection and rights. This situation is rampant where more than one community may hold the same medical knowledge, which raises the issue of geographical or historical locality and priority. For example, the use of certain plant derivatives, which is a common denominator in most herbal preparations in African indigenous communities, present challenges with regard to ownership. Thus the multiplicity of forms of possession of traditional medicines makes it particularly hard to apply existing IPRs or to develop *sui generis* regimes (World Bank 2004).

Mander et al. (1995) show that the Batswana have been in contact with their rich plant and animal biodiversity for a very long period and have over time used their IK on this biodiversity for sustainable community livelihood in terms of food, medicine, shelter and fuel. This knowledge system has been transferred from generation to generation for millennia. Biodiversity describes the variety of life in an area, including the number of different species, the genetic wealth within each species, the interrelationships between them, and the natural areas where they occur (Takacs 1996).

Nuri (2002) argues that despite this enormous richness in indigenous biologically diverse spe-

cies, especially plant species in the North West province, relatively few of these indigenous natural resources are currently economically utilized. Weisheit (2003), Reinhert and Coetzee (2002) and Venter and Van Den Heever (1998) indicate that only a few of the plant species are used as edible food material. The leaves and roots of edible plants have a high nutritional value and can play an important role in the prevention of malnutrition in rural areas. Deliwe (1998) emphasizes that the utilization of South African indigenous flora can only be successfully explored if the existing indigenous knowledge of the inhabitants is documented and made available to research and development (R and D). The aspects included in the paper are the socio-cultural protocols associated with Batswana indigenous use of medicinal, and food plants, and examples of Batswana medicinal and food plant uses.

## METHODOLOGY

This study concentrates on the Batswana indigenous knowledge of plants species for medicine and food uses in the North West province, South Africa. Taking into consideration the community-based nature of IKS the study followed participatory and multidisciplinary approaches.

Park (2006) defines participatory research as a research activity wherein ordinary people address common needs arising in their daily lives and generate knowledge in the process. Participatory research differs from basic and applied social science research in terms of people's involvement in the research process, integration of action with research and the practice-based nature of the knowledge that is entailed. It sets itself apart even from other forms of action-oriented research because of the central role that the community practitioners play. Participatory action-minded researchers with technical background often get involved in this process but mainly as facilitators.

Using this approach, the Batswana community knowledge holders and IKS Practitioners such as traditional healers, farmers, traditional midwives, community elders and leaders, in the study communities were actively involved in the whole research process. Their views were sought in all stages of the research including selection of study cases and interpretation of the data col-

lected. The study was conducted among the following Batswana tribal grouping in the North West province, South Africa that is, Barolong, Baphalane, Baphiri, Bakgatla, Batlhaping, Bakubung, Batlokwa, Bahurutshe, and Batlhako.

In order to have a comprehensive understanding of the research problem and taking into account the holistic nature of IKS and traditional medicine, researchers from both the natural (biology, natural resource management) and social sciences (sociology, social work) were involved in the research process.

In consultation with community leaders, elders and other key persons in the district municipalities, a purposive sample of 200 respondents (150 women and 50 men) participated in the study. Cohen and Manion (1999) define a purposive sample as a sample selected in a deliberative and non-random fashion to achieve a certain goal. In a focus group, for example, you may want to consciously seek out respondents at both ends of a spectrum (as well as some in the middle) to insure that all viewpoints are adequately represented. You might also preferentially recruit subjects who have the best knowledge and experience in an area.

In this study, women were given a high representation in the sample because according to the community leaders, they were the main knowledge holders of the major activities of community life such as agriculture, healthcare, food security and natural resource management. They had a very wide indigenous knowledge of medicinal and food plants.

In order to have the maximum participation of the community members in the research process, the study was conducted in the local knowledge of Setswana. Qualitative research methods such as key informant interviews, focus group discussions and participant observations formed the core of the data collection methods. These qualitative field methods were used to gather in-depth information on the study population's cultural attitudes and opinions related to the various aspects of the research problem. Key informants such as traditional healers, farmers, traditional midwives, heads of households (male and female) and community elders (male and female), were interviewed at all levels of the research process as a means to gain in-depth qualitative information (Cohen and Manion 1999).

The qualitative approach is a traditional method of the social scientists for extracting cultural knowledge through well-placed individuals in the society. It is part of the social science approach, often being used in situations where access to official records or data is weak or non-existent. Where official records exist, it is used as a means to gain further insight by questioning key people about their mode of life or specific social problems. Key informant interviews consisted of asking questions that are mainly semi-structured or open, allowing detailed, full answers from respondents. This approach contrasts with quantitative questionnaires, which allow only controlled and structured responses within narrow parameters. Focus group discussions were also conducted with randomly selected groups of 6-10 community members in the study areas.

A focus group discussion is a semi-structured interview in which the discussant knows in advance the topics to be covered. The people included were known to have been involved in a particular experience related to the research problem. Focus groups discussions are different from other types of group interviews in that they focus on a particular topic and they rely on group dynamics in order to generate data. The interaction is mainly between group members themselves and not between the members of the group and the interviewer. Group interaction is used in this type of research to generate data and as a source of data analysis. The assumption is that there is an interaction that is productive in widening the range of responses, in activating forgotten details of cultural experience/knowledge and in releasing inhibitions that are part and parcel of interviews with individuals (Vestra 2003).

Qualitative data in the form of audio taped interviews were transcribed and translated from Setswana into English. Interview and participant observation notes were typed and a content analysis conducted. Cohen and Manion (1999) explain that in content analysis researchers/evaluators classify key ideas in a written communication, such as a report, paper or film. Vestra (2003) defines quantitative data as information based on numbers or statistics that describes programs, activities and populations. The data comes from closed-ended questions, random samples, and counting. In this research study quantitative data from the questionnaires was

checked, coded and analyzed using SPSS/PC+. The following sections present and discuss the research findings.

## RESULTS AND DISCUSSION

### Batswana Indigenous Knowledge on Medicinal, Food and Plant Species and Community Uses

Using primary sources (community knowledge holders and IKS practitioners through face-to-face interviews and focus group discussions) from field study and examination of secondary sources (Mander et al. 1995; Van Wyk 1997; Reinherth and Coetzee 2002; Joffe 2005), the following examples provide Batswana's indigenous knowledge on medicinal and food plant species and their community uses:

*Aloe greatheadii* (Spotted aloe) *Kgopane*: The leaves were used to treat wounds, sores and burns, and roots treated soil binder in disturbed areas, for example, mine dumps.

*Cleome gynandra* – *L* (African Spider Flower) *Lerotho*, *Rothwe*: The roots were used to treat fevers, the root juice relieved scorpion stings, the leaves were used as a vesicant and rubefacient in the treatment of rheumatism and leaf juice was a remedy for ear pain, and the seeds were anthelmintic and rubefacient.

*Vangueria infausta* (Wild medlar) *Mmilo*, *mothwanyê*: The fruits are edible and fermented to beer. Medicinally, the roots and leaves were used as treatment for ringworms, pneumonia, or as a purgative. An infusion of the leaves is used for the relief of toothache.

*Celtis africana* (White Stinkwood) *Modutu*: The fruits are edible, the leaves and roots are edible and believed to increase sexual desire. The plant was also used to increase the fertility of livestock.

*Euclea crispa* subsp. *Crispa* (Blue Guarri) *Mohlakolo*: The bark and leaves were used to treat diabetes and prevent rheumatism, and the root infusion was taken orally against epilepsy. The leaves bark and roots were used to treat chronic wounds and stomachache. The roots are boiled and administered to children orally to relieve constipation.

*Ziziphus mucronata* (Buffalo-thorn) *Mokgalo*: People eat the ripe fruits fresh or dried, grind them to a meal and cooked as a kind of porridge. During the Anglo-Boer War, roasted

seeds were used as a coffee substitute by soldiers. Young leaves and shoots can be added to salads or cooked as spinach. Potent liquor is brewed from the fruits. Traditional remedies from leaves, bark and roots are made to treat dysentery, chest complaints and lumbago.

*Pterocarpus angolensis* (Blood wood, paddle-wood) *Mokwa*, *Morotômedi*: The bark and roots are made into remedies for treatment of ringworms, eye problems, and stomach problems and is known to increase the supply of breast milk. Women mix the red sap from the tree with animal fat to produce cosmetics for their faces and bodies.

*Croton gratissimus* var. *gratissimus* (Lavender Fever Berry/Lavender Croton) *Mologa*: *Mologa* is important for both animals and human lives. Remedies are prepared from various parts of the tree (leaves, roots and bark) and used traditionally as therapeutic agents. The leaves are crushed and applied to body sores, the liquid from crushed leaves is drunk to treat cold, influenza and even administered orally as a cure for fever, the leaves can also be dried, ground to fine papers and served as a very delicious tea. It is also believed that the leaves when mixed with water for bathing protect an individual against misfortunes. Livestock owners boil *mologa* and give it to their livestock to increase productivity, that is, produce more livestock.

*Euphorbia ingens* (Naboom) *Monkgopo*: The leaves or roots are prepared into a remedy used to treat warts and chronic ulcers. It is also used to treat blood related diseases, and the water from boiled leaves, bark or roots is used to clean decayed teeth.

*Acacia karroo* Hayne (Sweet thorn) *Mooka*: The sweet gum from the bark is eaten by both humans and animals, and it is also used for making confectionary. The Sweet Thorn is used medicinally to produce a range of remedies to cure eye illnesses, wounds and cold. The leaves and roots are eaten to relieve stomach pains. When the leaves or roots are boiled, the water is gurgled to treat throat infections. The leaves are fed to cattle as a treatment for tulip poisoning, an infection that results from the consumption of bulbous plants that belong to the genus *Home-ria*. In arid areas, the plant is used as an indicator of the availability of water. The flowers produce a lot of nectar and pollen for bee farming.

*Dichrostachys cinerea* subsp. *africana* (Kalahari Christmas) *Mosêlêselê*: The plant is a source

of nutrition (protein and minerals). The bark can be ground to produce very fine papers that are given to animals as a mineral supplement. Locally, the plant is used therapeutically in many different ways. The bark is boiled and drunk as a remedy for treating dysentery, elephantiasis, snakebite, leprosy, syphilis, gonorrhoea, and anthelmintic infections. Additionally, the resultant liquid from the bark when boiled can be used as a purgative, laxative, diuretic and used to wash the mouth to relieve toothache.

*Peltophorum africanum* (Weeping Wattle) *Mosetlha*: The roots are soaked in cold water and the liquid is used to wash wounds. The water can also be used to wash teeth to relieve toothache, gurgled to cure sore throat. The leaves and bark are soaked in water and drunk to eliminate intestinal parasites. They are also used as a laxative against stomach related illness. The stem and roots are soaked in water and the liquid drunk to relieve diarrhoea and dysentery.

*Pappea capensis* (Jacket-plum) *Mothata*: Batswana women use the fruits to make jam, jelly, alcoholic beverages and vinegar. Edible oil is extracted from the seeds and used to lubricate guns, make soap to treat baldness and ringworms. The leaves are used to cleanse blood especially for women who had miscarriages. The roots or leaves when eaten increase libido.

*Olea europaea subsp. africana* (Wild Olive) *Mothware*: Roots are used as purgative. The leaves treat cough and colds. The plant has large amounts of pollen and nectar making it popular with bee farmers. A brand of tea is made from the leaves. Ink is made from the fruit juice. Remedies are made as eye lotions and tonics to lower blood pressure, improve kidney functions, and treat diarrhoea and sore throats.

*Dovyalis caffra* (Kei Apple) *Mothono*: The fruits are tasty (slightly acidic), rich in Vitamin C, and can be eaten fresh or made into jam or jelly. Young fruits are made into pickles. The fruit juice is mixed with porridge to make a kind of traditional pudding.

*Grewia occidentalis* (Crossberry) *Motsotsojane*: The sweet fruits are edible. They are often picked and stored for later use. When fruits are boiled in milk, they taste like milkshake. The fruits are made into juice, which is drunk either fresh or fermented. Bruised bark soaked in hot water is used to dress wounds. Roots or bark is used to treat bladder problems. A shampoo prepared from the crushed bark is used to prevent hair from getting grey.

### The Socio-cultural Protocols Associated with Batswana Indigenous Use of Medicinal and Food Plant Species

The respondent knowledge holders and IKS practitioners were asked to stipulate any socio-cultural protocols associated with the use of indigenous plant species in the community. The information provided is as follows. The Batswana like other African tribal groups within and outside South Africa have various socio-cultural protocols including rituals associated with the use of plant material for medicinal and food purposes. The custodians of these knowledge systems and associated socio-cultural protocols were the traditional healers and community elders (both men and women). For instance, interviews with these community knowledge holders indicated that based on certain cultural belief systems there were socio-cultural protocols including taboos, which governed individual and community harvesting of certain plant species. These include the following. Plants such as 'mmilo', 'moopyane', 'moretologa', and 'leswama' could not be cut for firewood because this could bring bad luck to the community, cause thunderstorms and cows could bear male calves only. In the case of 'moselesele' plant, the smoke from the firewood could affect babies mentally. 'Mosetlha' and 'motswere' plants could not be harvested in summer because it could cause thunderstorms, heavy rains and floods with hail. 'Lekgorokgoro', 'mogaba', 'mogonono', 'Tshuka Ya Poo', and 'seswagadi' could not be harvested by women who had undergone abortion because their wound would not heal properly. 'Ditantanyana' could not be drunk by elders because it was only suitable for young children and babies to strengthen their bones.

The observation of socio-cultural protocols contributed greatly to the sustainable community use, conservation and protection of these plant species. According to the community knowledge holders, the whole indigenous process of using community biodiversity materials (both flora and fauna) could not be separated from the veneration of the ancestral spirits. These were believed to give effectiveness to the medicine and food plant taken. The veneration was also inspired by affection due to the bond, which existed between the departed and the living. This was especially the case when the living have known the dead and had relations of affection

with them while they were still alive. Van Pelt (1982) states that fear was also a motive for veneration.

Ranger and Kimambo (1972) elaborate that protection may be found in the observation of specific taboos associated with the specific plant material. Moreover, the precautions considered necessary when dealing with the custodians of these socio-cultural protocols such as traditional healers or priests comes from the fear that is based on the specific mode of being of these persons. They are considered to be powerhouses of forces, which may be helpful, but also belong to a different order of being, at least when they are performing their proper functions.

### CONCLUSION

The paper showed that the Batswana in the North West province had a rich and wide indigenous knowledge of their plant species diversity for medicine and food. The use of this knowledge and associated plant materials was governed by certain socio-cultural protocols. The observation of these socio-cultural protocols contributed greatly to the sustainable community use, conservation and protection of these plant species. In recent years, however, there has been an increasing interest and awareness in African indigenous knowledge with regard to the use of these medicinal and food plants for both sustainable community livelihood and commercial purposes.

### RECOMMENDATIONS

The paper recommends further research and development including validation of the documented IKS on medicinal and food plant materials in the study communities, promotion and protection of this rich knowledge through documentation and incorporation into the school curriculum, and more research to be done in order to identify the actual location of these indigenous plant species among the various Batswana communities. This will assist in developing mechanisms for protecting and conserving them for sustainable uses.

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